TIP No. 010-0523

# A Standardized Approach to Department of Defense Medical Surveillance of Injuries: Initial Objectives of the Military Injuries Working Group, 2019-2022

The Defense Safety and Oversight Council (DSOC) Military Injuries Working Group (MIWG) was formed in 2019, some of the objectives of which were to establish a unified Department of Defense (DoD) injury definition, create standardized medical injury surveillance reporting tools, and explore Service-level injuries to recommend DoD solutions to improve injury reporting. This document reflects initial efforts of the MIWG, accomplished between calendar years (CY) 2019 through 2022, while under the chairmanship of U.S. Army Public Health Center (APHC) (now known as the Defense Centers for Public Health-Aberdeen (DCPH-A)) public health scientists.

This technical information paper documents the injury definition, standardized medical injury surveillance reporting format, and medical cause-coding guidance recommended by the DSOC MIWG. The injury definition includes specified International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) injury diagnosis codes, and the standardized reporting format is demonstrated with CY 2018 Active-Duty (AD) Service member (SM) electronic health record (EHR) data. This report also describes the comparison between medical injury data and CY 2018 safety incident reporting data.

## 1. BACKGROUND

The MIWG is one of approximately 15 working groups and task forces under the DSOC purview supporting the DoD's Safety and Occupational Health (SOH) strategic plan. The MIWG was chartered on 18 June 2019 to specifically address military injuries. As stated in the charter, the MIWG "serves as a forum for collaboration among safety, public health, and research stakeholders to identify data-driven, benefit-focused safety and public health policies, programs, strategies, and initiatives designed to contribute to reduction of military injuries."

The MIWG is comprised of subject matter experts (SMEs) representing safety, public health, and research for each Service (Army, Air Force, Navy, Marines) and the Department of Defense. In addition, the charter calls for representatives from the Office of the Under Secretary of Defense (OUSD) for Personnel and Readiness (P&R) and of Acquisition and Sustainment (A&S), as well as identified members of the APHC (hereafter referred to as DCPH-A) to chair the MIWG.

MIWG meetings are held quarterly. All MIWG documents provided to members are saved on a dedicated DENIX site (https://authoring.denix.osd.mil/miwg/ (CAC card required)), including briefings, handouts, and reference materials. Analyses required to support MIWG objectives described in this document were conducted by DCPH-A-Injury Prevention Branch or Defense Health Agency (DHA)-Army Satellite personnel.

MIWG activities are focused on specific objectives assigned by the DSOC Integration Group, a DSOC governing body chaired by the Assistant Secretary of Defense for Readiness. To accomplish the objectives, MIWG chairpersons led members through discussions during virtual meetings in conjunction with email communications. The MIWG also establishes Subgroups (SGs) to address specific tasks. Resulting SG products are presented for MIWG

approval. The MIWG's final products are presented as recommendations to the DSOC Steering Group.

The MIWG held its first meeting in September 2019 and confirmed membership from each Service. The MIWG's findings and recommendations for its initial CY 2019 and several 2020 technical objectives, as stipulated below, are documented in this paper. Specifically, these objectives in the MIWG charter were to—

(a) *"Establish a DoD definition of "injury" and update key DoD references – most notably, update "injury" term in the Joint Pub 1-01 DoD Dictionary of Military and Associated Terms, and also consider the Department of Labor Occupational Safety and Health injury and illness definitions, as well as private sector best practices."*

(b) *"Develop standardized reporting rules and formats to ensure comparability Service: e.g., matrices to categorize International Classification of Disease (ICD-10-CM) injury diagnoses, per, body regions/anatomical sites, and nature of injury; incident rules."*

(c) *"Provide a yearend report on rates, trends and causes of injuries for each of the Services using existing medical data."*

(d) *"Review ICD-10 coding and recommend improvements to training or data entry to ensure cause-coding and limited duty are completed by the providers as well as other input such as on or off duty. Coordinate with Office for the Electronic Health Records."*

(e) *"Investigate Military Department gaps in mishap reporting and military medical injury treatment data to better understand how the systems and reporting can be improved. Recommend improvements to close the gaps effectively and efficiently. Coordinate with other WGs (i.e., the Safety Information Management (SIM) WG) and Task Forces (i.e., SOH Data Reform)."*

## 2. ACCOMPLISHED OBJECTIVES

### a. Injury Definition.

The first technical objective assigned to the MIWG was to establish consensus on an updated definition of injury, which also necessitated definitions of several injury-related terms not yet established in the Military Terms and Definitions publication (reference 1). Conceptual definitions were also operationalized by identification and categorization of ICD-10-CM diagnosis codes associated with the injury definition and subcategories of injury types.

MIWG members discussed past DoD and other national and international injury definitions (see details in **Appendix B**). It was particularly important that the injury definition comprehensively captured injuries of relevance to the medical community as stipulated by prior DoD efforts. Members recognized that a medically-based injury definition would be the broadest (most inclusive), and that not all safety, public health, or research initiatives would need to address all

injuries (i.e., certain categories or subcategories may be excluded as needed to focus only on subsets of injuries of interest).

The MIWG injury definition updates the DoD definition provided in the 2002 DoD Military Injury Metrics Work Group (WG) White Paper (reference 2 and **Appendix B**). The 2002 DoD Injury Metrics WG established a DoD case definition of injury for purposes of medical surveillance and military injury reporting metrics and included a list of associated ICD-9-CM codes. The definition and codes included *"traumatic cases identifiable as to time, place, and specific event or incident and cumulative trauma cases (e.g., stress fractures, tendonitis, carpal tunnel syndrome) that occur as a result of continued and repeated exposure to physiologic or biomechanical stresses in military injury metrics."*

The 2002 WG noted that injuries include "*nonfatal traumatic wounds or other conditions of the body caused by external force or exposure (i.e., heat or cold injury) or non-traumatic physiological harm or loss of capacity caused by continued or repeated neuro-MSK stress or strain*" and that injuries "*may occur in garrison, field, or deployed environments; on or off-duty; and may or may not result in lost work time (hospitalizations, quarters, convalescent leave) or limited duty*."

The MIWG agreed on definitions for injury and related terms in January 2020. The definitions were proposed to the DSOC (March 2020). Table 1 shows these preliminary definitions and terms.

**Table 1. DoD Injury Definition and Related Terminology, Proposed by Military Injuries Working Group**[a]

| | |
|---|---|
| **Injury** | Bodily damage caused by the instantaneous or gradual transfer of an external mechanical, thermal, chemical, electrical, radiological energy, or the restricted transfer of an essential element such as oxygen from sources including trauma, overuse, poisonings, extreme temperatures, and other environmental or man-made hazards. [See acute injury; CMT] |
| **Acute injury** | Traumatic body damage caused a single, high-intensity transfer of energy, such as a fracture, wound, sprain, strain, dislocation, concussion, burn, or acoustic trauma. |
| **Cumulative microtraumatic (CMT) injury** | Accumulated body damage caused by the repeated low-intensity transfer of energy including body impact, overuse, and or vibration, such as stress fractures, runner's knee, Achilles tendonitis, carpal tunnel syndrome, noise-induced hearing loss, and non-specific low back pain. |
| **Long-term injury related effect** | Chronic conditions attributed to a prior external energy transfer that may resolve or reoccur after many months or years or become permanent, such as post-traumatic osteoarthritis, spinal stenosis, or renal damage from heat stroke. |
| **Chronic condition** | A persistent or irreversible disease, illness, or long-term injury-related effect. |
| **Public health** | Efforts to prevent injury, illness, and disease; prolong life; and promote health at a population level through monitoring and surveillance, investigating health problems, informing and educating the population, mobilizing partnerships to solve problems, developing policies, enforcing health and safety laws, linking individuals to health services, ensuring a competent public health workforce, evaluating service effectiveness, and researching new insights and solutions. |

Note: [a] Final presentation to MIWG after adjudication, January 23, 2020.

Though the definitions have not been captured in the DoD Military Terms and Definitions publication at the date of this publication, the recommended injury definition was adapted for use in the March 2022 update of DoD Instruction (DoDI) 1308.03, *DoD Physical Fitness/Body Composition Program* (reference 3).

The following includes a portion of the MIWG injury definition adopted in the DoDI:

> "Damage caused by the transfer of an external mechanical, chemical, electrical, or radiological energy to the body. Most injuries are from mechanical energy transfer that results from either an abrupt high intensity force (acute traumatic injury) or a repetitive lower intensity force (cumulative microtraumatic injury, often referred to as an overuse injury). Most military injuries are to the MSK system and the majority of those are cumulative microtraumatic injuries attributed to physical training activities."

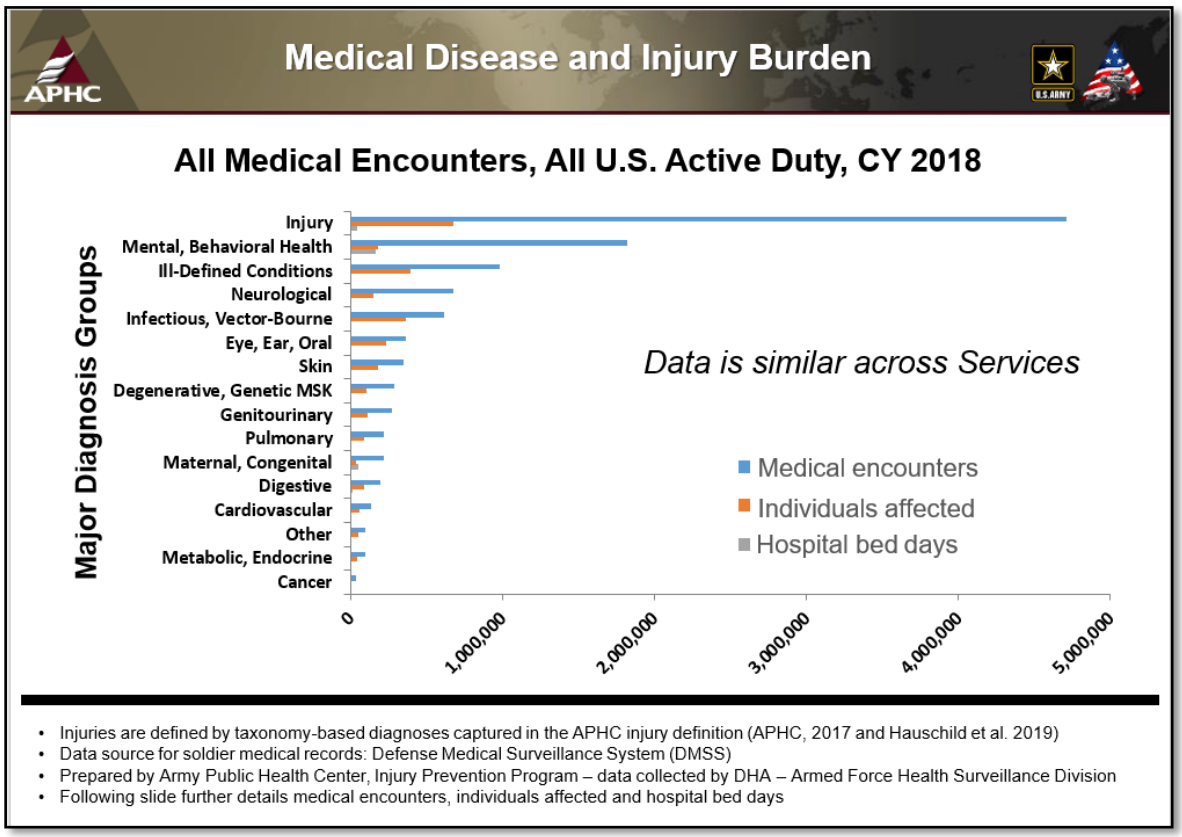
### b. Standardized injury surveillance reporting methods and format

To apply the injury definition to surveillance and reporting, the MIWG agreed to the ICD-10-CM injury diagnosis codes and categorization structure established in the DCPH-A's Taxonomy of Injuries (references 4 and 5).

The Taxonomy of Injuries captures over 13,000 specific medical diagnostic codes as incident injuries meeting the established definition of injury. Each year, the Centers for Disease Control and Prevention (CDC) publishes updates to the ICD-10-CM codes (reference 6). For transparency, the DCPH-A annually documents any associated changes to the Taxonomy of Injuries and maintains a current spreadsheet to support military injury surveillance applications. The spreadsheet also captures the non-injury categories of medical visits represented by all other ICD-10-CM codes.

The injury ICD-CM-10 diagnoses codes, taxonomic structure, and incident rule provide a standardized reporting format. Data were obtained through the Armed Forces Health Surveillance Division (AFHSD) and analyzed using a SAS® program to group results using the Fiscal Year (FY) 2020 Taxonomy of Injuries ICD-10-CM codes and methodology (reference 7).

**Figures 1 and 2** show the MIWG's resulting report of the medical surveillance data for all Services' AD SMs injuries using CY 2018 EHR. **Figure 1** depicts medical care utilization, with counts of total medical encounters, individuals affected, and hospital bed days by major diagnosis group. **Figure 2** presents the resulting all-Service AD SMs incident injuries in the Taxonomy of Injuries structure.




Notes.
1. There were 11,109,979 medical encounters of all Services' (Army, Air Force, Navy, Marines) AD SMs in CY 2018. Injuries accounted for 42.4% of all medical encounters (n=4,708,232), about 2.6 times as many as the second leading cause, mental/behavioral health (n=1,821,026; 16.4%). Injuries affected 675,293 (24.1%) AD SMs, 1.7 times more individuals than the second leading diagnosis group, ill-defined conditions (n=397613; 14.2%). Mental, behavioral health (n=164,411; 47.8%) required the most hospital bed days followed by Maternal, Congenital (n=54,151; 15.7%).

2. Data were reported using the Taxonomy of Injuries ICD-10-CM codes and methodology documented in the FY 2020 Taxonomy of Injuries update (reference 7). Changes to some codes and modified incidence rule, documented in the FY 2022 Taxonomy update that resulted from the FR2 evaluation (reference 8), did not change the recommended reporting format; there was over a 99% agreement between the FR2 body region assignments to diagnosis codes when compared to those of the standardized Taxonomy code list. Discrepancies in injury type between the two methodologies were primarily due to differing structures and ambiguity of the ICD-10-CM codes. The Taxonomy retained the structure for assigned body regions and injury types described in Addendum 2 of the original report (reference 4).

**Figure 1. Frequency of Injuries and Disease by Primary Diagnosis for All Services' Active-Duty Service Members' Medical Encounters (hospitalizations and outpatient visits), CY 2018; as Presented to the Military Injuries Working Group, 2020-21**

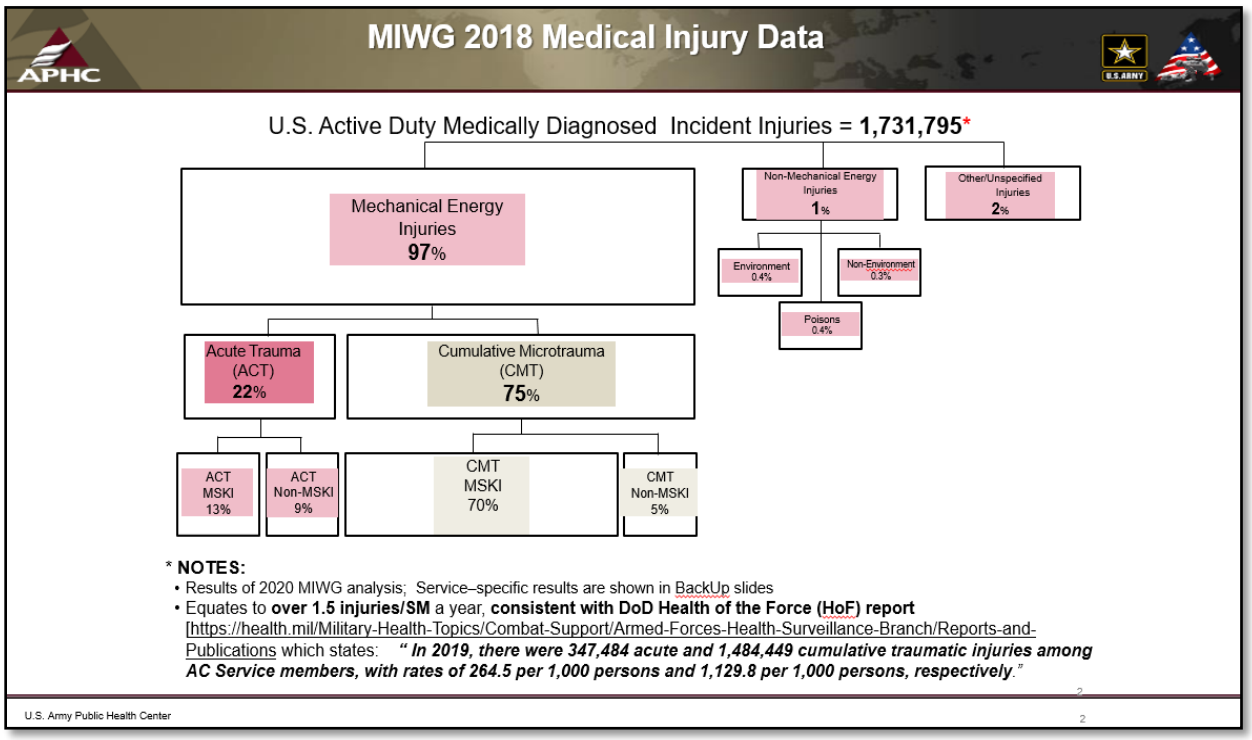



**Figure 2. Incident (initial encounter) injuries for all Services' Active-Duty Service Members, CY 2018; presented to the Military Injuries Working Group, 2020-21**

Key findings from this analysis were as follows:

- Injuries were the largest burden to the DoD's medical system in terms of number of encounters and number of affected AD SMs.
- Using the standardized Taxonomy of Injuries format, distributions of injuries by causal energy could be compared and were largely similar across Services.
    - For each Service, 97% of all injuries were caused by mechanical energy transfer, compared to 1% of injuries caused by environmental energy.
    - Only 25% of mechanical injuries were due to acute trauma. A majority (over 70%) were due to cumulative microtrauma (CMT, or overuse injuries).

Additional standardized reporting included matrices of the injury diagnoses by body regions/anatomical sites and type of injury. These matrices, for the aggregated all-Service data, are shown in **Appendix C**. This reporting format reflects the MIWG's recommended standardized reporting methods to ensure consistency of reporting and enable comparability of Service medical injury surveillance data.

While the Taxonomy of Injuries comprehensively captured diagnoses that met the MIWG's conceptual injury definition (Table 1), the OUSD (P&R) Force Safety and Occupational Health (FSOH) Office requested that the MIWG collaborate with their team that manages the DoD's

Force Risk Reduction System (FR2, https://joint.safety.army.mil/). All ICD-CM-10 codes in the Taxonomy of Injuries were reviewed by the FR2 team, and comments were provided to the MIWG (**Appendix B**, Figures B-3 and B-4). Modifications to the Taxonomy ICD-10-CM injury diagnosis code list (primarily additions) were made and captured in the DCPH-A's FY 2022 Taxonomy of Injuries Update (reference 8).

### c. Injury medical surveillance reports for each of the Services

Using the standardized injury surveillance reporting methods and format described above and shown in **Appendix C, Appendix D** provides the MIWG's final report of injuries for each of the four Service's CY 2018 data from AD SMs' EHR.

Across the Services, the largest burden to the military medical system was encounters for injuries. This equated to 42%, 44%, 50%, and 35% of all medical encounters for the U.S. Air Force, Army, Marine Corps, and Navy, respectively. This compared to more than two to four times that of the next category (mental and behavioral health conditions).

Using the Taxonomy, the types of injuries were also shown to be similar across the Services. All Services data showed 97% of injuries to be the result of mechanical energy transfers. Comparatively, injuries caused by environmental factors such as heat, cold weather extremes, or altitude were less than 1% for all Services. Also consistent among the Services, the majority of mechanical injuries were CMT injuries (75% or more) from repetitive activities. The acute trauma mechanical injuries ranged from 20 to 25%. The most commonly injured body region among each Service was the lower extremities and primarily involved damage to musculoskeletal tissues.

*NOTE: As with data in **Appendix C**, data reported in **Appendix D** are in accordance with the FY 2020 Taxonomy of Injuries update (reference 7); the changes to some codes and incident rules documented in the FY 2022 update (reference 8) do not change the recommended reporting format*.

### d. Improvements to cause-coding of injuries in medical records

Understanding the circumstances that result in injuries is a critical element of the information necessary to prioritize injury prevention efforts, not only in terms of public health initiatives but also for safety and other groups looking to prevent injuries. Provider "cause-coding" refers to the additional non-diagnostic ICD-10-CM external cause of injury codes that can be assigned, in addition to the specific medical diagnosis code. When used, external cause codes document details related to how an injury occurred. In ICD-10-CM, there are over 7,500 non-diagnostic cause codes. The following are the three types of ICD-10-CM external cause codes that can be combined for use with a single diagnosis code to provide the most complete information:

- A mechanism code (e.g., a fall from a surface, overexertion from repetitive activity)
- An activity code (e.g., running, use of free weights, play a team sport such as soccer)
- A place of occurrence code (e.g., recreational field, roadway)

The MIWG's analysis of CY 2018 AD SM medical records (**Appendices C and D**) found that less than 10% of injuries identified by medical records with an ICD-10-CM injury diagnosis also

contained ICD-10-CM external cause codes. Of the cause codes that were contained in the medical records, over a quarter were non-specific codes that provided no practical information to inform injury prevention efforts.

To recommend improvements to the quantity and quality of the cause-coding, the MIWG established a Medical Provider and Coder SG. The DCPH-A assisted this SG effort by conducting a detailed analysis of external cause codes documented in CY 2018 medical surveillance data for each of the Services. The purpose of the analysis was to identify leading cause codes and to develop a "short list" as a quick reference for medical staff to document cause codes more routinely and more specifically.

As recommended by SG members, the goal was to generate a list of common codes that could fit on no more than a single page (front and back). The analysis included ranking the leading mechanism, activity, and place of occurrence codes used by each Service. Service-level cause code data was reviewed to identify any unique codes. The analysis found that the majority of cause codes used were similar across Services, though a few codes that were primarily used by a specific Service were included on the shortlist (e.g., a "Parachuting" mechanism code (Y97.22X) from Army data, and "Activity involving watercraft" code (Y93.19) from Navy and Marine Corps data).

As its solution to assist the DoD medical community with improving the efficiency, quantity, and quality of cause-coding in medical records, the SG generated a draft "ICD-10-CM Cause-Coding Quick Reference Tool (QRT)" along with instructional guidance.

The initial draft QRT was reviewed by the MIWG and DCPH-A. A few additional codes, considered important but missing, were added. Footnotes and instructional guidance also clarified the application of the codes. This included noting that the provided QRT codes were only suggested as some of the most common mechanism, activity, and place codes for SMs, but that other more applicable codes can be used if deemed necessary.

Between 2021 and 2022, the QRT was presented and discussed with various DoD groups. As of September 2022, the DCPH-A was asked to review the QRT codes to ensure any ICD-10-CM FY 2023 updates were captured. In addition, though not external cause codes, the DHA requested the added notation of "duty status" codes, which have been useful to DHA and the military safety community.

**Appendix E** presents the September 2022 version of the ICD-10-CM Cause-Coding QRT and its instructional guidance.

### e. Comparison of injuries captured in safety reports with those in medical records

While the injury definition and associated ICD-10-CM diagnosis codes have been increasingly accepted for medical surveillance applications (reference 9), the DSOC Steering Group requested an assessment of the alignment of the Taxonomy with injury types reported in the Services' Safety data. The DSOC Steering Group requested a crosswalk of the Taxonomy categories with a list of safety terms provided by the DSOC Safety Information Management (SIM) WG.

**Figure 3** presents the crosswalk of the safety terms as aligned with the various categories and subcategories of the Taxonomy. The majority of the terms for incident safety reports aligned with a Taxonomy subcategory (and its associated array of ICD-10-CM codes). Certain illnesses and unexplained events (e.g., fainting) are not captured in the Taxonomy because such terms do not meet the definition of an injury.

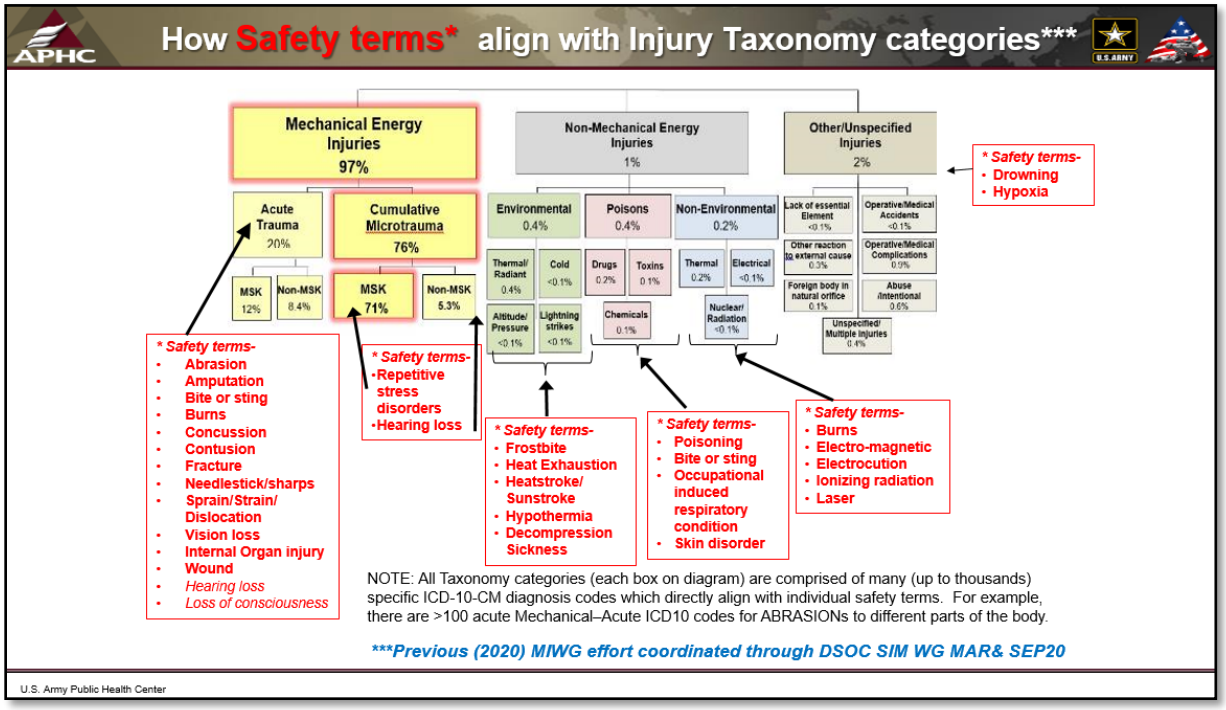



**Figure 3. Crosswalk of Safety Terms with the Taxonomy of Injuries**

The Service's Safety communities are required to report safety mishaps per DoDI 6055.07, *DoD Mishap Investigation, Report, and Classification* (reference 10). All Services classify reported mishaps (events) as occurring on or off duty and identify the severity of the event using similar severity classification systems. Though equipment damage is reflected in the classification systems, the MIWG evaluation focused only on the classification aspects that pertained to human injury.

