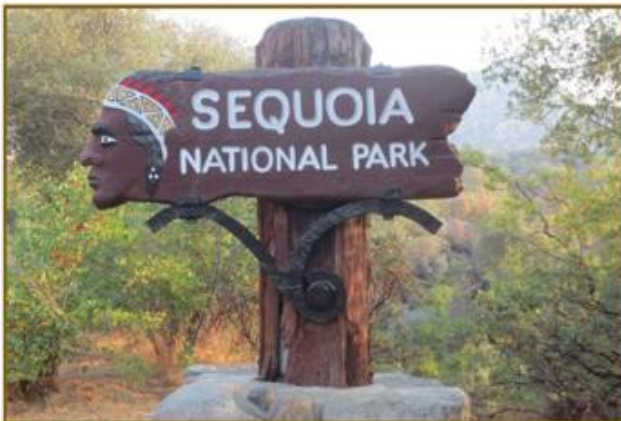
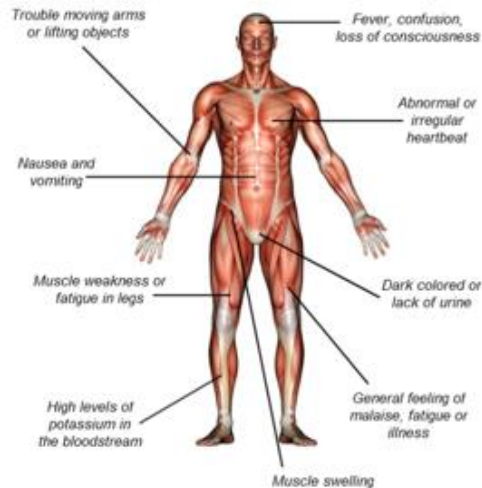


# Rhabdomyolysis in Wildland Fire

## 2016 Reported Cases



This summary of reports is intended to serve as another educational tool for current rhabdo awareness, prevention strategies, and response

A huge thank you goes to those who shared their experience, and those who facilitated sharing. Your stories are vital to understanding and engaging with rhabdo in wildland fire.

*“It doesn’t seem like there is a singular cause. It must have been a combination of factors as a whole contributing to my incident. I encourage firefighters to be honest with themselves and their supervisor in reference to how their bodies feel. Be brave enough to bring the situation to your supervisor. Set pride and ego aside for the benefit of your health.”*

– [SEKI Rhabdo LLR](#)

## 1. Current State of Rhabdomyolysis

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In the profession of wildland firefighting there has been a rise in the occurrence and awareness of exertional rhabdomyolysis, a serious medical condition. The 2016 fire season ended with 7 cases we are aware of. **This is more reports than any previous season.** 2016 brings the count of confirmed reports of rhabdo since 2008 to **26 cases**. Regardless of if increased reports are due to increased occurrences or education and recognition of Rhabdomyolysis, **firefighters must continue to address the issue.**

**According to the National Institutes of Health, rhabdomyolysis is defined as “the breakdown of muscle fibers that leads to the release of muscle fiber contents (myoglobin) into the bloodstream.”** Rhabdomyolysis is the end result of a process that leads to the death of muscle tissue.

Exercise, particularly when strenuous and unaccustomed, causes damage and subsequent muscle fiber breakdown, known as exertional rhabdomyolysis. During training and fire suppression, firefighters engage in strenuous activities and prolonged exertion, often under harsh environmental conditions and difficult terrain. The nature of their work and duties puts them at an increased risk for rhabdo.

Each case of rhabdo is unique in its causes, signs and symptoms, health consequences, and recovery. However, understanding the general causes and taking advice from previous case lessons can help foster a greater understanding on how to avoid Rhabdomyolysis. Becoming educated on the condition is especially important. If left undiagnosed or untreated, rhabdomyolysis can become severe and lead to long-term health consequences and potentially death for firefighters. Fortunately, no cases in 2016 resulted in long-term health issues.

The importance of reporting cannot be overstated. If there is a case on your crew or forest, please report it. As you can see from the cases in 2016, it can greatly help a future rhabdo patient and prevent future cases. Given that not all cases are reported and each reported case contains varying amounts and types of information, it is not yet possible to detect trends, give absolutes on causes & prevention strategies, or conclude the extent of Rhabdomyolysis among wildland firefighters. However, we can continue to educate and take steps to best prevent rhabdo and respond when it arises.

