

Fall-Related Injuries

What are fall-related injuries?

Unintentional “slips, trips, and falls” are routinely reported as one of the most common mechanisms for injuries in both civilian and military populations.¹⁻⁷ The resulting damage can be a bone fracture, or soft tissue tear or bruise, and involve various parts of the body, such as the lower extremities (ankle, foot), upper extremities (wrist, hand), back, or head. Though the injury may be reported as being caused by a fall, the falls occur during numerous activities. For example, a fractured ankle may result from a fall that occurred when tripping on a rock during a run, slipping on an icy step, landing the wrong way when playing basketball, or while getting out of a truck.

Why are fall injuries a concern to the Army?

The severity of fall-related injuries can be minor, temporarily disabling, or even fatal and can have long-term adverse impacts to a Soldier’s career and medical readiness (Table 1). Past studies have indicated as much as one-quarter of Army injury hospitalizations were due to falls.⁸ Fall-related injuries have also been a leading cause of medical evacuations from deployment settings and are among the top causes of outpatient injuries.¹⁻⁴ Though only a small percentage (less than 1%) are fatal or permanently disabling, the majority of fall-related injuries result in temporary disability and lost duty time.^{1,3-6}

Table 1. Types of fall-related injuries and readiness impact*

Minor*	Temporarily disabling*	Life threatening or fatal*
<ul style="list-style-type: none"> • Bruises • Cuts 	<ul style="list-style-type: none"> • Concussions • Sprained or torn ligaments • Strained muscles/tendons • Dislocated joints • Fractured bones 	<ul style="list-style-type: none"> • Severe head trauma • Spinal cord injury • Fatalities

Notes: *Minor injuries result in 0-1 day(s) of restricted or lost duty. Temporarily disabling refers to a range of up to 120 days (example estimated limited duty for fractured ankle = 120 days). Severe injuries include permanent disabilities and/or justification for discharge from service.⁴

What are common Army fall injury characteristics?

Active Duty Army fall-related injuries have been most frequently reported among enlisted males in their 20s.^{1,5,6} A recent investigation found that younger Soldiers (possibly due to less experience), and those who were less physically fit were at greatest risk of fall-related injuries.² Fractures, sprains, and strains are the primary reported injury types. Injuries are most common in the lower extremities (ankle, foot), followed by upper extremities (hand, wrist).^{1,5,6} These injuries are often associated with sports, parachuting, and walking on ice.^{1,6}

How can fall-related injuries be prevented?



DVIDS-4160868, U.S. Army photo by Devin Fisher

Because circumstances vary substantially, prevention requires awareness of the following activities that pose greatest risks and the associated effective prevention tactics:

✦ Icy and snowy conditions

Slipping on ice or snow is a leading hazard associated with fall-related injuries for both non-deployed Active Duty Soldiers and Army Civilians.^{1,3,7}

Prevention: While the effectiveness has not been studied in Army settings, improved local alerts, signage indicating icy hazard areas, and mechanisms to report slippery areas are recommended, especially in areas less prone to icy conditions.^{1,9,10} See page 2 for additional prevention strategies. The effectiveness of anti-slip footwear to reduce injuries from falls on ice has not been validated in Army settings, so specific anti-slip footwear cannot be recommended at this time.¹ However, local policy may suggest such equipment for continued operations or training.

✦ Entering or exiting vehicles

Falls when entering or exiting non-moving vehicles have commonly led to injuries among Active Duty Army personnel.^{1,2} The type of vehicle is a contributing factor (e.g., in 2011, light or medium high mobility multi-purpose wheeled vehicles (HMMWVs), personally-owned vehicles, and (in deployments) Mine-Resistant, Ambush-Protected (MRAP) vehicles were most commonly associated with fall injuries.)¹ Fatigue and load carriage also appear to be factors that lead to falls from vehicles.¹

Prevention: Though the reason vehicle type increases fall risk is not clear, familiarization with vehicle design and height may help to prevent falls, especially for taller vehicles such as MRAPs.¹ Injuries may be reduced by being alert to hazards, balancing loads, and ensuring proper 3-point contact with the vehicle (two feet and a hand, or two hands and a foot) at all times.¹

✦ Sports (Basketball)

Basketball is one of the leading sports associated with fall-related injuries in the Army, including during deployments.¹⁻³ This activity most frequently results in lower extremity injuries such as ankle sprains or fractures.^{1,11} Other sports associated with fall-related injuries include snowboarding and football.¹



DVIDS-6279231, U.S. Army photo by Sgt. Jeffrey Rouse

Prevention: Use of ankle braces when participating in basketball is proven to reduce fall-related ankle injuries.¹¹ This is especially true for players with a history of ankle sprains.

