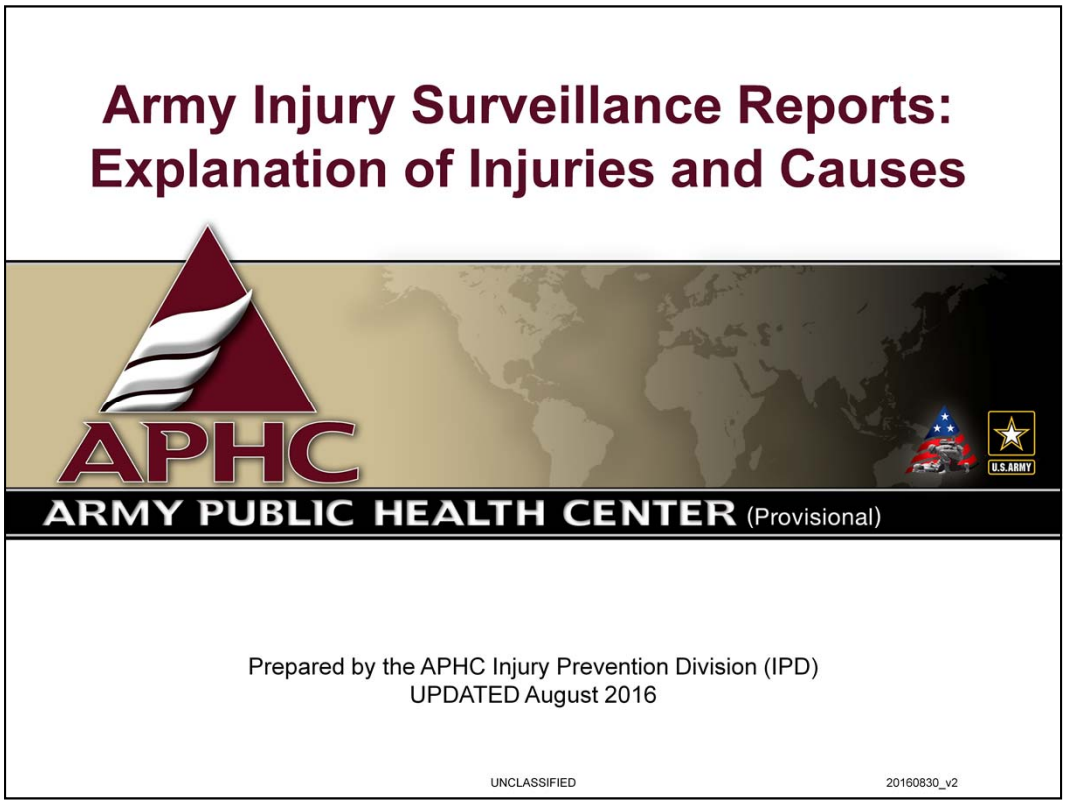


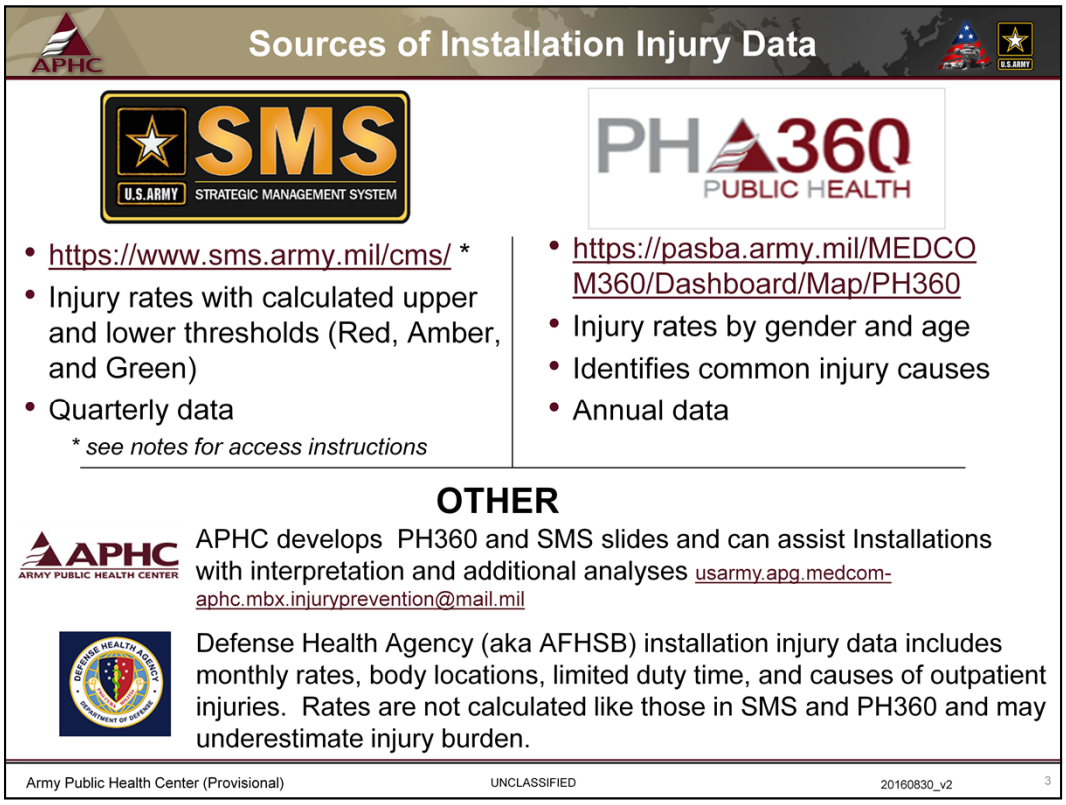
PowerPoint slides are available upon request from the APHC Injury Prevention Division at email address: usarmy.apg.medcom-aphc.mbx.injuryprevention@mail.mil