Generally, the Safety mishap classifications addressed injuries as "Class A," fatalities or total disability; "Class B," permanent partial disability and/or more than one person hospitalized (notable lost duty time); "Class C," injury resulting in lost duty time beyond day of event; and "Classes D and E," events that required restricted or reassignment of work or involved needle stick and hearing loss reports (based on adverse shifts in audiograms results).

The Service Safety Center SMEs explained that injury causal information and duty status information collected in the safety mishap systems were more detailed than the causal data obtained through the medical surveillance data. The MIWG established a Safety SG that included safety representatives from each Service to conduct a basic comparison of AD SMs'

injuries reported in the required Service's safety systems to the injuries captured in medical treatment records (EHR).

Each Service provided its extracted mishap data (Excel® format) for CY 2018 AD SMs to the DCPH-A analytical support. There were between 2,000 and 7,000 reported mishap events for each Service.

The safety data were summarized and presented in a format similar to the Service-specific injury medical record data (**Appendix D**). Specifically, the Taxonomy of Injuries was used as the reporting framework to compare the numbers and distribution of injuries in the two systems (safety and medical).

Taxonomy categories were systematically assigned to safety incident reports through an extensive review of the free-text narratives in the safety reports to approximately crosswalk the Taxonomy categories with the injury types used in Service Safety accident descriptions (**Figure 3**).

Since no personal identification data were collected, the relationship between injuries reported in the two systems could not be determined, so the analysis only characterized the number and distribution of types of injuries in each system. **Appendix F** provides details of the analysis.

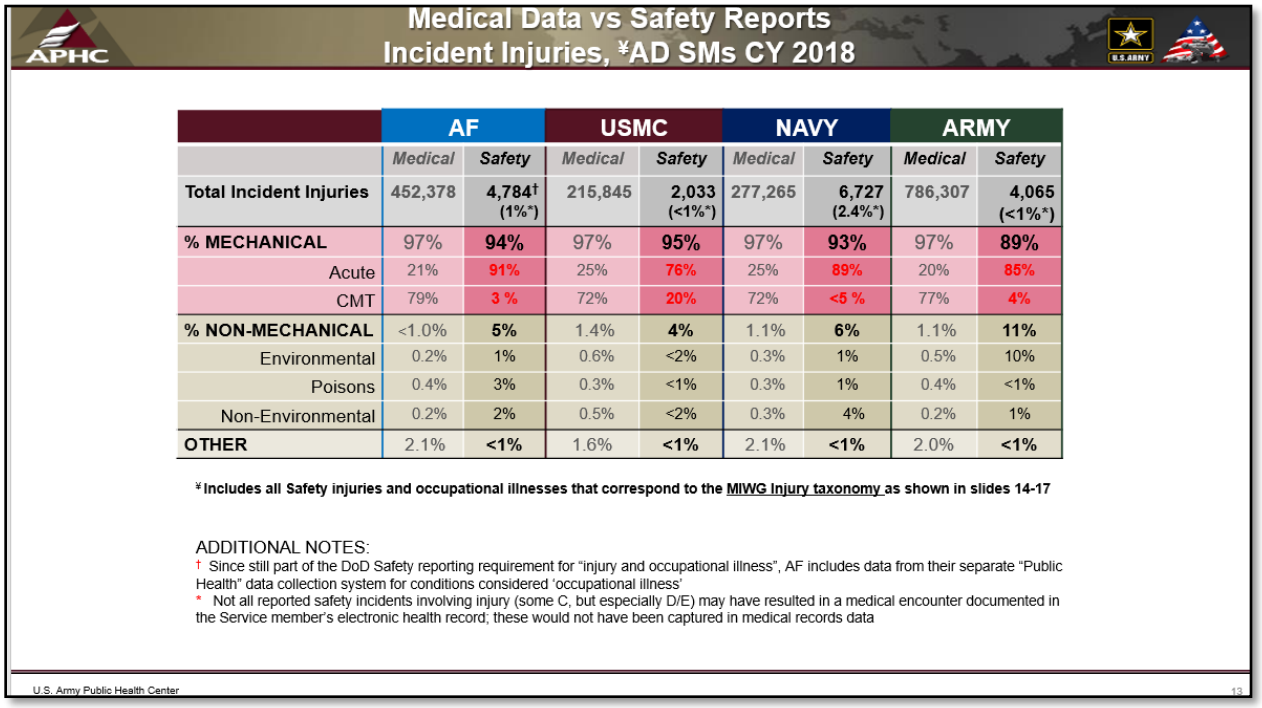
Key findings presented by the Safety SG to the MIWG were—

- A majority (80%) of the CY 2018 AD SM's Safety reports that included injuries/occupational illnesses aligned with Taxonomy categories/sub-categories.
    - Most Safety reports that did *not* meet MIWG injury definition *did not describe any adverse effect to a person or persons (e.g., referred to incidents involving damage to equipment or potential but not realized injury).*
    - A few reported events ('fainting' or 'loss of consciousness') did not have a cause (e.g., it was not clear if the incident was due to individual behaviors or conditions such as lack of nutrients, lack of sleep, existing illness, or dehydration) so these were also not captured as injuries.
- The number of reported CY 2018 Safety events was approximately 1% of the number of medically treated injuries.
    - *Similarities*: Both medical and safety data sets showed the majority (>90%) of all injuries were due to "mechanical energy transfer."
    - *Differences*:
        - The medical data indicated that the majority (>2/3) of treated SM injuries were CMT injuries.
        - The Safety indicated most reported mishaps were for acute trauma injuries.

- Most safety injury reports were for Class C and D (and Class E Navy/MC) safety incidents.
- Safety injury reports were mostly reported as On Duty (all Services).
- Army had the highest Off Duty "D," possibly because at the time of the safety reporting, the Army (by its regulation) was the only Service requiring that Class D incidents also be reported.

The final analysis (**Figure 4**) showed that the Service's safety systems only captured between 1% and 3% of the injuries reported in the medical records. Most of these were acute injuries. Differences were largely attributed to interpretations of Safety reporting requirements (such as reporting of only "on duty" injuries that resulted in lost or limited duty of 1 day or more), which likely contributed to lower capture, especially for CMT (overuse) injuries.

**Figure 5** demonstrates how the majority of injuries reported in the Services' safety systems were Class C and D and were primarily indicated as on duty events. **Figure 6** presents the Safety SG's conclusions regarding the differences between the safety and medical datasets.



Medical Data vs Safety Reports
Incident Injuries, ¥AD SMs CY 2018

| | AF | | USMC | | NAVY | | ARMY | |
|---|---|---|---|---|---|---|---|---|
| | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* |
| **Total Incident Injuries** | 452,378 | 4,784† (1%*) | 215,845 | 2,033 (<1%*) | 277,265 | 6,727 (2.4%*) | 786,307 | 4,065 (<1%*) |
| **% MECHANICAL** | 97% | **94%** | 97% | **95%** | 97% | **93%** | 97% | **89%** |
| Acute | 21% | **91%** | 25% | **76%** | 25% | **89%** | 20% | **85%** |
| CMT | 79% | **3 %** | 72% | **20%** | 72% | **<5 %** | 77% | **4%** |
| **% NON-MECHANICAL** | <1.0% | **5%** | 1.4% | **4%** | 1.1% | **6%** | 1.1% | **11%** |
| Environmental | 0.2% | 1% | 0.6% | <2% | 0.3% | 1% | 0.5% | 10% |
| Poisons | 0.4% | 3% | 0.3% | <1% | 0.3% | 1% | 0.4% | <1% |
| Non-Environmental | 0.2% | 2% | 0.5% | <2% | 0.3% | 4% | 0.2% | 1% |
| **OTHER** | 2.1% | **<1%** | 1.6% | **<1%** | 2.1% | **<1%** | 2.0% | **<1%** |

¥ Includes all Safety injuries and occupational illnesses that correspond to the MIWG Injury taxonomy as shown in slides 14-17

ADDITIONAL NOTES:
† Since still part of the DoD Safety reporting requirement for "injury and occupational illness", AF includes data from their separate "Public Health" data collection system for conditions considered 'occupational illness'
* Not all reported safety incidents involving injury (some C, but especially D/E) may have resulted in a medical encounter documented in the Service member's electronic health record; these would not have been captured in medical records data

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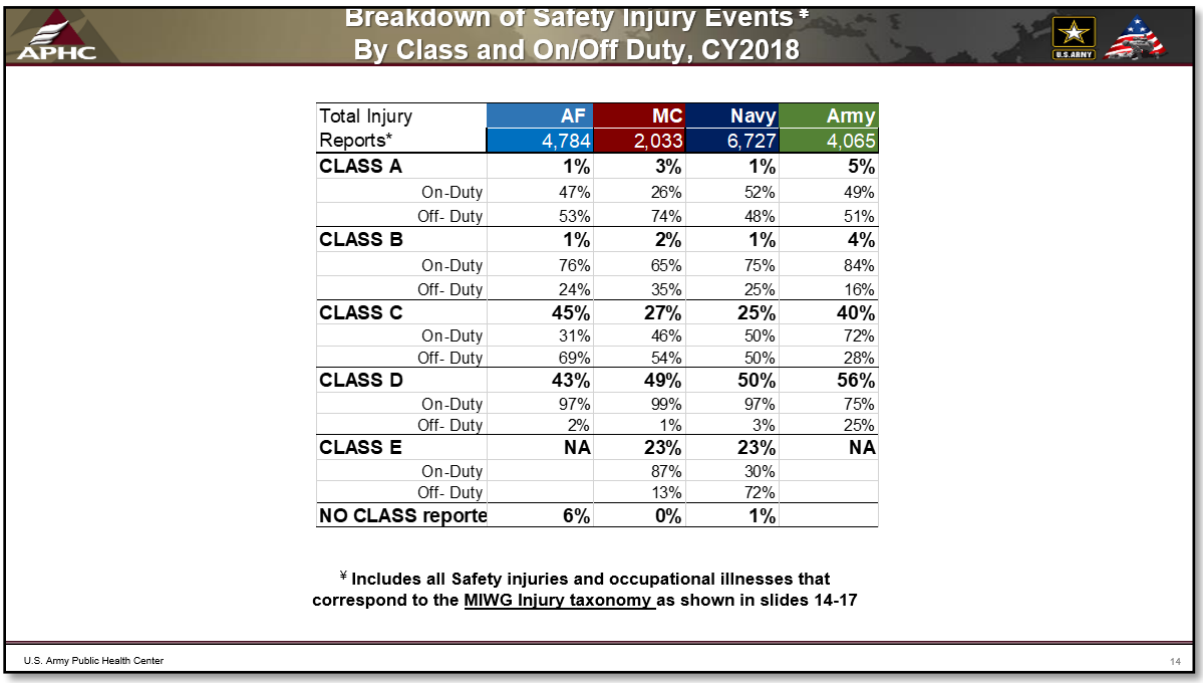
Notes: Presented to MIWG September 2021; analyses of Safety Data conducted by DCPH-A's Clinical Public Health and Epidemiology (CPHE) Directorate May-June 2021.

**Figure 4. Comparison of Active-Duty Service Members' Injures Reported in Safety Systems Versus Medically Treated Injuries, CY 2018**



Breakdown of Safety Injury Events ¥
By Class and On/Off Duty, CY2018

| Total Injury Reports* | AF 4,784 | MC 2,033 | Navy 6,727 | Army 4,065 |
|---|---|---|---|---|
| **CLASS A** | **1%** | **3%** | **1%** | **5%** |
| On-Duty | 47% | 26% | 52% | 49% |
| Off- Duty | 53% | 74% | 48% | 51% |
| **CLASS B** | **1%** | **2%** | **1%** | **4%** |
| On-Duty | 76% | 65% | 75% | 84% |
| Off- Duty | 24% | 35% | 25% | 16% |
| **CLASS C** | **45%** | **27%** | **25%** | **40%** |
| On-Duty | 31% | 46% | 50% | 72% |
| Off- Duty | 69% | 54% | 50% | 28% |
| **CLASS D** | **43%** | **49%** | **50%** | **56%** |
| On-Duty | 97% | 99% | 97% | 75% |
| Off- Duty | 2% | 1% | 3% | 25% |
| **CLASS E** | **NA** | **23%** | **23%** | **NA** |
| On-Duty | | 87% | 30% | |
| Off- Duty | | 13% | 72% | |
| **NO CLASS reporte** | **6%** | **0%** | **1%** | |

¥ Includes all Safety injuries and occupational illnesses that correspond to the MIWG Injury taxonomy as shown in slides 14-17

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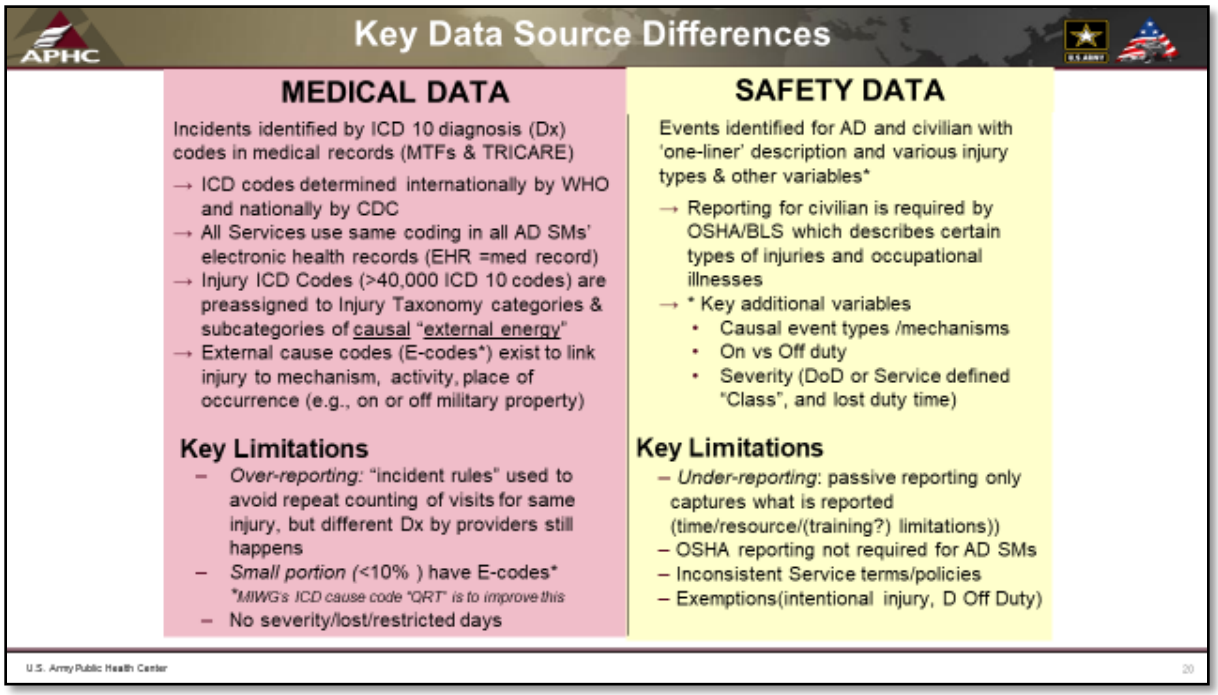
**Figure 5. Injuries Reported in Services' Safety Reporting Systems, CY 2018**



Key Data Source Differences

**MEDICAL DATA**

Incidents identified by ICD 10 diagnosis (Dx) codes in medical records (MTFs & TRICARE)

→ ICD codes determined internationally by WHO and nationally by CDC
→ All Services use same coding in all AD SMs' electronic health records (EHR =med record)
→ Injury ICD Codes (>40,000 ICD 10 codes) are preassigned to Injury Taxonomy categories & subcategories of causal "external energy"
→ External cause codes (E-codes*) exist to link injury to mechanism, activity, place of occurrence (e.g., on or off military property)

**Key Limitations**

– *Over-reporting:* "incident rules" used to avoid repeat counting of visits for same injury, but different Dx by providers still happens
– *Small portion* (<10% ) have E-codes*
*MIWG's ICD cause code "ORT" is to improve this
– No severity/lost/restricted days

**SAFETY DATA**

Events identified for AD and civilian with 'one-liner' description and various injury types & other variables*

→ Reporting for civilian is required by OSHA/BLS which describes certain types of injuries and occupational illnesses
→ * Key additional variables
• Causal event types /mechanisms
• On vs Off duty
• Severity (DoD or Service defined "Class", and lost duty time)

**Key Limitations**

– *Under-reporting*: passive reporting only captures what is reported (time/resource/(training?) limitations))
– OSHA reporting not required for AD SMs
– Inconsistent Service terms/policies
– Exemptions(intentional injury, D Off Duty)

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**Figure 6. Military Injuries Working Group-Safety Subgroup Conclusions Regarding Differences in Safety Data and Medical Data**

## 3. FUTURE MIWG EFFORTS

As demonstrated by the accomplishments described in the prior section, the MIWG has provided the foundation for standardizing the DoD's approach for the medical surveillance of injuries. According to its charter, the MIWG is also continuing to support requests from the DSOC and its WGs and Task Forces, as well as leveraging ongoing work and sharing lessons learned from Service public health and research centers to support the DoD SOH mission.

The MIWG also continues to address the following remaining objectives assigned in its charter:

- Review musculoskeletal and other injury data, establish methods to determine costs to the DoD, identify and review cost estimates from the Services, and recommend ways to ensure cost information is captured to prioritize prevention efforts.

- Use safety and medical data to assess root and mishap causes in training-related injuries, applying accepted epidemiological techniques.

Currently, the 2019-2022 MIWG recommendations for establishing a comprehensive and universal DoD injury definition and tool to enhance cause-coding in medical records are especially precedent-setting initiatives that will continue to shape future policy, procedure, and reporting. Because of the implications of these initiatives, the MIWG has engaged in follow-on efforts to support their completion. For example, in May 2022, the MIWG was tasked by DSOC leadership to develop and implement a pilot program to improve injury cause-coding in military EHR in partnership with DoD Health Affairs and the DHA. The Medical Injury Cause-Coding QRT Pilot Program is currently ongoing. In addition, the conceptual injury definition was reviewed by the MIWG in March 2023 and slight changes may be recommended. Future reports will document this work.

# APPENDIX A

## References

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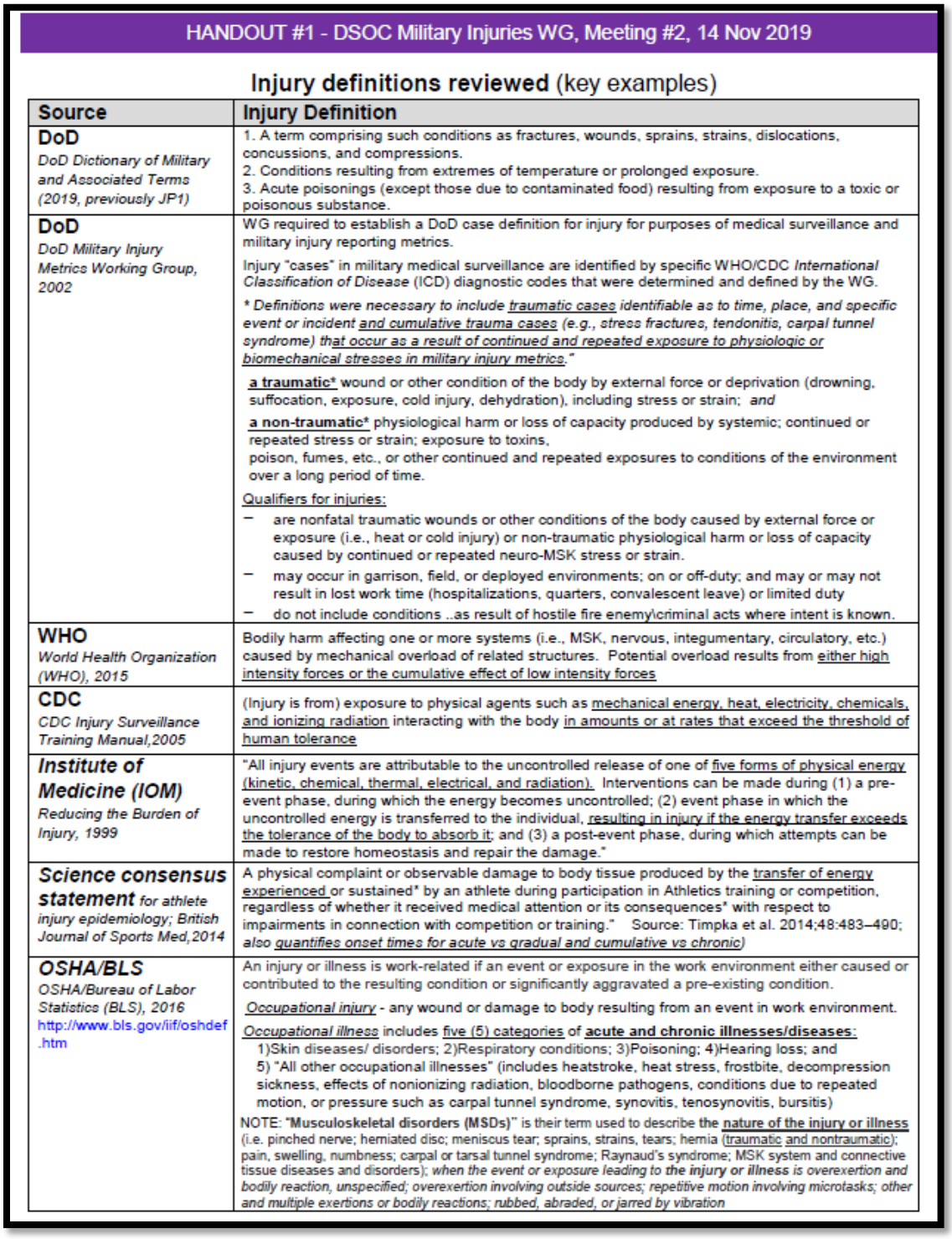
# APPENDIX B

## Materials Discussed by the MIWG
## During Development of the Injury Definition and Associated Injury Codes

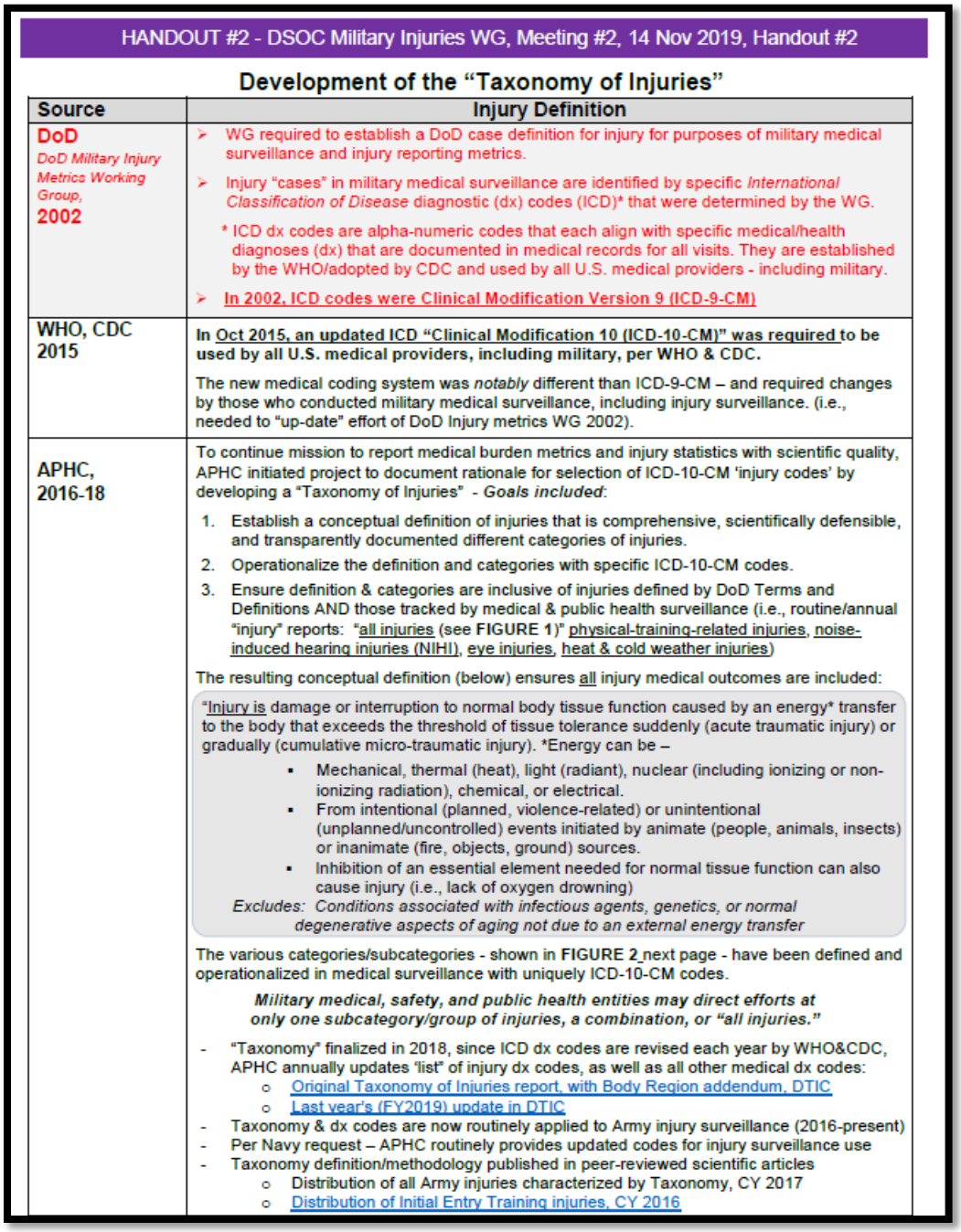


HANDOUT #1 - DSOC Military Injuries WG, Meeting #2, 14 Nov 2019

## Injury definitions reviewed (key examples)

| Source | Injury Definition |
|---|---|
| **DoD**<br>*DoD Dictionary of Military and Associated Terms (2019, previously JP1)* | 1. A term comprising such conditions as fractures, wounds, sprains, strains, dislocations, concussions, and compressions.<br>2. Conditions resulting from extremes of temperature or prolonged exposure.<br>3. Acute poisonings (except those due to contaminated food) resulting from exposure to a toxic or poisonous substance. |
| **DoD**<br>*DoD Military Injury Metrics Working Group, 2002* | WG required to establish a DoD case definition for injury for purposes of medical surveillance and military injury reporting metrics.<br>Injury "cases" in military medical surveillance are identified by specific WHO/CDC *International Classification of Disease* (ICD) diagnostic codes that were determined and defined by the WG.<br>** Definitions were necessary to include traumatic cases identifiable as to time, place, and specific event or incident and cumulative trauma cases (e.g., stress fractures, tendonitis, carpal tunnel syndrome) that occur as a result of continued and repeated exposure to physiologic or biomechanical stresses in military injury metrics."*<br>**a traumatic*** wound or other condition of the body by external force or deprivation (drowning, suffocation, exposure, cold injury, dehydration), including stress or strain; *and*<br>**a non-traumatic*** physiological harm or loss of capacity produced by systemic; continued or repeated stress or strain; exposure to toxins, poison, fumes, etc., or other continued and repeated exposures to conditions of the environment over a long period of time.<br>Qualifiers for injuries:<br>– are nonfatal traumatic wounds or other conditions of the body caused by external force or exposure (i.e., heat or cold injury) or non-traumatic physiological harm or loss of capacity caused by continued or repeated neuro-MSK stress or strain.<br>– may occur in garrison, field, or deployed environments; on or off-duty; and may or may not result in lost work time (hospitalizations, quarters, convalescent leave) or limited duty<br>– do not include conditions ..as result of hostile fire enemy\criminal acts where intent is known. |
| **WHO**<br>*World Health Organization (WHO), 2015* | Bodily harm affecting one or more systems (i.e., MSK, nervous, integumentary, circulatory, etc.) caused by mechanical overload of related structures. Potential overload results from either high intensity forces or the cumulative effect of low intensity forces |
| **CDC**<br>*CDC Injury Surveillance Training Manual,2005* | (Injury is from) exposure to physical agents such as mechanical energy, heat, electricity, chemicals, and ionizing radiation interacting with the body in amounts or at rates that exceed the threshold of human tolerance |
| ***Institute of Medicine (IOM)***<br>*Reducing the Burden of Injury, 1999* | "All injury events are attributable to the uncontrolled release of one of five forms of physical energy (kinetic, chemical, thermal, electrical, and radiation). Interventions can be made during (1) a pre-event phase, during which the energy becomes uncontrolled; (2) event phase in which the uncontrolled energy is transferred to the individual, resulting in injury if the energy transfer exceeds the tolerance of the body to absorb it; and (3) a post-event phase, during which attempts can be made to restore homeostasis and repair the damage." |
| ***Science consensus statement*** *for athlete injury epidemiology; British Journal of Sports Med,2014* | A physical complaint or observable damage to body tissue produced by the transfer of energy experienced or sustained* by an athlete during participation in Athletics training or competition, regardless of whether it received medical attention or its consequences* with respect to impairments in connection with competition or training." Source: Timpka et al. 2014;48:483–490; *also quantifies onset times for acute vs gradual and cumulative vs chronic)* |
| ***OSHA/BLS***<br>*OSHA/Bureau of Labor Statistics (BLS), 2016*<br>http://www.bls.gov/iif/oshdef.htm | An injury or illness is work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition.<br>*Occupational injury* - any wound or damage to body resulting from an event in work environment.<br>*Occupational illness* includes five (5) categories of **acute and chronic illnesses/diseases:**<br>1)Skin diseases/ disorders; 2)Respiratory conditions; 3)Poisoning; 4)Hearing loss; and<br>5) "All other occupational illnesses" (includes heatstroke, heat stress, frostbite, decompression sickness, effects of nonionizing radiation, bloodborne pathogens, conditions due to repeated motion, or pressure such as carpal tunnel syndrome, synovitis, tenosynovitis, bursitis)<br>NOTE: "**Musculoskeletal disorders (MSDs)**" is their term used to describe the nature of the injury or illness (i.e. pinched nerve; herniated disc; meniscus tear; sprains, strains, tears; hernia (traumatic and nontraumatic); pain, swelling, numbness; carpal or tarsal tunnel syndrome; Raynaud's syndrome; MSK system and connective tissue diseases and disorders); *when the event or exposure leading to the injury or illness is overexertion and bodily reaction, unspecified; overexertion involving outside sources; repetitive motion involving microtasks; other and multiple exertions or bodily reactions; rubbed, abraded, or jarred by vibration* |

