Proposal To Implement a Fire Department Health and Wellness Program

Problems

1. Firefighters are dying from sudden cardiac death: Over 50% of firefighter line of duty deaths are being attributed to a sudden cardiac event. The number of line of duty deaths in the fire service have been on the decline over the past few years, but the percentage of firefighters dying from sudden cardiac death has been fairly consistent year in and year out. The following is the abstract from the 2010 firefighter fatalities report from the NFPA:

"In 2010, a total of 72 on-duty firefighter deaths occurred in the U.S. This is another sharp drop from the 105 on-duty deaths in 2008 and 82 in 2009, and the lowest annual total since NFPA began conducting this annual study in 1977. Stress, exertion and other medical-related issues, which usually result in heart attacks or other sudden cardiac events, continued to account for the largest number of fatalities. More than half of the deaths resulted from overexertion, stress and related medical issues. Of the 39 deaths in this category, 34 were classified as sudden cardiac deaths (usually heart attacks) and five were due to strokes or brain aneurysm." (NFPA, 2010).

Smith, Liebig, Steward, and Fehling (2010) found that the acute physiological effects of firefighting such as adrenaline surge, increased core temperature and dehydration coupled with underlying cardiovascular disease may contribute to a sudden cardiac event (Smith, Liebig, Steward, & Fehling, 2010). In order to reduce the number of firefighter deaths caused by sudden cardiac death, we must first understand the physiological effects of firefighting and risk factors for cardiovascular disease.

Physiological Effects of Firefighting

Smith et al. (2010) detail research findings on the effect firefighting has on the major systems of the body:

Cardiovascular: Heart rate and blood pressure are increased. Firefighters may be working near maximum heart rate for the duration of their air bottle depending on the circumstances.

Thermoregulatory: The superheated environment coupled with the layers of protective clothing causes a significant increase in core body temperature. The physical work and heat conditions can quickly lead to dehydration.

Respiratory and Metabolic: The mental, emotional and physical stress causes

increased respiratory rate, oxygen consumption and lactate fatigue.

Nervous: The sympathetic nervous system is activated and large amounts of adrenaline are being released to help manage the perceived threat.

Muscular: The physical nature of the work leads to increased oxygen consumption, heat production and fatigue.

Cardiovascular Disease in Firefighters

A large percentage of people who die from coronary artery disease are over age 65. The risk for firefighters increases over age 45. In 2009, 34 of the 47 fire fighters to die from heart attack or stroke were between the ages of 35 and 60 (USFA, 2009). It is estimated that firefighters have a 300% increased risk for cardiac disease compared to other segments of the population. Dr. H. Robert Superko conducted a FEMA sponsored study of firefighters in Gwinnett County, Georgia. The study was prompted by the sudden death of a 53 year-old firefighter who suffered a cardiac arrest while fighting a house fire. Superko (2011) found that the stress and psychological pressures related to the job, poor nutrition, lack of exercise, and inherent personality traits, combined with a genetic predisposition to heart disease may have a tremendous impact on the risk of sudden cardiac death in firefighters (Superko, 2011).

Smith et al. (2010) describe cardiovascular disease as “a pathological condition that affects the heart, blood vessels, or the clotting potential of blood”. Although cardiovascular disease is a chronic condition that progresses over the course of many years, it may transition into an acute life-threatening event in which death occurs quickly. The physiological strain of firefighting coupled with underlying cardiovascular disease may be the lethal combination causing a sudden cardiac event in firefighters.

Most risk factors for cardiovascular disease can be mitigated with healthy lifestyle choices. High blood pressure, high cholesterol, obesity, and diabetes are all exacerbated by a sedentary lifestyle. Smoking cigarettes is another lifestyle choice that has a negative impact on health. Adhering to a healthy lifestyle that includes comprehensive firefighter fitness and healthy nutrition may be the key to reducing the annual firefighter line of duty deaths.

Firefighter Survival

Discussions about firefighter survival often include topics such as RIT, Mayday, and building construction. How often do we discuss physical fitness and nutrition as part of firefighter survival? The fire service as a whole, each fire department and individual firefighters should be placing a very high priority on improving firefighter health and wellness. Firefighter line of duty death statistics are fairly consistent year in and year out, yet many modern day fire departments do not have a formal health and wellness program. Many departments still do not have

dedicated exercise facilities, fitness testing procedures, or peer fitness trainers. According to NIOSH, less than half of the departments who experience a firefighter line of duty death had an established fitness and wellness program, and only 10% of those that did required participation.