✦ Parachuting

Military airborne training is one of the leading activities associated with fall-related injuries in the Army. The most common type of fall-related parachuting injury is associated with an improper landing and most frequently involves lower extremity injuries, especially the ankle.^{1,12}

Prevention: Studies repeatedly show that outside-of-the-boot ankle braces prevent ankle injuries during parachuting.¹² This equipment is not required, but is highly recommended.

How can you prevent fall-related injuries?

The following strategies have been recommended to reduce risks from fall-related hazards in healthcare facilities but also have applications in other settings.⁹ These hazards are also common to many Army work environments. Identification of site-specific causes and implementation of multiple fall prevention strategies are recommended.^{1,10,13}

Hazard Associated with Fall	Prevention Strategies
Contaminants on the floor (e.g., water, grease, oil)	<ul style="list-style-type: none"> • Ensure house cleaning protocols address both spill prevention and clean-up procedures • Use of signs and barriers, visual cues for wet floors • Post contacts for housecleaning to address spills • Ensure adequate spill cleanup materials at appropriate locations • Provide walk-off mats, paper towels, umbrella bags, trashcans at entrances, water fountains/sinks, ice • Use mats large enough for persons to take several footsteps to establish balance before stepping on bare floor • Secure mats from moving (tape if needed, mark location) • Wear slip-resistant shoes
Poor drainage (e.g., pipes and drains)	<ul style="list-style-type: none"> • Ensure pipes align with drains • Unclog drains • Redirect downspouts away from sidewalks/pedestrian traffic areas
Indoor walking surface irregularities	<ul style="list-style-type: none"> • Replace or re-stretch loose or buckled carpeting • Remove or patch blistered or broken tiles • Patch or fill cracks >1/4" in walkways • Eliminate hazards >1/4" high – use ramps >1/2", bevel slopes no greater than 1:2 • Create visual cues of changes in elevation (e.g., yellow paint) • Replace smooth flooring in areas exposed to water/grease with rougher surfaces • Make sure elevators align with floors
Outdoor walking surface irregularities	<ul style="list-style-type: none"> • Patch, fill or repave cracks, holes or grooves >1/2" in sidewalks, walkways, parking lots • Create visual cues (e.g., yellow paint on curbs) • Do not use concrete wheel stops in parking lots • Ensure water systems and other structures are covered or highlighted
Weather conditions (e.g., ice and snow)	<ul style="list-style-type: none"> • Maintain an aggressive program to promptly remove ice/snow from parking lots, garages, and walkways • Distribute winter slip warnings via email, bulletins, other • Place weather warning (freezing conditions) monitors at entrances, lots, garages • Display phone # (poster sign) and encourage personnel to report icy conditions to maintenance department • Place labeled bins of ice melting chemicals near entrances and outdoor stairs - provide scoops, directions, (and Material Safety Data Sheets) • Provide additional mats near entrances • Consider recommending slip-resistant footwear
Inadequate lighting	<ul style="list-style-type: none"> • Install more light fixtures in dim areas, especially around steps • Verify light bulbs work and provide appropriate and adequate illumination • Ensure appropriate lighting fixtures to reduce dark areas or uneven lighted surfaces
Stairs and handrails	<ul style="list-style-type: none"> • Create visual cues (e.g., yellow paint) on each step edge • Check that stair treads and nosing are slip resistant especially outside • Ensure stairs kept free of ice, snow, water • Ensure adequate lighting • Handrails required for more than 4 steps, and recommended for less than 4 steps • Ensure handrails are of adequate height (34"-38") and are continuous • Handrails extend 12" beyond top step and one tread depth at bottom • Handrails on both sides of stairs >44" wide, 1 handrail on right side descending for stairs <44" wide
Stepstools and ladders	<ul style="list-style-type: none"> • Train employees on proper use: 3 points of contact with ladder at all times while ascending or descending (e.g., two hands and one foot, or two feet and one hand) • Wear appropriate footwear (closed back and sufficient tread) • Place on even surfaces before using; ensure ladders are fully open/locked before climbing
Tripping hazards (e.g., clutter, cords, hoses, wires, tubing)	<ul style="list-style-type: none"> • Clear main walkways • Organize and consider wall mounted hooks, hose spools, shelves • Cover cords with beveled protective cover/tape to floor; use retractable cords, mount to desks
Improper use of floor mats	<ul style="list-style-type: none"> • Ensure mats/runners are large enough to take several footsteps before floor • Use beveled edge and non-slip mats, secure from moving • Replace curled, ripped, or worn mats (secure with tape if needed) • Use paint/tape markers to note consistent correct positioning

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