**Figure B-1. Injury Definition Handout 1, Discussed by MIWG Members, November 2019**



HANDOUT #2 - DSOC Military Injuries WG, Meeting #2, 14 Nov 2019, Handout #2

## Development of the "Taxonomy of Injuries"

| Source | Injury Definition |
|---|---|
| **DoD**<br>*DoD Military Injury Metrics Working Group,*<br>**2002** | ➢ WG required to establish a DoD case definition for injury for purposes of military medical surveillance and injury reporting metrics.<br>➢ Injury "cases" in military medical surveillance are identified by specific *International Classification of Disease* diagnostic (dx) codes (ICD)* that were determined by the WG.<br>* ICD dx codes are alpha-numeric codes that each align with specific medical/health diagnoses (dx) that are documented in medical records for all visits. They are established by the WHO/adopted by CDC and used by all U.S. medical providers - including military.<br>➢ In 2002, ICD codes were Clinical Modification Version 9 (ICD-9-CM) |
| **WHO, CDC 2015** | **In Oct 2015, an updated ICD "Clinical Modification 10 (ICD-10-CM)" was required to be used by all U.S. medical providers, including military, per WHO & CDC.**<br>The new medical coding system was *notably* different than ICD-9-CM – and required changes by those who conducted military medical surveillance, including injury surveillance. (i.e., needed to "up-date" effort of DoD Injury metrics WG 2002). |
| **APHC, 2016-18** | To continue mission to report medical burden metrics and injury statistics with scientific quality, APHC initiated project to document rationale for selection of ICD-10-CM 'injury codes' by developing a "Taxonomy of Injuries" - ***Goals included***:<br>1. Establish a conceptual definition of injuries that is comprehensive, scientifically defensible, and transparently documented different categories of injuries.<br>2. Operationalize the definition and categories with specific ICD-10-CM codes.<br>3. Ensure definition & categories are inclusive of injuries defined by DoD Terms and Definitions AND those tracked by medical & public health surveillance (i.e., routine/annual "injury" reports: "all injuries (see **FIGURE 1**)" physical-training-related injuries, noise-induced hearing injuries (NIHI), eye injuries, heat & cold weather injuries)<br>The resulting conceptual definition (below) ensures all injury medical outcomes are included:<br>"Injury is damage or interruption to normal body tissue function caused by an energy* transfer to the body that exceeds the threshold of tissue tolerance suddenly (acute traumatic injury) or gradually (cumulative micro-traumatic injury). *Energy can be –<br>▪ Mechanical, thermal (heat), light (radiant), nuclear (including ionizing or non-ionizing radiation), chemical, or electrical.<br>▪ From intentional (planned, violence-related) or unintentional (unplanned/uncontrolled) events initiated by animate (people, animals, insects) or inanimate (fire, objects, ground) sources.<br>▪ Inhibition of an essential element needed for normal tissue function can also cause injury (i.e., lack of oxygen drowning)<br>*Excludes: Conditions associated with infectious agents, genetics, or normal degenerative aspects of aging not due to an external energy transfer*<br>The various categories/subcategories - shown in **FIGURE 2** next page - have been defined and operationalized in medical surveillance with uniquely ICD-10-CM codes.<br>***Military medical, safety, and public health entities may direct efforts at only one subcategory/group of injuries, a combination, or "all injuries."***<br>- "Taxonomy" finalized in 2018, since ICD dx codes are revised each year by WHO&CDC, APHC annually updates 'list" of injury dx codes, as well as all other medical dx codes:<br>o Original Taxonomy of Injuries report, with Body Region addendum, DTIC<br>o Last year's (FY2019) update in DTIC<br>- Taxonomy & dx codes are now routinely applied to Army injury surveillance (2016-present)<br>- Per Navy request – APHC routinely provides updated codes for injury surveillance use<br>- Taxonomy definition/methodology published in peer-reviewed scientific articles<br>o Distribution of all Army injuries characterized by Taxonomy, CY 2017<br>o Distribution of Initial Entry Training injuries, CY 2016 |

**Figure B-2. Injury Definition Handout 2, Discussed by MIWG Members, November 2019**

HANDOUT #2 - DSOC Military Injuries WG, Meeting #2, 14 Nov 2019, Handout #2

**Figure 1. Annual military medical surveillance report: "Burden of Injury & Disease"**
(Example, CY 2017, Active Duty Army)

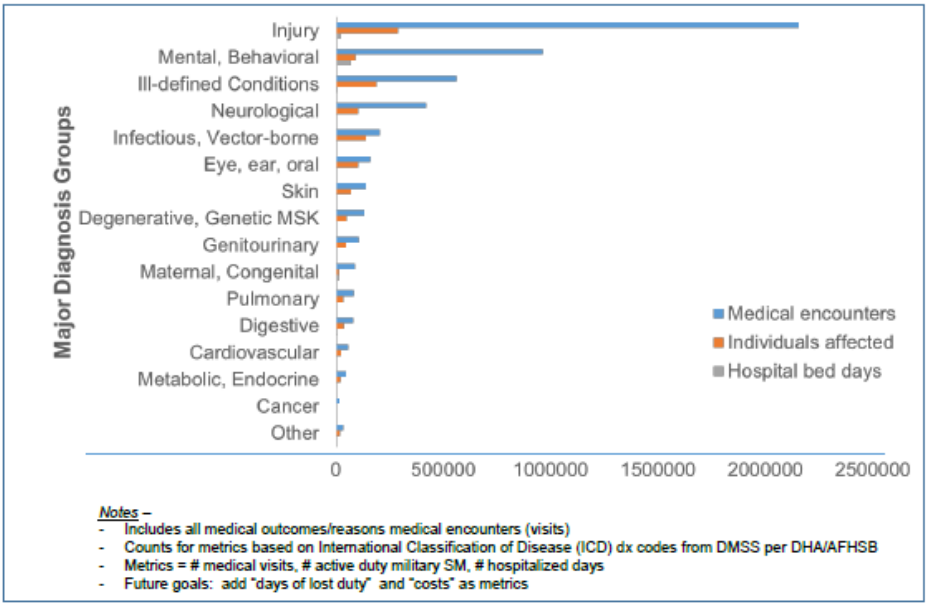



**Figure 2. Annual Army Injury data: Distribution of Army injuries by type of causal energy**
(Example, CY 2017, Active Duty Army)

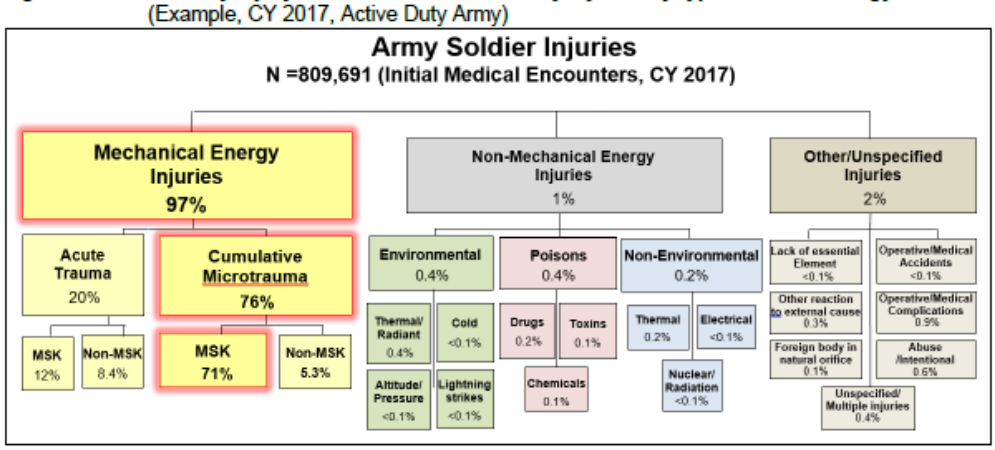
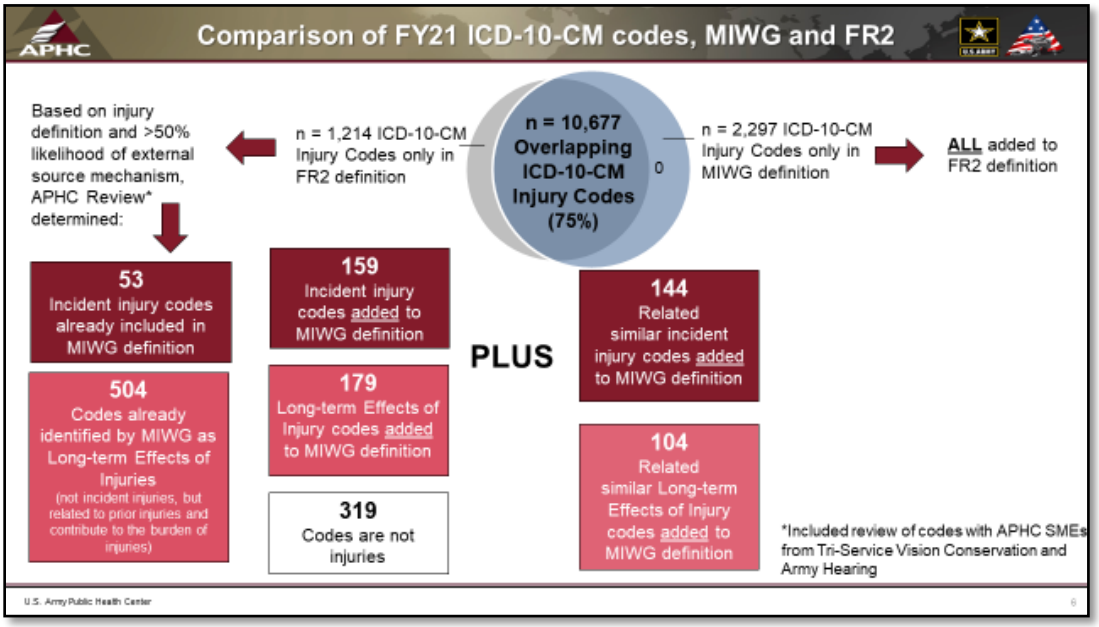
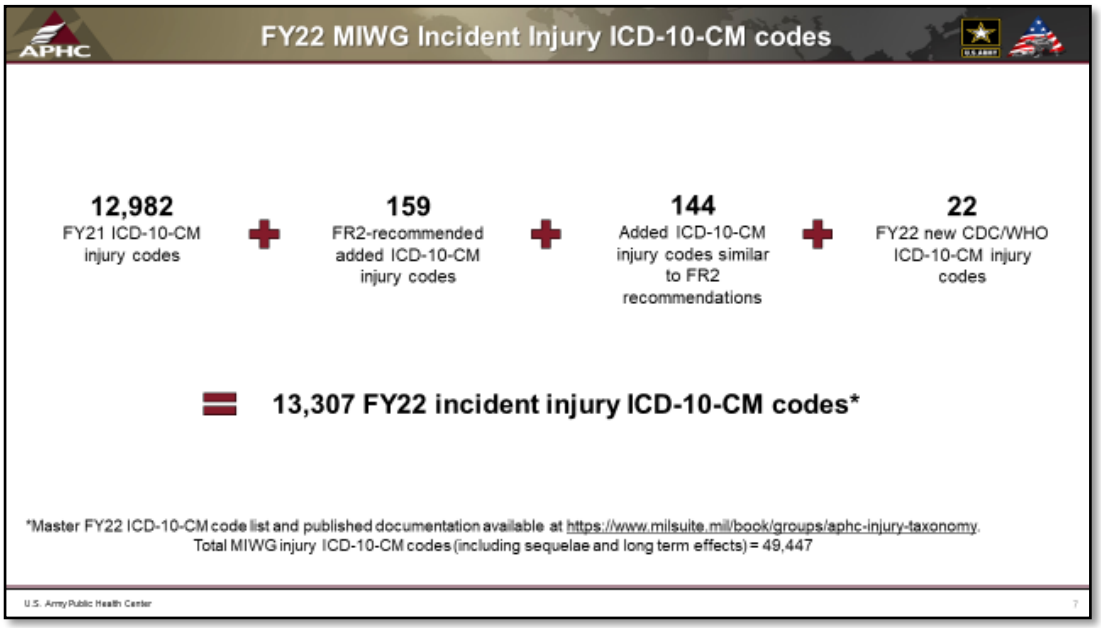



**Figure B-3. Injury Definition Handout 2 (page 2), Discussed by MIWG Members, November 2019**




Notes. Based on DSOC-directed comparison of DCPH-A Injury Taxonomy ICD codes and the codes used in the FR2, slides presented to MIWG 12/2/2021.

**Figures B-4 and B-5. Final FY 2022 ICD-10-CM Codes Used in Injury Surveillance that Align with the MIWG Injury Definition**

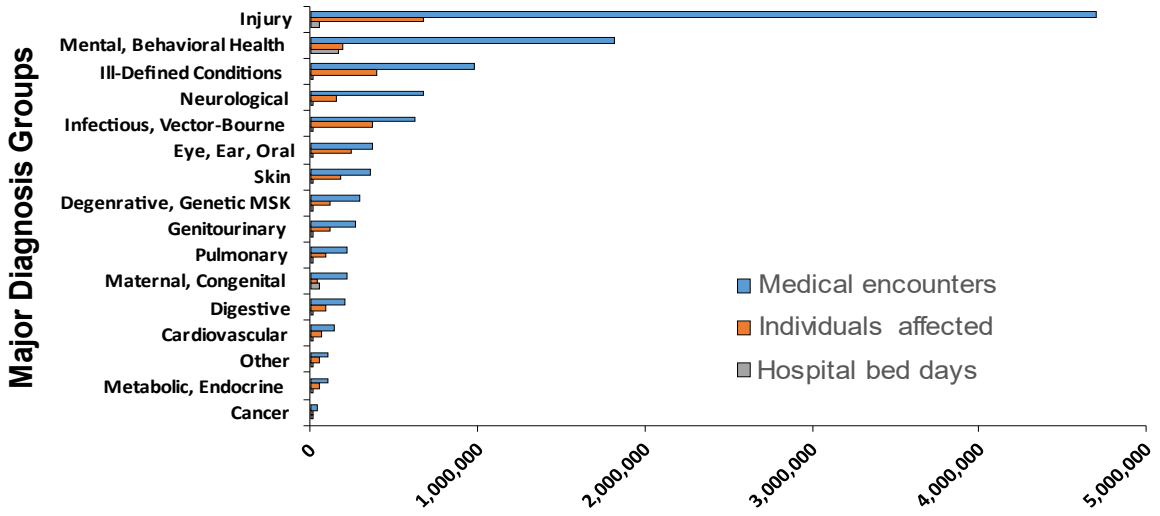
# APPENDIX C

## MIWG's Annual (Calendar Year 2018) Report of Injuries from Active-Duty Service Members' Electronic Health Records: All Services Combined

This appendix provides the results of the MIWG injury analyses of the Active-Duty Service members' CY 2018 medical encounter data for the DoD. The briefing slides in this Appendix, as last shown to the MIWG, represent the MIWG's recommended annual reporting format.

The methodology to create this report relied on the acquisition of each Service's Active-Duty medical encounters data by Armed Forces Health Surveillance Division (AFHSD). Medical diagnosis data were de-identified and presented in terms of the DCPH-A's "taxonomy of injuries and categorization of non-injury ICD-10-CM codes" (references 4 and 7).

## U.S. All Active Duty, 2018
## Relative Burden of Injuries and Diseases




**Burden of Disease and Injury -All Medical Encounters, All Active Duty, CY 2018**

- Injuries are defined by taxonomy-based diagnoses captured in the APHC injury definition (APHC, 2017 and Hauschild et al. 2019)
- Data source for soldier medical records: Defense Medical Surveillance System (DMSS)
- Prepared by Army Public Health Center, Injury Prevention Program – data collected by DHA – Armed Force Health Surveillance Division
- Following slide further details medical encounters, individuals affected and hospital bed days

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## U.S. All Active Duty, 2018
## Relative Burden of Injuries and Diseases (cont.)

| Diagnosis Groups | # Encounters | % | #People | % | #Bed Days | % |
|---|---|---|---|---|---|---|
| Injury | 4,708,232 | 42% | 675,293 | 24% | 46,299 | 13% |
| Mental, Behavioral Health | 1,821,026 | 16% | 186,099 | 7% | 164,411 | 48% |
| Ill-Defined Conditions | 983,723 | 9% | 397,613 | 14% | 9,909 | 3% |
| Neurological | 678,269 | 6% | 148,578 | 5% | 5,208 | 2% |
| Infectious, Vector-borne | 618,689 | 6% | 368,028 | 13% | 8,362 | 2% |
| Eye, Ear, Oral | 369,172 | 3% | 239,701 | 9% | 2,763 | <1% |
| Skin | 351,591 | 3% | 182,258 | 6% | 4,186 | 1% |
| Degenerative,Genetic MSK | 288,255 | 3% | 109,510 | 4% | 3,181 | <1% |
| Genitourinary | 272,647 | 2% | 117,498 | 4% | 5,434 | 2% |
| Pulmonary | 222,843 | 2% | 88,117 | 3% | 3,005 | 1% |
| Maternal, Congenital | 222,740 | 2% | 34,753 | 1% | 54,151 | 16% |
| Digestive | 199,493 | 2% | 92,356 | 3% | 15,896 | 5% |
| Cardiovascular | 134,400 | 1% | 60,171 | 2% | 6,602 | 2% |
| Other | 100,425 | <1% | 53,956 | 2% | 6,636 | 2% |
| Metabolic, Endocrine | 97,095 | <1% | 48,159 | 2% | 1,826 | <1% |
| Cancer | 41,379 | <1% | 5,713 | <1% | 6,223 | 2% |
| **Total** | 11,109,979 | 100% | 2,807,803 | 100% | 344,092 | 100% |

U.S. Army Public Health Center UNCLASSIFIED 2

**Figures C-1a, b. All Services' CY 2018 Medical Encounters, Injury as a Leading Burden; MIWG 2020**

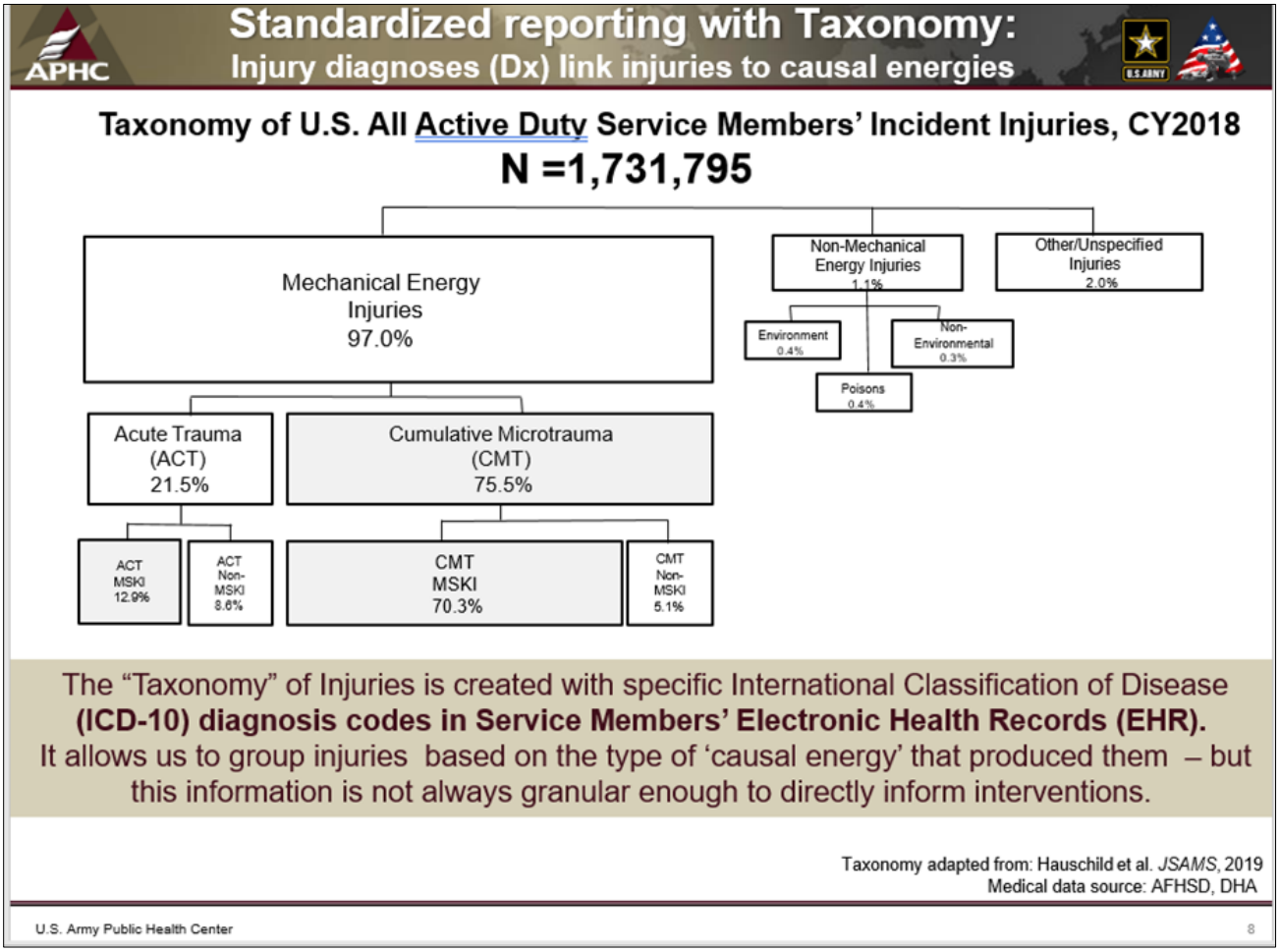
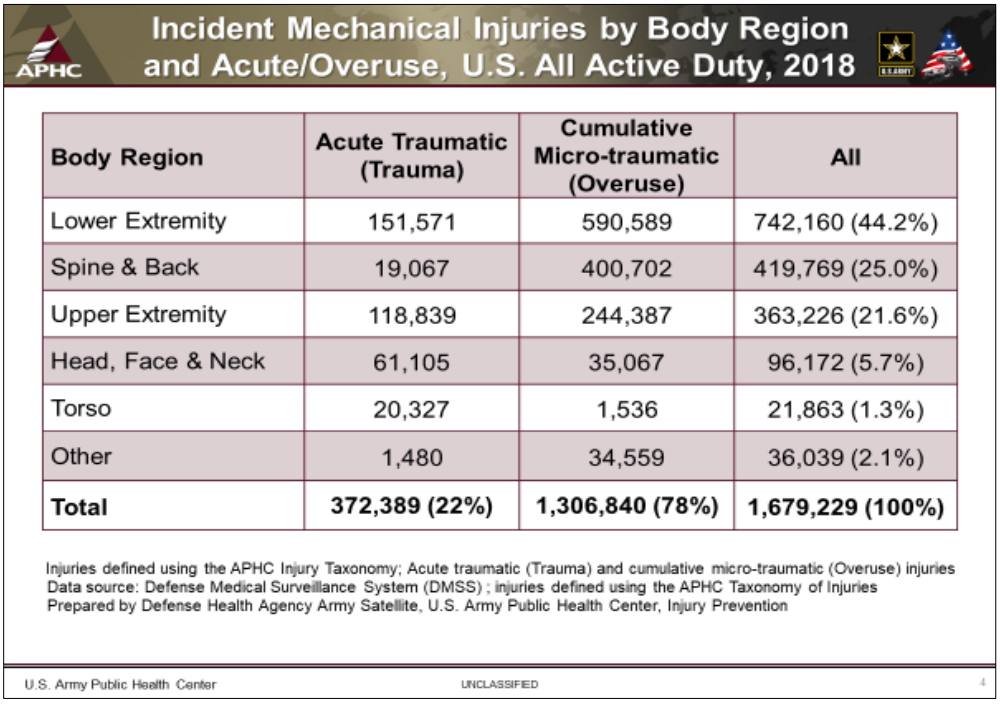



