

**Firefighter Health and Fitness:
Use of Incentive Programs to Decrease Firefighter
Heart Attack and Stroke**

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INTRODUCTION

The following paper will discuss the issues related to firefighter deaths that occur from heart attack or stroke and how incentive programs can be used to improve their overall health and fitness. Firefighters are subjected to many different situations in which they risk their lives to save others. However, many firefighters do not protect the most valuable asset, themselves. Too many line-of-duty deaths (LODD) occur each year, and the numbers have not changed much over the years. Approximately 40 to 50% of the LODDs that occur each year are from heart attack or stroke. A distinction between volunteer and career firefighters indicates that the majority of the deaths that occur are volunteer firefighters. Nevertheless, the trend is alarming, and it is unacceptable for firefighters to die from something that they could potentially have prevented. The mentality and complacency of individuals and organizations will need to be changed for deaths to be decreased. Firefighters must be in the best physical shape possible to perform their job exceptionally. In order to change the mentalities and the well being of firefighters, a major shift in exercise and diet habits will need to be pursued. Incentive type programs may also need to be used as a reward for those who take the initiative to better themselves. The information that follows will provide details on how the LODDs may be decreased and if incentive programs are effective.

BACKGROUND

In recent years, many articles and studies have been or are being conducted to determine how the fire service can reduce the number of LODDs. One major area of concern is death from heart attack and stroke. According to a Harvard study conducted by Stefanos N. Kales, MD, heart disease "...is definitely linked to emergency duties" (DeNoon, 2007). In addition, Dr. Kales' research has shown that the majority of firefighter deaths from heart attacks are the result of the physical activity performed and the exposure to toxic environments (DeNoon, 2007). All firefighters are well aware of the dangers associated with the job and the type of toxic environments that exist in their jobs. Hazardous environments range from smoke filled burning buildings to exposure to blood-borne pathogens and other environmental conditions. Most people are never exposed to these environments and yet firefighters deal with them constantly. While all firefighters are expected to perform in these environments, and do so willingly, many do not prepare themselves adequately for the stress their body experiences. Firefighters are required to go from inactivity to full activity in a matter of minutes. Any person that is subjected to these types of circumstances needs to have his/her body in the best shape possible. The physical fitness of a firefighter should be the top priority for that person, the fire department and the community they serve.

Most of the firefighters who have died from a heart attack had a preexisting heart condition, such as previous heart attacks or open heart surgery (Fahy, 2005). Several factors have been known to increase the risk for heart attack or stroke including: cigarette smoking, high blood pressure, high cholesterol, being overweight and/or obese, physical inactivity, diabetes, age and family history of heart disease (www.americanheart.org). Prior to a heart attack occurring, blood vessels in the heart become blocked by a gradual build-up of plaque (atherosclerosis) (Cole). The narrowing of the artery(s) increases the work it takes for the heart to pump blood through that vessel and reduces the

amount of oxygen that is delivered to the heart. The reduction of oxygen to the heart leads to the pain that most people feel in their chest, arms, neck, back or jaw. If the cardiac event continues and the heart is not receiving enough oxygen, then the heart tries to compensate and eventually will go into ventricular fibrillation and/or asystole (Cole). Death of the person may then be the end result due to the heart not being able to function properly.

Firefighter LODD Statistics (Career vs. Volunteer)

Year in and year out firefighters are dying in the line of duty and the numbers remain the same. The United States Fire Administration (USFA) posts all line-of-duty deaths on their website www.usfa.dhs.gov. The statistics on the website include information on how the firefighters died (i.e. heart attack or trauma). It also includes the time of day and month in which the deaths occurred. The USFA website states that they have a goal of reducing firefighter fatalities by 25% over 5 years and 50% over 10 years. The USFA has set very lofty goals for reducing firefighter fatalities, and the trends in the data have not reflected the goals they have set. On average, 109 firefighters have lost their lives in the line of duty each of the last 11 years (1997 through 2008). A study conducted by the NFPA and written by Rita Fahy in 2005 indicates that 43.7% of firefighter deaths from 1995 through 2004 were the result of sudden cardiac death. In addition, 23 other deaths were due to stroke and aneurysm. Between 1977 and 1986 the number of deaths from heart attack and stroke averaged near 60 firefighters. Since the early '90's the number of deaths have averaged between 40 and 50 firefighters, which is a decline of nearly 30% from earlier years (Fahy, 2005). However, the number of LODDs from sudden cardiac death has stabilized over the last 20 years. The percentage of deaths due to heart attack in professions such as police officers (22%), other occupational fatalities (15%), and EMS workers (11%) is relatively small when compared to firefighters (Kales, 2003).