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*“Reports of Rhabdomyolysis have been on the rise for the past five years. Most summer months do not pass without yet another heat related illness or Rhabdo FLA and their associated lessons becoming available.”*

–[Rhabdomyolysis Lessons Learned Review, Sequoia and Kings Canyon NP, 2016](#)

## 2. Summary of 2016 Cases

7 cases of Rhabdomyolysis were confirmed/reported during the 2016 fire season. 4 cases including an accompanying review. The details of these reviews can educate firefighters on how to deal with this medical emergency. It is highly recommended you read 1 or more of these reviews with your employees and co-workers (Links Below).

The 7 cases all occurred in May-June of 2016 and on multiple module types. 4 cases occurred within 4 days of each other. Firefighters were engaged in a variety of activities. All 7 firefighters were admitted to a hospital.

**Among cases, three common themes arose:**

- ❖ Educating crew members
- ❖ Speaking up and seeking early medical treatment
- ❖ PT program considerations

<b>Case &amp; Web Link:</b>	<b>Activity:</b>	<b>Crew Type:</b>	<b>Date &amp; Location:</b>	<b>Report Highlight:</b>
<a href="#"><u>Are You Educated Rhabdo FLA</u></a>	PT Run: first day	Type 1 Handcrew	May 2 Black Hills NF, SD	Crew communication
<a href="#"><u>Day One PT Rhabdomyolysis</u></a>	PT: Rappeller fitness testing, first day	Helitack	May 2 Rogue River-Siskiyou NF, OR	PT Gray Areas
<a href="#"><u>NezPerce-Clearwater NF Rhabdomyolysis</u></a>	PT: varied, 3 weeks	Type 2 Handcrew	June 5 NezPerce-Clearwater NF, ID	Seek treatment early
<a href="#"><u>SEKI Rhabdo LLR</u></a>	PT: run and calisthenics	Type 3 Engine	June 28-30 Sequoia & Kings Canyon NP, CA	Rhabdo education is vital
<a href="#"><u>Pack Test Rhabdo Incident</u></a>	Pack Test	Type 2 Handcrew	May 4 Wyoming	No report
<a href="#"><u>Physical Training Rhabdo Incident</u></a>	PT: first week	Type 1 Handcrew	May 5 Nevada	No Report
<a href="#"><u>Fish Fire Rhabdo</u></a>	Wildfire	Type 1 Handcrew	June 21 Angeles NF, CA	No Report

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

*-[Are You Educated Rhabdo FLA](#)*

### 3. Upstream Factors

Among the 4 cases, the only two risk factors were: **dehydration & overexertion**. The individuals themselves and their crews were surprised rhabdo occurred considering their fitness levels, lifestyle, and nutrition. In order to prevent this kind of surprise, it is always important to pay attention to your body and how it is reacting to job demands regardless of your fitness level, diet, sleep, etc.

***This is especially important at the beginning of the season.***

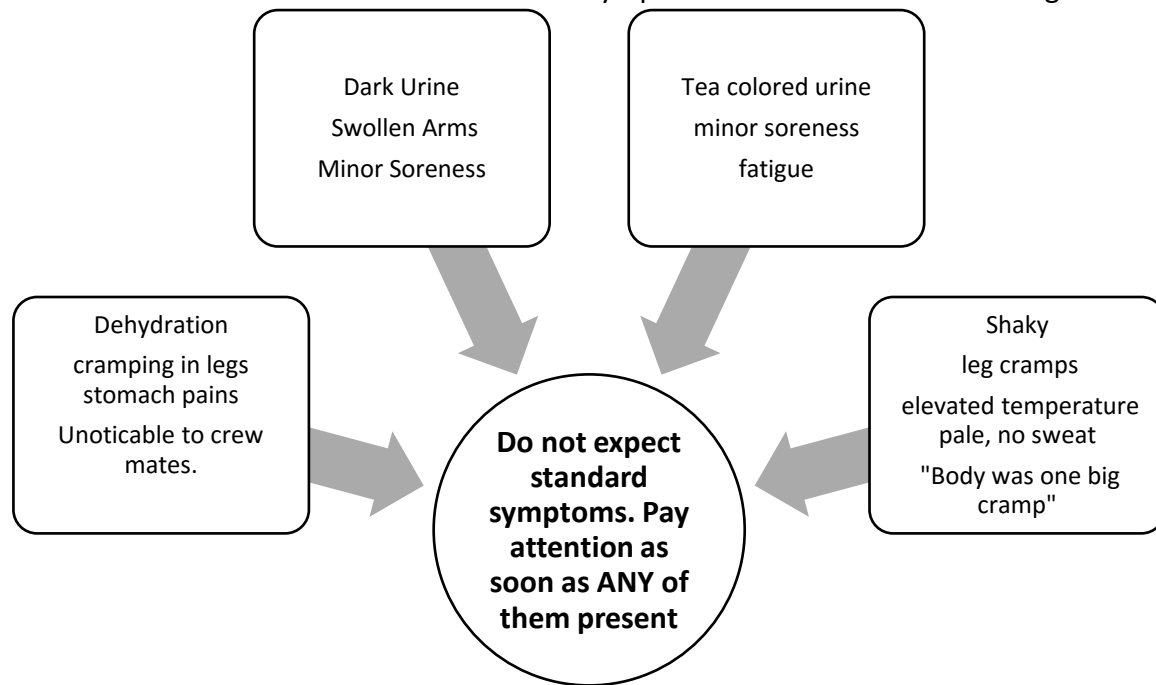
**The SEKI FLA recommends Self-Documentation for Firefighters:**

