Rapid Lesson Sharing

Event Type: Rhabdomyolysis and Skin Infection

Date: July 26, 2023

Location: Racetrack Fire and Grapevine Fire
Prescott National Forest
Arizona

Valuable Rhabdo Lessons—and Why Cleanliness is Important on Fires

The 2023 fire season for IHCs in region 3 started a bit slower than usual for most: RX support early, with a combination of small suppression fires and a handful of larger managed fires to support. When the monsoons stalled, conditions shifted into record heat and dry weather, and fire behavior began a steady uptick. In late July, a crew was assigned to the Racetrack Fire on the Prescott National Forest, a new lightning start threatening the community of Cherry.

The first shift started with overhead scouting the lines for firing options, as the crew was shuttled in via UTV to help improve the existing lines for burn operations. That night the crew bedded down at their vehicles, where the temperatures remained relatively warm throughout the night. The next morning the fire had calmed considerably, with only a handful of smokes visible along the edges. As a result the decision was made to go direct rather than burn out.

On top of the standard 6 quarts carried by each crewmember, the crew brought in an additional 12.5 gallons of water in 5/ 2.5 gallon “mini cubees” to be spread across the short squads as they went direct. With the weather forecasted to be even hotter and drier that day, an order was placed around 0900 for a delivery of cubees and Gatorade via helicopter sling.

By 1100 the temperature was 90 degrees with an RH of 27%. The crew drank most of their water by early afternoon, with one finishing all their water as well as 2 additional 20 oz. bottles of water mixed with electrolyte powder. With no timeframe for the water delivery, the decision was made for two crewmembers to hike back to the UTVs and bring up an additional 10 gallons of water.

The crew had electrolyte powders in the buggies which were used as needed, but not all crewmembers were carrying them. The crew took work breaks from the heat, however the lack of cover made finding shade difficult. It wasn’t necessarily a hard hotshot shift, as the sawyers only ran through one tank of gas each, but the rocky exposed black absorbed and radiated the heat, making the temperature feel higher than what it was.

Crewmember Taken to the ER

The 0900 order of water resupply arrived at 1700, and the crew took a long break in the sparse shade, rehydrating and trying to eat some food. Towards the end of the shift, a crewmember was experiencing muscle tightness and cramping. Back at the vehicles, when he felt he wasn’t getting better, he informed his squad leader that he was not feeling well. On top of the cramps, he was unable to keep anything down, and his urine was alarmingly discolored. Crew EMTs noted his

complexion was extremely pale with sunken eyes, and he was "zoning out," so the overhead took him to be evaluated by the medics assigned to the fire.

Based on his presentation, the medics advised that the crewmember should be taken directly to the ER, so the superintendent immediately drove the crewmember to the nearest hospital ER while the rest of the crew loaded up and headed to a hotel for the night instead of camping due to excessive heat warnings.

Upon arrival at the ER, the superintendent made the necessary contacts back to the district and Forest Staff on the Coconino, as well as starting the documentation needed for eSafety. After a quick discussion with forest personnel the decision was made to hold off on a hospital liaison unless the crewmember was admitted for observation.

Testing at the ER showed the crewmember's CK levels were approximately 600 U/L (the diagnostic threshold for rhabdomyolysis is 1000 U/L), and the ER diagnosed him with severe dehydration, administering IV fluids and painkillers to help with the cramping.

After being discharged, the crewmember was directed to remain in his room and rest the following day. Due to concerns from overhead that his CK level could continue to rise, the decision was made that he would be taken in again if he did not improve considerably after a full day's rest. The ER doctor had been relatively dismissive of his situation the first night, saying he was "just extremely dehydrated."

The following shift was even hotter than the first, hitting the 90s by the time the crew was on the line and eventually topping out at 107 degrees. During the hike into the fire, another crewmember reported feeling like he hadn't "bounced back" from the day before, and the decision was made to have the crewmember stay with the superintendent (also an EMT) for the shift, to be easily monitored if his condition changed. After a shift of rest, he felt significantly better and was able to finish out the roll with no issues. After the shift, the crew was reassigned to the Grapevine Fire, also on the Prescott National Forest.

Three Crewmembers Taken to ER in Flagstaff

The next morning, crew overhead saw that the original ill crewmember looked as bad as he had the first evening, if not worse, and conversation quickly turned to getting him better care in Flagstaff, where there is a larger hospital.

Overhead also identified another crewmember that morning who was also feeling the symptoms of heat related illness as they were experiencing muscle tightness that wouldn't go away. His quadriceps and hamstrings felt unnaturally tight, almost like they were bruised, and he felt like he just wasn't bouncing back.

A third crewmember had what appeared to be a possible skin infection with irritation around his waist and groin, which had appeared to just be chafing after the first shift. Treating it with hydrocortisone cream had no effect, and the irritation/infection was spreading. They made their way to the medical tent at ICP looking for help, but found there were no medical personnel there, as they were all attending morning briefing.

While waiting for overhead to return from briefing, the crewmember experiencing extreme muscle tightness looked over a Forest Service document in the crew buggy that explains rhabdomyolysis signs and symptoms. He told his squad leader he was concerned about his symptoms and wanted to be checked out as well. The superintendent made the decision to have all three leave the fire and head to the ER in Flagstaff.