There are a total of about 1,150,000 firefighters in the United States with approximately 825,000 volunteer firefighters and 323,000 career firefighters (USFA website). Since the United States consists of mainly rural areas, these volunteer departments and firefighters are a huge asset to their communities. Many of them do not get paid for the services they provide. The majority of the firefighters volunteer as a service to their communities to ensure that people and property remain safe and are protected. The volunteer firefighters typically have another job in which they work and have agreements with their employers that will allow them to respond to an alarm if they are needed. Career firefighters, on the other hand, account for a small percentage of the fire service in the United States. A career firefighter's main job is to be at the fire station for a set amount of time, and they get paid while they perform medical and/or fire services. Studies and data have shown that most of the LODDs that occur each year affect volunteer firefighters. This is a reasonable conclusion since the majority of the firefighters are volunteers. Based on calculations from 2008 data, approximately 60% of the deaths from heart attack/CVA were volunteer and about 40% were career firefighters (USFA website). By comparison, the percentage of Americans who died from heart attack or stroke in 2008 was approximately 35%, which is significantly less than the percentage of firefighter deaths from heart attack (nearly 50%) (www.americanheart.org).

Several studies have been conducted to determine if there is a link between the heart attacks that firefighters have suffered, the types of environments that they are exposed to and the type of stress that is placed on their bodies. Obesity and smoking are major contributing factors for increasing one's risk for heart disease and failure, based on a 2008 study published in the *American Journal of Cardiology* (International Fire Fighter July/August, 2008). Coupled with the extreme

amount of stress that is placed on a firefighter's body while fighting a fire, the results can be catastrophic and deadly. Firefighters typically are called to respond to a scene in a short amount of time going from a sedentary state to working at near maximum capacity. They are usually called to perform extreme physical activities while wearing about 50 pounds of gear and breathing through a self-contained breathing apparatus (SCBA). In addition, heat stress and fluid loss, inhalation of certain particulates and other toxins, noise exposure, and shift work are all factors that decrease cardiac output or increase blood pressure (Kales, 2003). Kales' study yielded some interesting results that supported the fact that most on-duty heart attack related deaths were precipitated by the job, for firefighters that had underlying heart disease or risk factors. Activities that were more strenuous also increased the risk of heart attack. On the other hand, firefighters who do not have cardiovascular risk factors are unlikely to die from a heart attack. They also concluded that 36% of the time, death occurred during fire suppression activities. The results also indicated that strong predictors of a LODD from a heart attack include firefighters who were 45 years or older, were current smokers, had hypertension and a prior diagnosis of arterial occlusive disease (Kales, 2003).

Other data shows that firefighters tend to experience heart attacks during certain times of the day and certain months of the year. The study conducted by the USFA in 2007 show that heart attacks occur mostly in males and ages range from 31 to over 61. The majority of the LODDs from heart attack in 2007 were in firefighters 51 years or older. Many of the deaths occurred at a specific time of the day (i.e. 0900 -1300, 1500- 2100 and 2300-0300). There also appears to be a correlation, at least in 2007, with the time of year in which the heart attacks occurred. Review of the 2007 data show an increase in heart attacks during the coldest months of the year (January and February) and the hottest months of the year (May through September).

INCENTIVE PROGRAMS

Everyone should eat healthier and exercise more, but Americans continue to get larger. Firefighters and EMS personnel are called to help people every day who are too large to get up off of the ground by themselves if they fall. The resulting disease processes destroy the body and the unhealthy lifestyles have been shown to decrease a person's lifespan and ability to enjoy life fully. Many firefighters know all of the facts about being overweight and the results from not eating healthy and exercising, yet firefighters continue to try and defy the odds. There are a large number of cities and fire departments that have adopted incentive programs to try to influence and reward their employees for achieving certain health goals and standards. The majority of these incentive programs include some sort of monetary pay or extra days off. Many are voluntary, but some feel that the programs should be mandatory for all fire personnel. The following information will involve a review of some of the incentive programs that different fire departments employ.

City of San Francisco, California Fire Department

The City of San Francisco Fire Department has been extremely proactive in trying to improve the health of their firefighters. To help alleviate the cost of undertaking a large health and fitness program, the San Francisco fire department applied for a grant from Federal Emergency Management Agency (FEMA). In 2008, a \$1.2 million grant was awarded to the fire department to continue their wellness and fitness program and "...to mitigate the work-related injuries, absenteeism, cardiovascular disease, and the effects of aging". The fire department also contributed \$300,000 to the program bringing the total funds to \$1.5 million. One of the problems that they feel is important

to their department is firefighters who are slightly older than the national average. In addition, from 2004-2006 they spent \$39 million in worker's compensation and almost \$23 million in sick pay. The cardiac problems that were reported by fire personnel accounted for 38% of the citywide claims associated with cardiovascular conditions. The city of San Francisco Fire Department is just beginning to implement an extensive health and fitness plan and only time will tell if it works. All information regarding the above information was taken from the San Francisco website www.sfgov.org.

