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Surviving the March

Lessons Learned from 101st AD

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Brigade Expert Infantry Badge (EIB) Foot March Vignette

In June 2021, a brigade combat team conducted an EIB testing foot march under warm, humid weather conditions. During the event, 28 Soldiers suffered exertional heat strokes and required emergency transport, six were hospitalized. Also, 34 Soldiers suffered heat exhaustion and were returned to duty on site. The weather was clear, the temperature was 77 degrees F with 100% relative humidity (RH) at the start of the foot march. The foot march started at 4 a.m., as weather conditions are most favorable at this time of day. During exercise or physical work in hot conditions, sweat evaporation is the primary heat loss mechanism. However, when the air's water vapor content is high, reflected in high %RH, sweat evaporation slows down or stops completely. As

a result, the Soldiers marching that day needed additional, external means to cool sufficiently. The forecast and conditions on the morning of the march were available to the unit. The unit reported checking the forecast, and heat illness prevention controls were in place, but during execution these controls failed, allowing humidity to become a contributing factor in the severity of heat injuries.

There were several heat illness prevention shortfalls, the unit plan had the necessary level of support to conduct the 12-mile foot march with three medics and a Field Litter Ambulance (FLA) at each two-mile point. However, that medical support became overwhelmed by the high number of heat injuries. The unit quickly coordinated with Emergency Medical Services (EMS), used bystanders to form aide and litter teams, and used an available van for recovery. They also repositioned their casualty collection point (CCP), allowing easier access to Soldiers.

Given the high level of humidity, the unit did not

have adequate equipment and supplies to maintain a ready access to water, ice sheets, and arm immersion tanks necessary to deal with the heat injuries. Soldiers reported running out of ice sheets and water despite starting with more than the required four quarts. They were also unable to resupply the necessary items and reported running out of water in the arm immersion tanks because they were being used incorrectly, which led to overconsumption.

The arm immersion tank concept requires Soldiers to dip their forearms into an ice water mixture, which quickly cools blood circulating near the skin. Research shows that immersing the arms for two to three minutes can effectively reduce core temperature (DeGroot et al., 2013), and reduce the frequency and severity of heat illness (DeGroot et al., 2015). Shorter duration immersion in cold water is less effective for reducing core temperature, but can still improve thermal sensation, or the Soldiers' perception of how hot they feel. Because the unit used make-shift arm immersion tanks, which were placed on the ground, in roughly two-and-a-half foot high coolers, Soldiers marching had to kneel to use the tanks effectively. This discouraged most Soldiers from using them because of the time and difficulty of kneeling with the weight of the ruck sacks and weapons they carried. The Soldiers instead opted to scoop the ice water mixture out of the arm immersion tanks with their helmets, thus emptying them faster than the unit anticipated. By scooping and dumping the ice water on their heads, Soldiers also failed to achieve the intended cooling effect. Had the unit resourced arm immersion tanks with legs or placed them at a height of three to four feet and provided instruction on the goals of arm immersion, this risk mitigation would have achieved its purpose.

Even though the mass casualty event consumed the installation's organic medical personnel and ambulance resources, in-place agreements with the surrounding community EMS assets enabled adequate medical response support. The installation should continue these mutual support agreements with surrounding communities.

The Foot March

The dismounted march, also called a foot march, is integral to the Army; from basic training to earning

coveted skill badges and tabs. The standard 12-mile foot march, conducted carrying a 35-pound load and completed in no more than three hours, is required to earn the Expert Field Medical Badge (EFMB), Expert Infantryman Badge (EIB), and the Air Assault Badge, among others. The Army's publication on foot marches contains guidance for conducting such events, and include an appendix on illness and injury awareness likely to occur during warm or hot weather like exertional heat illness (EHI) (Department of the Army, 2022a). Nevertheless, the noncommissioned officer (NCO) role is critical during a foot march, as NCOs are the Army's backbone, as well as its key leaders when it comes to training, Soldier welfare, discipline, and mission execution. This article will focus on foot marching and its importance to combat readiness, the risk of exertional heat illness, and best practices for leaders to ensure effective combat training and prevent serious injury or death during training events.



