



Arresting a fall is only the first step in preventing injury or death. Even if the arrest does not cause injury, a fallen worker can die from *suspension trauma* (orthostatic shock) if not rescued in time. Too often, a worker is saved by a personal fall arrest system (PFAS), only to succumb to suspension trauma while waiting for rescue.

What is Suspension Trauma?

Suspension trauma happens when a fallen worker is suspended in a harness with legs hanging. While arteries near the *fronts* of the legs continue pumping blood, the harness straps act like tourniquets on the veins in the *backs* of the legs and prevent used (deoxygenated) blood returning to the heart. If circulation is impeded enough, the heart rate will abruptly slow and reduce oxygen to the brain.

Even under ideal circumstances, with a rescue plan in place, suspension trauma must be treated as an *emergency*. It can be fatal in as little as 10 minutes. Typically, suspension trauma causes death in 15 to 40 minutes.

Steps to Reduce the Risk of Suspension Trauma

The best way to slow progression of suspension trauma is to stand. When a worker stands, the leg muscles must contract, which puts pressure on the veins. This pressure, along with a series of one-way valves within the veins, helps blood return to the heart and reduces the amount of blood pooling in the legs. A fallen worker can stand in one of several ways:

- **Suspension trauma relief straps:** A fallen worker can deploy trauma relief straps, creating a loop that the worker steps into and presses against to stand up. Relief straps are typically packaged in two pouches that attach to each side of a harness.

- **Onsite work equipment:** The onsite rescue team may be able to bring a ladder, an aerial lift, or other equipment for the suspended worker to stand on.
- **Structural member:** The onsite rescue team may be able to pull the suspended worker over to a structural member, a lower level, or the ground.

The Rescue

Whether or not the suspended worker has lost consciousness, the rescue team must be careful in handling the victim. Post-rescue death is caused by the heart's inability to tolerate the abruptly increased flow of carbon dioxide- saturated blood from the legs. Do not put a rescued worker in a horizontal position – whether conscious or not.

If the rescued worker does not have any apparent injuries from the fall, the worker should be placed in a sitting position with knees close to the chest. The position is often called a 'W' position. The fall victim should remain in the 'W' position for at least 30 minutes to prevent the oxygen-deprived blood returning to the heart suddenly.

When Emergency Medical Services (EMS) arrive onsite, ensure they know to treat the rescued worker for possible suspension trauma. Inform them how long the worker was suspended.

Before a Fall

- All personnel should be trained that suspension in an upright condition for longer than 5 minutes can be fatal. Workers should be trained to try to move their legs in the harness and try to push against any footholds.
- Workers should receive hands-on training on hanging in a harness and should try to get their legs as high as possible and their heads as close to horizontal as possible. Workers should not be permitted to work alone in a harness.
- Workers should have a way to signal for help, such as a whistle.

- The rescue plan and training should ensure that rescue of a fall victim happens in less than 5 minutes. Onsite work equipment should be evaluated for potential use in a fall rescue.
- Harnesses should be selected for the specific job application and must consider design, compliance, convenience of use, fit, potential arrest injury, and suspension trauma.

After a Fall

- Suspended workers should try to move their legs in the harness and try to push against any footholds, such as relief straps. Suspended workers should try to get their legs as high as possible and their heads as close to horizontal as possible.
- If the worker is suspended upright, emergency measures must be taken to remove the worker from suspension or move the fallen worker into a horizontal posture or at least to a sitting position prior to the rescue.
- Rescuers must be aware that post-rescue death may happen if a victim is moved too rapidly to a horizontal position. Moving a worker too quickly to a horizontal position is likely to allow a large volume of used (deoxygenated) blood to move to the heart, causing cardiac arrest.
- Rescuers must be aware of the first aid measures to prevent suspension trauma.