Purpose

This presentation is for Army personnel who are charged with interpreting injury surveillance data to support Installation injury reduction goals. This presentation describes:

1) **APHC sources of Active Duty Army* Installation injury rate information**
2) **How injuries are defined and injury rates calculated**
3) **Activities and causes that installations and units may need to investigate to reduce these injuries**
4) **Prevention strategies**

**Installation Civilian Injury rate information is currently available by request – because Civilian injury rates are based on Workers Compensation claims, the definitions and rate calculations are different than those described in this slide deck*



* To access Installation specific slides , when in SMS go to:

Dashboards>User Workspace>OTSG/MEDCOM HQ>DCS, Public Health>Public Health>Epidemiology and Disease Surveillance Portfolio (EDS)>Active Duty Injuries by Installation and MEDCOM Region (Quarterly)

SMS and PH360 rates are calculated from same data using similar definitions as described in this presentation, AFHSB (DHA) rates are calculated differently per example below:

PH360 annual rates, 2014

$$\frac{Number\ of\ injuries\ during\ specifed\ year}{Total\ deployment-adjusted\ person-years} = \frac{48{,}196}{44{,}625} = \mathbf{1{,}080\ injuries\ per\ 1{,}000\ person-years}$$

SMS annualized quarterly rates, Q12014

$$\frac{Number\ of\ injuries\ during\ specifed\ quarter}{Total\ deployment-adjusted\ person-years} = \frac{11{,}823}{10{,}841} = \mathbf{1{,}091\ injuries\ per\ 1{,}000\ person-years}$$

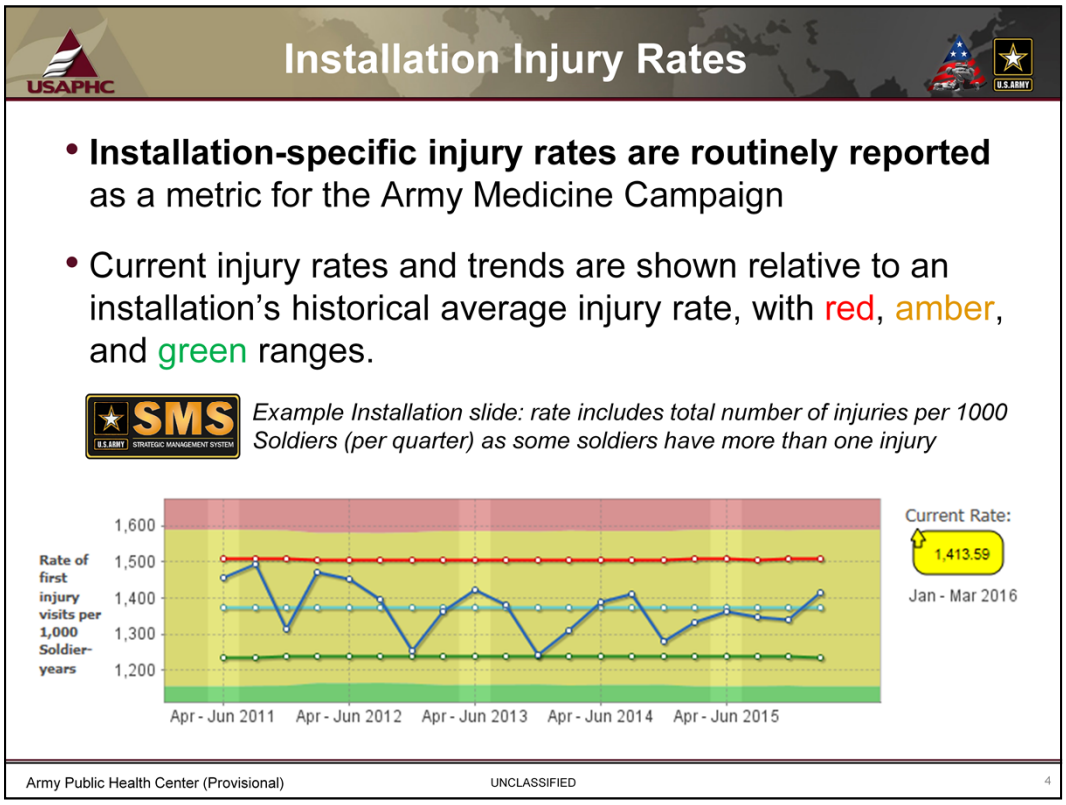
DHA/AFHSB Installation Injury Report monthly rates, March 2014