Department of Personnel Administration - Government of California

The government of California also provides an incentive pay for employees who participate and pass an annual physical fitness test. Employees who have worked as a full-time peace officer/firefighter for a certain amount of time are able to receive a \$65 "bonus" for each pay period as long as they maintain the required level of fitness. At any time that the employee is unable to pass the fitness exam, their incentive pay will stop. The employees who fail will be able to retake the physical fitness exam one time each quarter. At any time they pass the fitness exam their incentive pay will be reestablished, excluding any back pay during the period in which they failed. The above information was taken from the government of California website www.dpa.ca.gov.

City of Leawood, Kansas Fire Department

The Leawood Fire Department has established a wellness program in order to "...optimize physical performance as necessary for safe and effective operations on the emergency scene, to minimize major risk factors associated with cardiovascular disease, and to improve the long-term health of Fire Department personnel". The fire department has outlined specific goals that employees

need to achieve for physical fitness. They have also taken a stance on requiring firefighters to participate in a fitness improvement program if they have three or more major risk factors for cardiac disease (i.e. obesity, elevated blood pressure, elevated cholesterol level, smoking and cardiovascular fitness rating). The testing they perform includes a maximal stress test (Bruce Treadmill) and physical performance assessment (PPA). New hires are required to pass the Candidate Physical Ability Test (CPAT). If a firefighter is unable to pass the maximal stress test with a rating of at least fair, then he/she will be declared unfit for duty. Fire personnel are given two chances in one year to pass the PPA. The PPA consists of six activities performed in full protective gear wearing SCBA and must be completed in 12 minutes. The six activities include the hose drag/connection, hose relocation, ladder raise and climb, nozzle advance, simulated forcible entry, and simulated rescue. In addition to the annual fitness testing of all firefighters, a voluntary incentive program has been established. The incentive program allows a participant to accrue wellness leave hours based on the results from the additional testing. The additional testing includes a 1.5 mile run, sit-ups, vertical jump, push-ups and 300 meter run. Participants in the program may be able to obtain 25 hours of wellness leave for reaching the highest levels in all of the categories. All of the above information was taken from the City of Leawood Fire Department website (www.leawood.org) wellness program document, policy number AP 08, effective date August 5, 2003.

Missouri Valley Division Fire Chiefs Health and Wellness Survey

In April and May of 2008 a survey was conducted by the Missouri Valley Division of Fire Chiefs to determine the number of fire departments that have health and wellness programs. The survey of 198 fire departments included questions on how their fire department helps their employees keep or achieve physical fitness. The results are relatively shocking. Less than 45% of the

departments do not mandate a physical fitness program, however, about 90% provide exercise equipment at the fire station and approximately 75% give the firefighters time during the day to exercise. Only 30% of the departments make achieving mandatory fitness standards a requirement to remain on the fire department. About 25% have incentive type programs to encourage firefighters to stay healthy and fit. Nearly 35% of the departments do not allow tobacco use while at work. Less than 15% have taken the step to mandate no tobacco use at all. Only a few have peer fitness trainers that guide the firefighters through a training regimen. The responses by the chiefs indicate that money and time off for achieving fitness standards are the main incentives that fire departments use to help their firefighters stay fit and healthy. The above information was taken from the Missouri Valley Division Fire Chiefs Health and Wellness Survey and was found on the website www.mofirechiefs.org.

Do Incentive Programs Work?

Many examples of incentive programs can be found throughout the United States. The following are two examples of one that has and one that has not worked. The City of Montgomery, Ohio Fire Department has a well established health and fitness program in which participation is required of all firefighters, including the Chief. The program was established about six years ago and has been a positive experience for most involved. It should be noted that the program was constructed by the firefighter's union and all rules and consequences are part of the union contract. The program involves a variety of activities (exercising, attending health fairs, yearly physicals and other preventative medicine, etc.) in which a person is able to accumulate points that later translate into a dollar amount (up to \$500) at the end of the year. Each year firefighters are required to pass a physical fitness test. If they are unable to pass the first test, they get a chance to retest. If they fail

the retest, they could be released from their job. Since its inception, three firefighters have been released because they were unable to pass the physical fitness test. The initial funding for the program was obtained through a FEMA grant. Funding after the use of the grant was provided by the City of Montgomery. Results from the program have been excellent and several health problems (i.e. diabetes, thyroid problem, and heart problems) were discovered before they became major issues.