2. Tens of thousands of firefighters are injured on duty each year: According to a 2005 study conducted by NIST, about 80,000 U.S. firefighters are injured each year. It is estimated that firefighter injuries cost billions of dollars annually. Costs are attributed to workers compensation payments and other insured medical expenses, long-term care, lost productivity, the administrative costs of insurance and other factors (West, 2005). The following is the abstract from the 2010 firefighter injury report from the NFPA:

"NFPA estimates that 71,875 firefighter injuries occurred in the line of duty in 2010. An estimated 32,675 or two-fifths (45.4%) of the all firefighter injuries occurred during fire ground operations. An estimated 14,190 occurred during other on duty activities, while 13,355 occurred at non-fire emergency incidents. The leading type of injury received during fire ground operations was strain, sprain or muscular pain (52.8%), followed by wound, cut, bleeding, bruise (14.2%). Regionally, the Northeast had the highest fire ground injury rate." (NFPA 2010).

Firefighter injuries have a tremendous negative impact on fire departments, individual firefighters and taxpayers each year. Fire departments recognize the need to maintain fire apparatus to ensure that vehicles operate properly. For most departments, this is one of the largest line items in the annual budget. Why not budget for "personnel maintenance"? Firefighter injury prevention must also be a high priority for the fire service, individual fire departments and each firefighter whether they are paid or volunteer.

3. Most popular fitness programs are not designed for firefighters: Many fitness programs build general physical preparedness, but is being "generally fit" enough to meet the physiological demands of firefighting? Unfortunately, most fitness programs do not meet the needs of firefighters because they were not designed to develop the wide array of physical attributes that firefighters must possess. Physical preparedness for firefighters must follow function within the energy system of tactical response: The capacity to work at high intensity in multi-planar movements for repeated bursts of short duration with rapid recovery. Most PT programs fall short of these demands. Furthermore, most PT programs fail to place sufficient attention on injury proofing tactical responders (not just physically, but psychologically and biochemically) through active recovery and pre-habilitation training.

Popular Fitness Programs

Body Building: Body building training protocols are designed to increase the size and strength of individual muscle groups. This training approach focuses on single plane movements and often places undue stress on individual joint complexes. Physical strength and power are critical attributes for firefighters, but they must be expressed through multiple planes of movement through a full range of motion.

Endurance Training: Endurance training protocols are typically designed to improve performance at low to moderate intensity for longer periods of time, often up to an hour or more. This training protocol is appropriate for tri-athletes, endurance cyclists or marathon runners. Most firefighters will not operate for longer than 20 minutes while utilizing their Self Contained Breathing Apparatus. Conditioning of energy systems for firefighters should be more specific to this time period.

Muscle Confusion: Many firefighters are utilizing random high intensity training protocols to create adaptation through “muscle confusion”. The movement patterns and physical attributes required to perform as a firefighter are very specific. Specific training adaptations require specific training protocols.

Home Fitness: There are several home workout programs that are gaining popularity. Many of these are good programs for the general population, but are not ideal for firefighters. In most cases the exercises selected and the energy system development provided are meant for the widest demographic possible. Firefighters have very specific needs. Some of these programs require over an hour to complete. Most firefighters would benefit from a more efficient and more effective training protocol.

There is not one “right” way to train, or one physical training program that is the end all, be all for everyone. Ultimately, some form of exercise is better than no exercise at all. The best physical training program for any individual is the one that they will follow consistently. It is important that firefighters participate in comprehensive physical training that prepares them to perform at the highest level under stressful conditions. Training specifically for the occupational demands of firefighting will reduce the physiological strain experienced by the body. Reducing the physiological strain experienced by the body will lead to improved performance, and it will reduce the likelihood of suffering a sudden cardiac event. Comprehensive physical training in combination with proper firefighter nutrition will reduce the risk of cardiovascular disease. We want to empower our firefighters to serve the public to the best of their ability, avoid injury and most importantly go home to their families after each shift.