(NOT calculated like SMS and PH360)

$$\frac{Number\ of\ injuries\ during\ specifed\ month}{Total\ number\ of\ Soldiers\ with\ personnel\ record\ at\ Installation\ in\ specified\ month}$$

$$= \frac{4{,}939}{46{,}796}$$

$$= \mathbf{106}\ \boldsymbol{injuries\ per}\ \mathbf{1{,}000}\ \boldsymbol{Soldiers}$$

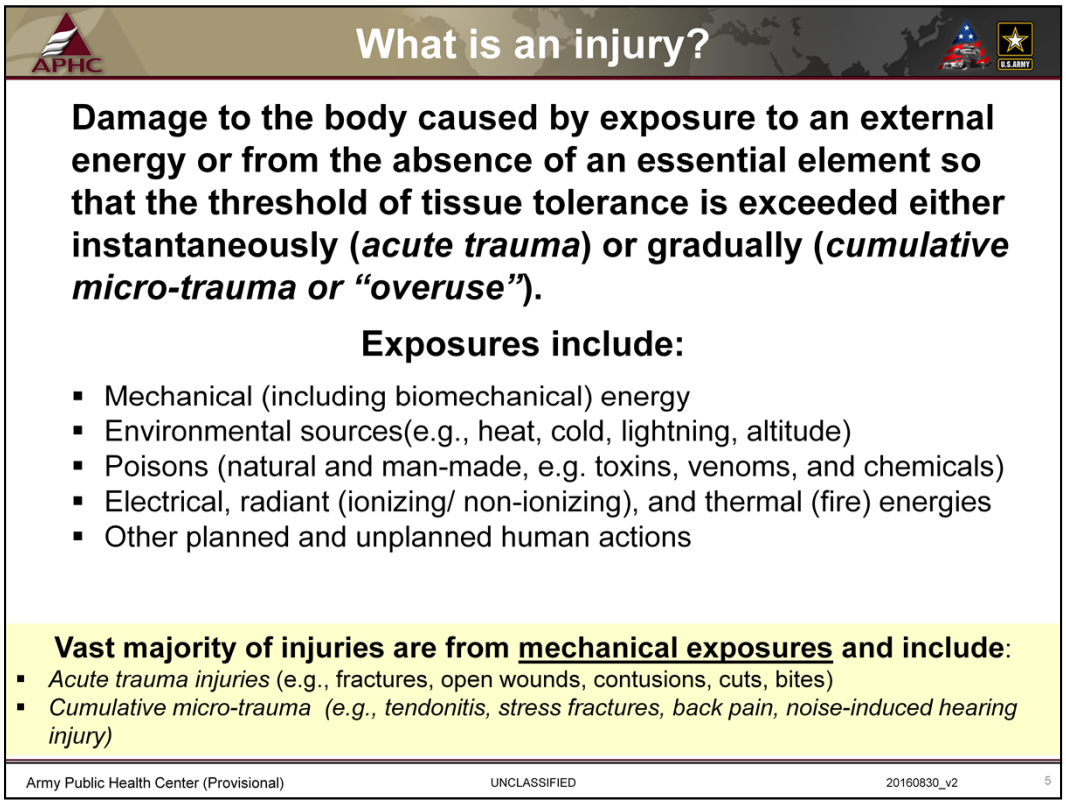


Available in the Army's Strategic Management System (SMS), https://www.sms.army.mil/cms
Go to Dashboards>User Workspace>OTSG/MEDCOM HQ>DCS, Public Health>Public Health>Epidemiology and Disease Surveillance Portfolio (EDS)>Active Duty Injuries by Installation and MEDCOM Region (Quarterly)

Metric Background:

Surveillance data shown is based on quarterly rates of medical encounters for injuries among active duty Soldiers.

