# U.S. Defense Safety Oversight Council (DSOC) Military Injuries Working Group (MIWG): A Collaboration to Reduce Military Injuries

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## Abstract

**Purpose:** This presentation describes the successes of a collaborative workgroup of U.S. military agencies involved in various aspects of military injury prevention. The Military Injuries Working Group (MIWG) was established because injuries remain a leading barrier to U.S. military medical readiness, with over 4.7 million medical encounters and an estimated 25 million days of limited duty related to injury among U.S. Service members annually.

**Methods:** The MIWG was chartered in 2019 under the Defense Safety Oversight Council (DSOC), with members from 15 military organizations representing safety, public health, and research. Initial MIWG objectives assigned by the DSOC included establishing a definition of injury and developing standardized reporting methods for analyses of military Service members' medical records. For these objectives, the MIWG selected the Army Public Health Center's Taxonomy of Injuries and applied it to analyses of injury-related medical encounters for all U.S. military Services (Army, Navy, Marine Corps, Air Force). Subsequent MIWG objectives resulted in a quick reference tool (QRT) to improve use of injury external cause codes in medical records, and a comparison of the medical injury data to U.S. military safety investigation data.

**Results:** Across all U.S. Services, injury was the leading reason for seeking medical care (42.0 - 49.7% of all medical encounters). Most injuries resulted from mechanical energy transfers (>95%), affected the musculoskeletal system (>82%), and were due to cumulative microtrauma or "overuse" (>72%). The top three mechanisms of unintentional injury, representing nearly 50% of all cause-coded injury medical encounters across all Services, were overexertion, falls, and struck by/against. Less than 10% of injuries in the medical records had documented causes, while nearly 100% of safety data contained cause information. However, safety data captured only a small proportion of initial injuries reported in medical records (on average <1%).

**Conclusions:** The MIWG's analyses revealed similar distributions of injury categories and leading causes across the U.S. Services. With improved cause coding with QRT use, medical records will provide actionable information into underlying causes of injury to supplement safety data. Investigations of medical and safety data and comparisons across Services support the development of policy, programs, and initiatives to reduce military injuries.

**Military Impact:** Injuries are a complex, multi-faceted military health issue. As such, data on injurious sources of energy transfer and causes of injury furthers understanding that enables prevention planning. Partnerships, such as those formed under the DSOC MIWG, are essential to advancing military injury prevention.

## Background

- Injuries are a leading barrier to military medical readiness, recognized by the U.S. Department of Defense safety and U.S. Army medical community.[1,2] Injuries to military personnel result in death, disability, and limited duty. Rates vary by Service, training status, occupation, and individual characteristics.[3] Addressing this large and complex problem requires multidisciplinary partnerships focused on a range of injury types and causes.

