



Firemedically

with Mike McEvoy

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What We Don't Know Is Hurting Us

Heavy physical exertion can trigger cardiac events – countless studies have made this connection. It came as little surprise to the medical community when in March a group of Harvard Medical School researchers published a 10-year analysis of firefighter deaths from heart disease¹.

Firefighting is tough and dangerous. The most frequent cause of on-duty death is heart disease, not burns or injuries. A disproportionate 45 percent of firefighters die at work from cardiac events, compared to 22 percent of police officers, 11 percent of emergency medical providers, and 15 percent of all workers.

Firefighters are most likely to die during and immediately after heavy exertion including fighting fires (32.1 percent), returning from an alarm (17.4 percent), responding to an alarm (13.4 percent), during physical training including live burn training (12.5 percent), and responding to non-fire emergencies (9.4 percent). Why are more firefighters dying on the job from cardiac events than other workers? The simple answer is we don't know.

The Harvard study conclusions were obvious – while exertion triggers cardiac events, regular exercise prevents against them. Every fire department should have a regular fitness program, and firefighters should undergo annual physical performance testing. Modifiable cardiovascular risk factors need to be discovered and addressed, while annual physical exams that address hypertension, diabetes, obesity, smoking cessation, and excessive alcohol consumption should be mandatory.

NIOSH preaches these preventative measures in virtually every firefighter fatality investigation report, which is obviously good advice. But does risk prevention and improved fitness reduce firefighter deaths? Possibly. Editorial commentary on the Harvard study² suggested that volunteer firefighters were less fit and less healthy compared to their career brothers and sisters, causing volunteers to die more often.

Editors based their conclusion on 70 percent of on-duty firefighter deaths in 2005 that occurred in volunteers. They failed to take note that 70 percent of the 1.1 million firefighters in the United States are volunteers. To accurately reach such a conclusion would require careful analysis of the hours worked and duties performed by typical career and volunteer firefighters, with risk adjustment of the mortality figures. Are volunteers less healthy than their career counterparts? We don't know.

We also don't know why firefighters die or if they die more often than other workers with jobs that require similar levels of exertion, if there are any. Many people mistakenly believed the Harvard study showed firefighters have an increased risk of death from cardiovascular disease. Not so. What the authors did demonstrate that we didn't conclusively know before is that heart attack deaths happen most often during firefighting activities, returning from and responding to alarms, and during physical fitness activities and live fire training.

The study qualifies where the risks of firefighting lie. Truth be told, firefighters actually have a lower risk of cardiovascular deaths than the general population². The standardized mortality ratio for cardiovascular death in firefighters is 0.9. Translated into layman's terms, firefighter risk of death from heart attack is 90 percent of the entire population risk, or 10 percent less than average. Perhaps the physical exercise of firefighting makes them more healthy, but, again, we don't know that.

We also know virtually nothing about non-fatal cardiovascular events in firefighters. It seems logical that a firefighter who collapses in cardiac arrest while on duty, whether at a fire scene, at training, or in the station, would — in most cases — get immediate, top-notch medical care. Visitors and employees who collapse in hospitals get prompt and excellent care that lends to survival rates approaching 100 percent.

Two elements eluding researchers investigating firefighter deaths are resuscitation records, which are usually unavailable, and data on firefighters who collapse but survive because of the prompt and effective resuscitative efforts of their well trained and equipped colleagues.

Resuscitation records might reveal problems we don't know exist. If resuscitation records of collapsed firefighters demonstrate prompt BLS, early defibrillation, and early ACLS consistently delivered with overall outcomes worse than comparable worker groups experiencing cardiac arrest in the workplace, the reasons warrant further investigation. Perhaps carbon monoxide, cyanide, environmental particulate, or other toxic exposures lead to cardiovascular events or interfere with successful resuscitation. We don't know. The tools to non-invasively measure carbon monoxide with pulse oximetry, safely treat suspected cyanide toxicity, and sample for environmental contaminants are all available — but few departments use them.

More than 10 years ago, an era of evidence-based medicine (EBM) changed the field of health care forever. Premised on the theory that what you don't know will hurt you, nearly every practice was subjected to scientific scrutiny. Medical decision making changed from being individual clinical judgment to being tied with systematic research. Many time honored beliefs were proven useless, others prevailed, and some became best practices. Examples include giving aspirin to patients with acute myocardial infarcts and lowering cholesterol and blood pressure in people at high risk for acute coronary events.

Scientific evidence proved that lives could be saved when medical providers do implement these practices. Conversely, routine antibiotics for sore throats and annual chest X-rays were shown not to save lives; these practices were discouraged.

The fire service needs more science and a healthy dose of evidence-based medicine. Ignorance can no longer be bliss. Many initiatives targeted at reducing firefighter deaths have the weight of good science behind them: Seat belts save lives, treating hypertension, lowering cholesterol, and improving fitness all reduce the incidence of cardiovascular disease. But does better management and accountability? Does more money? What about better code enforcement? We don't know.

Prompt CPR and early defibrillation saves lives — are there other resuscitation interventions specific to the fireground environment that would improve outcomes? We don't know. We need research and we need proof before we leap to conclusions. Until we truly understand the problem, solutions are mere educated guessing.

Some words of caution from the medical community: science is not the be all and end all. Evidence-based medicine has become incredibly controversial³. Why? Because it tends at times to exclude common sense. High quality scientific evidence cannot be the only basis for decision making. Added to research should be experience, values, and preferences.

Let's be careful not to throw common sense out the window. When that happens in medicine, smart people, patient preferences, and organizational values are ignored. The results are simply not that good.

Highlighting ludicrous reliance on scientific evidence alone was a 2003 British Medical Journal article calling for volunteers to study the effectiveness of parachutes in preventing death from falls out of airplanes⁴. The authors contended that, in the spirit of not adopting any practice without evidence of effectiveness, proponents of evidence-based medicine should volunteer as control subjects to free fall from airplanes in order to determine whether the experimental group using parachutes had better outcomes. Duh; and point well taken: some things are obvious.

For the fire service, some things are obvious as well. Those things we need to do. What we don't know, we need to study. Otherwise, firefighters will continue to die in proportions far greater than our fellow public safety brothers and sisters, and in numbers far exceeding the rest of society.

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