**Figure C-2. All Services' CY 2018 Injuries from EHR- Categorized using the Taxonomy of Injuries; MIWG 2020**



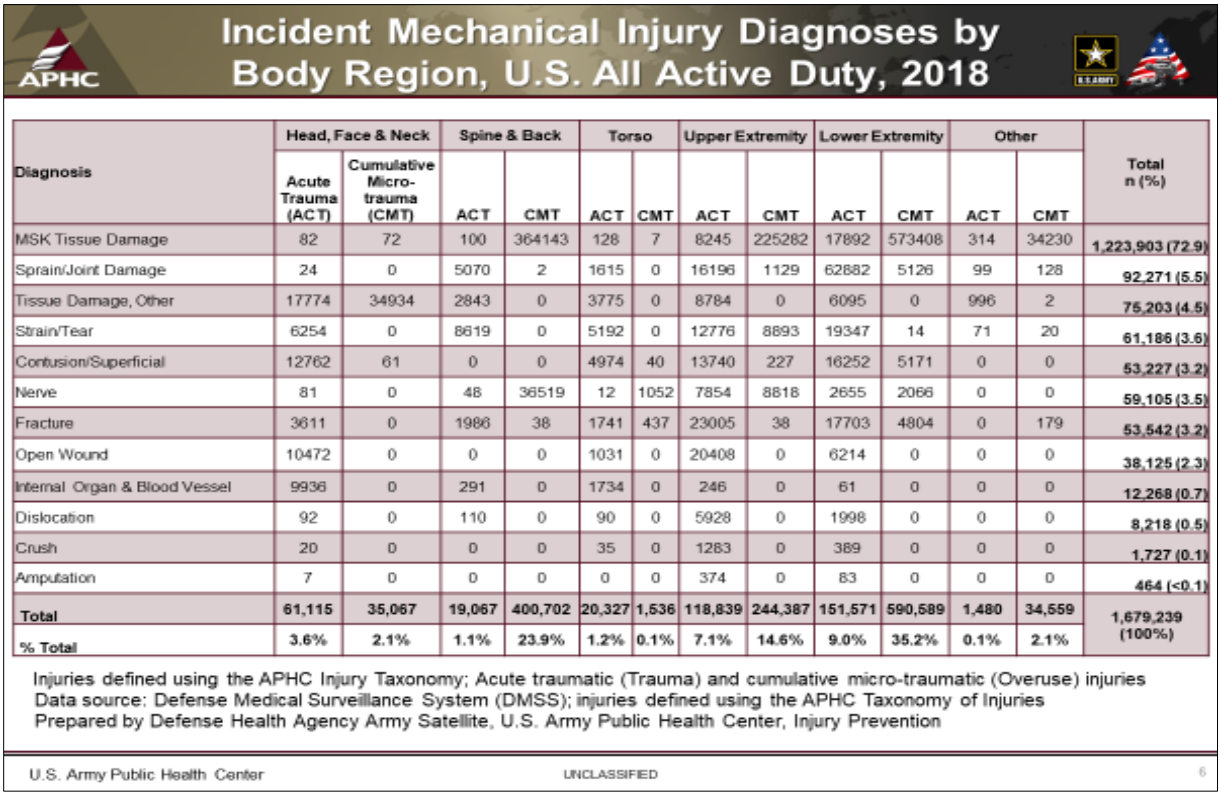
## Incident Mechanical Injuries by Body Region and Acute/Overuse, U.S. All Active Duty, 2018

| Body Region | Acute Traumatic (Trauma) | Cumulative Micro-traumatic (Overuse) | All |
|---|---|---|---|
| Lower Extremity | 151,571 | 590,589 | 742,160 (44.2%) |
| Spine & Back | 19,067 | 400,702 | 419,769 (25.0%) |
| Upper Extremity | 118,839 | 244,387 | 363,226 (21.6%) |
| Head, Face & Neck | 61,105 | 35,067 | 96,172 (5.7%) |
| Torso | 20,327 | 1,536 | 21,863 (1.3%) |
| Other | 1,480 | 34,559 | 36,039 (2.1%) |
| **Total** | **372,389 (22%)** | **1,306,840 (78%)** | **1,679,229 (100%)** |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS) ; injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

U.S. Army Public Health Center UNCLASSIFIED 4

**Figure C-3. All Services' CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas (overuse) by Primary Body Region; MIWG 2020**



## Incident Mechanical Injury Diagnoses by Body Region, U.S. All Active Duty, 2018

| Diagnosis | Head, Face & Neck | | Spine & Back | | Torso | | Upper Extremity | | Lower Extremity | | Other | | Total n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acute Trauma (ACT) | Cumulative Micro-trauma (CMT) | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | |
| MSK Tissue Damage | 82 | 72 | 100 | 364143 | 128 | 7 | 8245 | 225282 | 17892 | 573408 | 314 | 34230 | 1,223,903 (72.9) |
| Sprain/Joint Damage | 24 | 0 | 5070 | 2 | 1615 | 0 | 16196 | 1129 | 62882 | 5126 | 99 | 128 | 92,271 (5.5) |
| Tissue Damage, Other | 17774 | 34934 | 2843 | 0 | 3775 | 0 | 8784 | 0 | 6095 | 0 | 996 | 2 | 75,203 (4.5) |
| Strain/Tear | 6254 | 0 | 8619 | 0 | 5192 | 0 | 12776 | 8893 | 19347 | 14 | 71 | 20 | 61,186 (3.6) |
| Contusion/Superficial | 12762 | 61 | 0 | 0 | 4974 | 40 | 13740 | 227 | 16252 | 5171 | 0 | 0 | 53,227 (3.2) |
| Nerve | 81 | 0 | 48 | 36519 | 12 | 1052 | 7854 | 8818 | 2655 | 2066 | 0 | 0 | 59,105 (3.5) |
| Fracture | 3611 | 0 | 1986 | 38 | 1741 | 437 | 23005 | 38 | 17703 | 4804 | 0 | 179 | 53,542 (3.2) |
| Open Wound | 10472 | 0 | 0 | 0 | 1031 | 0 | 20408 | 0 | 6214 | 0 | 0 | 0 | 38,125 (2.3) |
| Internal Organ & Blood Vessel | 9936 | 0 | 291 | 0 | 1734 | 0 | 246 | 0 | 61 | 0 | 0 | 0 | 12,268 (0.7) |
| Dislocation | 92 | 0 | 110 | 0 | 90 | 0 | 5928 | 0 | 1998 | 0 | 0 | 0 | 8,218 (0.5) |
| Crush | 20 | 0 | 0 | 0 | 35 | 0 | 1283 | 0 | 389 | 0 | 0 | 0 | 1,727 (0.1) |
| Amputation | 7 | 0 | 0 | 0 | 0 | 0 | 374 | 0 | 83 | 0 | 0 | 0 | 464 (<0.1) |
| **Total** | **61,115** | **35,067** | **19,067** | **400,702** | **20,327** | **1,536** | **118,839** | **244,387** | **151,571** | **590,589** | **1,480** | **34,559** | **1,679,239 (100%)** |
| **% Total** | **3.6%** | **2.1%** | **1.1%** | **23.9%** | **1.2%** | **0.1%** | **7.1%** | **14.6%** | **9.0%** | **35.2%** | **0.1%** | **2.1%** | |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

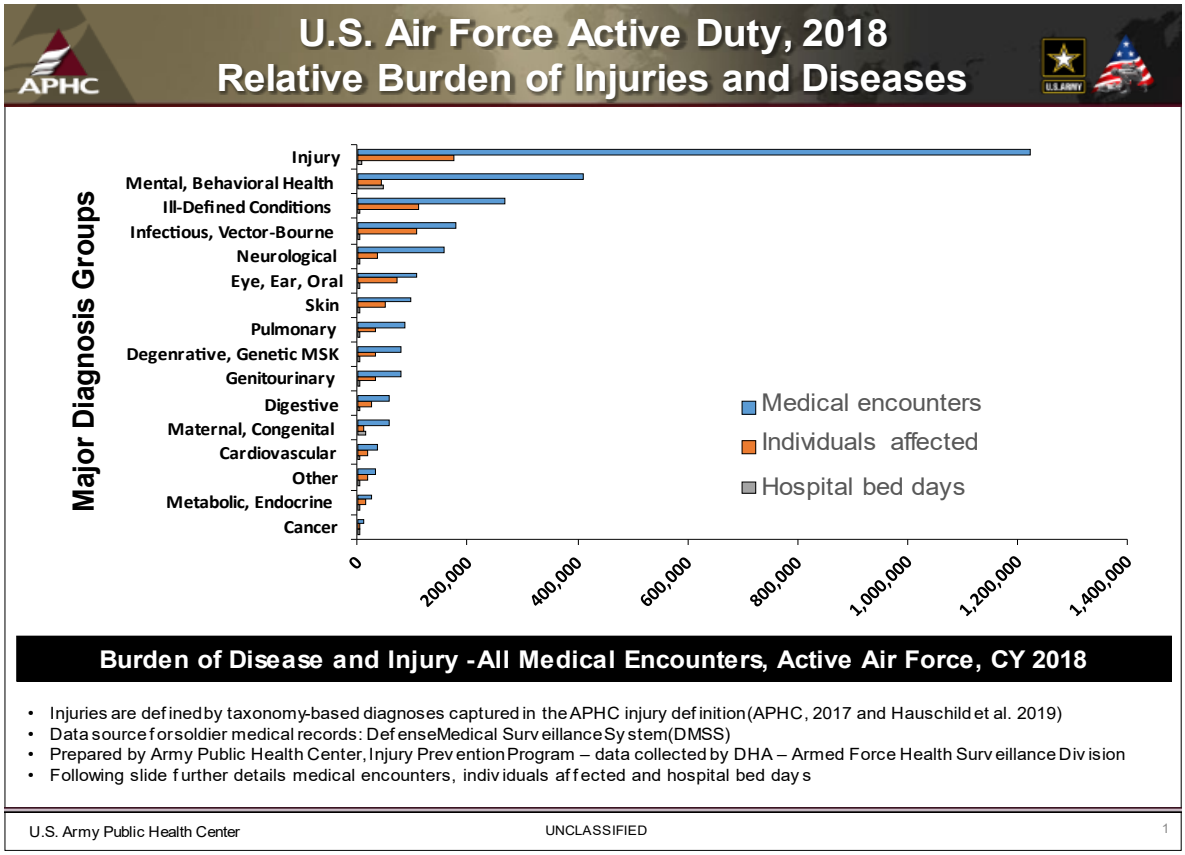
U.S. Army Public Health Center UNCLASSIFIED 6

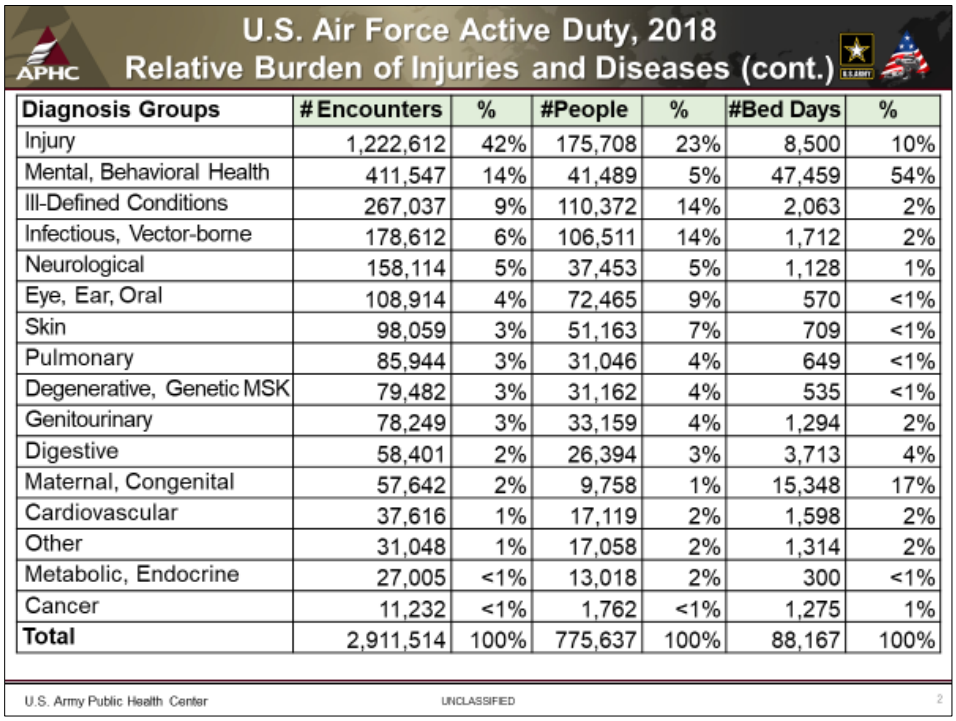
**Figure C-4. All Services' CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas by Injury Type and Primary Body Region; MIWG 2020**

# APPENDIX D

## MIWG's Annual (CY 2018) Report of Injuries from Active-Duty Service Members' Electronic Health Records:

## Individual Services Medical Injury Data




| Diagnosis Groups | # Encounters | % | #People | % | #Bed Days | % |
|---|---|---|---|---|---|---|
| Injury | 1,222,612 | 42% | 175,708 | 23% | 8,500 | 10% |
| Mental, Behavioral Health | 411,547 | 14% | 41,489 | 5% | 47,459 | 54% |
| Ill-Defined Conditions | 267,037 | 9% | 110,372 | 14% | 2,063 | 2% |
| Infectious, Vector-borne | 178,612 | 6% | 106,511 | 14% | 1,712 | 2% |
| Neurological | 158,114 | 5% | 37,453 | 5% | 1,128 | 1% |
| Eye, Ear, Oral | 108,914 | 4% | 72,465 | 9% | 570 | <1% |
| Skin | 98,059 | 3% | 51,163 | 7% | 709 | <1% |
| Pulmonary | 85,944 | 3% | 31,046 | 4% | 649 | <1% |
| Degenerative, Genetic MSK | 79,482 | 3% | 31,162 | 4% | 535 | <1% |
| Genitourinary | 78,249 | 3% | 33,159 | 4% | 1,294 | 2% |
| Digestive | 58,401 | 2% | 26,394 | 3% | 3,713 | 4% |
| Maternal, Congenital | 57,642 | 2% | 9,758 | 1% | 15,348 | 17% |
| Cardiovascular | 37,616 | 1% | 17,119 | 2% | 1,598 | 2% |
| Other | 31,048 | 1% | 17,058 | 2% | 1,314 | 2% |
| Metabolic, Endocrine | 27,005 | <1% | 13,018 | 2% | 300 | <1% |
| Cancer | 11,232 | <1% | 1,762 | <1% | 1,275 | 1% |
| **Total** | 2,911,514 | 100% | 775,637 | 100% | 88,167 | 100% |

**Figures D-1a, b. U.S. Air Force CY 2018 Medical Encounters, Burden of Injuries and Disease; MIWG 2020**

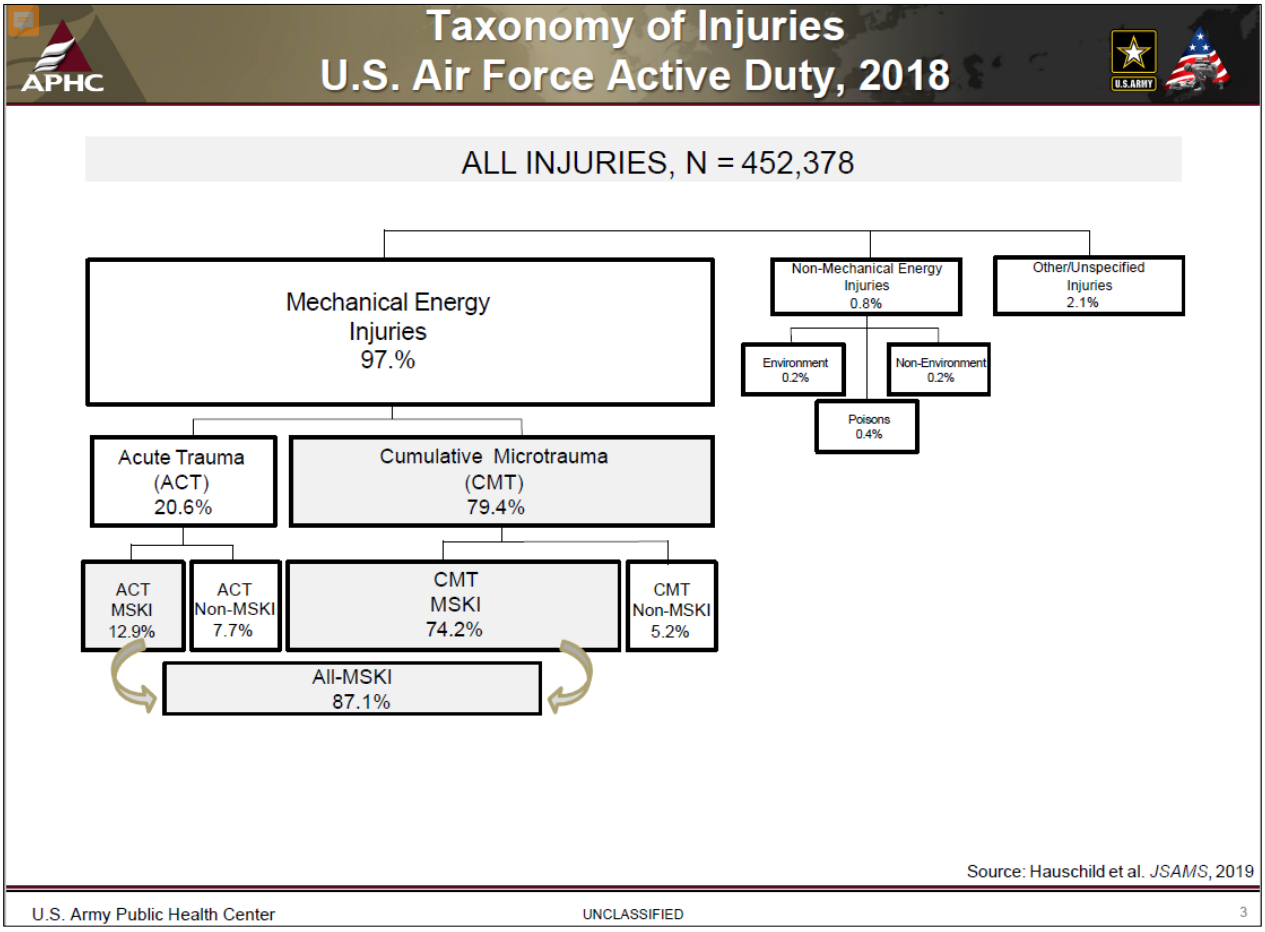



**Figure D-2. U.S. Air Force CY 2018 Injuries from EHR- Categorized using the Taxonomy of Injuries; MIWG 2020**

## Mechanical Injuries by Body Region and Acute/Overuse, U.S. Air Force Active Duty, 2018

| Body Region | Acute Traumatic (Trauma) | Cumulative Micro-traumatic (Overuse) | All |
|---|---|---|---|
| Lower Extremity | 39,560 | 150,012 | 189,572 (43.2%) |
| Spine & Back | 4,271 | 117,529 | 121,800 (27.7%) |
| Upper Extremity | 28,404 | 55,714 | 84,118 (19.1%) |
| Head, Face & Neck | 13,246 | 8,036 | 21,282 (4.8%) |
| Torso | 4,755 | 305 | 5,060 (1.2%) |
| Other | 305 | 17,150 | 17,455 (4.0%) |
| **Total** | **90,541 (21%)** | **348,746 (79%)** | **439,287 (100%)** |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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**Figure D-3. U.S. Air Force CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas (overuse) by Primary Body Region; MIWG 2020**

## Incident Mechanical Injury Diagnoses by Body Region U.S. Air Force Active Duty, 2018

| Diagnosis | Head, Face & Neck | | Spine & Back | | Torso | | Upper Extremity | | Lower Extremity | | Other | | Total n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acute Trauma (ACT) | Cumulative Micro-trauma (CMT) | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | |
| MSK Tissue Damage | 12 | 19 | 8 | 106,542 | 32 | 3 | 2,008 | 50,399 | 5,351 | 146,813 | 79 | 17,071 | 328,337 (74.7) |
| Sprain/Joint Damage | 7 | 0 | 1,218 | 1 | 401 | 0 | 4,105 | 299 | 16,682 | 1,513 | 16 | 48 | 24,290 (5.5) |
| Tissue Damage, Other | 3,639 | 8,004 | 380 | 0 | 704 | 0 | 1,739 | 0 | 1,109 | 0 | 184 | 0 | 15,759 (3.6) |
| Strain/Tear | 1,695 | 0 | 2,136 | 0 | 1,550 | 0 | 3,137 | 2,452 | 5,156 | 4 | 26 | 3 | 16,159 (3.7) |
| Contusion/Superficial | 3,025 | 13 | 0 | 0 | 1,206 | 11 | 3,111 | 55 | 4,007 | 356 | 0 | 0 | 11,784 (2.7) |
| Nerve | 13 | 0 | 14 | 10,977 | 3 | 285 | 2,069 | 2,502 | 873 | 714 | 0 | 0 | 17,450 (4.0) |
| Fracture | 663 | 0 | 421 | 9 | 307 | 6 | 5,158 | 7 | 4,196 | 612 | 0 | 28 | 11,407 (2.6) |
| Open Wound | 2,345 | 0 | 0 | 0 | 199 | 0 | 5,288 | 0 | 1,517 | 0 | 0 | 0 | 9,349 (2.1) |
| Internal Organ & Blood Vessel | 1,818 | 0 | 60 | 0 | 337 | 0 | 47 | 0 | 19 | 0 | 0 | 0 | 2,281 (0.5) |
| Dislocation | 23 | 0 | 34 | 0 | 13 | 0 | 1,399 | 0 | 545 | 0 | 0 | 0 | 2,014 (0.5) |
| Crush | 5 | 0 | 0 | 0 | 3 | 0 | 265 | 0 | 85 | 0 | 0 | 0 | 358 (0.1) |
| Amputation | 1 | 0 | 0 | 0 | 0 | 0 | 78 | 0 | 20 | 0 | 0 | 0 | 99 (<0.1) |
| **Total** | **13,246** | **8,036** | **4,271** | **117,529** | **4,755** | **305** | **28,404** | **55,714** | **39,560** | **150,012** | **305** | **17,150** | **439,287 (100%)** |
| **% Total** | **3.0%** | **1.8%** | **1.0%** | **26.8%** | **1.1%** | **0.1%** | **6.5%** | **12.7%** | **9.0%** | **34.1%** | **0.1%** | **3.9%** | |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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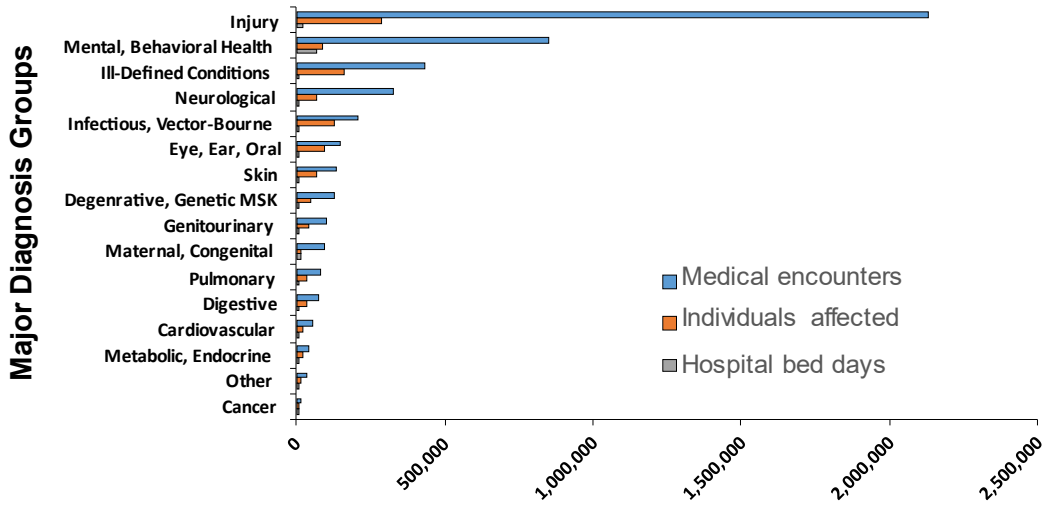
**Figure D-4. U.S. Air Force CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas by Injury Type and Primary Body Region; MIWG 2020**

## U.S. Army Active Duty, 2018
## Relative Burden of Injuries and Diseases




**Burden of Disease and Injury -All Medical Encounters, Active Army, CY 2018**

- Injuries are defined by taxonomy-based diagnoses captured in the APHC injury definition (APHC, 2017 and Hauschild et al. 2019)
- Data source for soldier medical records: Defense Medical Surveillance System (DMSS)
- Prepared by Army Public Health Center, Injury Prevention Program – data collected by DHA – Armed Force Health Surveillance Division
- Following slide further details medical encounters, individuals affected and hospital bed days

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## U.S. Army Active Duty, 2018
## Relative Burden of Injuries and Diseases (cont.)

| Diagnosis Groups | # Encounters | % | #People | % | #Bed Days | % |
|---|---|---|---|---|---|---|
| Injury | 2,130,483 | 44% | 284,754 | 25% | 20,326 | 14% |
| Mental, Behavioral Health | 848,490 | 17% | 86,137 | 8% | 69,191 | 49% |
| Ill-Defined Conditions | 433,572 | 9% | 162,496 | 14% | 4,277 | 3% |
| Neurological | 325,666 | 7% | 67,732 | 6% | 1,660 | 1% |
| Infectious, Vector-borne | 210,365 | 4% | 126,618 | 11% | 3,165 | 2% |
| Eye, Ear, Oral | 149,539 | 3% | 94,925 | 8% | 1,481 | 1% |
| Skin | 135,637 | 3% | 68,040 | 6% | 1,834 | 1% |
| Degenerative,Genetic MSK | 126,828 | 3% | 45,722 | 4% | 1,620 | 1% |
| Genitourinary | 104,464 | 2% | 45,382 | 4% | 2,271 | 2% |
| Maternal, Congenital | 93,194 | 2% | 13,176 | 1% | 18,033 | 13% |
| Pulmonary | 79,517 | 2% | 33,748 | 3% | 1,282 | <1% |
| Digestive | 78,679 | 2% | 36,368 | 3% | 6,305 | 4% |
| Cardiovascular | 54,588 | 1% | 24,035 | 2% | 2,352 | 2% |
| Metabolic, Endocrine | 40,706 | <1% | 20,514 | 2% | 798 | <1% |
| Other | 37,282 | <1% | 18,682 | 2% | 2,936 | 2% |
| Cancer | 17,039 | <1% | 2,048 | <1% | 2,901 | 2% |
| **Total** | 4,866,049 | 100% | 1,130,377 | 100% | 140,432 | 100% |