## Methods

- The Military Injuries Working Group (MIWG) was chartered under the U.S. Department of Defense (DoD) Defense Safety Oversight Council (DSOC) in 2019 to serve as a forum for collaboration among DoD safety, public health, and research stakeholders. Its mission is to identify data-driven safety and public health policies, programs, strategies, and initiatives designed to contribute to reduction of military injuries. With this data-centric mission, initial objectives sought to describe differences between medical and safety data, determine a standardized definition of injuries and standardized reporting for DoD medical injury surveillance, and review of medical records coding to recommend improvements to collection of injury causes.
- The U.S. Military Safety Centers have a primary responsibility to prevent mishaps through the identification of causes and hazards associated with safety events. As a consequence, a comparison of U.S. military medical and safety data was conducted, to understand the strengths and limitations of each data system, and to determine whether medical data could supplement safety data. Injuries documented in medical records were identified using the Taxonomy of Injuries[4] and incident medical encounters for one year (2018) and were matched to safety report data provided by each Services' safety organization. (Table 1)
- To achieve standardized reporting of injuries in the DoD medical surveillance system, the MIWG reviewed and selected the Taxonomy of Injuries[4] definition and methodology, and applied it to 2018, and more recently, 2021 (shown here) injury-related medical encounters for U.S. military services (Army, Navy, Marine Corps, Air Force). The Taxonomy defines injury as "Damage to or interruption of the normal functioning of body tissues that results when an energy transfer from an external source exceeds the threshold of tissue tolerance, either suddenly or gradually." The Taxonomy identifies International Classification of Diseases Version 10, Clinical Modification (ICD-10-CM) diagnosis codes meeting the injury definition. This includes acute traumatic, cumulative microtraumatic (overuse), environmental, and other injuries. It provides a comprehensive injury definition for standardized military medical injury reporting that also enables focus on injury subcategories, as desired. (Figures 1-3)
- To further support safety, public health, and military unit injury prevention activities, DSOC leadership identified improved injury cause coding of medical records as a priority. In medical records, the transition to ICD-10-CM resulted in an increase from 1,300 to 7,600 external cause codes. To facilitate clinician cause coding of injuries in the medical record, a Quick Reference Tool (QRT) was developed by a MIWG subgroup of providers and a medical coder.[5] The objective of the QRT was to (1) reduce time required to select codes by clinicians and (2) provide a list of specific military-relevant codes to inform injury prevention. In November 2022, DSOC leadership directed a Medical Injury Cause Coding QRT Pilot Program at six U.S. military treatment facilities. (Figure 4)

## Limitations

- Surveillance summaries utilized for MIWG activities rely on the completeness of centralized military medical records and safety data systems.
- Membership turnover due to military rotations affects consistency of working group participation. Working group assignment may not be voluntary, resulting in varying levels of interest and engagement. Changing organizational priorities and commitments affects members' ability to contribute.
- Improvements to injury cause coding of medical records is dependent on leadership support and medical coder and clinician participation.

## Conclusions

- Medical injury surveillance data provides a more complete picture of military injuries.
- Standardization of medical injury surveillance summaries is possible and provides data to inform injury prevention decision making.
- Cause coding of injuries documented in medical records is necessary to provide actionable information for injury prevention which is the objective of the Medical Injury Cause Coding QRT Pilot Program.
- Combining the capabilities of DoD safety, public health, and research organizations offers expanded opportunities for advancement of U.S. military injury prevention.

## References

1. Angello JJ and Smith JW. The military accident and injury prevention challenge setting a foundation for the future. Am J Prev Med, 2010. 38(1 Suppl): p. S212-3.
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3. Jones BH, et al. Medical surveillance of injuries in the U.S. military: descriptive epidemiology and recommendations for improvement. Am J Prev Med, 2010. 38(1 Suppl): p. S42-60.
4. U.S. Army Public Health Center. Public Health Information Paper No. 12-01-0717, A Taxonomy of Injuries for Public Health Monitoring and Reporting, 2017. https://apps.dtic.mil/sti/citations/AD1150155.
5. Defense Centers for Public Health-Aberdeen. Technical Information Paper No. 010-0523, Standardized Approach to Department of Defense Medical Surveillance of Injuries: Initial Objectives of the Military Injuries Working Group, 2019-2022. https://apps.dtic.mil/sti/citations/trecms/AD1204754

## Results

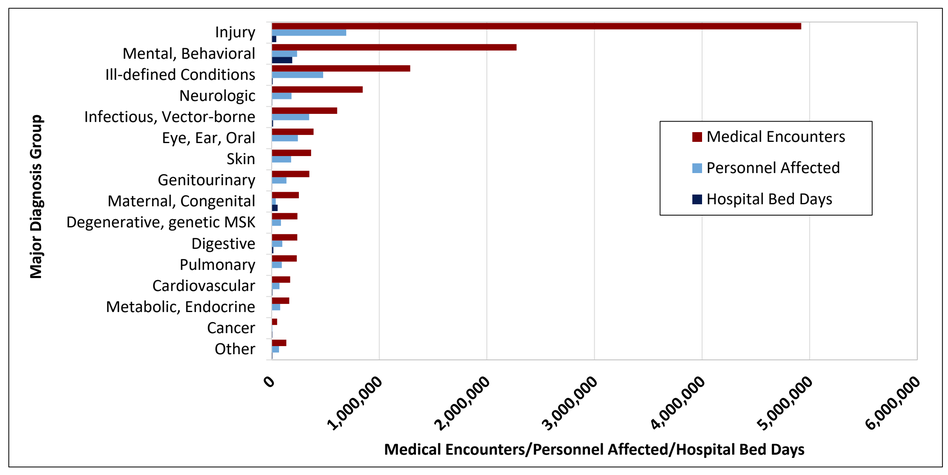
**Table 1. Comparison of Injuries in Military Medical and Safety Data, U.S. Active Duty Service Members, 2018**