A U.S. Army soldier assigned to 2nd Stryker Brigade Combat Team, 7th Infantry Division, participates in the 12-mile ruck march, during the 2nd annual E3B event held on North Fort Lewis, Wash., Nov. 5, 2021. (U.S. Army photo by Spc. Dean Johnson)

Purpose of Foot Marching and Combat Readiness

Since its inception, Soldiers had to walk to battle and perform their mission when they arrived. A foot march, or loaded road march, is a common military exercise and a core skill, especially for infantry and special forces. It is also a mark of combat readiness. Foot marches allow for troop and equipment movement

with limited vehicle support. Foot marches are successful when troops arrive at their destination at the prescribed time and are physically able to execute their mission. Success depends on effective organization, Soldier management, an effective chain of command, and proper NCO supervision to prevent injuries.

During a march, Soldiers may carry an assault pack, body armor, helmets, weapon, four quarts of water, and other necessary equipment weighing from 35-70 pounds or more. Many units today conduct 26-mile marches to build cohesion, esprit-de-corps, and make training realistic, physically tough, and mentally challenging. NCOs must know their Soldiers, protect their welfare, and train them for combat. Soldiers must be fit enough to march a long distance and still be ready to fight.

Troop conditioning and acclimatization to the area of operations is important, and should include physiological and psychological adjustment. Commanders must



Soldiers from throughout 68th Combat Sustainment Support Battalion, 4th Sustainment Brigade, 4th Infantry conduct an early morning road march Aug. 22, 2019 on Fort Carson. (U.S. Army photos by Sgt. James Geelen)

choose the combat load, the rate and length of the march, and the rest needed based on their Soldiers' physical endurance. Good planning and leadership are essential for troops to arrive in a condition required to accomplish the mission (Department of the Army, 2022a).

Historical Examples of Foot Marches

There are many examples of successful foot marches throughout the history of combat. During the Civil War, the 14th Infantry Division marched from Washington D.C. to Pennsylvania in June 1863, and participated in the Battle of Gettysburg on July 3.

Another example is commemorated by the Manchu Mile, which is a 25-mile foot march event conducted semi-annually today by the 9th Infantry Regiment. This event honors the Army's involvement in the Chinese Boxer Rebellion in 1900. Soldiers marched 85 miles straight into combat from Taku Bar to Tientsin China where they immediately went into action to help rescue besieged foreign diplomats and missionaries from insurgent Boxers.

Another successful march occurred in World War II during the Sicilian Campaign. The 3rd Battalion, 30th Infantry Division marched across mountains from Aragona to San Stefano. It made the 54-mile cross-country trek in 33 hours of continuous marching. Two hours after they arrived, the unit joined the attack, which resulted in San Stefano's capture (Department of the Army, 1990).

Injuries and Heat Illness

Conducting a 12-mile foot march is not without risk to Soldiers. They may experience minor ailments such as soreness, fatigue, or blisters on their feet; while others may have more severe outcomes such as falls, dehydration, or exertional heat illness. The environmental aspects and risk

of injury emphasizes the importance of integrating force health protection into mission planning and overseeing preventive efforts and medical treatment to support the march. Event planners cannot ignore the possibility of exertional heat illness and should consider the combination of required movement speed, march length, load carried, all under extreme weather conditions.

