

California Study: Hydration Key to Firefighters' Safety

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IRVINE A pioneering study into how dehydration and innate physical demands of firefighting affect performance is radically changing the way the Orange County Fire Authority operates, setting aside long-held firehouse traditions in the interest of science to maximize the efficiency of its workforce and keep firefighters from dying prematurely.

Hundreds of local firefighters are now rethinking their shift-change coffee klatch and soda habits in the wake of the fire authority study, which laid out significant lapses in understanding the damaging effects of dehydration and a lack of effective rehabilitation practices to protect firefighters' health.

Nearly half the firefighters whose deaths are related to duty die not in fiery infernos or dramatic building collapses, but of heart attacks and coronary events, most within 24 hours of the time the fire alarm sounds. A total of 440 firefighters, or 43.7 percent of those who died on the job, had sudden cardiac death, a National Fire Protection Association study from 1995 to 2004 found.

Scientists have long had elite athletes in their cross hairs, testing and tinkering with the human body in an attempt to stretch physical ability to the outer limits.

Playing with fire for a living is inherently dangerous, but little research had been done on the intrinsic physical demands and stress of firefighting and on what can be done to create a safer and more efficient workforce, until the fire authority launched its hydration study in August.

Conducted by the fire authority's Wellness and Fitness Program (WeFit), financed by federal funds and backed by the Orange County Professional Firefighters Association, the study's results have altered the way local firefighters recover from fires.

Swigs of water and a few minutes' rest are being swapped for some quality time under an ice-cold towel -- a now-proven way to quickly bring racing heart rates back to normal. Firefighters are being made aware of the damage their job does to their bodies and ways to train to prevent heart attacks and strokes on and off the job.

Temperatures hovered around the 80s when 126 local firefighters and paramedics, from 23 to 60 years old, suited up and marched through the 30-minute drill mimicking an apartment fire.

From newbie firefighter to battalion chief, they arrived in a variety of sizes, ages and physical ability. They swallowed tiny transmitters embedded in a large, white pill and strapped on wristband computers that recorded heart rate five times a second.

For 15 minutes, they fought the blaze, dragging heavy hoses and pulling weighted dummies to safety. Flames reaching hundreds of degrees licked the ceiling above as firefighters crawled through the apartment, battling the blaze with shots of water. Their hearts pounded at nearly 200 beats a minute -- about triple their resting rate.

Their internal temperatures rose to a high of 106 degrees. They were cooking themselves.

For 15 minutes, they marched up and down the six flights of stairs. Their heart rates stayed near their maximums, pumping as they marched up and down.

Four percent of the study participants threw in the towel before the 30-minute physical test was complete, unable to keep up with the demands of pulling 100 pounds of hose and marching up and down flights of stairs, weighed down by 60 pounds of protective clothing and gear.

Those numbers, which came from an army of volunteers from the fire authority's 850 firefighters and chiefs, were disturbing, said Nancy Espinoza, the fire authority's exercise physiologist.

Even more startling was the revelation that 90 percent of the participants were dehydrated before the drill began, setting up themselves for even more of a strain on their bodies, said Dennis Ratcliffe, 33, of OCFA Station 21.

"Everyone knows we should drink more water, but we are all still fairly bad at that," Ratcliffe said.

When the 30 minutes were up, the firefighters rested, randomly assigned to four different rehab methods. Some gathered around a misting fan. Others covered their heads with iced towels. Others sat in Kore Koolers -- sideline chairs that allow their elbows to be submerged in ice and water.

Even sitting still, their core body temperatures continued to shoot up for five more minutes. Firefighters dropped an average of 3 pounds during the 30-minute drill. One firefighter lost 8 pounds, a loss so severe it could significantly affect decision-making ability.

The maximum heart rate averaged 180 beats per minute, with the highest hitting 214 beats per minute.

Kore Koolers proved nearly as effective as cooling down with wet towels over firefighters' heads and necks. The fire authority is now packing towels in coolers rather than investing in the more expensive, unwieldy chairs, Espinoza said.

With more people jam-packing cities, firefighters are being forced to be experts in everything from swift-water rescue to high-rise fires and everything in between. More demands mean more stress on firefighters, said Joe Kerr, president of the Orange County Professional Firefighters Association. People are working too hard to meet not only the demands of the public, but also the demands firefighters place on themselves, he said.

Meeting some of those demands could be as simple as a few more glasses of water throughout the day -- and a few more hours a week in the gym, going through exercise routines tailored to mimic firefighting tasks, said Capt. Mike Contreras, who commands the fire authority's WeFit program.

"Firefighters are generally in good shape," said Dr. Orr Limpisvasti of Anaheim's Kerlan-Jobe Orthopaedic Center. "But if you're going to ask your body to do something very stressful, it is critical to be hydrated -- and stay hydrated."

Firefighters cannot be required to down certain amounts of water, but hydrating will be encouraged, Espinoza said. The fire authority is also looking at different electrolyte-replacement drinks to rehydrate crews during longer firefights.

The benefits go beyond saving human lives. The culture shift is also saving dollars -- lowering

workers' compensation costs, health care bills and reducing overtime to backfill for injured firefighters.

Since the inception of the WeFit program, which provides employees an hour during shifts to work out and the gyms to do it, the fire authority has seen workers' compensation costs for its top four injuries -- back, shoulder, heart and knee -- drop from \$5.8 million to \$1.8 million.

The authority is not only looking to save lives and money now; officials are also looking to the future, hoping to create a firefighting force trained to combat not only fires, but also the inherent physical stresses and demands that firefighting brings. And with the graying firefighting force, aimed at drawing on experienced firefighters who can meet all of the demands of modern firefighting, fire departments across the country are preparing their troops for the stress of the jobs into their 40s and 50s -- well past the prime of many elite athletes.

"Knocking on a door to tell a family member their loved one is dead or injured is the last thing you want to do," said OCFA Chief Chip Prather. "We're hoping to prevent that from happening."

The need for proper hydration and elite fitness is being drilled into the troops with signs posted in restrooms and common areas, and the message will be repeated during mandatory meetings. Hydrating is no longer an option; it's a survival tool.

"When you show up to work, you expect the person next to you to be able to do the job," Ratcliffe said. "And if something happens to you, you expect them to be able to help you."