| Taxonomy Categories | Service 1 | | Service 2 | | Service 3 | | Service 4 | |
|---|---|---|---|---|---|---|---|---|
| | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* | *Medical* | *Safety* |
| All injuries (Acute, Overuse, Environmental, Poisonings) | 452,378 | 4,784† (1%) | 215,845 | 2,033 (<1%) | 277,265 | 6,727 (2%) | 786,307 | 4,065 (<1%) |
| Acute, Environmental, Poisonings | 96,809 | 4,742† (5%) | 56,983 | 1,634 (3%) | 71,533 | 6,361 (9%) | 168,269 | 3,878 (2%) |
| Acute Only | 93,809 | 4,489† (5%) | 53,961 | 1,535 (3%) | 68,484 | 5,955 (9%) | 159,620 | 3,460 (2%) |

**Across U.S. Military Services, <1 to 2% of medically-treated injuries also received a safety report, with a total of 17,609 injuries reported in safety reports. When considering only acute and environmental injuries, a higher percentage (2 to 9%) were captured in safety reports.**

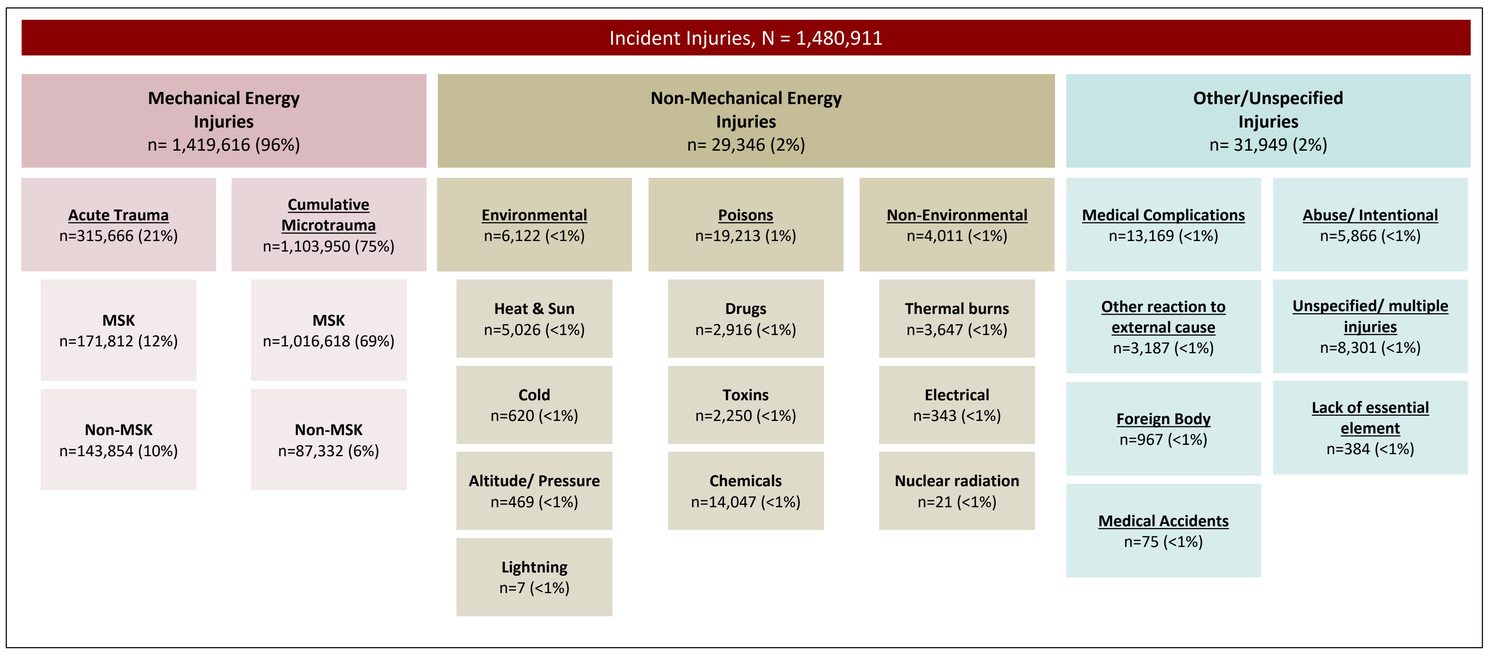
**Review of 2021 medical data from all U.S. military services indicated that injuries accounted for 39% of all medical encounters (n=4,921,642), about 2.2 times as many encounters as the second leading cause, mental and behavioral disorders (n=2,275,915; 18%). In 2021, injuries affected over 690,000 Service Members.**