The red and green thresholds shown on Public health 360 installation's specific surveillance slides represent three standard deviations above and below the historical process mean ("average") injury rates. Rate values in the amber area are consistent with historical trends, which does not imply acceptable performance. Injury rates currently in the amber or red areas should be improved, and the green threshold can be used as a long-term target value. Lines representing 2 standard deviations from the historical mean provide an intermediate warning indication (red line) and an indication of potential improvement (green line).



Vast majority of injuries are from mechanical exposures and include:

- Acute trauma injuries (e.g., fractures, open wounds, and contusions from motor vehicle accidents, falls, animal bites)
- Cumulative micro-traumas from overuse or other excessive exposure (stress, friction) over time (minutes, hours, days, weeks).

Most common Active Duty Army injury = cumulative micro-traumas, e.g.,

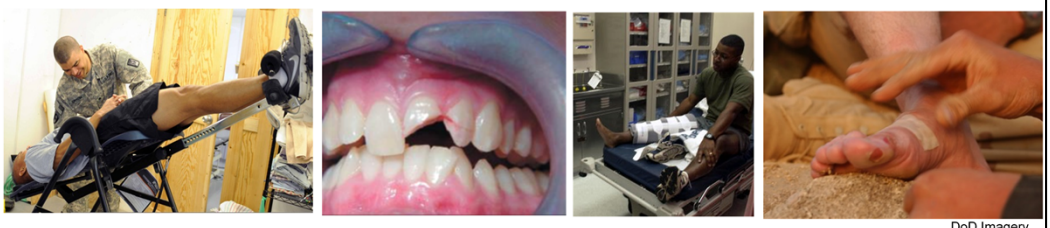
- Overuse injuries to lower back and to knees, lower legs, and ankles/feet
- Most presumed to physical-training-related injuries

Additional information regarding injury definitions is available in Am J Prev Med. 2010 Jan;38(1 Suppl):S42-70.

* For complete list see the description and code list for the at Information pertaining to AFHSB Installation Injury Report (IIR) injuries under 'Documentation' at http://www.health.mil/Military-Health-Topics/Health-Readiness/Armed-Forces-Health-Surveillance-Branch/Reports-and-Publications/Installation-Injury-Reports

How injury rates derived?

- **Diagnosis by a medical provider**: surveillance tracks specific medical diagnosis codes that meet the definition of injury
- **Occurrence of an injury:** *primary diagnosis* codes in individual medical records (both inpatient and outpatient) using *60-day incident rule* to identify new injuries and exclude follow-ups
- **Injury rate:** # injuries ÷ # of Soldiers at location adjusted according to exposure time (*e.g., includes only time at that location for each Soldier, which could be from one day to the full time frame (year or quarter), and does not include deployed time*)



DoD Imagery

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Primary medical code series used*

Acute traumatic mechanical ICD-10-CM S-00-S99, select T-codes , H-codes (eye, hearing)

Environmental, Electrical/Radiant/Thermal - select T-codes

Poisons – select T-codes

Cumulative injuries: selected musculoskeletal conditions from ICD-10-CM M00-M99 series; friction blisters (select S-codes)

- For complete list see the description and code list for the at Information pertaining to AFHSB Installation Injury Report (IIR) injuries under 'Documentation' at http://www.health.mil/Military-Health-Topics/Health-Readiness/Armed-Forces-Health-Surveillance-Branch/Reports-and-Publications/Installation-Injury-Reports

Incidence of Injury = determined through queries of inpatient and outpatient medical records (direct MTF care and TRICARE purchased care) for primary diagnoses indicative of an injury or injury-related musculoskeletal condition. A 60-day incident rule was used to identify new or incident injuries and to exclude follow-up visits associated with the same incident.

Rates were adjusted to remove deployment time, given the lack of in-theater medical data.

Additional information regarding injury definitions is available in Am J Prev Med. 2010 Jan;38(1 Suppl):S42-70.

How are injury "causes" determined?

External cause codes: Surveillance tracks additional codes in the medical records that can provide information regarding external factors or conditions associated with injury. Though there are limitations these codes are used determine leading "causes."