The spectrum of heat illness ranges from relatively minor muscle cramps to heat exhaustion (HE) and potentially fatal exertional heat

stroke (EHS) (Department of the Army, 2022b; Epstein & Ranovich, 2019). Heat cramps occur when sweating depletes the body's salt levels in muscles and causes painful cramps. Heat exhaustion is the most common heat illness and occurs when cardiac output (the amount of blood the heart pumps in one minute) cannot meet the competing demands of muscle blood flow and skin blood flow for heat dissipation. Symptoms may include elevated body temperature, excessive fatigue, an inability to continue, nausea, dizziness, and/or generalized weakness. Exertional heat stroke (EHS) is the most serious heat-related illness and occurs when the requirement for heat dissipation, mostly via evaporation of sweat, doesn't work and results in an elevated body core temperature. Symptoms include body temperatures more than 104 degrees and profound central nervous system dysfunction, characterized by altered mental status, loss of consciousness, seizures, or even death if not treated promptly (Centers for Disease Control and Prevention, 2022). Each year there are more than 500 EHS and over 2,000 other heat injuries in the Department of Defense (Defense Health Agency, 2021). Historically, there are one or two heat-related fatalities annually, (Carter et al., 2005) though anecdotal evidence suggests fewer fatal events in recent years. Fort Campbell consistently ranks in the top four for frequency of heat illness events annually, due in large part to the summer heat and humidity coupled with high intensity, tough, and realistic training exercises integral to the light infantry and the post's Air Assault mission.

Education and Awareness of Cultural Barriers

There is a fine line between safety and motivating Soldiers during a 12-mile foot march. It is essential for lead-

ers at all echelons to know and monitor their Soldiers to ensure “motivation” doesn’t turn into “counterproductive leadership” with a disregard for their safety.

Leadership is one of the most important aspects of preventing exertional heat illness. In addition to medics, all NCOs should be trained to be first responders, educated on heat illness, able to recognize warning signs, and empowered to act. Understanding the environment, and watching for signs of cramping, dizziness, and mental status changes are vital to Soldier safety. When NCOs are not educated on the signs of heat illness in a training environment, the cultural inertia of motivating Soldiers to push through pain and discomfort to cross the finish line could be life threatening.

Individual Responsibility and Risk Factors

Risk factors for exertional heat illness can be categorized as individual, mission-related, and environmental. Mission-related risk factors are difficult to mitigate when conducting a foot march, especially as part of testing to earn a skill badge or tab, as the task, conditions and standards are fixed. But the responsibility lies with both the individual who will be participating in the event, and with the organization conducting the event to recognize these factors.

Environmental (heat, humidity, solar radiation) risk factors can be at least partially mitigated by selecting the appropriate time of year to conduct the event. However, annual training cycle considerations may dictate the event take place during the summer months and therefore planning the foot march for early morning, when the wet bulb globe temperature index is lowest, is recommended (Department of the Army, 2022b).

Individual Soldiers bear some responsibility for heat risk mitigation. Every Soldier must be educated on the spectrum of heat illness, recognizing symptoms, prevention, and treatment. By ensuring they start the foot march in a well-rested, fueled, and hydrated state, they can reduce the risk of becoming heat casualties. Individual Soldiers maintaining the required level of physical fitness and staying within their work capacity also mitigate risk. This mindset may go against the Army culture of always striving to excel, but some days, under some environmental conditions, just “meeting the standard” should be acceptable.

Attempting to maximize performance in harsh environmental conditions is a recognized risk factor for exertional heat stroke (Epstein & Ranovich, 2019). Organizational leaders may consider restricting Soldiers who have a fever-producing illness or infection on the day of the event or who are taking certain medications that may increase the risk of EHI from participating. Even when all appropriate heat illness mitigation procedures are implemented, it’s prudent to prepare for possible heat casualties.

The Sabalauski Air Assault School (TSAAS), 101st Airborne Division, Best Practices

The Army’s premier Air Assault School training platform at Fort Campbell has multiple best practices in place to enhance safety in the training environment. TSAAS prevents heat illness by providing preliminary education, enforcing uniform standards, applying coordinated and deliberate NCO leadership along foot-march events, and supplying supplemental electrolyte packets. The TSAAS senior medic and company first sergeant coordinate the cadre reaction to heat injuries and oversee more than 50 12-mile foot marches and 38 six-mile foot marches annually.