Objectives

A formal fire department health and wellness program will have a tremendous impact on reducing firefighter line of duty deaths, reducing firefighter injuries and improving firefighter performance. The following objectives will be key components of a comprehensive health and wellness program for our fire department:

1. **To implement annual and bi-annual medical exams for firefighters:** A physician appointed by our fire department will conduct bi-annual medical exams for firefighters under age 40, and annual medical exams for firefighters over age 40.

2. **To implement annual physical fitness assessment:** A physical fitness assessment should be administered once or twice a year by a certified physical fitness specialist.

3. **To set up a firefighter combat course:** A firefighter combat course will be comprised of multiple stations that replicate common tasks performed by firefighters on the fire ground.

4. **To appoint peer fitness trainers or contract with outside fitness specialists:** A comprehensive fire department health and wellness program must include qualified fitness specialists to conduct fitness assessments for firefighters and to be available for exercise and nutrition consultation.

5. **To adopt a specific and comprehensive firefighter fitness program:** The physical, mental and emotional demands for firefighters are unique, and at times quite extreme. Firefighters require a specific and comprehensive fitness program that will help them perform at a high level, avoid injuries and return home safely.

6. **To address firefighter survival stress management:** The variety of stressors that firefighters are exposed to can have short term and long term negative effects. In the short term, these stressors can hinder cognitive function and physical performance. In the long term, these stressors can impact firefighter health and longevity. We need to prepare our firefighters to deal with a variety of stressors.

7. **To make incident safety and firefighter rehab a high priority on scene:** Clearly defining firefighter risk management procedures and providing adequate rehab for firefighters on scene will improve firefighter safety and health.

Methods

1. **Implementing annual and bi-annual medical exams for firefighters:** Our fire department will interview local physicians and determine which are qualified to conduct firefighter medical exams. Once a physician is identified, we will generate a contract that clearly states fire department expectations for the physician. Labor and management will discuss firefighter medical exams, and come to an agreement regarding the details of the program. Medical exams will include, but may not be limited to a comprehensive medical questionnaire, vital signs, body weight and body composition, a complete cardiac and pulmonary work up, blood work, head to toe physical exam, audiometry, eye exam, diagnostic imaging, screenings for cancer and other diseases, and exercise and nutrition counseling. The exams will be performed bi-annually for firefighters under age 40, and annually for those over age 40.

2. **Implementing annual physical fitness assessment:** The physical fitness assessment will evaluate body weight and composition, aerobic capacity, muscular strength and endurance, flexibility and movement capability. Individual exercise prescription and nutrition counseling will also be part of this process. Physical fitness assessments will be conducted by certified fire department peer fitness trainers, or qualified fitness specialists from outside of the department.

3. **Setting up a firefighter combat course:** The firefighter combat course will include the following stations:

   Don SCBA: Don SCBA in 60 seconds or less

   Stair Climb/Hose Carry: Carry hose bundle up 4 flights of stairs.

   Equipment Hoist: Hoist a hose roll up to the 4th story using a rope.

   Forcible Entry: Strike a large tire with a sledge hammer, using full overhead swings 10 times.

   Pull Ceiling: Lift a 15lb Clubbell overhead 5 times per side using the “Pike Press” technique.

   Advance Charged Hose Line: Advance charged 1 3/4 hose line 100’.

   Victim Rescue: Drag a rescue dummy 50’.

The course may be set up on the training ground on a temporary or permanent basis. This course will help firefighters gauge their fitness specific to firefighting tasks, and it may also be used as a baseline for air consumption/management (SCBA) while completing fire ground tasks.

4. **Appointing peer fitness trainers or contracting with outside fitness specialists:** A comprehensive fire department health and wellness program must include qualified fitness professionals to conduct fitness assessments for firefighters, and to be available for exercise and nutrition consultation. The IAFF/IAFC Fire Service Joint Labor Management Wellness/Fitness Initiative outlines a Peer Fitness Trainer Certification Program. The number of peer fitness trainers required will depend on the size of the department. The alternative would be to hire qualified fitness specialists from outside of the department under contract as needed.

