

## Are you Educated: Rhabdomyolysis (Rhabdo)

### Facilitated Learning Analysis

May, 2016

The intent of an FLA is primarily focused on the ability to create a usable document that facilitates learning without assigning blame. One of the primary goals of the FLA process is to create an environment of trust without retribution so that we can truly learn from an experience. The Team would like to express their extreme gratitude to all who participated in this process. It is our hope that this document does justice to their willingness to share their story with the rest of the wildland fire community.

**Eric Zanotto, Team Leader/District Fire Management Officer**

USFS – Pike National Forest

**Travis Fack, Union Representative/Natural Resource Specialist**

USFS – Bighorn National Forest

**Tim Griffin, Subject Matter Expert/IHC Assistant Superintendent**

USFS – Roosevelt Hotshots

**Aaren Nellen, Writer/Assistant Fire Engine Operator**

USFS – Nebraska National Forest and Grasslands

# **Are you Educated: Rhabdomyolysis (Rhabdo)**

*Do you and your employees understand the symptoms and potential consequences of Rhabdomyolysis?*



*The "long-run"*

## **BACKGROUND**

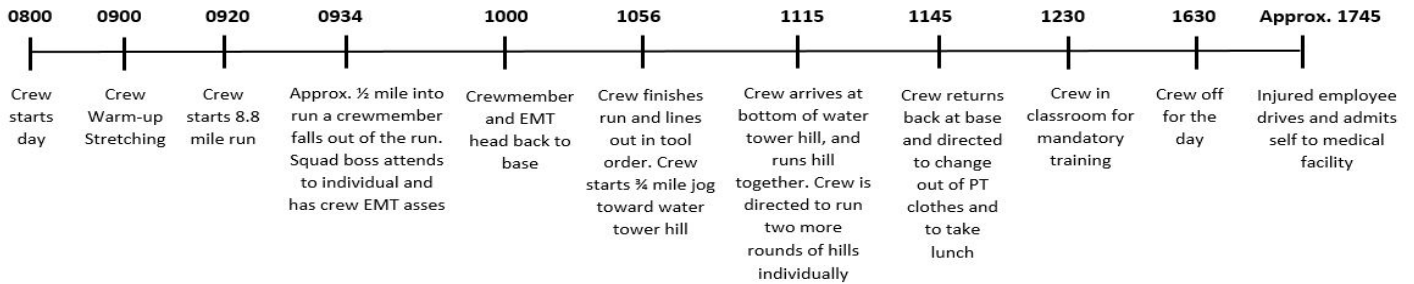
The crew began a seemingly normal day. It was the first day for new seasonal employees and a re-acquaintance for returning crew members and overhead. There were a lot of things that needed to get done and there were conflicting priorities present; for the crewmembers it was paperwork, physical fitness training, and a familiarization with Standard Operating Guidelines; for the Superintendent it was the hiring of a new Squad Boss. The overhead had decided on a plan to "divide and conquer" the items on the list. The crew structure consists of a Superintendent, two Captains, two Squad Bosses, and two lead crew-members (Senior Firefighters). The Superintendent and one of the Captains worked on hiring and paperwork, the other Captain worked on paperwork and performance plans for the seasonal workforce, the Squad Bosses worked out the physical fitness plan for the day.

The crew's physical fitness plan is comprised of hiking (80%), running and strength workouts (20%). The normal and preferred first-day workout is a long hike after covering Standard Operating Guidelines with the crewmembers. On this day, due to all of the other administrative needs, events were re-arranged. After paperwork was filled out, the Captains began faxing completed work to the Albuquerque Service Center and printing the required performance plans. When this was completed the Superintendent and one Captain worked on hiring the new Squad Boss while the other Captain continued on performance management tasks.

Additionally, and due to recent and unexpected snowfall in the area, the long hike that was planned changed to a run to accommodate for crew safety. The 1<sup>st</sup> day has begun.

# THE STORY

## Timeline for May 2, 2016



On Monday, May 2<sup>nd</sup> the seasonal workforce assigned to an interagency hot-shot crew arrived at station for their first day of work. The expected on-boarding paperwork was promptly completed and at 0900 they were led through group stretches and warm-up exercises in preparation for an approximate nine mile run. The run was led by a seasoned squad leader across a paved surface with no more than seventy-five vertical feet of elevation change. During the run, one employee “fell-out”. He was promptly evaluated by an EMT, escorted back to station under his own power, and was allowed time to recover without reprisal.

Upon return to station, the remainder of the crew reconfigured and lined-out in “tool-order” to continue PT. It was noted that during this brief lull in activity, the employee who would eventually be diagnosed with Rhabdomyolysis made the comment “It’d be nice to have some water...”, to which another within ear-shot replied “yeah... I know”. The “long, slow run” was followed by three rounds of relatively short uphill sprints interrupted by a “loop-run” within sight of the hot-shot base. This event lasted roughly forty-five minutes.