- *Cause codes are not well documented in medical records* (especially outpatient)
- *Cause codes are not always specific* - many describe a general mechanism (e.g., "falling from a surface" or "exhaustion", or "struck by something") and do not describe the specific activity (e.g., falling while walking on a sidewalk, excessive running, improper lifting technique for work task) or conditions (e.g. black ice) that lead to the incident
- *Much of what is known about specific "causes" of various injuries is based on more in-depth investigations and site-specific assessments*

➢ ***NOTE: Installations should investigate leading "causes" of their injuries to identify potentially problematic activities or conditions***

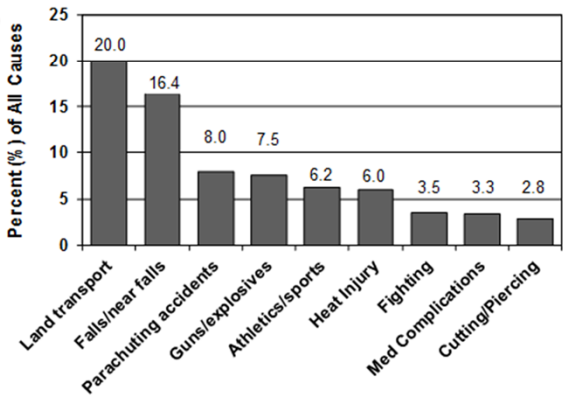
Hospitalization (Inpatient) Leading Injury Causes

Below is an example of leading causes of injuries among hospitalized patients. Because the number of these inpatient injuries is usually low (typically <1% of an Installation's overall injuries), **injury causes in current efforts focus on *outpatient* data**

(inpatient cause data may be provided on request)

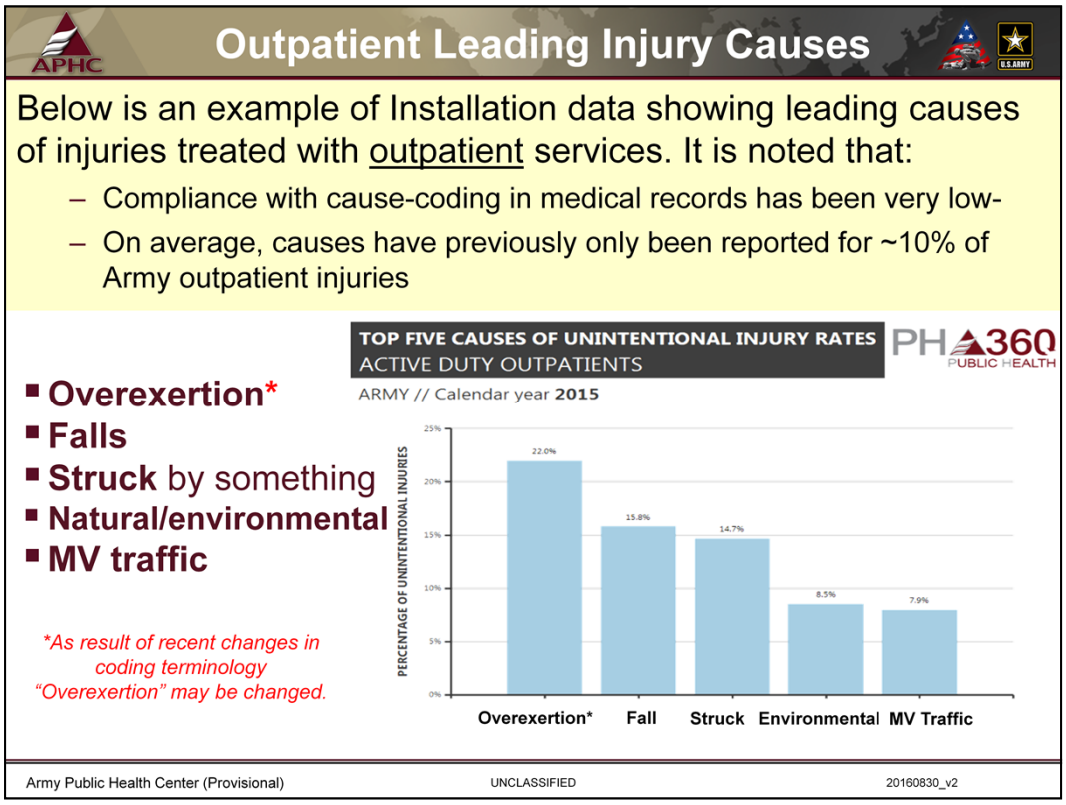
- **Motor vehicles** ('land transport')
- **Falls**
- Parachuting*
- Guns/explosives*
- Sports/athletics

** less relevant at some installations*



A "Cause code" is required for inpatient traumatic injuries

CAUSES SHOWN: from 2012 hospitalization data (provided to APHC Injury Prevention Program from the Armed Forced Health Surveillance Center). Cause codes were derived from the required STANAG cause coding. Leading causes are similar to other years evaluations; also similar to those discussed Ruscio et al, AJPM 2010.