5. **Adopting a specific and comprehensive firefighter fitness program:** There are many physical fitness programs available to firefighters, but few that meet our specific and unique needs. We will identify a comprehensive firefighter fitness program, and we will provide the exercise equipment necessary to participate in the program on duty. This fitness program will also be a part of our recruit academy training each day. TACFIT Fire Fighter and Core Performance are examples of comprehensive fitness programs.

6. **Addressing firefighter survival stress management:** Siddle (1995) states the three important perceptions that influence the level of survival stress are the level of threat perceived such as nature of the incident, potential victims, etc, individual confidence in knowledge, skills and ability to control the threat, and past experience in dealing with the threat. This provides the foundation for training goals and objectives:

   Skill Confidence: Hands on training for the wide variety of skills required for firefighters such as hose and ladder evolutions, ventilation, etc.

   Situational Confidence: Participation in regular scenario based training to prepare for the incidents that may be encountered such as residential structure fires, high rise drills, firefighter survival drills, etc.

   Visualization: Use fire scene photos to generate conversation about strategy and tactics. Discuss fire scenarios for buildings in the response area.

   Breath Control: Practicing slow controlled breathing when stress levels are increased can help control anxiety and re-focus on the task at hand (Siddle,1995, pp. 91-107).

Physical Training: Firefighters are tactical athletes. Sonnon (2010) states, "tactical athletes require a comprehensive physical training program which will foster the physical skills, attributes and energy reserves necessary for tactical response (Sonnon, 2010). This training approach not only improves performance on the fire ground, but it will also help prepare your body for the physiological strain of firefighting.

7. **Making incident safety and firefighter rehab a high priority on scene:** Our department will provide clear expectations for risk management to our Company Officers and firefighters. We will risk a lot to save life, we will risk a little to save property, and we will risk nothing for that which is already lost. We will provide adequate rehabilitation on scene for firefighters. The rehab station will include an evaluation of vital signs, hydration and body temperature regulation.

Budget and Schedule

1. **Implementing annual and bi-annual medical exams for firefighters:**

   Budget: The cost for fire department medical exams will depend on the final contract between the fire department and the appointed physician.

   Schedule: Once the contract for service is finalize, the program should be implemented as soon as possible. Firefighters under age 40 well undergo a medical examination bi-annually, and those over age 40 will undergo a medical exam annually. Members of the Hazardous Materials Team will undergo a medical examination annually. Each firefighter will participate in the exam in or around their birth month.

2. **Implementing annual physical fitness assessment:**

   Budget: The cost to implement annual physical fitness assessment will depend on how many times per year we administer the assessment, the number of peer fitness trainers that we authorize to receive certification, and the annual expense of these individuals administering the assessments to the department (possible overtime).

   Schedule: It is recommended that the fitness assessment be conducted twice a year. Each shift should have two opportunities to participate in the Fall physical fitness assessment and the Spring physical fitness assessment. We will be able to begin this program once we have certified peer fitness trainers in place, or we have identified qualified fitness specialists from outside the department who will administer the program.

3. **Setting up a firefighter combat course:**

   Budget: The cost for setting up the combat course should be quite small. We currently possess most of the equipment necessary to complete the course.

   Schedule: The course will be set up for the first time at the beginning of next year. Each firefighter will complete the course twice a year.

4. **Appointing peer fitness trainers or contract with outside fitness specialists:**

   Budget: The cost of certifying firefighters through the Wellness/Fitness Initiative Peer Fitness Trainer Certification Program will depend on the number of trainers the department deems necessary. Once they are certified, much of the continuing education and administration of physical fitness assessments may be completed on duty. There may be some overtime incurred for C.E. and fitness testing. The cost to hire fitness specialists from outside of the department will be approximately $50 per hour, per trainer.

   Schedule: We will authorize firefighters to complete the Peer Fitness Trainer Certification Program during the Fall of next year. We will begin conducting physical fitness assessment, and providing exercise and nutrition consultation during the Spring of next year.

5. **Adopting a specific and comprehensive firefighter fitness program:**

   Budget: The cost to adopt a specific firefighter fitness program will depend on the program we select. There may be a cost associated with licensing the program, and/or certifying fire department peer fitness trainers to teach a specific program. The cost for equipment will also vary depending on personnel needs and available space at each station. Each station may be outfitted with a full compliment of tactical fitness equipment, requiring very little space for less than $2500.