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**Figures D-5a, b. Army CY 2018 Medical Encounters, Burden of Injuries and Disease; MIWG 2020**

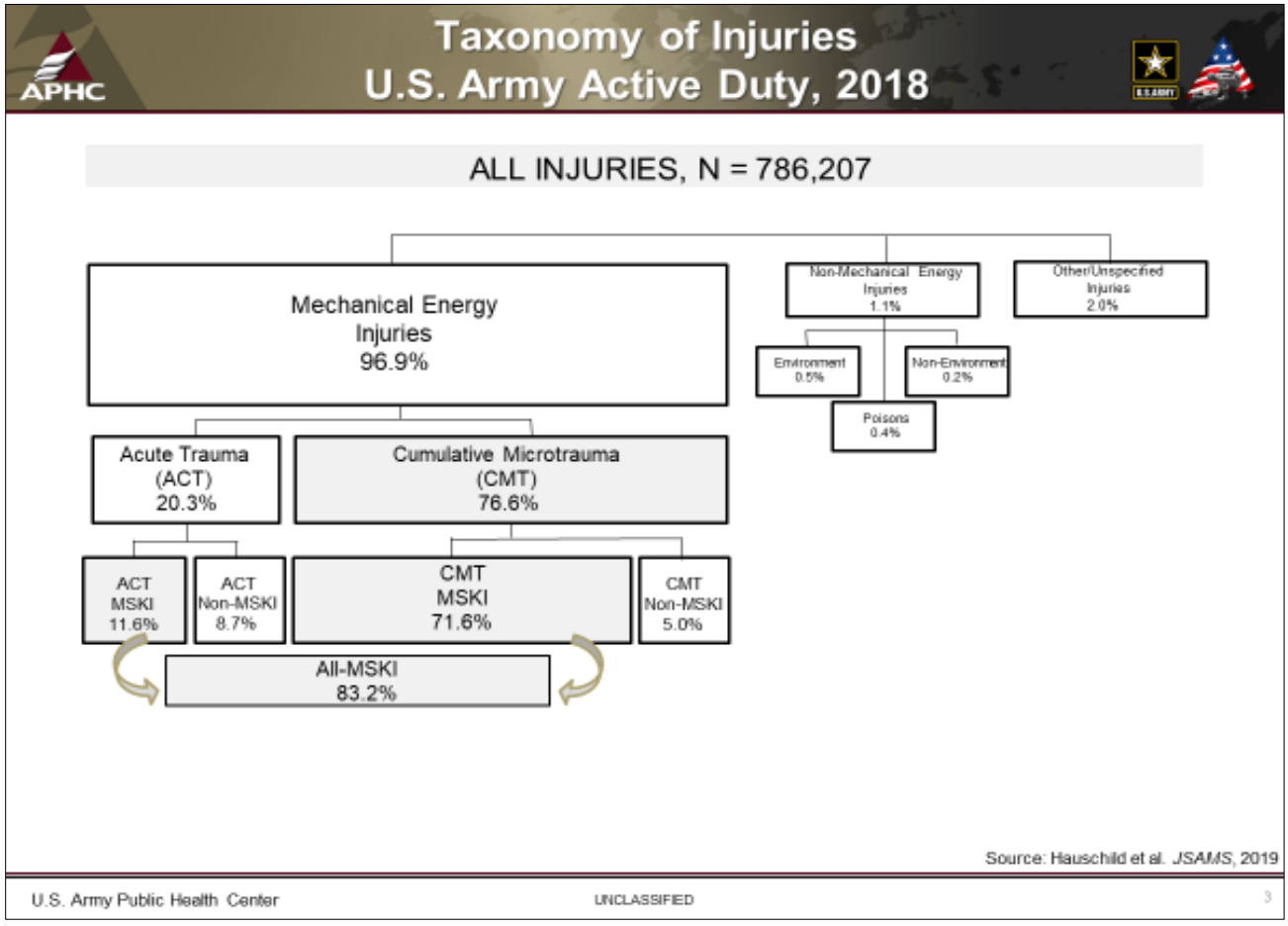
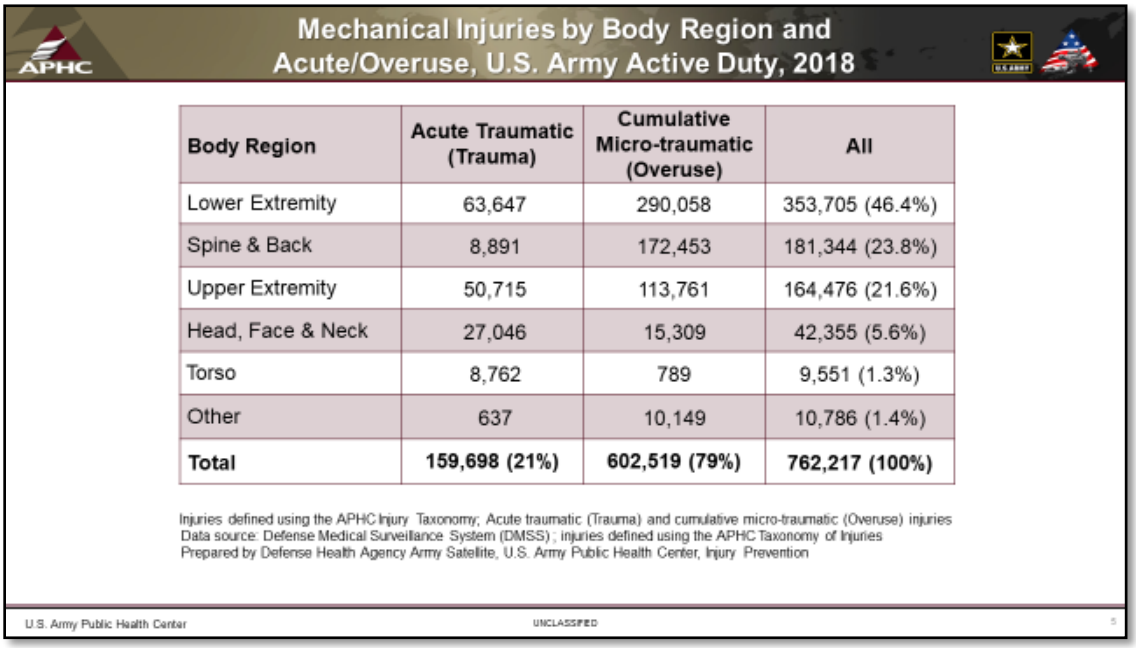



**Figure D-6. Army CY 2018 Injuries from EHR- Categorized using the Taxonomy of Injuries; MIWG 2020**



Mechanical Injuries by Body Region and Acute/Overuse, U.S. Army Active Duty, 2018

| Body Region | Acute Traumatic (Trauma) | Cumulative Micro-traumatic (Overuse) | All |
|---|---|---|---|
| Lower Extremity | 63,647 | 290,058 | 353,705 (46.4%) |
| Spine & Back | 8,891 | 172,453 | 181,344 (23.8%) |
| Upper Extremity | 50,715 | 113,761 | 164,476 (21.6%) |
| Head, Face & Neck | 27,046 | 15,309 | 42,355 (5.6%) |
| Torso | 8,762 | 789 | 9,551 (1.3%) |
| Other | 637 | 10,149 | 10,786 (1.4%) |
| **Total** | **159,698 (21%)** | **602,519 (79%)** | **762,217 (100%)** |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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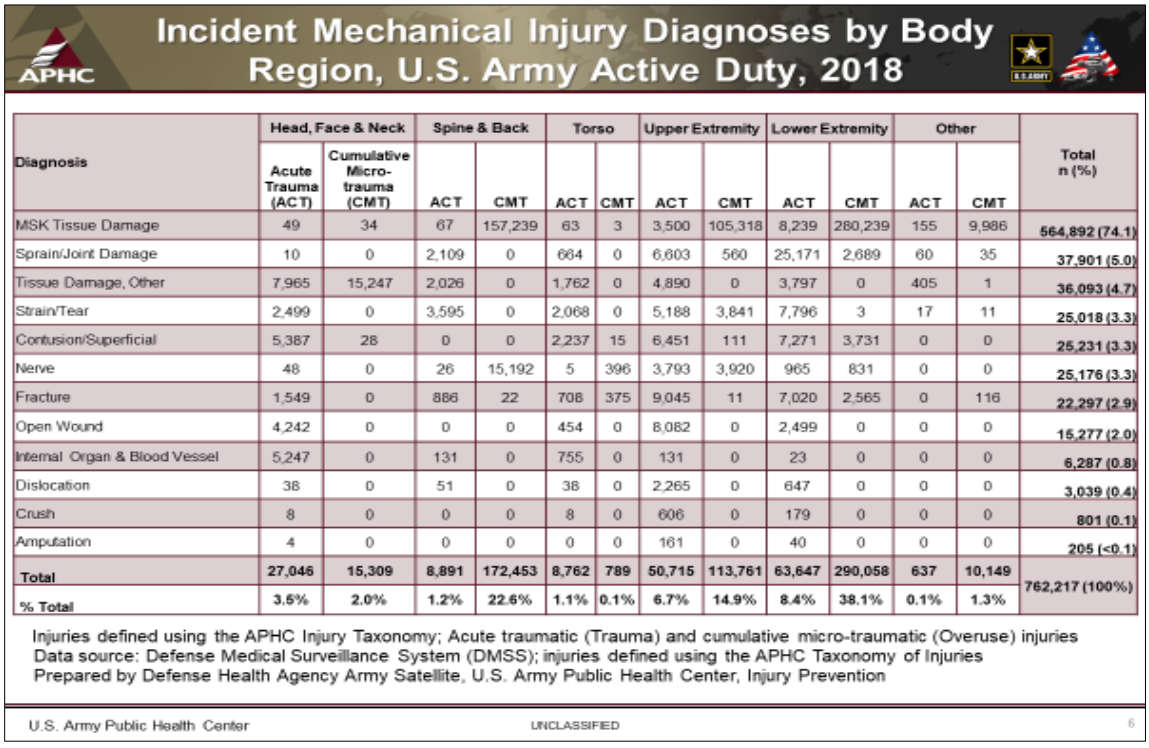
**Figure D-7. Army CY 2018 Mechanical Injuries from EHR- Acute and Cumulative Microtraumas (overuse) by primary body region; MIWG 2020**



Incident Mechanical Injury Diagnoses by Body Region, U.S. Army Active Duty, 2018

| Diagnosis | Head, Face & Neck | | Spine & Back | | Torso | | Upper Extremity | | Lower Extremity | | Other | | Total n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acute Trauma (ACT) | Cumulative Micro-trauma (CMT) | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | |
| MSK Tissue Damage | 49 | 34 | 67 | 157,239 | 63 | 3 | 3,500 | 105,318 | 8,239 | 280,239 | 155 | 9,986 | 564,892 (74.1) |
| Sprain/Joint Damage | 10 | 0 | 2,109 | 0 | 664 | 0 | 6,603 | 560 | 25,171 | 2,689 | 60 | 35 | 37,901 (5.0) |
| Tissue Damage, Other | 7,965 | 15,247 | 2,026 | 0 | 1,762 | 0 | 4,890 | 0 | 3,797 | 0 | 405 | 1 | 36,093 (4.7) |
| Strain/Tear | 2,499 | 0 | 3,595 | 0 | 2,068 | 0 | 5,188 | 3,841 | 7,796 | 3 | 17 | 11 | 25,018 (3.3) |
| Contusion/Superficial | 5,387 | 28 | 0 | 0 | 2,237 | 15 | 6,451 | 111 | 7,271 | 3,731 | 0 | 0 | 25,231 (3.3) |
| Nerve | 48 | 0 | 26 | 15,192 | 5 | 396 | 3,793 | 3,920 | 965 | 831 | 0 | 0 | 25,176 (3.3) |
| Fracture | 1,549 | 0 | 886 | 22 | 708 | 375 | 9,045 | 11 | 7,020 | 2,565 | 0 | 116 | 22,297 (2.9) |
| Open Wound | 4,242 | 0 | 0 | 0 | 454 | 0 | 8,082 | 0 | 2,499 | 0 | 0 | 0 | 15,277 (2.0) |
| Internal Organ & Blood Vessel | 5,247 | 0 | 131 | 0 | 755 | 0 | 131 | 0 | 23 | 0 | 0 | 0 | 6,287 (0.8) |
| Dislocation | 38 | 0 | 51 | 0 | 38 | 0 | 2,265 | 0 | 647 | 0 | 0 | 0 | 3,039 (0.4) |
| Crush | 8 | 0 | 0 | 0 | 8 | 0 | 606 | 0 | 179 | 0 | 0 | 0 | 801 (0.1) |
| Amputation | 4 | 0 | 0 | 0 | 0 | 0 | 161 | 0 | 40 | 0 | 0 | 0 | 205 (<0.1) |
| **Total** | **27,046** | **15,309** | **8,891** | **172,453** | **8,762** | **789** | **50,715** | **113,761** | **63,647** | **290,058** | **637** | **10,149** | **762,217 (100%)** |
| **% Total** | **3.5%** | **2.0%** | **1.2%** | **22.6%** | **1.1%** | **0.1%** | **6.7%** | **14.9%** | **8.4%** | **38.1%** | **0.1%** | **1.3%** | |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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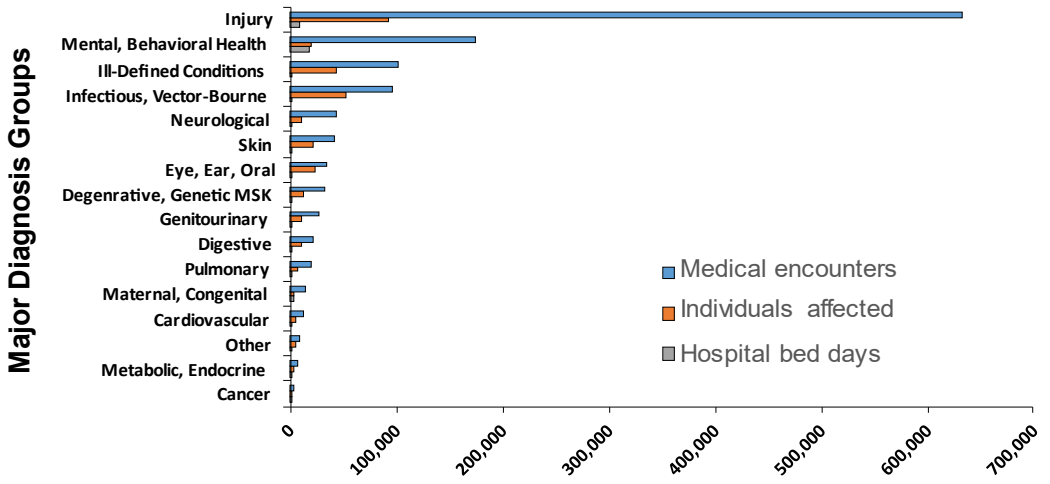
**Figure D-8. Army CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas by Injury Type and Primary Body Region; MIWG 2020**

## U.S. Marine Corps Active Duty, 2018
## Relative Burden of Injuries and Diseases




**Burden of Disease and Injury -All Medical Encounters, Active Marine Corps, CY 2018**

- Injuries are defined by taxonomy-based diagnoses captured in the APHC injury definition (APHC, 2017 and Hauschild et al. 2019)
- Data source for soldier medical records: Defense Medical Surveillance System (DMSS)
- Prepared by Army Public Health Center, Injury Prevention Program – data collected by DHA – Armed Force Health Surveillance Division
- Following slide further details medical encounters, individuals affected and hospital bed days

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## U.S. Marine Corps Active Duty, 2018
## Relative Burden of Injuries and Diseases (cont.)

| Diagnosis Groups | # Encounters | % | #People | % | #Bed Days | % |
|---|---|---|---|---|---|---|
| Injury | 633,335 | 50% | 93,601 | 29% | 8,445 | 20% |
| Mental, Behavioral Health | 175,245 | 14% | 19,131 | 6% | 18,113 | 43% |
| Ill-Defined Conditions | 101,587 | 8% | 44,397 | 14% | 1,330 | 3% |
| Neurological | 95,673 | 8% | 52,737 | 16% | 1,663 | 4% |
| Infectious, Vector-borne | 44,457 | 3% | 11,295 | 3% | 669 | 2% |
| Eye, Ear, Oral | 41,269 | 3% | 22,206 | 7% | 892 | <1% |
| Skin | 34,829 | 3% | 22,762 | 7% | 278 | 1% |
| Degenerative,Genetic MSK | 32,950 | 3% | 12,676 | 4% | 465 | 1% |
| Genitourinary | 27,157 | 2% | 11,763 | 4% | 665 | 2% |
| Maternal, Congenital | 21,401 | 2% | 10,194 | 3% | 2,138 | 5% |
| Pulmonary | 19,234 | 2% | 7,953 | 2% | 447 | 1% |
| Digestive | 14,901 | 1% | 3,195 | 1% | 4,380 | 10% |
| Cardiovascular | 12,881 | 1% | 5,695 | 2% | 738 | 2% |
| Metabolic, Endocrine | 9,020 | <1% | 4,947 | 2% | 940 | 2% |
| Other | 7,641 | <1% | 4,143 | 1% | 182 | <1% |
| Cancer | 3,729 | <1% | 467 | <1% | 757 | 2% |
| **Total** | 1,275,309 | 100% | 327,162 | 100% | 42,102 | 100% |

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**Figures D-9a, b. U.S. Marine Corps CY 2018 Medical Encounters, Burden of Injuries and Disease; MIWG 2020**

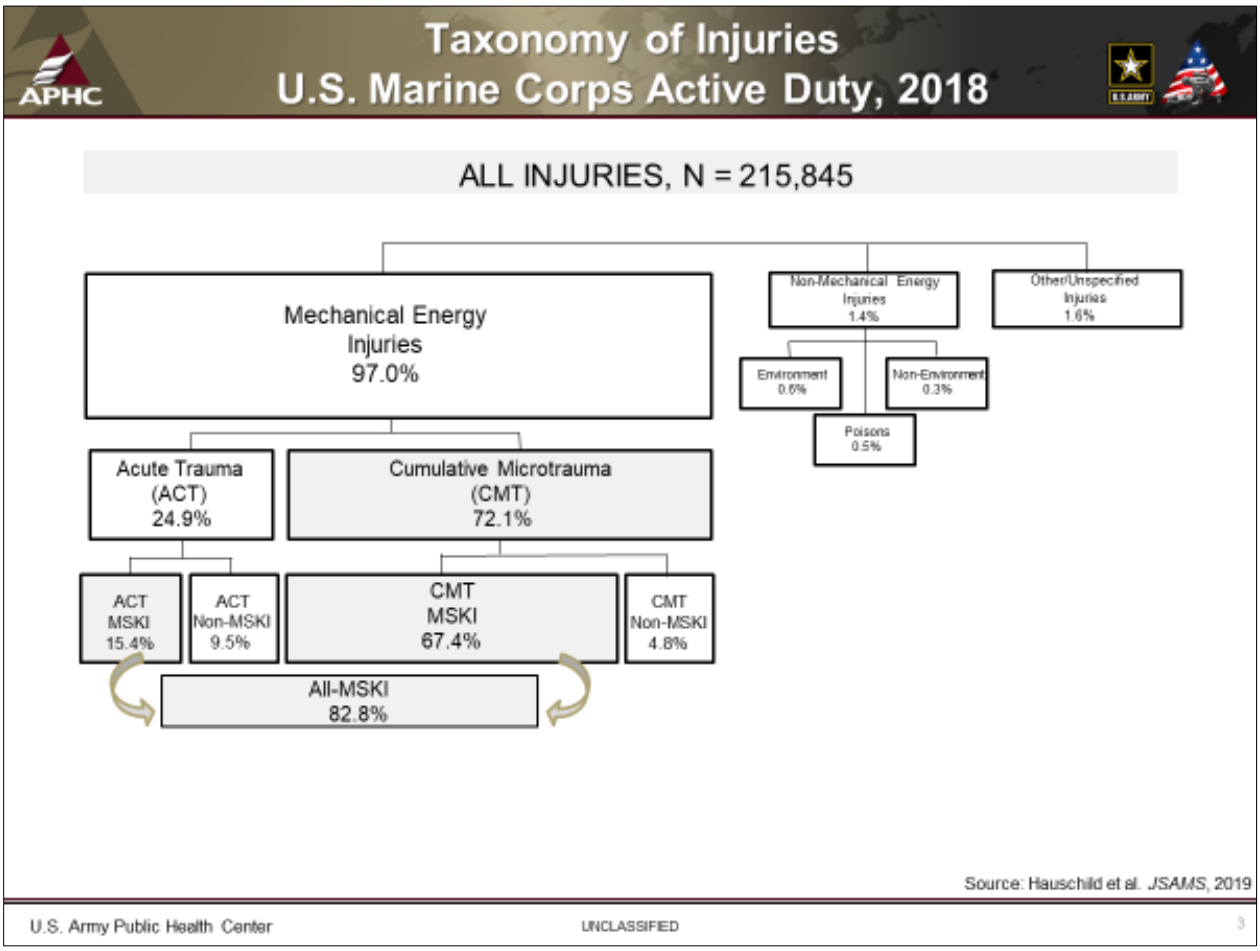
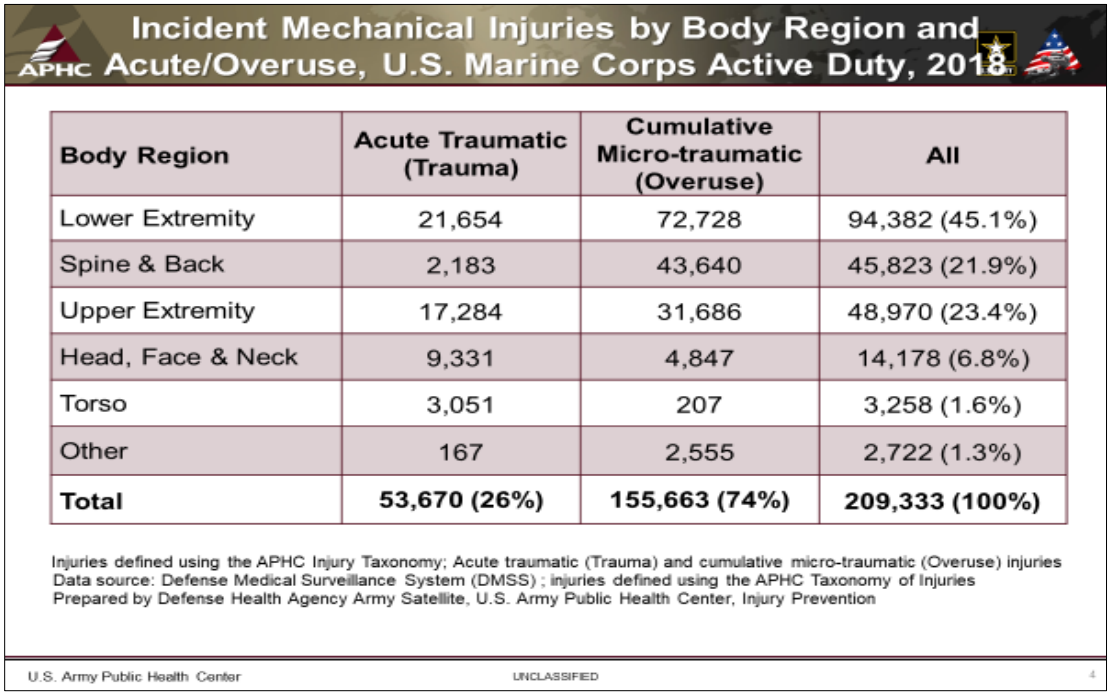



**Figure D-10. U.S. Marine Corps CY 2018 Injuries from EHR - Categorized using the Taxonomy of Injuries; MIWG 2020**



## Incident Mechanical Injuries by Body Region and Acute/Overuse, U.S. Marine Corps Active Duty, 2018

| Body Region | Acute Traumatic (Trauma) | Cumulative Micro-traumatic (Overuse) | All |
|---|---|---|---|
| Lower Extremity | 21,654 | 72,728 | 94,382 (45.1%) |
| Spine & Back | 2,183 | 43,640 | 45,823 (21.9%) |
| Upper Extremity | 17,284 | 31,686 | 48,970 (23.4%) |
| Head, Face & Neck | 9,331 | 4,847 | 14,178 (6.8%) |
| Torso | 3,051 | 207 | 3,258 (1.6%) |
| Other | 167 | 2,555 | 2,722 (1.3%) |
| **Total** | **53,670 (26%)** | **155,663 (74%)** | **209,333 (100%)** |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS) ; injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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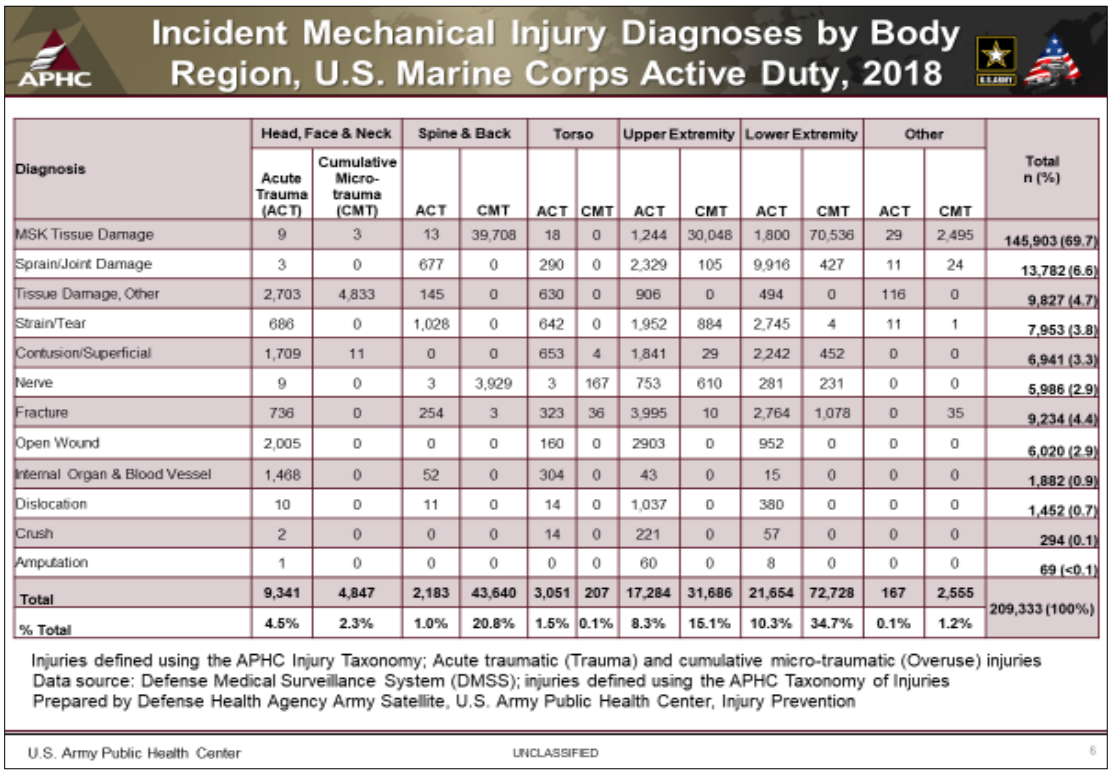
**Figure D-11. U.S. Marine Corps CY 2018 Mechanical Injuries from EHR- Acute and Cumulative Microtraumas (overuse) by Primary Body Region; MIWG 2020**



