Injury Prevention: Just the Facts

Parachuting Injuries

FACT SHEET 12-006-1115

Why are parachuting injuries a concern for the Army?

Image: Defense Video & Imagery Distribution System (DVIDS)

Military airborne operations date back to the World War II era, where the U.S. Army Airborne Test Platoon deployed the very first parachute, the "T-4," in 1940.[1] Today, advancements in parachute technology and training standards have bolstered the Army's proficiency in combat airborne operations. Despite rigorous training and implementation of safety procedures, parachuting is the leading cause of lower-extremity fractures in the Army.[2] Injuries sustained during airborne operations result in evacuations, hospitalizations, and lost duty time. Some injuries can have permanent career or life-long impacts.

What are the most common parachuting injuries and how are they caused?

Injuries to the lower extremities (e.g., ankle, leg, & hip), low back, and head are most common.[2, 3, 9] Specifically, ankle fractures, ankle sprains, low back sprains, and closed head injuries/concussions are key concerns.[3]

Parachuting injuries occur throughout all phases of the jump but ground impact is the primary event associated with injury.[1] Upon landing, Soldiers are taught to execute a "parachute landing fall" (PLF) to distribute the forces of ground impact across the body (described on page 2). Variations in environmental conditions (e.g., wind speed), drop zone terrain, and the speed at which the Soldier contacts the ground can make it difficult to execute the PLF properly.[4]

What are risk factors for Army parachuting injuries?

Scientific evidence for intrinsic (e.g., personal) risk factors include older age, lower fitness level, greater body weight, and female gender.[5] External or environmental risk factors are discussed below:

❖ *Time of Day*

Injury risk increases when jumps are performed at night versus during the day. This is likely due to reduced visibility and depth perception, which can make it difficult to avoid obstacles during the descent and landing.

❖ *High Wind Speeds*

Higher wind speeds impact the ability to execute a controlled landing. Winds can increase landing speed which can reduce time to react. Injuries in strong winds may also occur due to collisions with trees, landings outside of the pre-determined drop zone, or by being dragged on the ground by the parachute.[3,4]

❖ *Drop Zone Terrain*

Jumps on dirt airfields or areas characterized or surrounded by uneven ground, trees, and embankments are particularly dangerous.[4]

❖ *Type of Aircraft and Exit Method*

Comparisons between fixed-wing and rotary-wing (e.g., helicopters) aircraft determined higher injury risk in fixed-wing aircrafts. A possible explanation is that rotary-wing aircraft leave paratroopers with more room to perform the jump, thereby lessening the risk for entanglements. Exits from the side of the plane (as opposed to the tail end) have demonstrated increased injury risks due to entanglements.[3]

❖ *Air Temperature*

Higher temperatures are associated with higher injury rates. If humidity and standard pressure remain constant, air density will decrease as temperatures increase. Jumps when air is less dense result in a faster descent due to less air resistance, which may cause issues with the PLF execution.[4]

❖ *Combat Loads*

Injury risk increases with greater parachute load. Heavier loads result in faster descent velocity and force of ground impact. During a jump, additional equipment precedes the paratrooper in the landing. This may cause another potential landing hazard.[3]

❖ *Type of Parachute*

Injury incidence between the two latest parachuting systems, the T-10 and T-11, were compared in a recent study of basic airborne training.[1] The T-11 was found to have a lower injury incidence even when controlling for well-established parachuting injury risk factors, such as night jumps and higher temperatures. The T-10 was associated with higher risk for key injuries such as closed-head injuries and fractures.

Images: DVIDS

T-10 Parachute

T-11 Parachute

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How Can Parachuting Injuries be Prevented?

The following describes a few recommendations to reduce one's risk for injury. This list is not exhaustive therefore the appropriate policies and procedures for airborne operations should also be consulted.

Continue Use of the T-11 Parachute System

The T-11 Advanced Tactical Parachute System became operational in the Army in 2010 and is being phased in to replace the T10. In comparison with the T-10, the T-11 has a larger canopy and a more rectangular shape. These characteristics contribute to a slower descent and greater vertical stability after chute deployment.[1] Investigations of the T-11 demonstrate considerably lower injury risk when compared to the T-10 system.[1,9]

Image: DVIDS

Wear the Parachute Ankle Brace (PAB)

Despite myths regarding their lack of effectiveness and anecdotal complaints of feasibility and discomfort, epidemiological studies have continued to provide evidence that the PAB is a cost-effective strategy for reducing parachuting ankle injuries.[5,6] Claims that they cause other (non-ankle) injuries have also been disproven.[6] Ankle brace use during airborne operations was among only six interventions with strong enough evidence to be recommended as an injury prevention strategy by the Joint Services Physical Training Injury Prevention Working Group.[7] Studies involving both airborne[9] students and trained parachutists[8] have shown that not wearing the PAB considerably increases risk of ankle injuries. To maximize your protection against these potential career impacting injuries, consider using the PAB.

Improve Fitness and Maintain Healthy Weight

While female gender and older age has been associated with higher rates of parachuting injury, you can't change these factors. But because low aerobic fitness, greater body weight, and lower upper body muscular endurance are associated with higher parachuting injury risk,[5] everyone can reduce their risk through good exercise and nutrition habits. At a minimum, maintain a healthy weight and meet basic Army standards for aerobic fitness (such as 2-mile run times). Strength building should also be included in physical training programs since upper body muscle strength and muscle endurance appear to be especially important in airborne operations.

Use the Parachute Landing Fall (PLF)

Image: DVIDS

In addition to the factors described above, static line problems, entanglements, or other variables can affect one's ability to properly land, despite proper training. Landing is when most injuries happen. Paratroopers usually land at a speed around 13 mph, resulting in a landing force that is comparable to jumping off of a 9-12 foot wall.[4] The PLF is used to spread the forces of impact across various parts of the body instead of a single part (such as ankles). This greatly reduces your risk of injury. For a proper PLF, a correct landing position must be maintained during the descent (i.e., knees slightly bent with the feet together). The landing begins when the feet and toes meet the ground, is followed by a sideways roll onto the legs and torso, and ends when the Soldier rolls onto his or her back and deploys the canopy release.

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