Prior surveillance and studies (AJPM Supplement 1, 2010; Marshall, 2014) have shown that the most common Active Duty Army injuries are musculoskeletal injuries treated on an outpatient basis. These injuries have primarily been to the lower back and lower extremities (e.g., knees, lower legs, and ankles/feet. This past evidence has suggested these are typically due to cumulative microtrauma, or "overuse", and can most often be associated with some form of physical military training. Prior to 2016, medical cause-code terminology for these overuse injuries used the term "Overexertion." As result of recent changes in coding terminology (ICD-10), "Overexertion" may be changed, such as to "Overuse".

Example shown from Army Public Health 360 reports for Army-wide injury causes attributed to outpatient medical encounters. Installation-specific injury data are available from PH360: https://pasba.army.mil/MEDCOM360/Dashboard/Map/PH360

NOTE: as opposed to ICD 9 coding requirements, ICD-10 requires cause codes for all dx codes – this may lead to better cause/activity info in future (if enforced)

Additional Explanation of Selected Leading Injury "Causes"

CAUSE: "Overexertion"

- **Most common Army outpatient injury**
  - **Lower extremities (ankle/foot/knee) and lower back "overuse"**
    - *"Overexertion" has been described as a primary "cause" –has appeared to primarily be due to cumulative microtrauma such as from physical training*
  - **Specific injury types**:
    - *Inflammation and pain (variable duty restrictions and costs)*
    - *Sprains and strains* (avg 90 day lost/restricted duty per injury)
    - *Stress Fractures* (avg 120 day lost/restricted duty/injury, high medical cost)
- **Activities and contributing hazards**
  - **Physical Training/Sports**
  - **Lifting & lowering, Pushing/pulling**
    - On the job
    - Personal activity (home maintenance, cleaning, other)
    - During physical training/weight-lifting

DoD Imagery

RECOMMENDATIONS:

- ***Educate unit leaders/Soldiers*** on principles of physical training to avoid common overtraining
- ***Improve medical CAUSE coding at MTFs to track and assess*** *(example codes in notes)*

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Prior surveillance and studies (AJPM Supplement 1, 2010; Marshall, 2014) have demonstrated that the most common Active Duty Army injuries are musculoskeletal injuries treated as outpatient injuries. These injuries have primarily been to the lower back and lower extremities (e.g., knees, lower legs, and ankles/feet. This past evidence has suggested these are typically cumulative micro-traumas, or "overuse injuries" and can most often be associated with some form of physical military training. Prior 2016 medical cause-code terminology for these Overuse injuries used the term "Overexertion." As result of recent changes in coding terminology "Overexertion" may be changed, such as to "Overuse"

EXAMPLE RECOMMENDED CODES: ICD10 activity codes including Y93.07 (Running), Y93.67 (Basketball), Exercise machine (Y93.A1); Muscle strengthening (Y93.B2)

ICD9 cause code E885 “Falls”

§ SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of narrative Incident Reports Jan-Dec 2011. NOTE: While associated with other types of injuries, Physical Training and Combat Training resulted in only a small percentage of fall-related injuries

Falls: Common Causes & Recommendations
1 of 5

Sports

- One of the most common activities associated with fall-related injury in Army Active Duty (non-deployment and deployment)
  - **Basketball** is primary sport of concern
- **Injury types**: Lower extremities; e.g., ankle sprains or fractures
- **Effective interventions**:
  - Wearing rigid ankle braces during basketball
  - Other sports: protective gear (e.g., mouthguards)

DoD Imagery

RECOMMENDATIONS:

- ***Require and promote and provide educational information*** products regarding the benefits of using protective equipment in sports (e.g., ankle braces during basketball
- ***Improve medical CAUSE coding at MTFs to track and assess*** *(example in notes)*

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Example suggested ICD10 sport activity code: use **Y93.67** for Basketball

SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of Narrative Incident Reports Jan-Dec 2011. NOTE: While associated with other types of injuries, Physical Training and Combat Training resulted in only a small percentage of fall-related injuries