**Figure 1. Medical Surveillance Review: Relative Burden of Illnesses and Injuries, U.S. All Services Active-Duty, 2021**




Diagnosis group "Other" includes adverse effects of drugs, blood disorders, and other neoplasms (not cancer)
Data source: Military Health System Data Repository (MDR); injuries defined using the Taxonomy of Injuries
Prepared by DCPH-A Injury Prevention, email: dha.apg.Pub-Health-A.mbx.injuryprevention@health.mil

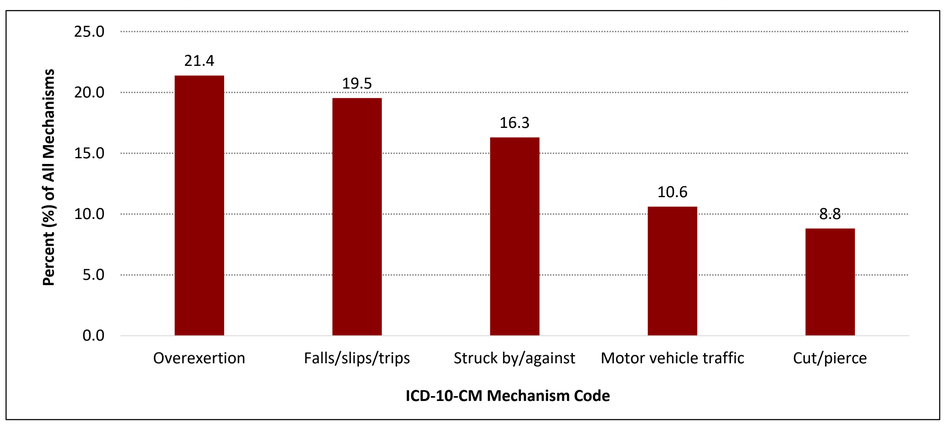
**Figure 2. Medical Surveillance Review: Taxonomy of Injuries, U.S. All Services Active-Duty, 2021**




*MSK = damage to tissue(s) of the musculoskeletal system (i.e., bone, cartilage, muscle, tendon, fascia, joint, ligament, bursa, or synovium)
Data source: Military Health System Data Repository (MDR); injuries defined using the Taxonomy of Injuries
Prepared by DCPH-A Injury Prevention, email: dha.apg.Pub-Health-A.mbx.injuryprevention@health.mil

**Across the U.S. military, the majority (96%) of new (incident) injury diagnoses were attributable to mechanical energy sources and 69% were cumulative micro-traumatic injuries to the musculoskeletal (MSK) system.**