   Schedule: The department will conduct research on fitness programs available to firefighters. We will select the program that we plan to adopt, purchase the equipment necessary for firefighters to participate in the program on shift, and implement the program formally at the beginning of next year. This program will also be part of daily training during new recruit academies.

6. **Addressing firefighter survival stress management:**

   Budget: There is very little cost associated with addressing firefighter survival stress management. Many of the strategies will be addressed in other areas of our fire department health and wellness program. We will design fire department training to address key components of survival stress management.

   Schedule: We will implement this training immediately, and stress management will be a key component of regular firefighter training and participation in the fire department health and wellness program.

7. **Making incident safety and firefighter rehab a high priority on scene:**

   Budget: There is no cost associated with prioritizing incident safety and adequate firefighter rehab at emergency incidents.

   Schedule: Specific policies regarding risk management and firefighter rehab will be generated as soon as possible, and these procedures will begin immediately.

Expected Results and Evaluation Plan

1. **Implementing annual and bi-annual medical exams for firefighters:**

   Expected Results: The firefighter medical exams will include, but may not be limited to a comprehensive medical questionnaire, vital signs, body weight and body composition, a complete cardiac and pulmonary work up, blood work, head to toe physical exam, audiometry, eye exam, diagnostic imaging, screenings for cancer and other diseases, and exercise and nutrition counseling. This process will help monitor the health of each firefighter on a regular basis, and bring light to any issues that may affect fitness for duty. These exams will place an emphasis on cardiac health, therefore reducing the risk of cardiovascular disease.

   Evaluation Plan: The fire department will monitor sick leave statistics, discuss general health trends of firefighters as a group with the fire department physician, and will seek feedback from firefighters regarding the effectiveness of the regular medical exams.

2. **Implementing annual physical fitness assessment:**

   Expected Results: It is expected that firefighters participating in regular physical fitness assessments with exercise and nutrition consultation will see improvements in their fitness, body composition and overall health. This will lead to improved performance and injury prevention, and will also reduce the risk of cardiovascular disease.

   Evaluation Plan: The fire department peer fitness trainers will compile general data based on age of participants in the fitness assessment program. We will evaluate general trends in the department over time.

3. **Setting up a firefighter combat course:**

   Expected Results: Each individual firefighter will get a sense of their own "firefighter fitness". They will determine their strengths and weaknesses when performing basic fire ground tasks. Firefighters will have access to peer fitness trainers as needed to improve performance in this evolution.

   Evaluation Plan: Each firefighter will record the number of circuits they are able to complete before they run out of air, and the amount of time it takes them to empty their SCBA bottle. This is valuable information for individuals to have, as it relates to air management. General trends will be measured over time.

4. **Appointing peer fitness trainers or contract with outside fitness specialists:**

   Expected Results: The fire department peer fitness trainers will be an invaluable resource to our department. These individuals will directly impact the health and wellness of their peers through regular physical fitness assessment, exercise prescription and nutrition counseling. Fitness specialists contracted from outside of the department would also be a great asset if we choose not to train our own personnel.

   Evaluation Plan: The department will collect feedback from firefighters to gauge the effectiveness of the peer fitness trainer/outside fitness specialist program.

5. **Adopting a specific and comprehensive firefighter fitness program:**

   Expected Results: Firefighters will perform at a higher level, avoid injury and reduce the risk of line of death through regular participation in a specific and comprehensive firefighter fitness program.

Evaluation Plan: The fire department will monitor injury and illness statistics, and will seek feedback from firefighters regarding the effectiveness of the specific firefighter fitness program.

6. **Addressing firefighter survival stress management:**

   Expected Results: Firefighters will experience improved performance and improved health through stress reduction.

   Evaluation Plan: The fire department will seek feedback from firefighters regarding the effectiveness of the firefighter survival stress management program.

7. **Making incident safety and firefighter rehab a high priority on scene:**

   Expected Results: Company Officers and firefighters will improve their risk management skills, and they will participate in on scene rehab as needed depending on the demands of the incident.

   Evaluation Plan: Incident Commanders will provide feedback regarding the decisions being made by Officers and firefighters at emergency incidents. They will also provide feedback regarding the effectiveness of incident rehab. Data will be collected at rehab stations during emergency incidents to monitor trends over time.

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