Falls: Common Causes & Recommendations 2 of 5

Parachuting (Airborne Operations)

- Military parachuting training operations cause many nonfatal injuries
- **Injury types**: fractures, sprains, strains of knee, leg, foot (especially *ankle*)
- **Effective means to reduce injuries**:
  - Studies repeatedly confirm effectiveness of outside-of-the boot ankle braces to reduce frequency and severity of ankle-related injuries.
  - Recent studies show use of T-11 parachute is safer than T-10

DoD Imagery

RECOMMENDATIONS:

- ***Recommend/require outside-of-boot ankle braces***
- ***Recommend/require use of T11 parachute***
- ***Improve medical CAUSE coding at MTFs to track and assess*** *(example in notes)*

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Example of ICD 10 cause code: Parachute landing ICD10 code =**V97.22XA**

SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of Narrative Incident Reports Jan-Dec 2011.

Falls: Common Causes & Recommendations 3 of 5

Snow/Icy Conditions

- Leading contributing hazard to fall injuries
- **Not just in areas prone to ice or snow**: persons may be at greater risk in areas less prone to icy conditions due to a lack of anticipation and/or lack adequate controls (e.g., shoveling, salt, floor mats to absorb water, ice alerts)

DoD Imagery

RECOMMENDATIONS:

- ***Policy on cold weather injuries*** should include awareness and prevention goals to reduce fall-related injuries associated with ice and snow
- ***Equipment and procedures*** to ensure timely removal and control of ice and snow
- ***Other low cost interventions should be implemented:*** increased local alerts, signage in areas of icy conditions, mechanisms to report icy hazard areas (e.g. installation hotline number or email)
- ***Improve medical CAUSE coding at MTFs to track and assess*** *(examples in notes)*

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Example ICD10 cause codes for snow/ice :

W00.1XXA (same level),

W00.2XXA (stairs/steps),

W00.2XXA (different level not stairs)

SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of Narrative Incident Reports Jan-Dec 2011.

Falls: Common Causes & Recommendations 4 of 5

Entering and exiting non-moving vehicles

- **Vehicle types most commonly associated with fall injuries:**
  - Light to medium high mobility multi-purpose wheeled vehicles (i.e., HMMWVs)
  - Personally operated vehicles (POVs)
  - Mine resistant armor protected (MRAP) vehicles (in deployments)
- **Lack of situational awareness**
- **Not using 3 point contact**
- **Carrying objects**
- **Other**: wearing gear, fatigue

MRAPs, DoD Imagery

RECOMMENDATIONS

- ***Conduct installation-specific assessment*** to identify vehicle types and factors associated with falls while entering and exiting vehicles
- ***Improve medical CAUSE coding at MTFs to track & assess*** *(example in notes)*

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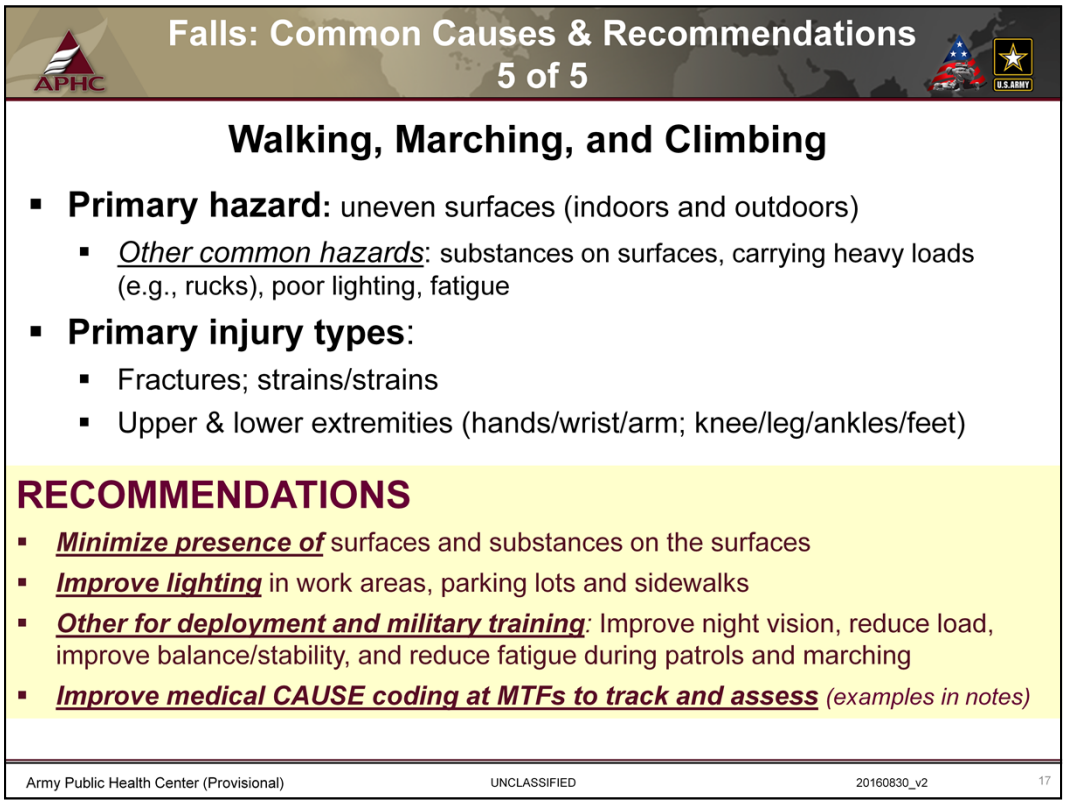
ICD10 code V87.8XXA (non collision vehicle injury); also require type of vehicle/circumstance in narrative

SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of Narrative Incident Reports Jan-Dec 2011.

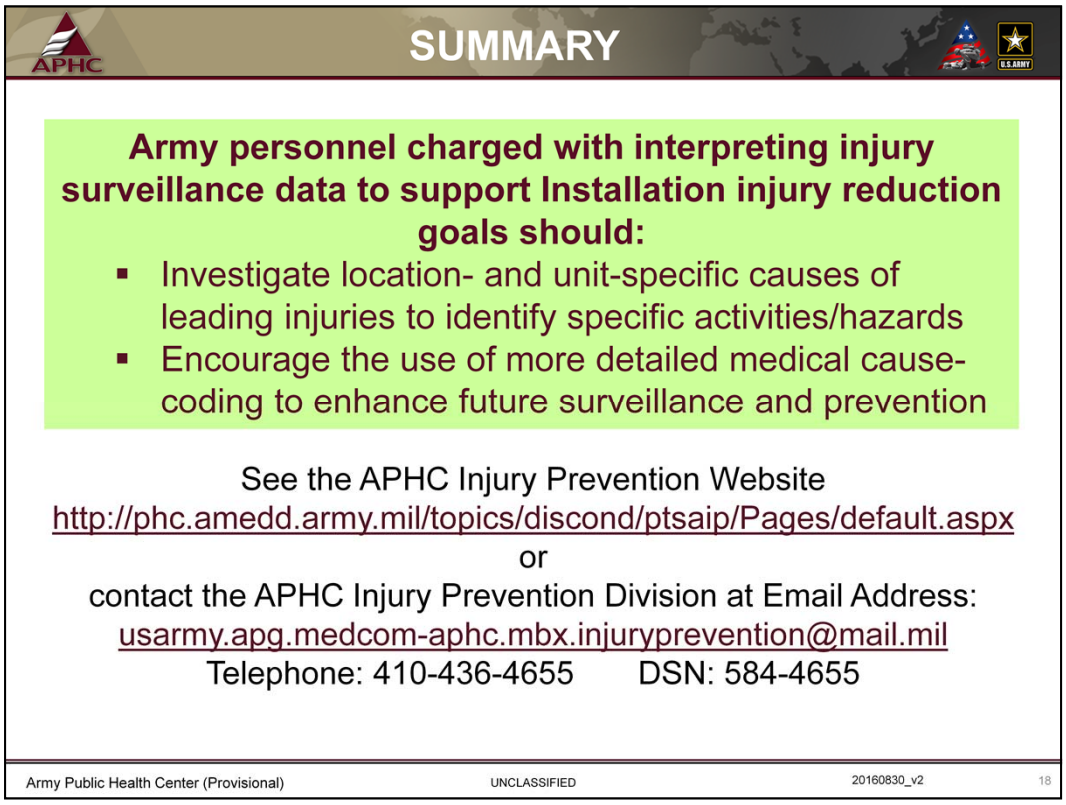


Example ICD10 CAUSE codes:

walking/marching **Y93.01**;

fall from Curb/sidewalk **W10.1XXA**, and or LOCATION - **Y92.XXX**

SOURCE: APHC Report S.0032427, Etiology of Fall Related Injuries in the Army: Review of Narrative Incident Reports Jan-Dec 2011.



APHC has recommendations for specific ICD-10 codes and has Factsheets and technical references regarding various activities and associated injuries.

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