The 11 days of training starts with day zero, which includes a two-mile run and an obstacle course. Throughout the three training phases, Soldiers continue physical fitness events including a four-mile run, a six-mile foot march, and a 12-mile foot march. Soldiers get an initial briefing on day zero from the sports dietician who covers hydration, proper nutrition, and fueling before, during, and after foot marches. The dietician covers signs and symptoms of dehydration and how to prevent it from happening. The senior medic also gives a briefing on day zero on how to prevent, recognize, and treat heat illnesses. Soldier education empowers every individual to maximize health, safety, and performance.

Soldiers conduct a foot march using laps on a shorter route. The foot-march course is three miles long to improve safety and span of control by medics and cadre, where Soldiers will complete one or two laps out and back for a total of six or 12 miles. In general, during a 12-mile foot march the first and last place Soldier are about five miles apart, so a three-mile foot march route enhances the cadre’s ability to observe Soldiers, monitor for concerning signs or symptoms, and control the event. A water buffalo is stationed at each mile marker along the route. Arm immersion tanks full of ice water are elevated and stationed along the route at mile three, six, nine, and 12. Arm cooling is mandatory when temperature is higher than 69 degrees at start time.

Students also receive two electrolyte packets to help replenish body minerals lost during the foot march, and allow carbohydrate snacks. Soldiers were in uniform, carried their helmets in their rucksacks, eliminated additional layers, and wore headlamps through the march, allowing the cadre to monitor them. One cadre member serves as the official pacer moving at a 15 minute/mile pace. Any Soldier who falls behind the pacer, does not look well, or displays concerning symptoms, is pulled from the event and put in the trail vehicle for safety and to stop potential heat illness progression.

The unit deploys its medical assets and active cooling loadouts, both mobile (FLA, TMP) and stationary (checkpoints), to achieve the maximum coverage. At least seven vehicles and mobile-aid stations cover the route each containing: one ice bath, three water cans, one full large ice cooler, one complete ice sheet set up, a rectal thermometer, standard medical supplies, and

medics. Cadre members employ ice baths to immediately cool Soldiers experiencing mental status changes and/or temperatures more than 104 degrees F; temperature is reassessed every five minutes to ensure a downward trend; and call EMS to transfer the ailing Soldier to the installation emergency center. Cadre and medics work together to closely monitor all Soldiers foot marching. They look for early warning signs of heat illness, encourage candidates, and ensure a safe environment. Experts evaluate and review these practices annually, they are essential life-saving tools and should be shared across the Army.

Brigade Expert Infantry Badge (EIB) Foot March Vignette

In August 2021, a brigade combat team conducted an EIB testing foot march, also under warm, humid weather conditions (70°F, 48% RH). Two exertional heat strokes occurred at the finish line requiring emergency transport and hospitalization. There were six additional heat exhaustion injuries, all of whom were returned to duty on site. While the lower %RH was likely beneficial, all TSAAS best practices and lessons learned described above were implemented for this EIB event and contributed to fewer heat injuries. Another best practice they employed was embedding an NCO liaison from the military treatment facility with the unit's medical personnel. Having this individual along allowed for rapid communication

and connectivity from points of injury to the hospital emergency room. This proactive communication and team readiness to rapidly transfer potential patients was invaluable to provide definitive medical care to Soldiers heat illness.

Conclusion

Foot marching is a core combat readiness skill that must be trained in all climates and conditions. While leaders need to be aware of and prepare for the possible consequences of training in hot, humid environmental conditions, the best practices developed by TSAAS at Fort Campbell and applied to EIB testing allow for continued combat training during the summer months. The Army would prefer to prevent rather than treat exertional heat stroke, to the maximum extent possible. NCO leadership is pivotal to creating a safe and successful training environment, especially during foot marching events, which will continue to be a fundamental skill for combat readiness in the Army.

For leaders planning events during hot-humid weather conditions, the Army Heat Center and the Warrior Heat- and Related-Event Collaborative (WHEC) can provide guidance. They are available through the Ask-the-Expert function on the WHEC website, <https://www.hprc-online.org/resources-partners/whec> or by emailing Lt. Col. David DeGroot directly. ■

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