*“Water-Tower Hill” – The site of the up-hill sprints.*

There were both new and returning seasonal employees present that day. Crew cohesion had not yet been given time to develop, but there was a sense of unity across the workforce based on pride in employment. The weather was seasonably cool and the entire crew had been verbally prepared for this level of exertion during physical training.

“Put in effort, know yourself, if (you’re) feeling bad you’ve got to let us know!”, and “Early detection has to be the key...”

- Crew Captain

After taking lunch and re-grouping at 1230 the seasonal workforce was presented with the crew’s Standard Operating Guidelines and Procedures as well as expectations. During this time, one of the captains spoke and stressed the importance of physical fitness, knowing personal limits, and communicating any unusual physical issues promptly. He engaged the audience by humbly telling a story pertaining to a former crew-member going down on the line. At 1400 the Forest FMO and the recently retired local Forest Supervisor arrived and presented the crew with leader’s intent. The content of this presentation included a reiteration of the “Chief’s Letter”, the critical importance of fostering an open and respectful organizational culture, Duty, Respect, Integrity, and a brief synopsis regarding the idiosyncrasies of living and working in a small community. This presentation was followed by an opportunity to ask questions. All-the-while and unbeknownst to anyone, a first year seasonal employee sat quietly in the front of the room experiencing cramping in the legs and feeling stomach pains. Please note that this employee was not the individual who “fell-out” during PT. The workday ended at 1630.

“I couldn’t tell there was anything wrong.”

-Crew Captain

Sometime following his departure the injured crew-member drove himself at least 41 miles to a medical facility where he admitted himself for treatment. He did so without notifying his supervisor or any fellow crew-members. At 0745 on the morning of May 3<sup>rd</sup>, the hot-shot superintendent was notified by the injured employee’s family that he was in the hospital with dehydration and were awaiting additional test results. He was subsequently diagnosed with Rhabdomyolysis. All required and expected communication, as well as associated paperwork was completed to standard. The concern for the well-being of the injured seasonal was expressed in person, at the medical facility by both crew overhead and the Forest FMO. The injured employee has been released from the hospital and is recovering.

“When you do this job, you care about people...”

- Crew Supt.

“Overhead takes really good care of us.”

- Returning Seasonal

**Something to consider:**

- Many Crewmembers commented that they were surprised to hear the injured employee went to the hospital after work. He appeared to be fine throughout the day and didn't communicate experiencing any signs or symptoms associated with Rhabdomyolysis.
- During the 2015 (approximately one year prior) annual IC Refresher, crew overhead attended Rhabdomyolysis Training provided by a health care professional.

*"Since I've had it, I've realized that it's hard to explain Rhabdo unless you have had it."*

- Rhabdo Victim  
(Unrelated to this incident)

**THE BIG LESSON: We need more RHABDO EDUCATION....**

***YOU need to read this article!!***

**[Rhabdomyolysis in Wildland Fire A review of reported cases](#)**

*This recent new publication "Rhabdomyolysis in Wildland Fire A review of reported cases" from the National Technology and Development Program released in May 2016 is a great resource, the document can be found on the Wildland Fire Lessons Learned Center's website.*

Early recognition of rhabdo is key in treatment and recovery. Know your body and report upwards, or even sideways as needed. (See page 12 of *Rhabdomyolysis in Wildland Fire, A review of reported cases*)

If supervisors and/or EMT's in the field are not sure of the extent of the illness/injury, take extra precautions and send the patients to a higher level of care, and request attending physicians run tests to eliminate or get to diagnosis as early as possible (See [Handout for Medical Providers](#)).

*"I don't know much at all about Rhabdo."*

- Returning Seasonal

*Note: Crew leaders should print this page and carry it with them. In the event of a potential case of rhabdomyolysis, bring this sheet with you to the hospital, clinic, etc.*

## Exertional Non-traumatic Compartment Syndrome and Rhabdomyolysis in Wildland Firefighters

This wildland firefighter is presenting to your Emergency Department for evaluation of muscle pain along with possibly heat illness. Our wildland firefighters in the last several years have had an increased incidence of exertional non-traumatic compartment syndrome as well as rhabdomyolysis because of the prolonged exertion during fire response duties and training, carrying heavy loads (up to 110 lbs.) and arduous exertion for long periods of time across steep terrain. Several cases have become permanently disabling.

These firefighters tend to be stoic in regards to their injuries and pain, and don't normally complain of much until they can't deal with it. As a result, the pain tends to be an acute onset complaint. These two diagnoses are rare, often initially misdiagnosed, and difficult to identify, but please consider them high in your differential, so that we can keep these firefighters doing a job they love.