## Incident Mechanical Injury Diagnoses by Body Region, U.S. Marine Corps Active Duty, 2018

| Diagnosis | Head, Face & Neck | | Spine & Back | | Torso | | Upper Extremity | | Lower Extremity | | Other | | Total n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acute Trauma (ACT) | Cumulative Micro-trauma (CMT) | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | |
| MSK Tissue Damage | 9 | 3 | 13 | 39,708 | 18 | 0 | 1,244 | 30,048 | 1,800 | 70,536 | 29 | 2,495 | 145,903 (69.7) |
| Sprain/Joint Damage | 3 | 0 | 677 | 0 | 290 | 0 | 2,329 | 105 | 9,916 | 427 | 11 | 24 | 13,782 (6.6) |
| Tissue Damage, Other | 2,703 | 4,833 | 145 | 0 | 630 | 0 | 906 | 0 | 494 | 0 | 116 | 0 | 9,827 (4.7) |
| Strain/Tear | 686 | 0 | 1,028 | 0 | 642 | 0 | 1,952 | 884 | 2,745 | 4 | 11 | 1 | 7,953 (3.8) |
| Contusion/Superficial | 1,709 | 11 | 0 | 0 | 653 | 4 | 1,841 | 29 | 2,242 | 452 | 0 | 0 | 6,941 (3.3) |
| Nerve | 9 | 0 | 3 | 3,929 | 3 | 167 | 753 | 610 | 281 | 231 | 0 | 0 | 5,986 (2.9) |
| Fracture | 736 | 0 | 254 | 3 | 323 | 36 | 3,995 | 10 | 2,764 | 1,078 | 0 | 35 | 9,234 (4.4) |
| Open Wound | 2,005 | 0 | 0 | 0 | 160 | 0 | 2903 | 0 | 952 | 0 | 0 | 0 | 6,020 (2.9) |
| Internal Organ & Blood Vessel | 1,468 | 0 | 52 | 0 | 304 | 0 | 43 | 0 | 15 | 0 | 0 | 0 | 1,882 (0.9) |
| Dislocation | 10 | 0 | 11 | 0 | 14 | 0 | 1,037 | 0 | 380 | 0 | 0 | 0 | 1,452 (0.7) |
| Crush | 2 | 0 | 0 | 0 | 14 | 0 | 221 | 0 | 57 | 0 | 0 | 0 | 294 (0.1) |
| Amputation | 1 | 0 | 0 | 0 | 0 | 0 | 60 | 0 | 8 | 0 | 0 | 0 | 69 (<0.1) |
| **Total** | **9,341** | **4,847** | **2,183** | **43,640** | **3,051** | **207** | **17,284** | **31,686** | **21,654** | **72,728** | **167** | **2,555** | **209,333 (100%)** |
| **% Total** | **4.5%** | **2.3%** | **1.0%** | **20.8%** | **1.5%** | **0.1%** | **8.3%** | **15.1%** | **10.3%** | **34.7%** | **0.1%** | **1.2%** | |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

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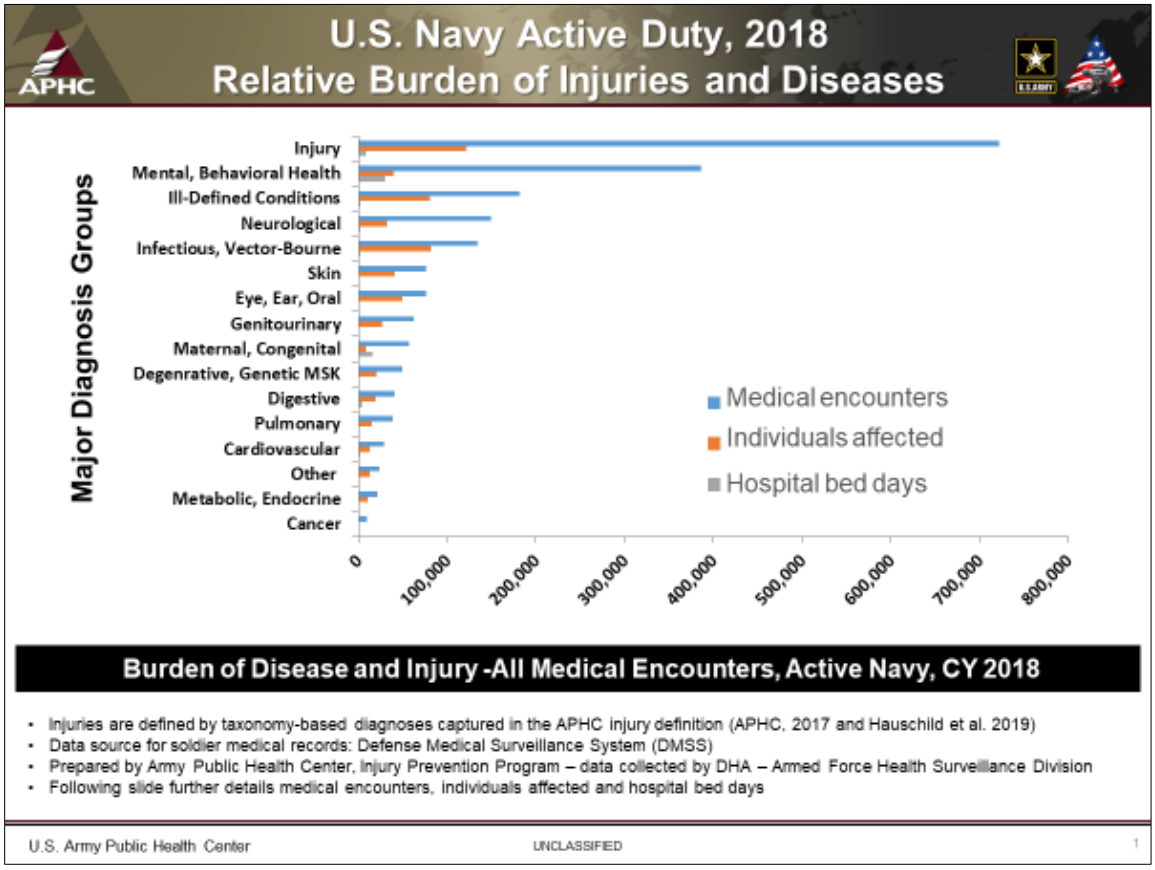
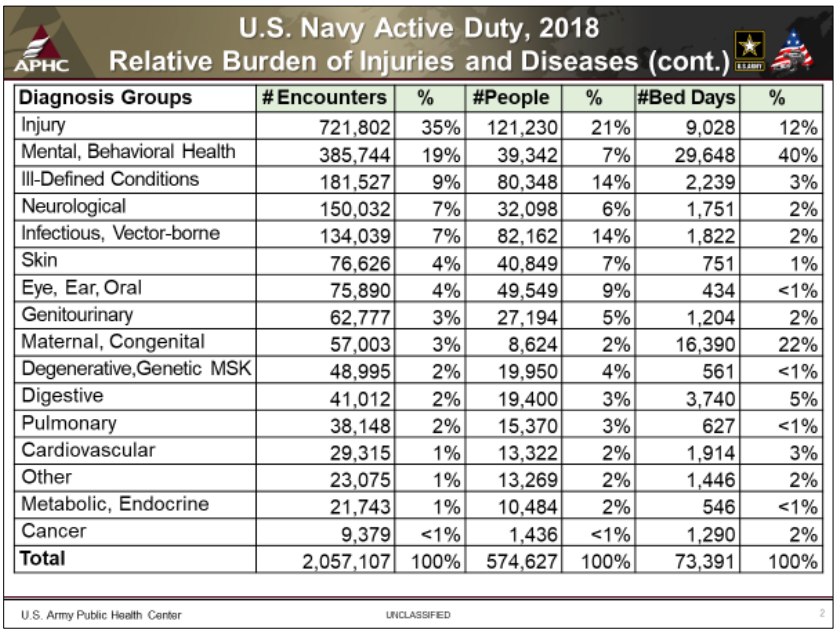
**Figure D-12. U.S. Marine Corps CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas by Injury Type and Primary Body Region; MIWG 2020**




| Diagnosis Groups | # Encounters | % | #People | % | #Bed Days | % |
|---|---|---|---|---|---|---|
| Injury | 721,802 | 35% | 121,230 | 21% | 9,028 | 12% |
| Mental, Behavioral Health | 385,744 | 19% | 39,342 | 7% | 29,648 | 40% |
| Ill-Defined Conditions | 181,527 | 9% | 80,348 | 14% | 2,239 | 3% |
| Neurological | 150,032 | 7% | 32,098 | 6% | 1,751 | 2% |
| Infectious, Vector-borne | 134,039 | 7% | 82,162 | 14% | 1,822 | 2% |
| Skin | 76,626 | 4% | 40,849 | 7% | 751 | 1% |
| Eye, Ear, Oral | 75,890 | 4% | 49,549 | 9% | 434 | <1% |
| Genitourinary | 62,777 | 3% | 27,194 | 5% | 1,204 | 2% |
| Maternal, Congenital | 57,003 | 3% | 8,624 | 2% | 16,390 | 22% |
| Degenerative,Genetic MSK | 48,995 | 2% | 19,950 | 4% | 561 | <1% |
| Digestive | 41,012 | 2% | 19,400 | 3% | 3,740 | 5% |
| Pulmonary | 38,148 | 2% | 15,370 | 3% | 627 | <1% |
| Cardiovascular | 29,315 | 1% | 13,322 | 2% | 1,914 | 3% |
| Other | 23,075 | 1% | 13,269 | 2% | 1,446 | 2% |
| Metabolic, Endocrine | 21,743 | 1% | 10,484 | 2% | 546 | <1% |
| Cancer | 9,379 | <1% | 1,436 | <1% | 1,290 | 2% |
| **Total** | 2,057,107 | 100% | 574,627 | 100% | 73,391 | 100% |

**Figures D-13a, b. U.S. Navy CY 2018 Medical Encounters, Burden of Injuries and Disease; MIWG 2020**

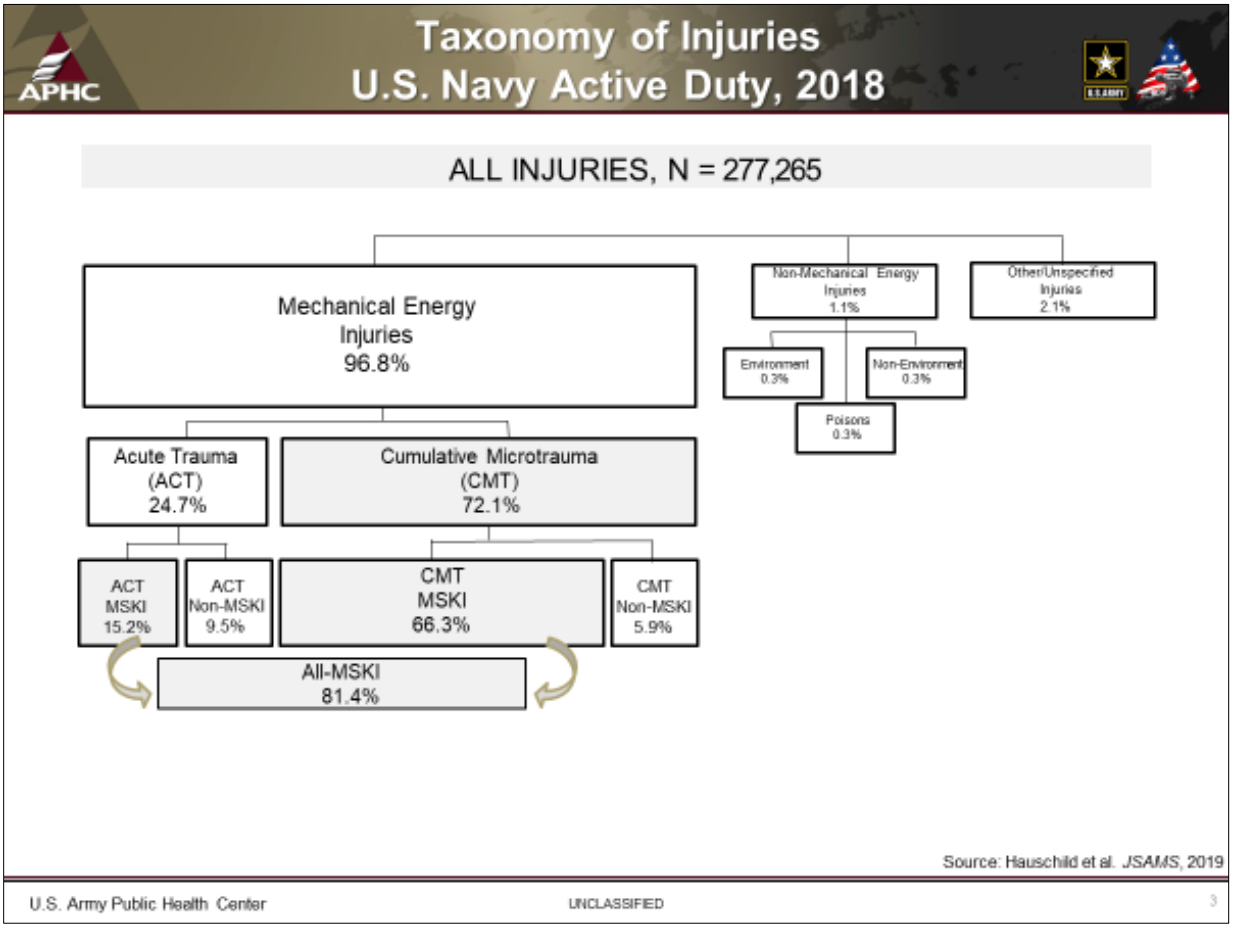
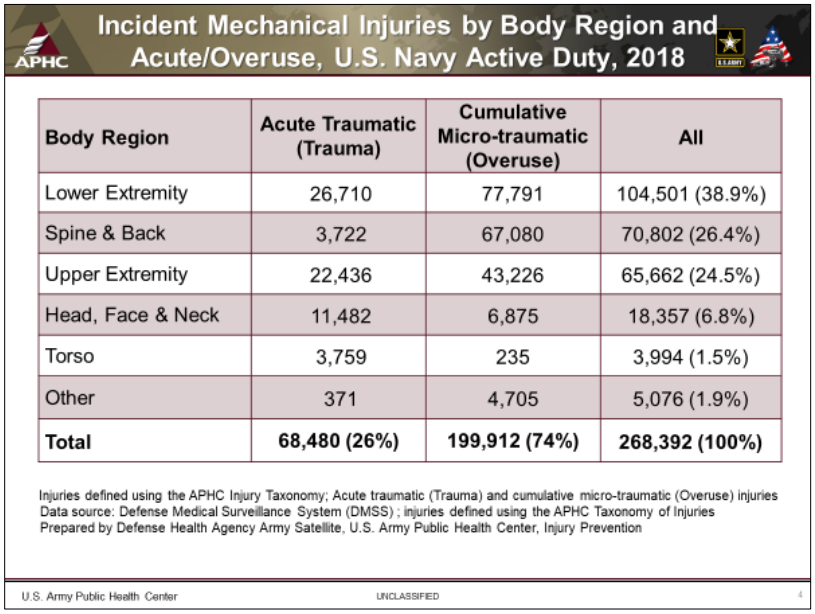



**Figure D-14. U.S. Navy CY 2018, Injuries from EHR- Categorized using the Taxonomy of Injuries; MIWG 2020**



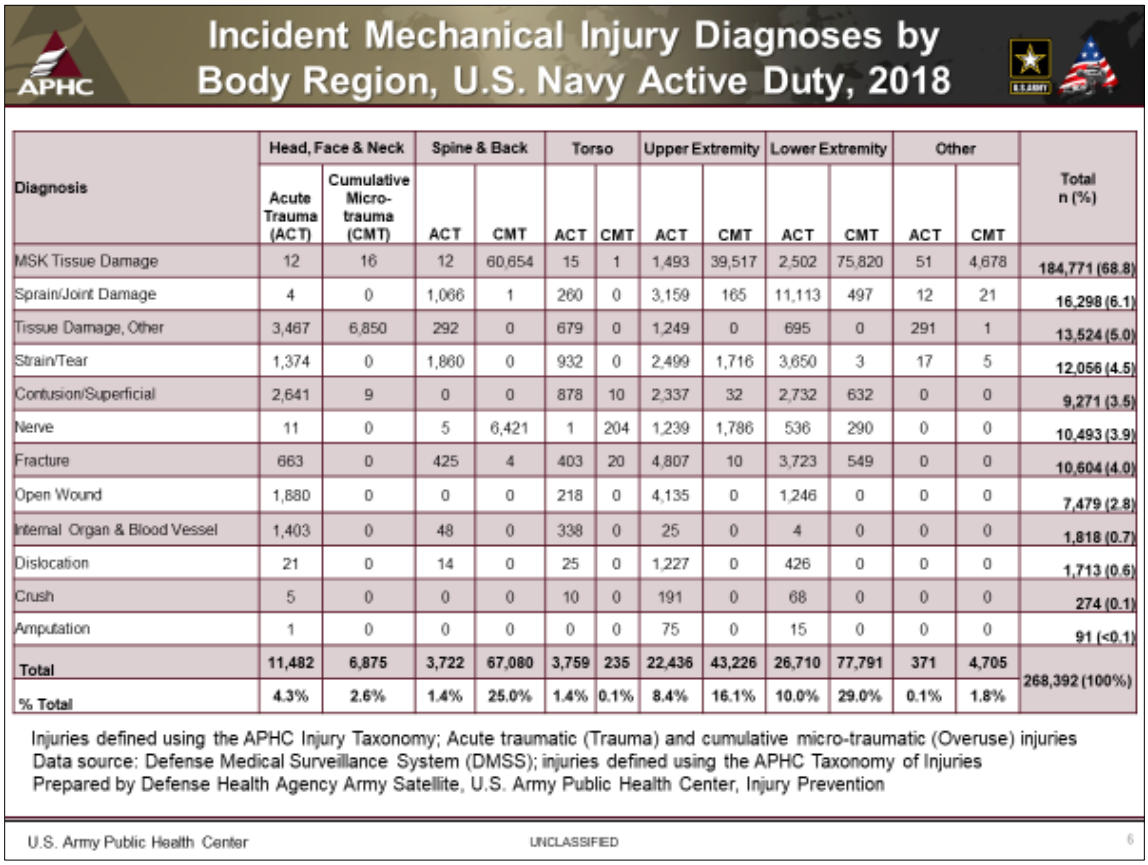
## Incident Mechanical Injuries by Body Region and Acute/Overuse, U.S. Navy Active Duty, 2018

| Body Region | Acute Traumatic (Trauma) | Cumulative Micro-traumatic (Overuse) | All |
|---|---|---|---|
| Lower Extremity | 26,710 | 77,791 | 104,501 (38.9%) |
| Spine & Back | 3,722 | 67,080 | 70,802 (26.4%) |
| Upper Extremity | 22,436 | 43,226 | 65,662 (24.5%) |
| Head, Face & Neck | 11,482 | 6,875 | 18,357 (6.8%) |
| Torso | 3,759 | 235 | 3,994 (1.5%) |
| Other | 371 | 4,705 | 5,076 (1.9%) |
| **Total** | **68,480 (26%)** | **199,912 (74%)** | **268,392 (100%)** |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS) ; injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

U.S. Army Public Health Center UNCLASSIFIED 4

**Figure D-15. U.S. Navy CY 2018 Mechanical Injuries from EHR- Acute and Cumulative Microtraumas (overuse) by Primary Body Region; MIWG 2020**



## Incident Mechanical Injury Diagnoses by Body Region, U.S. Navy Active Duty, 2018

| Diagnosis | Head, Face & Neck | | Spine & Back | | Torso | | Upper Extremity | | Lower Extremity | | Other | | Total n (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acute Trauma (ACT) | Cumulative Micro-trauma (CMT) | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | ACT | CMT | |
| MSK Tissue Damage | 12 | 16 | 12 | 60,654 | 15 | 1 | 1,493 | 39,517 | 2,502 | 75,820 | 51 | 4,678 | 184,771 (68.8) |
| Sprain/Joint Damage | 4 | 0 | 1,066 | 1 | 260 | 0 | 3,159 | 165 | 11,113 | 497 | 12 | 21 | 16,298 (6.1) |
| Tissue Damage, Other | 3,467 | 6,850 | 292 | 0 | 679 | 0 | 1,249 | 0 | 695 | 0 | 291 | 1 | 13,524 (5.0) |
| Strain/Tear | 1,374 | 0 | 1,860 | 0 | 932 | 0 | 2,499 | 1,716 | 3,650 | 3 | 17 | 5 | 12,056 (4.5) |
| Contusion/Superficial | 2,641 | 9 | 0 | 0 | 878 | 10 | 2,337 | 32 | 2,732 | 632 | 0 | 0 | 9,271 (3.5) |
| Nerve | 11 | 0 | 5 | 6,421 | 1 | 204 | 1,239 | 1,786 | 536 | 290 | 0 | 0 | 10,493 (3.9) |
| Fracture | 663 | 0 | 425 | 4 | 403 | 20 | 4,807 | 10 | 3,723 | 549 | 0 | 0 | 10,604 (4.0) |
| Open Wound | 1,880 | 0 | 0 | 0 | 218 | 0 | 4,135 | 0 | 1,246 | 0 | 0 | 0 | 7,479 (2.8) |
| Internal Organ & Blood Vessel | 1,403 | 0 | 48 | 0 | 338 | 0 | 25 | 0 | 4 | 0 | 0 | 0 | 1,818 (0.7) |
| Dislocation | 21 | 0 | 14 | 0 | 25 | 0 | 1,227 | 0 | 426 | 0 | 0 | 0 | 1,713 (0.6) |
| Crush | 5 | 0 | 0 | 0 | 10 | 0 | 191 | 0 | 68 | 0 | 0 | 0 | 274 (0.1) |
| Amputation | 1 | 0 | 0 | 0 | 0 | 0 | 75 | 0 | 15 | 0 | 0 | 0 | 91 (<0.1) |
| **Total** | **11,482** | **6,875** | **3,722** | **67,080** | **3,759** | **235** | **22,436** | **43,226** | **26,710** | **77,791** | **371** | **4,705** | **268,392 (100%)** |
| **% Total** | **4.3%** | **2.6%** | **1.4%** | **25.0%** | **1.4%** | **0.1%** | **8.4%** | **16.1%** | **10.0%** | **29.0%** | **0.1%** | **1.8%** | |

Injuries defined using the APHC Injury Taxonomy; Acute traumatic (Trauma) and cumulative micro-traumatic (Overuse) injuries
Data source: Defense Medical Surveillance System (DMSS); injuries defined using the APHC Taxonomy of Injuries
Prepared by Defense Health Agency Army Satellite, U.S. Army Public Health Center, Injury Prevention

U.S. Army Public Health Center UNCLASSIFIED 6

**Figure D-16. U.S. Navy CY 2018 Mechanical Injuries from EHR - Acute and Cumulative Microtraumas by Injury Type and Primary Body Region; MIWG 2020**

# APPENDIX E

## The ICD-10 Cause-Coding Quick Reference Tool (QRT) Recommended by the MIWG

## (as of September 2022)

Version 20220930
Military Injuries Working Group (MIWG) of the Defense Safety Oversight Committee (DSOC)

INFORMATION PAPER

Department of Defense (DoD) External Cause Coding Quick Reference Tool (QRT) to Document Cause, Activity, and Place of Occurrence Codes in Active Duty Service Members' Electronic Health Record (EHR)

1. PURPOSE. Provide guidance for the U.S. military medical community to improve both the quality and quantity of International Classification of Disease (ICD-10-CM) external cause codes (i.e., mechanism, activity, and place of occurrence codes) documented in Active Duty (AD) Service Members' Electronic Health Records (EHRs).

2. RELEVANCE. These external codes are critical for military public health surveillance experts to identify problematic injury scenarios. To implement effective injury prevention strategies to improve DOD's force readiness and reduce the medical and lost labor costs, it is essential to have an understanding of not just the number and types of injuries, but the circumstances that caused them.

3. BACKGROUND.

a. Diagnoses documented in the EHR provide the most complete data set for identifying injuries among AD Service Members (SMs). Injuries are identified as a specific set of injury ICD-10-CM[1] codes monitored by DoD public health organizations for annual injury reporting and to investigate injury trends.

b. The circumstances leading to each injury diagnosis can be captured in the EHR with external ICD-10 Causal mechanism, Activity, and Place of occurrence (V, X, Y, and W) codes. However, these "extra" codes are not required, so are currently very infrequently documented by the medical community.

c. A review of 2018 injury data from all Services (Air Force, Army, Navy, and Marines) by the Army Public Health Center (APHC) for the DoD Military Injuries Working Group (MIWG) showed that less than 10% of injuries had cause/activity/place coding. Of the external codes used, between one third and one half were generic or 'unspecified' cause/active/place codes that did not provide any value. The data was used by the MIWG to support the development of a "short list" of the most common useful codes (the **DoD External Cause Coding Quick Reference Tool (QRT)**). The APHC updates QRT cause codes as part of its annual Taxonomy of Injuries update.[1]

[1] Per MIWG, "injury" is defined as "Bodily damage caused by the instantaneous or gradual transfer of an external mechanical, thermal, chemical, electrical, radiological energy or the restricted transfer of an essential element such as oxygen from sources including acute trauma, overuse (repetitive micro-traumas), poisonings, extreme temperatures (e.g. heat/cold-weather injuries), and other environmental or man-made hazards. Long term effects and chronic conditions are not injuries but may be related to prior injury. The definition is adapted from the injury taxonomy in http://www.dtic.mil/docs/citations/AD1039481 and its updates. Questions can be referred to usarmy.apg.medcom-phc.mbx.injuryprevention@mail.mil

4. GUIDANCE.

a. Code selection. For all injuries (treated through both Inpatient and Outpatient visits), ensure useful external cause/activity/place codes are documented in EHR (example screenshots for documentation in AHLTA is available by request.)

i. Start with the **DoD Medical "External Cause Coding QRT**." Medical staff should become familiar with the categories and codes on this list. These are provided as a first check - *if these do not adequately describe an injury being treated, selection of a more appropriate code is encouraged*.

ii. Avoid non-specific ICD-10 cause codes, such as "X58XXX, Exposure to other specified factors." These provide no medical/ health/safety/or research value.

iii. Use of somewhat generic mechanism codes (e.g., W1839X, fall from same level) is only of value if used along with a specific Activity code (e.g., Y9367, Basketball) and a Place code (e.g., Y9239 military indoor athletic facility). In this example, a clearer picture of the injury problem is provided, so if data shows a large portion of falls occurs during basketball in military facilities, possible prevention strategies at these facilities (e.g., policy requirements for certain shoe wear, ankle braces, etc.) could be investigated or implemented. When known, military duty status may be captured *as an additional factor* (Y99.1 or Y99.8), but should only be used to supplement the cause codes as described by this information paper and QRT.

iv. When providers use ICD-10-CM "T-codes" for diagnoses (such as T391X2 "Poisoning by 4-Aminophenol derivatives, intentional self-harm" or "T63301, Toxic effect of unspecified spider venom"), a cause is inherently captured. However, even in these cases it may still be useful to document Place codes.

b. Reducing clinical documentation time.