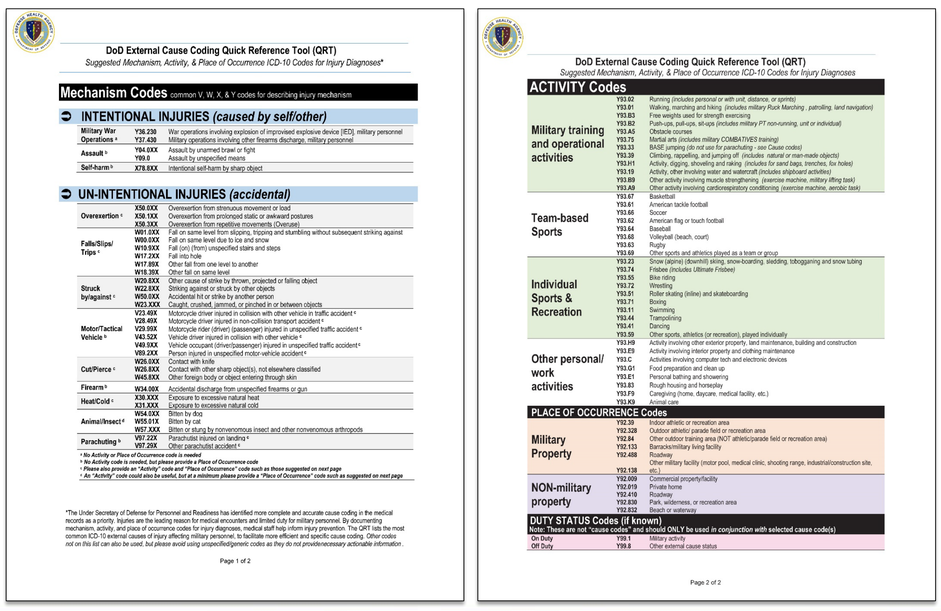
**Figure 3. Medical Surveillance Review: Summary of Mechanisms of Unintentional Injury Outpatient Visits, U.S. All Services Active-Duty, 2021**




Total number of unintentional injury outpatient visits with activity codes = 103,466 (7%); may not be representative of the distribution of mechanisms for all incident injuries
Data source: Military Health System Data Repository (MDR); injuries defined using the Taxonomy of Injuries
Prepared by DCPH-A Injury Prevention, email: dha.apg.Pub-Health-A.mbx.injuryprevention@health.mil

**Only 7% of military injury outpatient injury encounters were cause-coded. Among these encounters, leading mechanisms of injuries were overexertion (21.4%) and falls (19.5%).**

**Figure 4. MIWG Quick Reference Tool (QRT) for Medical Cause Coding**


DoD External Cause Coding Quick Reference Tool (QRT)
*Suggested Mechanism, Activity, & Place of Occurrence ICD-10 Codes for Injury Diagnoses**

**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 |
| | Y69.0 | 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 |
| | X50.2XX | Overexertion from repetitive movements (Overuse) |
| Falls/Slips/ Trips [c] | W01.1XX | 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] |
| | V49.0XX | 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 |
| | W28.8XX | 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*

*The Under Secretary of Defense for Personnel and Readiness has identified more complete and accurate cause coding in the medical records as a priority. Injuries are the leading reason for medical encounters and limited duty for military personnel. By documenting mechanism, activity, and place of occurrence codes for injury diagnoses, medical staff help inform injury prevention. The QRT lists the most common ICD-10 external causes of injury affecting military personnel, to facilitate more efficient and specific cause coding. *Other codes not on this list can also be used, but please avoid using unspecified/generic codes as they do not provide necessary actionable information.*

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DoD External Cause Coding Quick Reference Tool (QRT)
*Suggested Mechanism, 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, for 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 |
| | Y93.65 | 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 |
| | Y92.32B | 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 |

**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 |

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**Tool developed by the MIWG to facilitate medical records injury cause coding. Over 7,000 available external cause codes were reduced to <90 of the most common specific military-relevant cause codes based on prior survey and medical records data.**