Classic signs/symptoms:

- Muscle pain/cramping
- Swelling of affected area of limb
- Weakness/decreased ROM of affected limb
- Dark, tea colored urine in rhabdomyolysis

Consider:

- Check serum CPK
- Value is considered positive if 5X's greater than the upper limit of that assay's reference range or above 1000 IU/L<sup>2</sup>
- If normal but high suspicion, admit for observance and serial CPK's q6hr x 12-24 hr<sup>1</sup>

1. Criddle LM [2003], Rhabdomyolysis: Pathophysiology, Recognition, and Management. Crit Care Nurse 23(6):14-30.
2. Khan FY [2009], Rhabdomyolysis: A Review of the Literature. Netherlands J Med 67(9):272-283.



## **Other Information Resources:**

<http://www.medicinenet.com/rhabdomyolysis/article.htm>

Treatment of exertional rhabdomyolysis among athletes: a systematic review protocol: White Paper. <http://www.fgcu.edu/CHPSW/RS/files/Henderson.pdf>

## **EDUCATIONAL CONSIDERATIONS**

- **DEVELOP TRAINING** for fire and non-fire employees as part of critical training, employee orientation, and district safety meetings based around education of risk factors, possible causes, and symptoms. These trainings could be added into RT-130, crew critical training, district safety meetings for all ground based personnel involved in physical fitness, field work, and fire-line activities.
- **SUPPLY RHABDO EMPLOYEE FACT SHEET** to new employees with initial on-boarding paperwork to be received prior to start-date.
- **SEEK-OUT OPPORTUNITIES** to provide expert trainings from certified medical staff for all employees.
- **MEET WITH LOCAL MEDICAL PROFESSIONALS** in the pre-season regarding the treatment of patients experiencing symptoms. This also provides a great avenue to talk about roles of the hospital liaison and burn protocols.
- **RESIST RHABDO NORMALIZATION** - With an increase of rhabdo cases, the tendency to normalize the acceptance of cases needs to be recognized and a continuation to conduct more research is needed.

33% of patients diagnosed with Rhabdomyolysis develop a quick onset of kidney failure, and 8% of all cases are fatal.

Khan FY [2009], Rhabdomyolysis: A Review of the Literature. Netherlands J Med 67(9):272-283.

## LESSONS LEARNED

- **SPEAKING UP** – early allows crew leaders to get firefighters special attention when necessary to be able to return to normal duty. Crewmembers that make honest assessments of their signs and symptoms can be given the earliest possible treatment often dramatically reducing recovery time. Know your body and limits and use the chain of command before the condition escalates. Speaking up can be challenging when starting a new job and during the first few weeks of training as the crew is still developing cohesion. Keep in mind that “toughing it out” isn’t always the answer. Avoid ignoring a condition until it is at a critical level, when it can be prevented earlier often at a lower impact to your health and your crew. See [Rhabdomyolysis fact sheet for firefighters](#).
- **SHARING STORIES AS A LEARNING TOOL** – Supervisors: Sharing our successes and failures in a constructive manner to teach key points throughout training. In doing so we can both allow others to learn from our past, and work toward creating a climate of open communication. Encourage firefighters to not hide mistakes or situations that may show a weakness, but rather seize these experiences as learning opportunities for the greater good of the whole group.
- **VERBALIZING WATER AVAILABILITY DURING PT** – Make water location known and allow time for drinking water when appropriate. *Although dehydration isn’t the leading cause of Rhabdomyolysis, which is a condition caused by exertion, it can be a contributing factor.*
- **INCREASING KNOWLEDGE OF RHABDOMYOLYSIS** – Cases of rhabdo appear to be more prevalent than ever before and are being reported in firefighters of all levels of physical conditioning. We need to accept that while we don’t understand everything about Rhabdomyolysis, it’s a challenge that the current firefighting culture is facing. Education of Rhabdomyolysis is an important step in our ability to recognize the signs and symptoms of the condition. A few minutes going over the Rhabdomyolysis fact sheet as a crew is recommended.
- **DEVELOPING RELATIONS WITH LOCAL MEDICAL PROVIDERS** – Not all past cases of rhabdo in wildland firefighters were correctly diagnosed during initial care. Heat illness and dehydration share common signs/symptoms and can lead to a missed diagnosis for rhabdo. In addition, rhabdomyolysis is a very rare occurrence in the general population. Many physicians will go their entire careers without seeing a single case of rhabdomyolysis. Since early detection and treatment can greatly reduce the severity and recovery time, it is important that medical providers understand and test for rhabdo. Diplomatically sharing information and nurturing our relationships with local medical providers could lead to better care for potential rhabdomyolysis patients in the future. See [Handout for Medical Providers](#) linked in education section above.



## APPENDIX A- References

West, Molly, Symonds, Jennifer D.O., Domitrovich, Joe Ph.D, "Rhabdomyolysis in Wildland Fire A review of reported cases". May 2016. <http://www.wildfirelessons.net/HigherLogic/System/DownloadDocumentFile.ashx?DocumentFileKey=8bdca4a7-9e52-0219-f8b0-980d470c2149&forceDialog=0>

Cover Photo Source. National Institutes of Health, WebMD

## APPENDIX B- Weather Observations