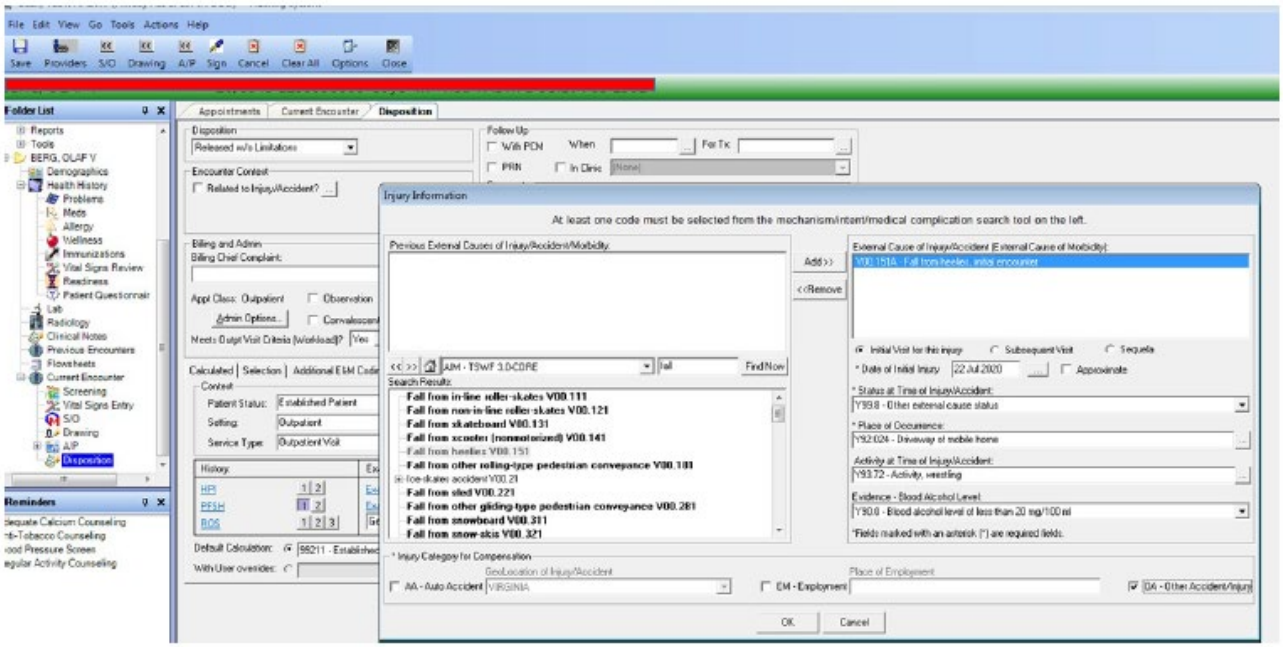
i. The primary reason these external cause codes have not been included in EHRs is because of the additional time required of providers/clinicians. Time is more importantly directed to their medical evaluation, diagnosis, and treatment.

ii. As a solution, various medical facilities use other medical support staff to record cause, activity, and place codes *before* or *after* a medical encounter. For example - medical technicians can input codes at the medical intake phase before the diagnosis, or nurses or coders can input after diagnoses. This practice is HIGHLY encouraged, as it both reduces the time burden on the clinicians, and can help improve the quantity and quality of the external ICD codes. All medical staff should therefore become familiar with the injury definition and the **QRT.**

c. Routinely monitor local use of cause-coding. Certain codes for causes or activities not on the QRT may be found to relevant to site-specific locations or populations. Questions or suggestions regarding codes listed on the **QRT** can be submitted to usarmy.apg.medcom-aphc.mbx.injuryprevention@health.mil.

**TIP No. 010-0523**

Military Injury Work Group (MIWG) of the Defense Safety Oversight Committee (DSOC); 23 November 2021

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Version 20220930
Military Injuries Working Group (MIWG) of the Defense Safety Oversight Committee (DSOC)

## DoD Medical External Cause Coding Quick Reference Tool (QRT)

*Suggested Cause, Activity, & Place of Occurrence ICD-10 Codes for Injury Diagnoses**

# CAUSE Mechanism Codes* common V, W, X, & Y codes for describing injury mechanism

## ➲ INTENTIONAL INJURIES *(caused by self/other)*

| | | |
|---|---|---|
| Military War Operations [a] | Y36.230 | War operations involving explosion of improvised explosive device [IED], military personnel |
| | Y37.430 | Military operations involving other firearms discharge, military personnel |
| Assault [b] | Y04.0XX | Assault by unarmed brawl or fight |
| | Y09.0 | Assault by unspecified means |
| Self-harm [b] | X78.8XX | Intentional self-harm by sharp object |

## ➲ UN-INTENTIONAL INJURIES *(accidental)*

| | | |
|---|---|---|
| Overexertion [c] | X50.0XX | Overexertion from strenuous movement or load |
| | X50.1XX | Overexertion from prolonged static or awkward postures |
| | X50.3XX | Overexertion from repetitive movements (Overuse) |
| Falls/Slips/ Trips [c] | W01.0XX | Fall on same level from slipping, tripping and stumbling without subsequent striking against |
| | W00.0XX | Fall on same level due to ice and snow |
| | W10.9XX | Fall (on) (from) unspecified stairs and steps |
| | W17.2XX | Fall into hole |
| | W17.89X | Other fall from one level to another |
| | W18.39X | Other fall on same level |
| Struck by/against [c] | W20.8XX | Other cause of strike by thrown, projected or falling object |
| | W22.8XX | Striking against or struck by other objects |
| | W50.0XX | Accidental hit or strike by another person |
| | W23.XXX | Caught, crushed, jammed, or pinched in or between objects |
| Motor/Tactical Vehicle [b] | V23.49X | Motorcycle driver injured in collision with other vehicle in traffic accident [c] |
| | V28.49X | Motorcycle driver injured in non-collision transport accident [c] |
| | V29.99X | Motorcycle rider (driver) (passenger) injured in unspecified traffic accident [c] |
| | V43.52X | Vehicle driver injured in collision with other vehicle [c] |
| | V49.9XX | Vehicle occupant (driver/passenger) injured in unspecified traffic accident [c] |
| | V89.2XX | Person injured in unspecified motor-vehicle accident [c] |
| Cut/Pierce [c] | W26.0XX | Contact with knife |
| | W26.8XX | Contact with other sharp object(s), not elsewhere classified |
| | W45.8XX | Other foreign body or object entering through skin |
| Firearm [b] | W34.00X | Accidental discharge from unspecified firearms or gun |
| Heat/Cold [c] | X30.XXX | Exposure to excessive natural heat |
| | X31.XXX | Exposure to excessive natural cold |
| Animal/Insect [d] | W54.0XX | Bitten by dog |
| | W55.01X | Bitten by cat |
| | W57.XXX | Bitten or stung by nonvenomous insect and other nonvenomous arthropods |
| Parachuting [b] | V97.22X | Parachutist injured on landing [c] |
| | V97.29X | Other parachutist accident [c] |

*[a] No Activity or Place of Occurrence code is needed*
*[b] No Activity code is needed, but please provide a Place of Occurrence code*
*[c] Please also provide an "Activity" code and "Place of Occurrence" code such as those suggested on next page*
*[d] An "Activity" code could also be useful, but at a minimum please provide a "Place of Occurrence" code such as suggested on next page*

By documenting Cause, Activity and Place of Occurrence codes for all injury diagnoses medical staff will help inform injury prevention policy.
* This ***initial set of Cause codes to consider*** reflects particularly common codes based on a Defense Safety Oversight Council, Military Injuries Work Group review of 2018 military ICD-10-CM injury data IAW the injury definition in http://www.dtic.mil/docs/citations/AD1039481.
*Other codes not on this list can also be used, but please avoid using unspecified/generic codes as they do not provide useable data.*

Version 20220930
Military Injuries Working Group (MIWG) of the Defense Safety Oversight Committee (DSOC)

## DoD Medical External Cause Coding Quick Reference Tool (QRT)

*Suggested Cause, Activity, & Place of Occurrence ICD-10 Codes for Injury Diagnoses**

| ACTIVITY Codes** | | |
|---|---|---|
| Military training and operational activities | Y93.02 | Running *(includes personal or with unit, distance, or sprints)* |
| | Y93.01 | Walking, marching and hiking *(includes military Ruck Marching , patrolling, land navigation)* |
| | Y93.B3 | Free weights used for strength exercising |
| | Y93.B2 | Push-ups, pull-ups, sit-ups *(includes military PT non-running, unit or individual)* |
| | Y93.A5 | Obstacle courses |
| | Y93.75 | Martial arts *(includes military COMBATIVES training)* |
| | Y93.33 | BASE jumping *(do not use for parachuting - see Cause codes)* |
| | Y93.39 | Climbing, rappelling, and jumping off *(includes natural or man-made objects)* |
| | Y93.H1 | Activity, digging, shoveling and raking *(includes for sand bags, trenches, fox holes)* |
| | Y93.19 | Activity, other involving water and watercraft *(includes shipboard activities)* |
| | Y93.B9 | Other activity involving muscle strengthening *(exercise machine, military lifting task)* |
| | Y93.A9 | Other activity involving cardiorespiratory conditioning *(exercise machine, aerobic task)* |
| Team-based Sports | Y93.67 | Basketball |
| | Y93.61 | American tackle football |
| | Y93.66 | Soccer |
| | Y93.62 | American flag or touch football |
| | Y93.64 | Baseball |
| | Y93.68 | Volleyball (beach, court) |
| | Y93.63 | Rugby |
| | Y93.69 | Other sports and athletics played as a team or group |
| Individual Sports & Recreation | Y93.23 | Snow (alpine) (downhill) skiing, snow-boarding, sledding, tobogganing and snow tubing |
| | Y93.74 | Frisbee *(includes Ultimate Frisbee)* |
| | Y93.55 | Bike riding |
| | Y93.72 | Wrestling |
| | Y93.51 | Roller skating (inline) and skateboarding |
| | Y93.71 | Boxing |
| | Y93.11 | Swimming |
| | Y93.44 | Trampolining |
| | Y93.41 | Dancing |
| | Y93.59 | Other sports, athletics (or recreation), played individually |
| Other personal/ work activities | Y93.H9 | Activity involving other exterior property, land maintenance, building and construction |
| | Y93.E9 | Activity involving interior property and clothing maintenance |
| | Y93.C | Activities involving computer tech and electronic devices |
| | Y93.G1 | Food preparation and clean up |
| | Y93.E1 | Personal bathing and showering |
| | Y93.83 | Rough housing and horseplay |
| | Y93.F9 | Caregiving (home, daycare, medical facility, etc.) |
| | Y93.K9 | Animal care |
| **PLACE OF OCCURRENCE Codes**** | | |
| Military Property | Y92.39 | Indoor athletic or recreation area |
| | Y92.328 | Outdoor athletic/ parade field or recreation area |
| | Y92.84 | Other outdoor training area (NOT athletic/parade field or recreation area) |
| | Y92.133 | Barracks/military living facility |
| | Y92.488 | Roadway |
| | Y92.138 | Other military facility (motor pool, medical clinic, shooting range, industrial/construction site, etc.) |
| NON-military property | Y92.009 | Commercial property/facility |
| | Y92.019 | Private home |
| | Y92.410 | Roadway |
| | Y92.830 | Park, wilderness, or recreation area |
| | Y92.832 | Beach or waterway |
| **SUPPLEMENTARY DUTY STATUS Codes (if known)** | | |
| **Note: These are not "cause codes" and should ONLY be used *in conjunction with* selected cause code(s)** | | |
| On Duty | Y99.1 | Military activity |
| Off Duty | Y99.8 | Other external cause status |

** This initial set of Activity and Place codes to consider reflects particularly common codes based on a review of military ICD-10-CM injury data. Other codes not on this list may also be used, but please avoid using unspecified/generic codes as they do not provide useful data.

# APPENDIX F

## Comparison of CY 2018 AD SMs' Injuries Reported in Services' Safety Reporting Systems with Injuries Captured in Medical Data

## Final Presentation by the MIWG's Safety SubGroup 4th Quarter 2021

## F-1. Background.

By DoD policy, Services are required to report mishaps and accidents in an established system. Report criteria include damage to equipment and/or injury or illness to personnel (military and civilian). The MIWG analysis focused on the incidents that resulted in harm to personnel health. Figure F-1 summarizes the general safety classes.

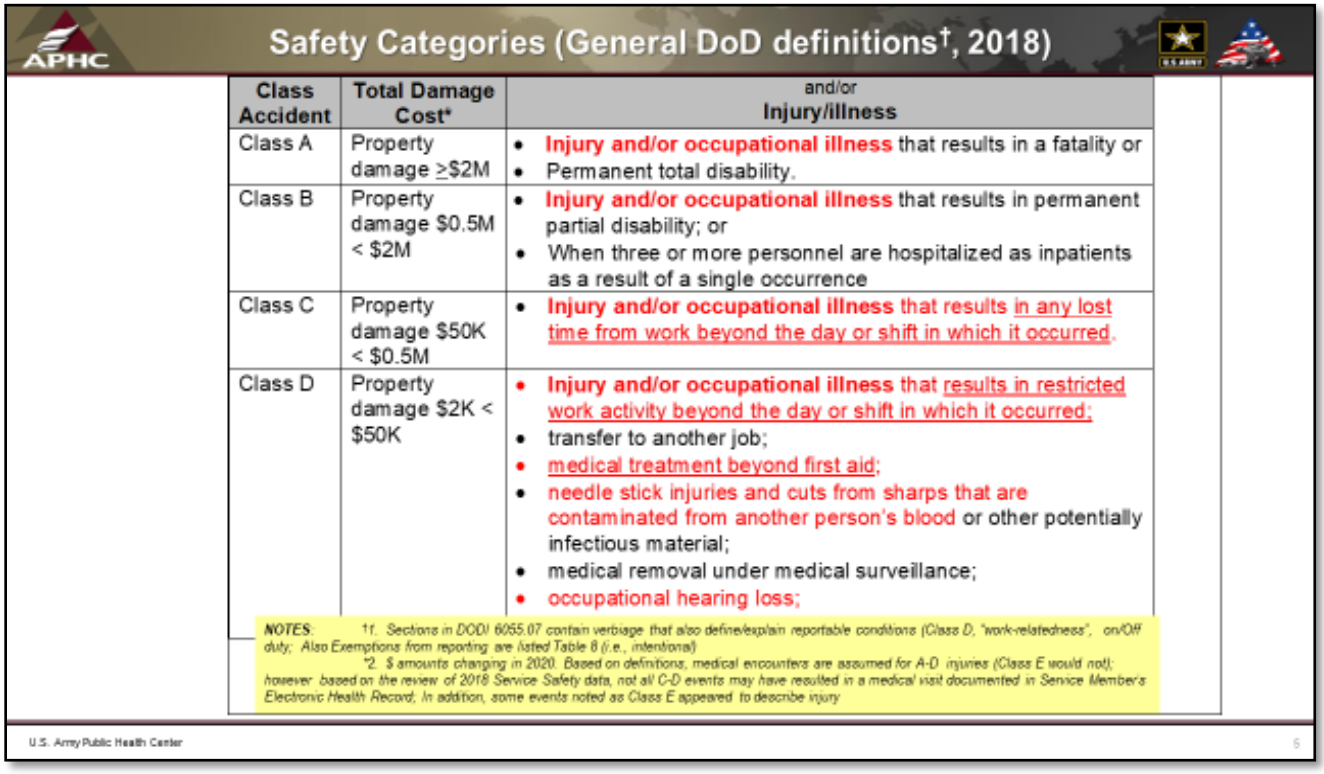



**Figure F-1. Safety Categories, Provided by DSOC and SIM WG to MIWG**

Though each are similar, at the time of this effort, each Service had its own safety regulation and electronic mishap reporting system. The USAF, USN, and USMC used the same electronic reporting structure. The variables describing the event and injury scenario in the USA system was similar but with some slightly different variables and terms.

The injury taxonomy was used as the framework to compare the numbers and taxonomic distribution of injury types between the two systems (medical and safety) for each Service by applying the crosswalk of the MIWG injury and related terms (Figure 3). Since no personal identification data were collected, the relationship of and injury reported in the two systems could not be determined, so the analysis only characterized the number and distribution of types of injuries in each system.

## F-2. Analysis

Each Service provided its extracted mishaps data (Excel format) for CY 2018 AD SMs. The USN and USN data were provided as a combined set. There over 5,000 report events for each

Service. Data sets were cleaned to remove Civilians and contractors. Each Service has some AD events that occurred to SMs from other Services, but these were a small portion (less than 2% of overall datasets).

Two separate DCPH-A public health scientists conducted separate analyses of each data set. These injury taxonomy subject-matter experts (SMEs) separately reviewed all variables for each line-item report, though key variables used included the one-liner narrative event description, injury type, and activity. Other variables (employment duty status, and Class of injury) were also critical for final results. The SMEs independently assigned taxonomy categories using the crosswalk (Figure F-3) to guide their review of each safety injury event and assign a Taxonomy category. Differences were discussed to ensure consensus when needed.

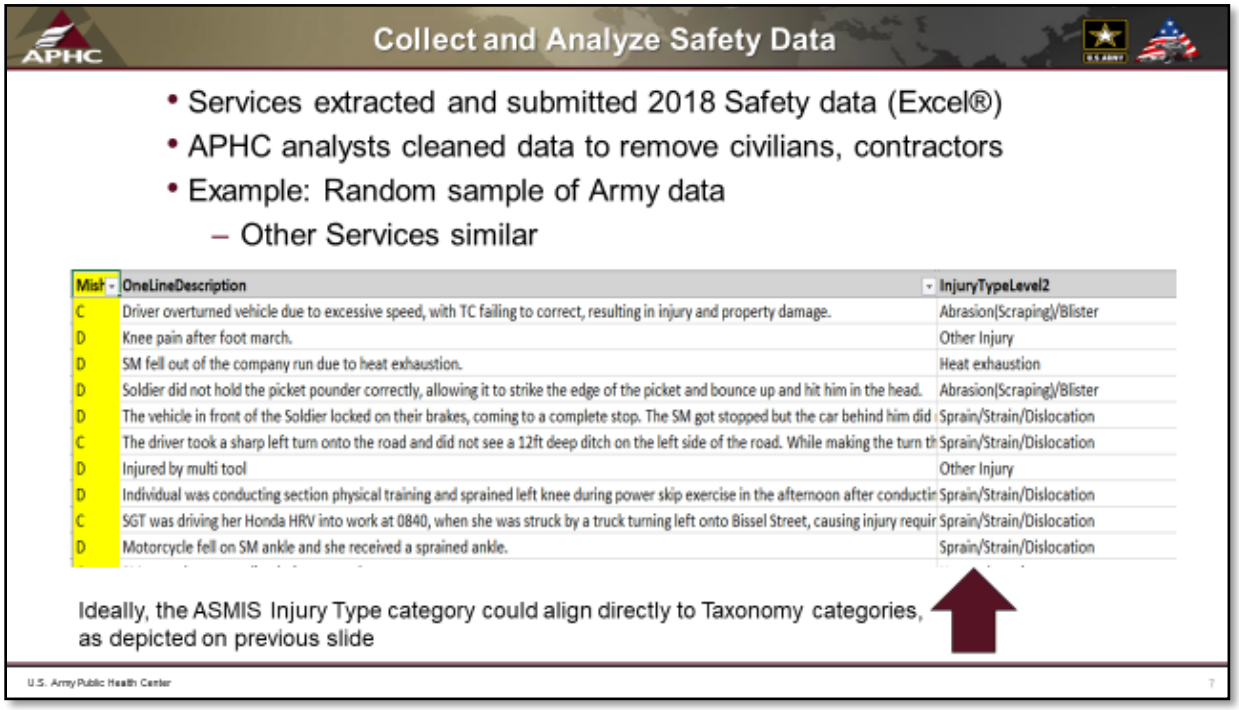



**Figure F-2. Example Safety Data (Army), AD SM CY 2018, MIWG AD SMs, CY 2018, MIWG**

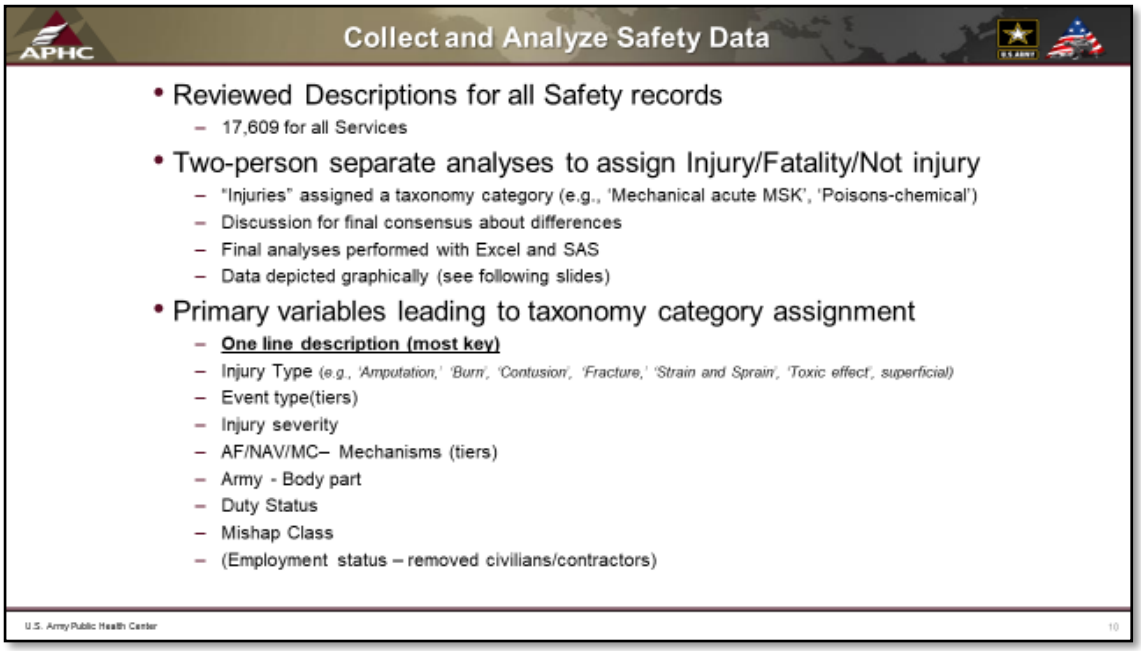


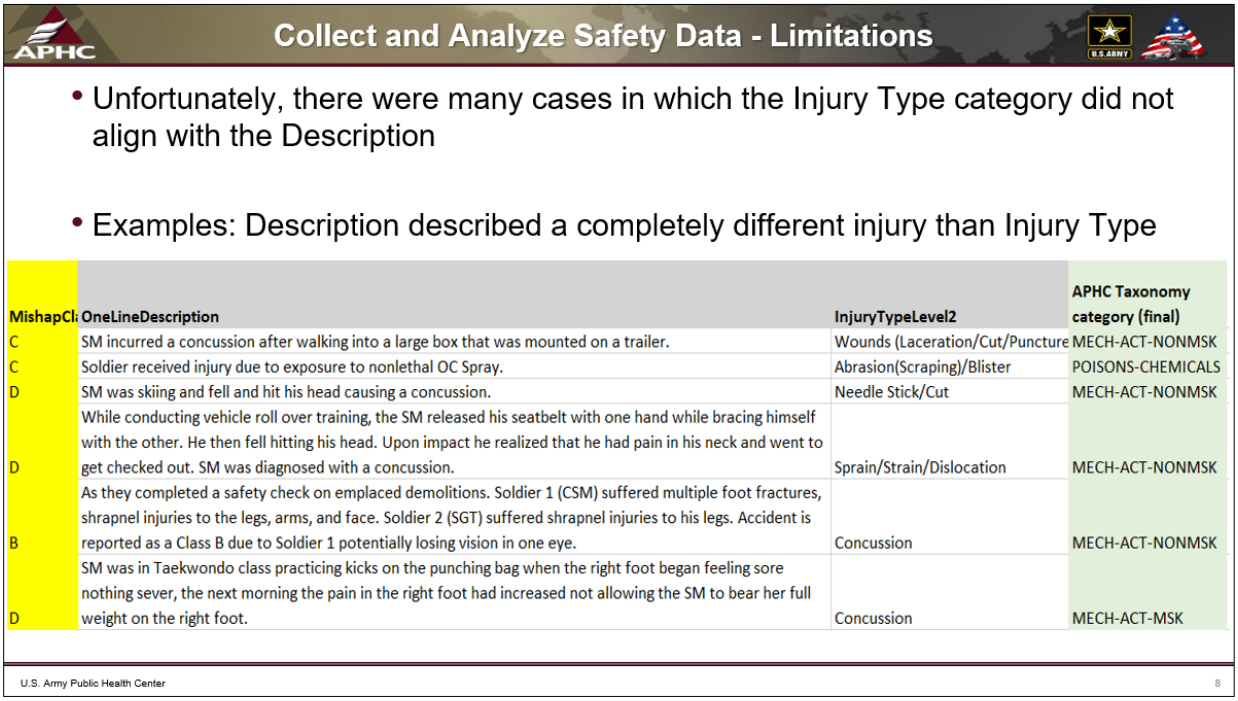

**Figure F-3. Comparison Analysis of Safety and Medical Injury Data, AD SM CY 2018, MIWG**

While not all variable fields provided consistent information, SMEs developed general rules and discussed all cases to ensure consensus. Some example rules include:

- Chest pain, abdomen pain, dehydration, or lightheadedness were defined as NOT INJURY, unless description indicates other injury-related external energy cause (heat, a fall, etc.).
- Foreign body in eye were categorized as “mechanical acute non-MSK injuries” as opposed to “other Foreign Body” injury type to align with S055-S057 and T150-T159 ‘foreign body in eye’ taxonomy code categorizations.
- Liquid/fluid in eye (fuel, grease, paint, etc.) were categorized as Poisons-Chemicals.
- If safety report noted decompression sickness (DCS), this was captured as an “Environmental –Pressure” injury to align with T703 taxonomy categorization.
- Unless specifically noted as pressure-related, a pulmonary embolism (PE) was considered NOT INJURY.
- Hypoxia from planes/diving was captured as an injury under ‘OTHER- ABSENCE.’
- Electric shocks were captured as the subcategory of injuries ‘NON-MECH NonEnv.’

## F-3. Limitations.

SMEs discovered that reliance of the safety terms describing many of the injuries did not appear to represent the incident as described in the narrative account (Figures F-4 and F-5).