All three affected crewmembers departed ICP in Prescott at approximately 0830, arriving at the ER around 1000. The IMT and the crew's local unit helped with transportation to the ER. Of the three, the ill crewmember from the first shift made an appointment with their primary care doctor but waited with the others in the ER in case his condition worsened before the appointment.

When the second HRI crewmember received his blood work back, it showed a CK level of 5300 U/L, over the diagnostic threshold for rhabdomyolysis, and he was admitted for observation to track his CK levels. Subsequent blood work over the evening showed a drop overnight. He was discharged the next afternoon, sent home to rest, with direction to get follow up bloodwork in a week to make sure his levels dropped below 1000 U/L before returning to work.

The crewmember with skin irritation was diagnosed with a fungal and staph infection due to the dirty work environment. He was prescribed antibiotics and sent home to rest as well, until the infection cleared up.

The crewmember who was seen by his personal doctor had additional blood work done, and was advised by his doctor that he needed to rest for another week and continue to hydrate, as his blood work (from the ER visit) showed elevated liver enzymes. He was cleared to full duty after the additional week of rest, but the follow up bloodwork was initially "lost" by the testing company, resulting in a delay of multiple weeks before he received those results.

The crew was on their next assignment in New Mexico when he received a call from his personal doctor that his CK levels were at 1993 U/L when he was tested in Flagstaff, meaning he had developed rhabdomyolysis, but based on his doctor's observations, she felt his CK levels had already been on the downward trend by that time.

Of the three crewmembers who were brought to advanced care, two were cleared to full duty after approximately one week, while the second rhabdomyolysis patient had a longer recovery, not being released to full duty for approximately one month.

Lessons

Recognizing Rhabdo Symptom Signs Early

The rhabdomyolysis education that wildland firefighters have received over the years is highly beneficial, as well as the awareness sheet created for ERs. The second crewmember stated he probably wouldn't have considered that he had rhabdomyolysis if he hadn't read this sheet while waiting for overhead to return from briefing.

While their CK levels were nowhere near the levels seen in some other severe wildland fire rhabdomyolysis cases in the past (where CK levels have reached 80,000+ U/L), it may be that recognizing their symptoms early contributed to their faster recovery times compared to more severe cases.

Some crewmembers admitted to not taking (powdered mix) packets from the crew supply because they didn't want to be "that person" who takes too many or takes the last one.

Electrolyte Intake

Electrolyte intake is critical for wildland firefighters during operations to replace lost salt. Having powdered mixes available to individuals can make it easier for them to carry it and utilize it. However, some crewmembers admitted to not taking packets from the crew supply because they didn't want to be "that person" who takes too many or takes the last one. Reminding everyone that the supply bin items are there to be used is critical—as well as making sure everyone knows the crew can always replace what is used.

Continuous Staffing of ICP Medical Tents

Medical tents at ICP need to be continuously staffed by medical personnel. While overhead is attending briefings, other crewmembers are completing their daily tasks. This is often their best opportunity to visit the medical tent if they have any issues or needs. But if there is no one there (as was the case with this incident), they may just go back to their crew and decide to "tough it out."

Why ERs Provide Our Best Medical Care Option

Emergency Rooms remain our best option for medical care for firefighters during the initial stages of illness and injury. Even though the wait may be longer at an ER versus a doctor's office, blood work and other tests done at the ER will be completed quickly. At the ER, they need the results to diagnose and either admit or discharge a patient.

On the other hand, “regular” medical clinics are designed for tests to be looked over at a follow-up appointment, leading to delays. In this instance the delay was nearly three weeks and revealed that the crewmember did in fact have rhabdomyolysis. The crewmember made a full recovery with the week of rest, but had this firefighter’s CK level been significantly higher there could have been serious complications.

The delay in getting test results back from a “regular” medical clinic—not an ER—was nearly three weeks and revealed that the crewmember did in fact have rhabdomyolysis.

Larger ERs Better Equipped to Deal with Rhabdo

Larger ERs are often better equipped to deal with less common illnesses such as rhabdo, both at the testing and treatment level. Both the first crewmember and superintendent mentioned they felt like his situation was downplayed at the initial ER visit at the smaller hospital, which was a contributing factor to the decision for that crewmember to not only rest a full shift but reassess the next day to possibly be seen again. When it became apparent that there were multiple ill crewmembers, this also contributed to the push for all three to be see in Flagstaff rather than the local ER.

Cleanliness on Fire Assignments

Maintaining cleanliness on fire assignments is often difficult. Showers are not always available and, if they are, there is a tradeoff that needs to be considered: Getting clean or getting more rest?

Even when showers or other cleaning options (such as “bath in a bag” body wipes) are available (both in camp or when firefighters are staying in hotels), firefighters are stuck with the flame-resistant clothing they have with them—putting them right back in the grime. Most crews issue multiple pairs of flame-resistant pants and shirts. Even so, crewmembers don’t always swap out their dirty clothing, either because they’re saving them “for emergencies” or for other reasons.

Just like with the powdered electrolytes, we need to emphasize to our employees that we issue spare flame-resistant clothing to be used, and we can always swap the dirty ones out at a camp.

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