EIGA Safety Information

Prepared by SAC

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Working at Height – the Hazard of Suspension Trauma when using Fall Arrest Systems

Introduction

Working at height is a common type of activity in the gas industry. Many different hazards have been identified for working at height. EIGA wants to raise awareness of the specific risk of suspension trauma which may be less understood and consequently underestimated. In the gas industry, suspension trauma is most likely to occur when a person working at height and using a harness accidentally falls and is left motionless, suspended by the harness for a period of time.

What is suspension trauma?

Suspension trauma (Syn. "orthostatic shock while suspended"), also known as harness hang syndrome (HHS), or orthostatic intolerance, is an effect which occurs when the human body is held upright without any movement for a period of time. If the person is strapped into a harness they can eventually lose consciousness. Research indicates that remaining upright after losing consciousness can be fatal in a matter of minutes [1], due to the brain not receiving the oxygen it requires.

Scope and Aim of the Safety Information

This Safety Information is intended to raise awareness, to all those involved in the planning and execution of working at heights when using fall arrest systems, of how suspension trauma can occur while people are suspended following a fall and provides guidance on signs and symptoms.

The document also outlines recommendations for preventing suspension trauma, as well as recommendations for worker training and rescue.

Background

The symptoms of suspension trauma include nausea, dizziness, poor concentration, fatigue, headache, palpitations and fainting [1].

While suspended in a harness, blood can accumulate in the veins in the legs (commonly called venous pooling) due to a lack of movement. Some venous pooling occurs naturally when a person is standing, but normal movement of the limbs pumps blood back to the heart quickly.

An accumulation of blood in the legs reduces the amount of blood in circulation. During severe venous pooling, low blood pressure and the reduction in quantity of blood flowing to the brain causes loss of consciousness. This reduction also can have an effect on other vital organs and if this situation persists the outcome can be fatal.

Description of Hazard

Suspension trauma can be experienced by people using fall arrest systems. Following a fall, a person can remain suspended in a harness. The sustained immobility can lead to a state of unconsciousness.

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Unconscious/immobile people suspended in their harness will not be able to move their legs and will not fall into a horizontal position, as they would if they fainted while standing. During the static upright position, venous pooling is likely to occur and cause orthostatic intolerance, especially if the suspended person is left in place for some time. Venous pooling and orthostatic intolerance can be exacerbated by other circumstances related to the fall. For example, shock or the experience of the event that caused the fall, other injuries, the fit/positioning of the harness, the environmental conditions, and the person's psychological state all can increase the onset and severity of the pooling

and orthostatic intolerance. Unless the person is rescued promptly using established safe procedures, venous pooling and orthostatic intolerance could result in serious or fatal injury, as the brain, kidneys, and other organs are deprived of oxygen.

Training

People working at heights shall receive training in how to use fall arrest systems and other personal protective equipment correctly while performing their jobs. People who wear fall arrest devices while working, and those who may perform rescue activities, shall also be trained in:

- How to ascertain whether their personal protective equipment is correctly fitted and worn, so that it performs as intended;
- How suspension trauma can occur;
- How to recognize the signs and symptoms identified in this Safety Information; and
- The rescue procedures, equipment and methods used to diminish risk while suspended (research indicates that this should be within five (5) minutes)
    - Rescue procedures should include the following contingency based actions:
        - If self-rescue is impossible, or if rescue cannot be performed promptly, the person should be trained to "pump" their legs frequently to activate the muscles and reduce the risk of venous pooling. Footholds can be used to alleviate pressure, delay symptoms, and provide support for "muscle pumping."
        - Continuous monitoring of the suspended person for signs and symptoms of suspension trauma.
        - Ensuring that a person receives standard trauma resuscitation once rescued.
        - If the person is unconscious, keeping their air passages open and obtaining first aid.
        - Monitoring the person after rescue, and ensuring that they are evaluated by a health-care professional and taken to hospital if necessary. Possible delayed effects, such as kidney failure, which is not unusual in these cases, are difficult to assess on the scene.

Recommendations

To reduce the risk associated with prolonged suspension in fall arrest systems, employers shall implement plans to prevent prolonged suspension in fall protection devices.

The following general practices are recommended:

- A safety work permit system and rescue plan/procedure shall be in place to ensure suspended people can be rescued as quickly as possible.
- Raise awareness:
    - That suspended people are at risk of suspension trauma and that this is potentially life threatening. Suspended people with head injuries or who are unconscious are particularly at risk.
    - Of the signs and symptoms of suspension trauma.
- Discuss with suppliers of fall protection systems to ensure the risk of suspension trauma is considered in the design and specification of the equipment.

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References

[1] Safety and Health Information Bulletin SHIB 03-24-2004, updated 2011, *Suspension Trauma/Orthostatic Intolerance.* U.S. Department of Labor, Occupational Safety & Health Administration. www.osha.gov

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