## Collect and Analyze Safety Data - Limitations

- Unfortunately, there were many cases in which the Injury Type category did not align with the Description
- Examples: Description described a completely different injury than Injury Type

| MishapCl | OneLineDescription | InjuryTypeLevel2 | APHC Taxonomy category (final) |
|---|---|---|---|
| C | SM incurred a concussion after walking into a large box that was mounted on a trailer. | Wounds (Laceration/Cut/Puncture | MECH-ACT-NONMSK |
| C | Soldier received injury due to exposure to nonlethal OC Spray. | Abrasion(Scraping)/Blister | POISONS-CHEMICALS |
| D | SM was skiing and fell and hit his head causing a concussion. | Needle Stick/Cut | MECH-ACT-NONMSK |
| D | While conducting vehicle roll over training, the SM released his seatbelt with one hand while bracing himself with the other. He then fell hitting his head. Upon impact he realized that he had pain in his neck and went to get checked out. SM was diagnosed with a concussion. | Sprain/Strain/Dislocation | MECH-ACT-NONMSK |
| B | As they completed a safety check on emplaced demolitions. Soldier 1 (CSM) suffered multiple foot fractures, shrapnel injuries to the legs, arms, and face. Soldier 2 (SGT) suffered shrapnel injuries to his legs. Accident is reported as a Class B due to Soldier 1 potentially losing vision in one eye. | Concussion | MECH-ACT-NONMSK |
| D | SM was in Taekwondo class practicing kicks on the punching bag when the right foot began feeling sore nothing sever, the next morning the pain in the right foot had increased not allowing the SM to bear her full weight on the right foot. | Concussion | MECH-ACT-MSK |

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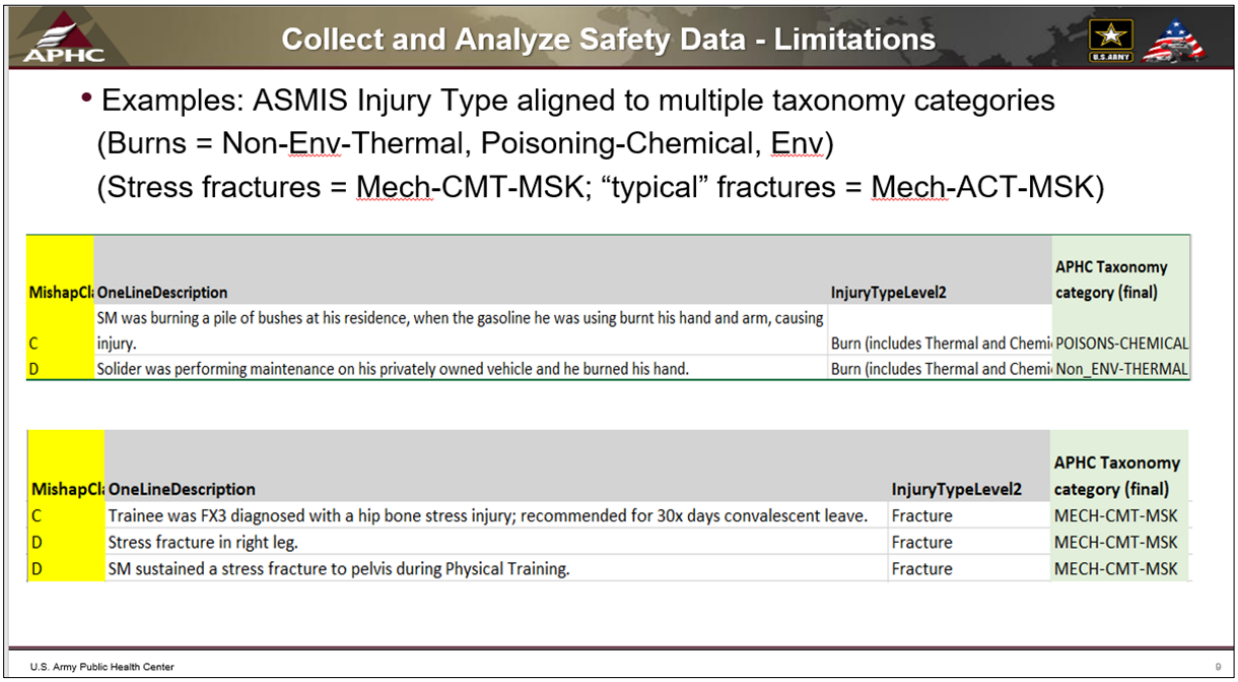
**Figure F-4. Limitations of Comparison Analysis of Safety and Medical Injury Data, AD SM CY 2018, MIWG**



## Collect and Analyze Safety Data - Limitations

- Examples: ASMIS Injury Type aligned to multiple taxonomy categories
  (Burns = Non-Env-Thermal, Poisoning-Chemical, Env)
  (Stress fractures = Mech-CMT-MSK; "typical" fractures = Mech-ACT-MSK)

| MishapCl | OneLineDescription | InjuryTypeLevel2 | APHC Taxonomy category (final) |
|---|---|---|---|
| C | SM was burning a pile of bushes at his residence, when the gasoline he was using burnt his hand and arm, causing injury. | Burn (includes Thermal and Chemi | POISONS-CHEMICAL |
| D | Solider was performing maintenance on his privately owned vehicle and he burned his hand. | Burn (includes Thermal and Chemi | Non_ENV-THERMAL |

| MishapCl | OneLineDescription | InjuryTypeLevel2 | APHC Taxonomy category (final) |
|---|---|---|---|
| C | Trainee was FX3 diagnosed with a hip bone stress injury; recommended for 30x days convalescent leave. | Fracture | MECH-CMT-MSK |
| D | Stress fracture in right leg. | Fracture | MECH-CMT-MSK |
| D | SM sustained a stress fracture to pelvis during Physical Training. | Fracture | MECH-CMT-MSK |

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**Figure F-5. Examples of Limitations of Comparison Analysis of Safety and Medical Injury Data, AD SM CY 2018, MIWG**

## F-4. Results.

Figures F-6 through F-9 provide the Service-specific results, and Figure F-10 provides the final comparison.

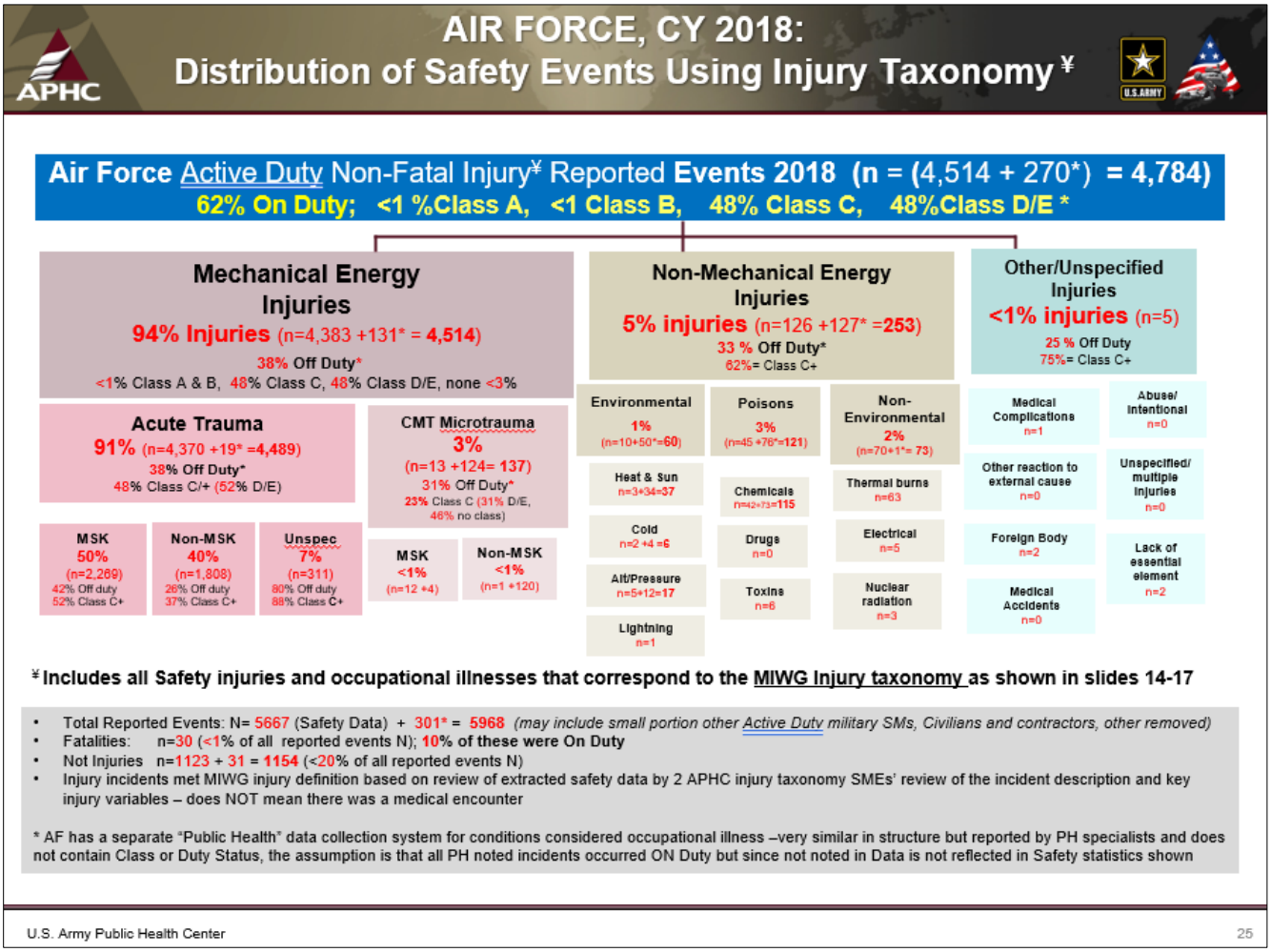



**Figure F-6. Air Force Distribution of Injuries* in CY 2018, Safety System (*as defined by the MIWG)**

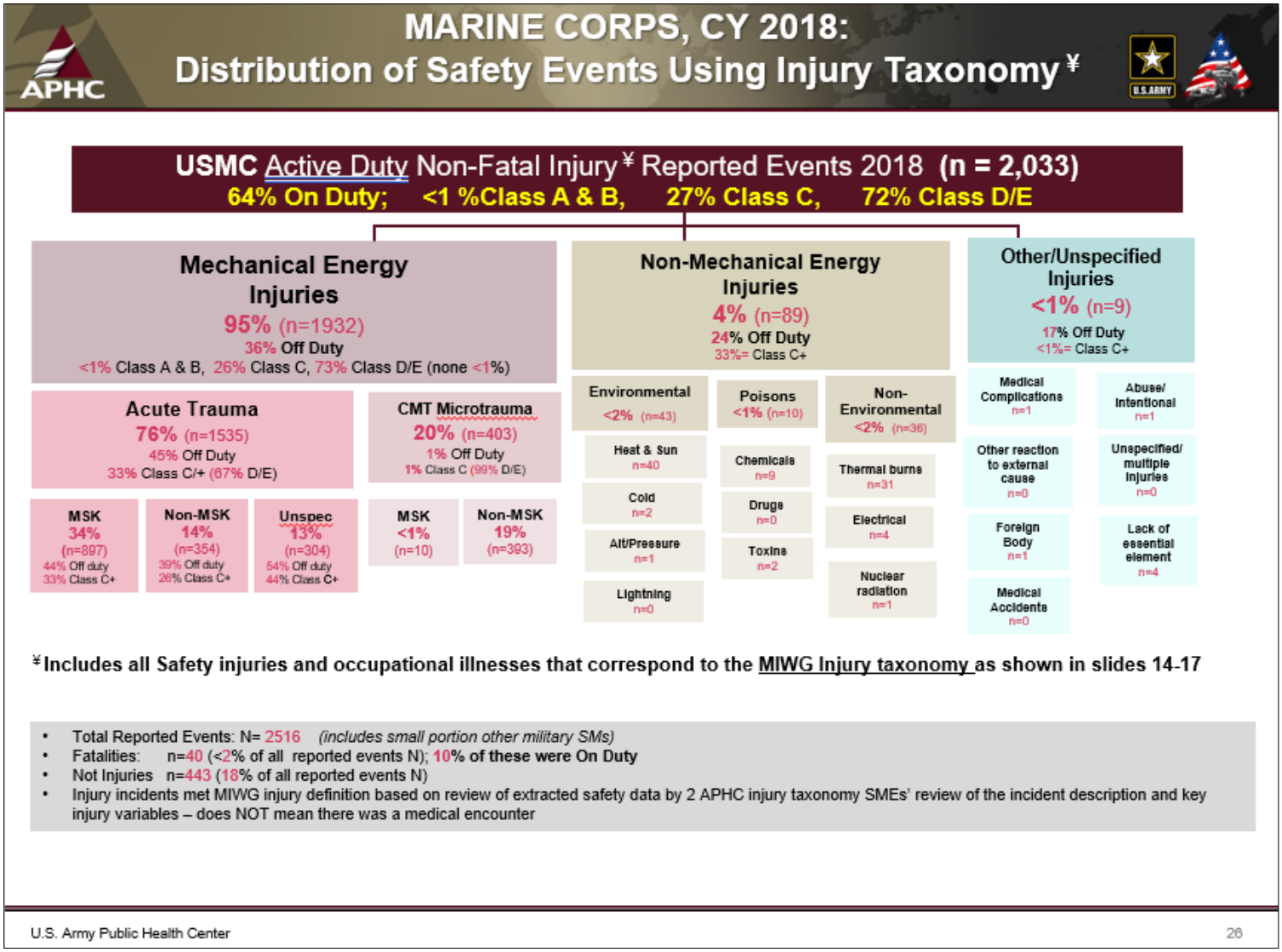



**Figure F-7. Marine Corp Distribution of Injuries* in AD SMs, CY 2018, Safety System (*as defined by the MIWG)**

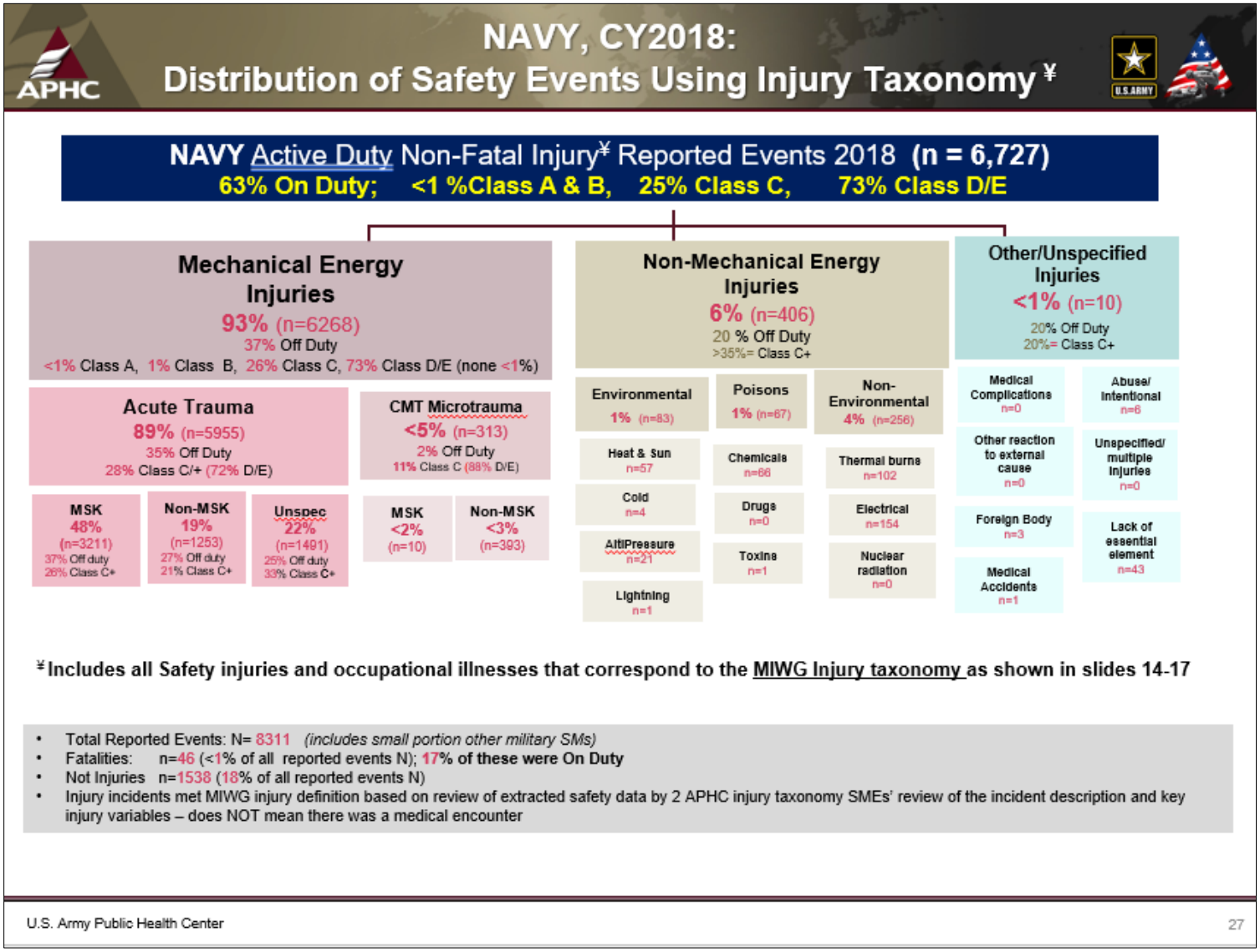



**Figure F-8. Navy Distribution of Injuries* in AD SMs, CY 2018, Safety System (*as defined by the MIWG)**

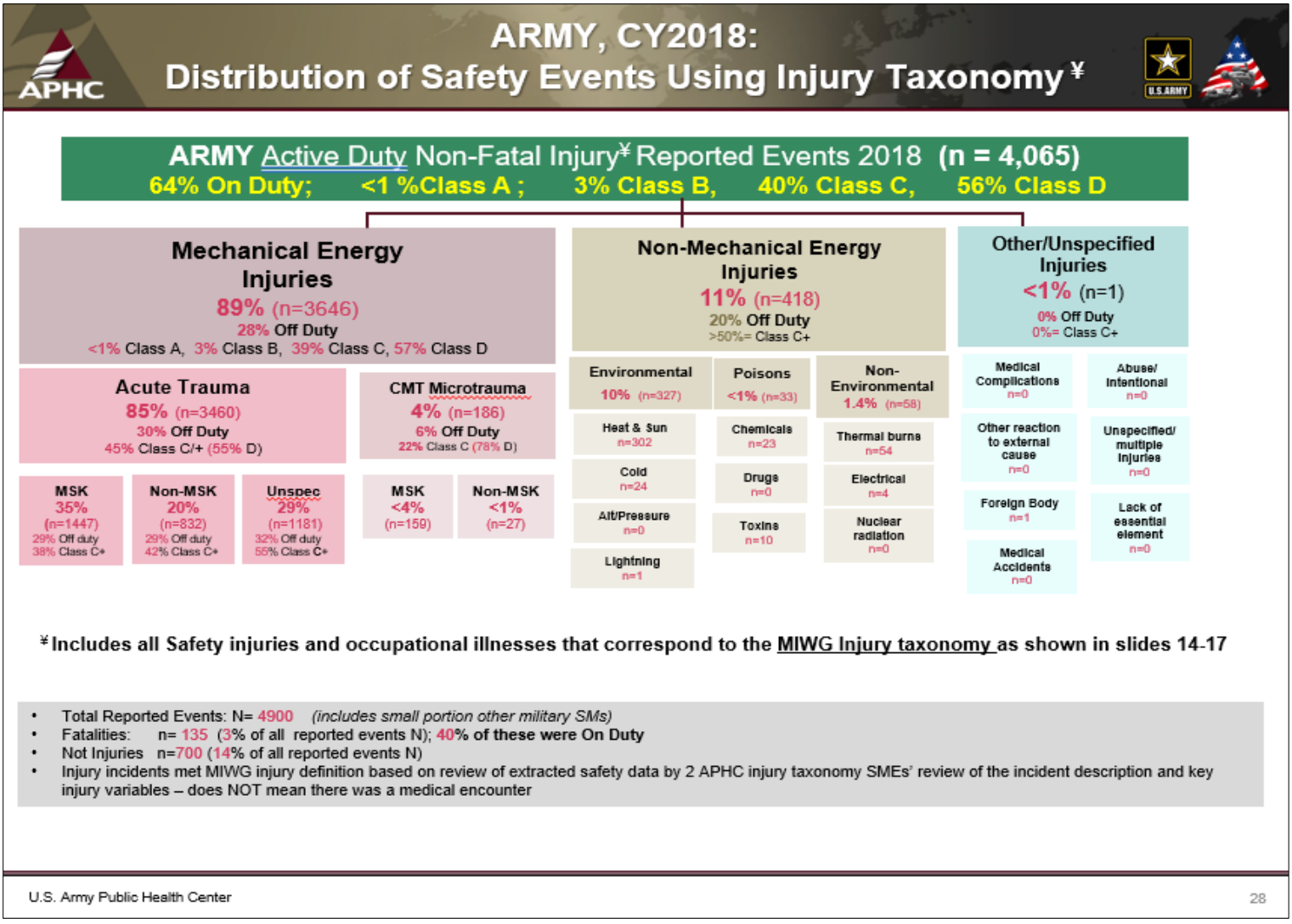
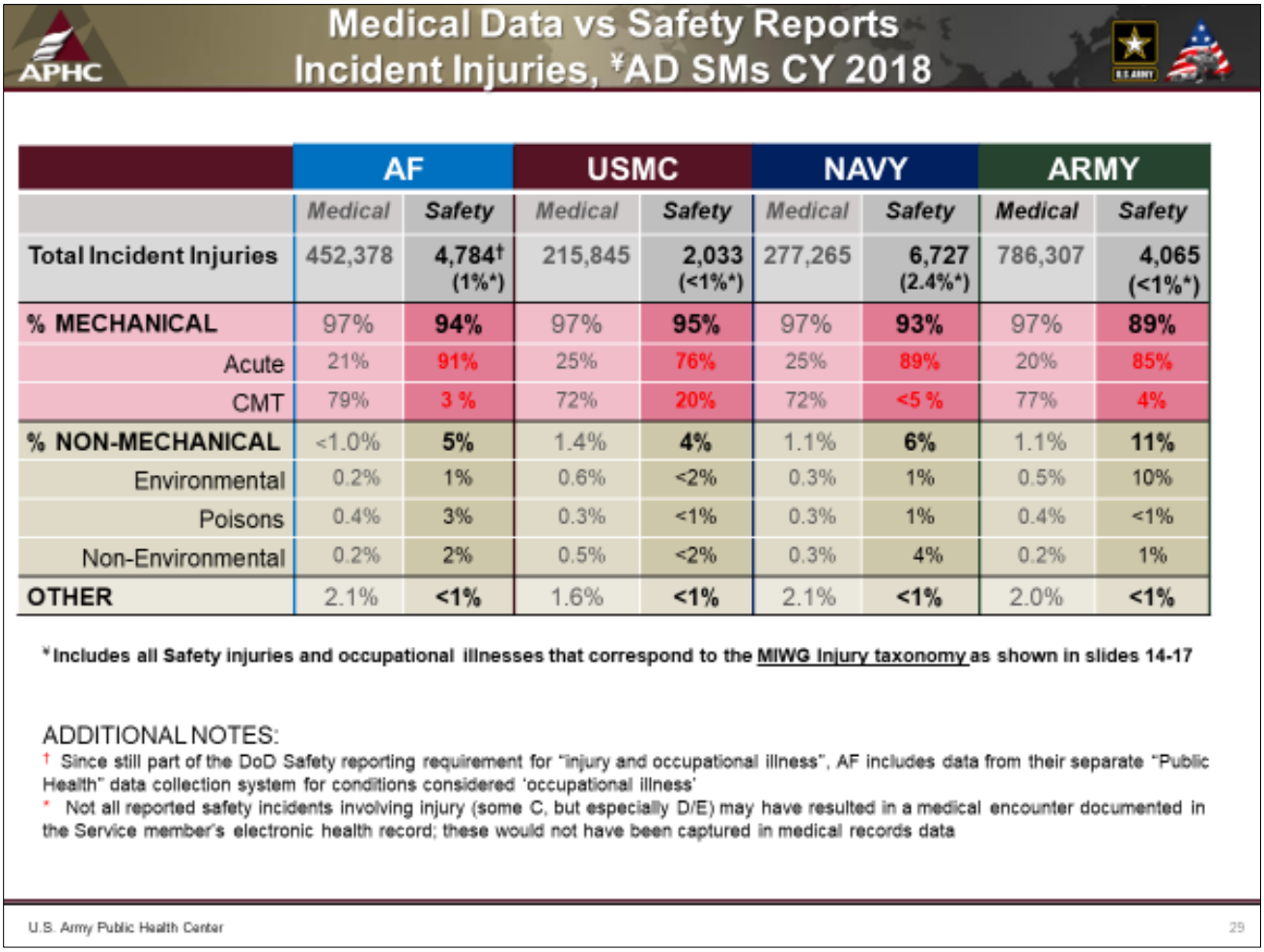



**Figure F-9. Army Distribution of Injuries* in AD SMs, CY 2018, Safety System (*as defined by the MIWG)**



## Medical Data vs Safety Reports
## Incident Injuries, ¥AD SMs CY 2018

| | AF | | USMC | | NAVY | | ARMY | |
|---|---|---|---|---|---|---|---|---|
| | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* |
| **Total Incident Injuries** | 452,378 | **4,784† (1%*)** | 215,845 | **2,033 (<1%*)** | 277,265 | **6,727 (2.4%*)** | 786,307 | **4,065 (<1%*)** |
| **% MECHANICAL** | 97% | **94%** | 97% | **95%** | 97% | **93%** | 97% | **89%** |
| Acute | 21% | **91%** | 25% | **76%** | 25% | **89%** | 20% | **85%** |
| CMT | 79% | **3 %** | 72% | **20%** | 72% | **<5 %** | 77% | **4%** |
| **% NON-MECHANICAL** | <1.0% | **5%** | 1.4% | **4%** | 1.1% | **6%** | 1.1% | **11%** |
| Environmental | 0.2% | **1%** | 0.6% | **<2%** | 0.3% | **1%** | 0.5% | **10%** |
| Poisons | 0.4% | **3%** | 0.3% | **<1%** | 0.3% | **1%** | 0.4% | **<1%** |
| Non-Environmental | 0.2% | **2%** | 0.5% | **<2%** | 0.3% | **4%** | 0.2% | **1%** |
| **OTHER** | 2.1% | **<1%** | 1.6% | **<1%** | 2.1% | **<1%** | 2.0% | **<1%** |

*** Includes all Safety injuries and occupational illnesses that correspond to the MIWG Injury taxonomy as shown in slides 14-17**

ADDITIONAL NOTES:

† Since still part of the DoD Safety reporting requirement for "injury and occupational illness", AF includes data from their separate "Public Health" data collection system for conditions considered 'occupational illness'

* Not all reported safety incidents involving injury (some C, but especially D/E) may have resulted in a medical encounter documented in the Service member's electronic health record; these would not have been captured in medical records data

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**Figure F-10. Incident Injuries* (numbers) in AD SMs Medical Reports Compared to Number of Injuries in Safety Reports, CY 2018, (*as defined by the MIWG)**