The first 3 can be documented by one person on the crew:

- ❖ Keep a daily log to accurately and thoroughly document PT. Generic entries such as “PT – Crew Run” should be elaborated into more detail (“Crew Run, 5 miles, 700’ elevation gain”).
- ❖ Accurately and thoroughly document daily project work.
- ❖ Document the weather daily, even when not on a fire assignment.
- ❖ Track daily food and fluid intake to the best extent possible.
- ❖ Note any unusual muscle soreness, change in fatigue levels, and other indicators of dehydration, heat illness, and/or Rhabdomyolysis.

### 4. Recognizing Symptoms & Speaking Up

Different combinations & severities of symptoms will lead to the same diagnosis



## Ever Felt This Type of Cramp Before?

Muscle cramps are some of the most studied and least understood reactions in the body. Cramps as a possible sign or symptom for Rhabdo is not black and white. So far, in most cases, individuals did report that the cramps preceding Rhabdo onset were *unique*—meaning they had never felt anything like it before. The distinction of **unique cramping** may be helpful when evaluating a potential Rhabdo situation: *"Have you ever felt this type of cramp before?"*

### -Day one Rhabdo FLA

#### Tea and Coca-Cola Colored Urine:

This sign is very specific & indicative of rhabdo. If your urine is dark: do not wait-report it immediately to crew supervisor or EMT.

***For a full list of risk factors, signs & symptoms see Page 4 of: [Rhabdomyolysis MTDC Report](#)***



"If he had ignored his symptoms, there is a good chance he could have ended up in the hospital for a much longer stay and risked permanent damage to his kidneys or liver."

"They instructed that they really needed him to speak up if things worsened or if there was an injury."

**Listen to your  
body and speak  
up**

"Every firefighter needs to know:  
1. HOW IMPORTANT it is to seek IMMEDIATE medical attention.  
2. How serious of a problem this condition can cause to kidneys"

"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."

*"Not all Rhabdomyolysis cases in wildland fire involve excessive environmental heat or dehydration, nor "extreme" physical training activities. We must recognize the symptoms and seek medical attention even if our mental models of what causes Rhabdomyolysis doesn't match the situation.*

-NezPerce-Clearwater NF FLA

## 5. Physical Training

Introducing rhabdomyolysis into the complicated myriad of PT considerations is difficult. There are conflicting objectives with PT and **regardless of your fitness level or the PT precautions your take to avoid Rhabdo, it can still happen.**

- ❖ **6 of the 7 cases in 2016 happened during PT.**
  - 3 were on the first day
  - 3 were within the first 3 weeks of PT
- ❖ **In cases with reports:**
  - 4 of 4 individuals or crews thought that the PT matched their job requirements
  - 4 of 4 individuals or crews thought that PT types & levels were expected

### Review Perspectives:

- ❖ *“From the perspective of the crew in this instance, the activities that day were **not** excessive.”*
- ❖ *“Mike had visited with the Crew Supervisors and was given expectations on fitness standards and the importance of showing up to work physically fit.”*
- ❖ *“He is also physically fit and is described as one of the better hikers on his crew.”*
- ❖ *“the entire crew had been verbally prepared for this level of exertion during physical training.”*

### Take Aways from 2016:

#### 1. Proper Training Prior to Day 1

Have initial meeting or phone call to prepare crew members on PT expectations and follow up until the first day of the season. Individuals need to train in the off season to be at the proper fitness level for their job. Individual training should include a program similar to crew PT program.

#### 2. Reorganize Training Schedule to Reflect Day One Stress and Anxiety

Acknowledging that stress and anxiety affect physiology, there was discussion around the mental and physical intensity of Day One. Other programs have also experienced Rhabdo cases early on in the critical training period. One such program shifted their “hard day” from Day One to later in the week and the occurrence of Rhabdo has sharply declined. –Day One Rhabdo FLA

#### 3. New workouts & exertion level

This can be at the beginning of the season, coming back from an injury, or changing PT for other reasons. Continue to work hard and push yourself, but recognize a new workout or new intensity level and monitor your body closely.

