

# PREVENTING HEAT STRESS ON THE FLIGHT LINE

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## **Preventing Heat Stress on the Flight Line**

Sailors and Marines often work in hazardous environments at their duty stations. Military aviation operations are some of the most dangerous operating environments; with propellers spinning, jet exhaust blowing, high-powered electrical and radar systems, high-pressure air, high noise, and numerous types of hazardous chemicals required to maintain aircraft and pieces of support equipment constantly moving around work areas. To help protect Sailors and Marines from some of these hazards, the Navy requires the use of personal protective equipment (PPE) while supporting aviation operations.

While required PPE does eliminate potential risk, wearing uniforms and PPE can also add to the No. 1 flight line safety problem – heat injuries. Wearing prescribed PPE is important, but it is also essential to train aviation support personnel on human factors and recognize when they are impacted by high temperatures, which can cause dehydration, fatigue, heat exhaustion, and lead to impaired thought and slowed reactions. Heat stress, including heat stroke and exhaustion, heat cramps and rashes, sunstroke and loss of physical and mental acuity, can occur over time, or rapidly, within minutes. Heat-related injuries can lead to operational disruptions that can be hazardous for mission completion and readiness. Heat “illnesses” are exacerbated by a lack of proper nutrition and hydration, exercise, health issues and age, but these conditions are aggravated even more in aviation operations due to required PPE and the wearing of heavy, flame-retardant uniforms. Aviation support personnel must stay well hydrated and rotate in and out of extreme heat conditions, as lack of adequate hydration is the No.1 driver in heat-related injuries and mishaps.

According to Mayo Clinic, heat exhaustion occurs due to dehydration, strenuous activity in heat and heavy perspiration. The symptoms are cool, moist skin with goose bumps, heavy sweating, faintness or dizziness, fatigue, weakness, rapid pulse, low blood pressure, muscle cramps, nausea and headaches. Below are the steps to take if you encounter a heat stress issue:

- Move the person out of the heat into a shady or air-conditioned place.
- Lay the person down and elevate their legs and feet slightly.
- Remove tight or heavy clothing.
- Have the person drink cool water or other non-alcoholic beverage without caffeine.
- Cool the person by spraying or sponging them with cool water and fanning.
- Monitor the person carefully; contact a medic or doctor if symptoms worsen or don't improve within one hour.



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More serious (heatstroke) symptoms, requiring immediate medical attention, include fainting, agitation, confusion, seizures, inability to drink, and core body temperature of 104 degrees F (40 degrees C).

Heat-related injury and risk mitigation best practices on the flight line include, but are not limited to:

- Enforcing appropriate hydration, sleep, nutrition, health, exercise, acclimatizing programs, and temperature monitoring equipment
- Work changes such as more frequent breaks, swapping people out more frequently, providing a convenient cool break area, acclimatization activities, and using chiller/misting fans where feasible
- Uniform and PPE adjustments include de-blousing to the T-shirt when feasible, providing cooling vests in extreme heat, and alternate head protection devices for hangar maintenance. Note: Do not violate fire, hearing, and chemical exposure protection requirements when applicable
- Providing safety and heat-mitigation training, including visible signage of dangers in high-heat/danger areas, etc.
- Monitoring self and other personnel as mental and physical acuity quickly decrease; know the signs, what to do and who to call for additional help.

Maintaining the proper hydration level is the No. 1 best practice. The key word here is “proper” hydration. Overhydration is when an individual takes in too much water and can be more dangerous than dehydration. Individual hydration levels are somewhat subjective and determining the ideal and proper hydration level for an individual may require additional analysis by qualified personnel to be effective. Below are a few recommendations to help avoid dehydration.

- Drink a minimum of 1-2 quarts of water in a 24-hour period.
- Avoid alcohol, caffeine and energy drinks altogether, as these actually worsen dehydration.
- A dehydration warning sign is a dark-colored and/or significant reduction in urine.

Proper hydration is critical for operations in high-temperature environments and is negatively affected by consumption of energy drinks (within 24-48 hours prior), caffeinated beverages (tea, coffee, soda), and alcohol. Under normal conditions, a person should consume 1 - 2 quarts of water daily (2 quarts = eight 8-ounce glasses); however,



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this may not be sufficient for someone who sweats excessively, has health or nutrition issues, or performs duties in high-heat environments, especially when wearing necessary PPE and uniforms. As many Sailors and Marines consume energy drinks, they must be extremely cautious to avoid them, on or off duty.

In many military operating locations, the temperature can become significantly elevated during the summer months. Working outside in high-temperature conditions does us no favors in our attempt to keep cool and stay on mission. With this in mind, there are many things our organizations, and we as individuals, can do to mitigate heat-related injury and illness risks.

We should ensure easy access to water and/or, electrolyte-replacement drinks throughout the day. We need designated cool-off areas near work stations, and frequent breaks along with updating training and work procedures are highly recommended. It also helps to place visual reminders in the workspace so all personnel can see them and act accordingly. Individually, we can restrict or minimize our consumption of energy, caffeinated and alcoholic drinks to mitigate the negative impact.

Safety is an all-hands evolution and by taking specific preventive measures, personnel can avoid heat stress in aviation operations.