All of the information for the City of Montgomery, Ohio Fire Department was taken from their wellness guidelines Policy #V-16 (Rev. June 2006) and their union contract as supplied by Assistant Chief Tom Wolf.

The incentive program that was established in Spring Hill, Florida is an example of a program that did not work, or was not given enough time to work. The Spring Hill incentive program paid out monetary rewards for firefighters who achieved specific fitness goals. By the end of one year it appeared that the program was successful, and it had paid out a total of approximately \$63,000. However, the timing of when the program started was probably its downfall. At the end of the first year, when it was time to renew and negotiate their union contract, the firefighters dropped the incentive program for a higher pay raise (King, 2003). The benefits of the program were unable to be witnessed due to the short-term gains from a pay raise.

Effectiveness of Health and Fitness Programs

As can be seen from all of the above information, there are a few ways in which fire departments have utilized health and fitness programs. On one end of the spectrum, fire departments may make the health and fitness program purely voluntary except for doctor's physicals. On the other end of the spectrum, some fire departments are starting to require all employees to pass a yearly

physical agility test (i.e. Leawood, Kansas). Several factors influence the effectiveness of health and fitness programs and incentive programs and include the following:

- Many incentive programs are unable to get off of the ground or even pass the initial phases of research because of funding.
- Support from the fire department and city administrators would allow funds to be made available for use as monetary rewards.
- Funding may have to be obtained through grants if cities are unwilling to fund the programs.
- Every fire department is different, and all aspects of an incentive program need to be carefully reviewed before any commitments are made.
- Program success would involve participation of all firefighters and not just a select few. Many firefighters already work out and keep their bodies in optimal shape. The firefighters who already exercise are not the ones who would be hard to convince about the importance of a health and fitness program. The target of a health and fitness program should focus on firefighters who are inactive or have minimal physical activity.
- Would it be hard to convince all firefighters that it is necessary to participate?
- Can a monetary reward and a voluntary exercise program be successful for more than a few years before people become bored and uninterested?
- Can a health and fitness program be successful without making participation mandatory?

Mandatory Health and Fitness Programs

There are a lot of examples of fire departments that have established guidelines for “mandatory” exercise for all of their firefighters while on duty. However, a majority of the

firefighters do not take advantage of the time they have while on duty to stay physically fit. Every department is different, but the only way to have a successful health and fitness program in which everyone participates is to make it mandatory. Making something mandatory for someone is a major step, especially when they have not been required to do anything in the past. There are many fire departments around the nation that are implementing mandatory training and annual fitness testing, like the Leawood, Kansas Fire Department.

Some of the annual physical fitness tests that fire departments conduct are not representative of what a firefighter does at a fire scene. A standardized test that all fire departments (career and volunteer) are required to use may need to be implemented to ensure firefighter fitness remains consistent from year to year. Participation in physical training and exercise regimens should also be made mandatory and enforced by shift commanders and fire departments. A lot of fire departments have established health and fitness programs as a part of their guidelines and state that it is mandatory for each firefighter to exercise a certain amount of time each day. However, it is safe to assume that these “rules” are not being enforced. A major change in the habits of firefighters will be the only way LODDs from heart attack will decrease. A fire district board member in Spring Hill, Florida states it clearly, “...If they (firefighters) are killed, their spouse will come and ask us why we let them continue in a job where they were not physically fit? (King, 2003)”

CONCLUSION

Firefighters are by far more physically fit than the general population, but the amount of deaths due to heart attack and stroke need to be reduced. The number of LODDs due to heart attack and stroke account for nearly 50% of all firefighter deaths each year. These numbers have stayed the

same for many years with no dramatic decrease since the 1980's. Since a firefighter is exposed to high stress environments and the physical demands placed on their bodies are extreme, they need to be in the best shape possible. Everyone knows that they should exercise and eat healthy, but few people follow through with the commitment to live a healthy lifestyle. All fire departments need to have a mandatory fitness program that is monitored and followed to ensure firefighters are doing everything in their power to prevent the possibility of a heart attack or stroke. A mandatory yearly physical fitness test needs to be developed and employed for everyone who wants to be and remain a career or volunteer firefighter. Doctor's physicals and stress tests need to be conducted every year no matter what age to ensure that firefighters are service ready. The attitude of the entire fire service community needs to be changed to reflect the goals of preventing LODDs as established by the United States Fire Administration. If people do not change then LODDs from heart attack and stroke will remain the same and may even increase in the years to come. What is more important: putting a little work into staying alive by exercising or sitting on the couch watching the television? Firefighters cannot afford to become or remain lazy, slothful and gluttonous when the citizens and fellow firefighters of their communities are depending on them.

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