#### 4. Structure PT programs to include flexibility & recovery, & remember one size doesn't fit all

Workouts included a variety of running, hiking, circuits, pushups, pullups, sit-ups, and calisthenics. The crew intentionally limited amount of high intensity “cross- fit style” training due to Rhabdo and overuse injury concerns.

#### 5. Rhabdo can happen regardless of your fitness level and daily habits



*If Bob had not recognized through training—whether from that day or the previous year—that his symptoms signified the possibility of Rhabdomyolysis, his case could have been much more severe. The 2013 SEKI Rhabdo incident ended the career of a fine young firefighter. Bob, fortunately, was not as unlucky.*

-SEKI Rhabdo

## 6. Education

Rhabdo education may seem over emphasized and constantly repeated. However, the more education the better the prevention of rhabdo.

### ❖ Educate your crew on the following items on **DAY 1**

- risk factors
- signs & symptoms
- what to do if symptoms are experienced
- Make sure your employees know this is not an ailment to “tough out”, that they need to report symptoms IMMEDIATELY
- Supply rhabdo fact sheet to new employees with initial on-boarding paperwork to be received prior to start-date.

### ❖ Make sure crew EMT's are well versed in rhabdo & responding to it

### Educational Resource Links:

- ❖ Rhabdo FLA's and other reviews (Links to 2016 FLA's on Page 3)
- ❖ Handout for medical providers
- ❖ Rhabdomyolysis: What Firefighters Need to Know
- ❖ Heat and Exertion Injury Prevention
- ❖ Rhabdomyolysis MTDC Report

### **Podcast Discussion**

Wildland Fire Lessons Learned Center-Emerging Lessons 2016. Discussion of some rhabdo cases and early detection due to education:

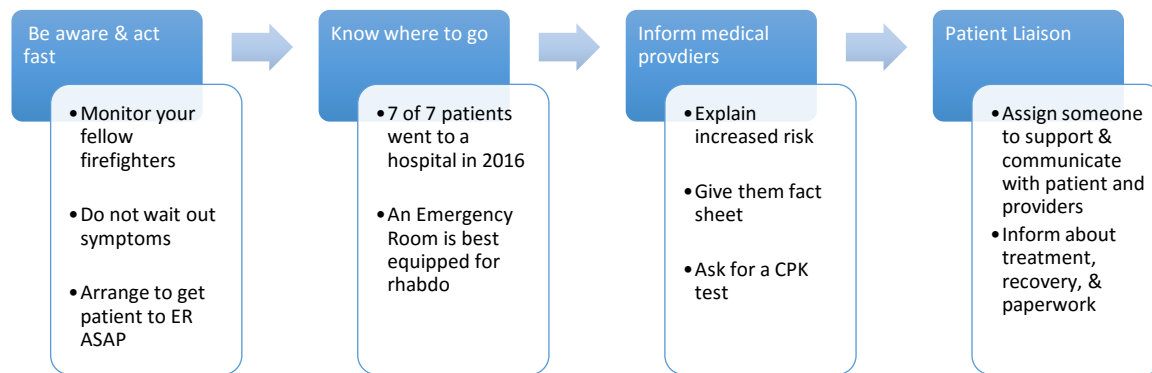
#### Podcast

### **Webinar Discussion**

This insightful discussion on rhabdomyolysis, compartment syndrome, and exertional heat illness —that includes myth busting—features a firefighter rhabdo victim/survivor as well as helpful insights from medical and physiology experts Dr. Joe Domitrovich and Dr. Jennifer Symonds:

#### ExertionRhaboWebinar

## 7. Medical Response & Treatment



Getting treatment the **same day** symptoms appear is important. These 4 steps all play an important role to ensure the best outcome.

The crew boss visited Mike on a daily basis and coordinated with medical staff and additional resources to ensure Mike received proper care.

*“Would you want your family to go to the hospital by themselves?”—Crew EMT, Nez Perce Clearwater Rhabdo FLA*

## 8. Reporting

As time consuming as it can be, reporting cases is vital to data capture. The more standardized information collected the more we can pinpoint direct causes and prevention strategies.

- ❖ If someone on your crew experiences rhabdo please consider doing a review or reporting the case.
- ❖ There is new online reporting form for rhabdo: [CLICK THIS LINK TO THE RHABDO REPORTING FORM](#)

## 9. Conclusion

Rhabdomyolysis is a challenge wildland firefighters are currently facing. 2016 contained cases where individuals, crews, and medical personnel all responded quickly and properly. Most cases occurred during early season PT. We do not understand everything about rhabdo, so as we gain more knowledge on from cases, it is important to take the time and energy to stay informed and keep others informed on the continual lessons learned.