Career Fire Fighter Dies After Falling From Aerial Ladder During Training – Florida

Executive Summary

On January 6, 2012, a 49-year-old male career fire fighter (the victim) died from injuries sustained after falling from the tip of a 105-ft aerial ladder during training. The aerial ladder was set up behind the victim's fire station so that personnel could climb the ladder for training. Fire fighters were dressed in station or exercise attire. All fire fighters, including the victim, were wearing ladder safety belts as they ascended and descended the ladder. Some personnel included the ladder climb into an exercise routine. Prior to the victim's second climb, he complained of his legs being wobbly and feeling out of shape. After reaching the tip of the ladder on his second climb, the victim failed to immediately come back down. The fire fighters on the ground did not think anything of it until they heard a noise and looked up to see the victim tumbling down the rungs of the ladder. The victim tumbled out of the protection of the ladder rails and struck the passenger side rear outrigger. Lifesaving measures were taken by fire fighters on scene, but the victim succumbed to his injuries at the hospital.

Contributing Factors

- *Aerial apparatus standard operating procedures not fully developed and implemented to include measures to protect training participants from inadvertent falls and the safe and proper use of aerial apparatus*
- *Apparatus used as part of an unstructured training evolution and circuit training exercise*
- *Possible unknown medical problem experienced by the victim.*

Key Recommendations

- *Fire departments should ensure that standard operating procedures regarding proper use and operation of aerial apparatus are developed, implemented, and enforced*
- *Fire departments should ensure that a "safe discipline" is maintained at all times, including training*
- *Fire departments should consider adopting a comprehensive wellness and fitness program, including annual medical evaluations consistent with NFPA standards and performing annual physical performance (physical ability) evaluations for all fire fighters.*

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The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1998, Congress appropriated funds to NIOSH to conduct a fire fighter initiative that resulted in the NIOSH Fire Fighter Fatality Investigation and Prevention Program which examines line-of-duty deaths or on duty deaths of fire fighters to assist fire departments, fire fighters, the fire service, and others to prevent similar fire fighter deaths in the future. The agency does not enforce compliance with state or federal occupational safety and health standards and does not determine fault or assign blame. Participation of fire departments and individuals in NIOSH investigations is voluntary. Under its program, NIOSH investigators interview persons with knowledge of the incident who agree to be interviewed and review available records to develop a description of the conditions and circumstances leading to the death(s). Interviewees are not asked to sign sworn statements and interviews are not recorded. The agency's reports do not name the victim, the fire department or those interviewed. The NIOSH report's summary of the conditions and circumstances surrounding the fatality is intended to provide context to the agency's recommendations and is not intended to be definitive for purposes of determining any claim or benefit.

For further information, visit the program Web site at www.cdc.gov/niosh/fire or call toll free 1-800-CDC-INFO (1-800-232-4636).

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Introduction

On January 6, 2012, a 49-year-old male career fire fighter (the victim) died from injuries sustained after falling from the tip of a 105-ft aerial ladder during training. On January 9, 2012, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On January 23 – 27, 2012, a safety and occupational health specialist and a general engineer from the NIOSH Fire Fighter Fatality Investigation and Prevention Program traveled to Florida to investigate this incident. The NIOSH investigators met with the fire chief, assistant fire chief, the local union president, fire department's training commander, the city's risk manager, associate medical examiner, sheriff's office crime scene unit, and field representatives for the Florida State Fire Marshal, Bureau of Fire Standards and Training.

The NIOSH investigators visited, documented, and photographed the incident scene and aerial ladder involved in the incident. *Note: Due to Florida Statue 406.136, NIOSH investigators were unable to incorporate any photos of the apparatus, incident scene, or victim's attire within this investigative report.* The NIOSH investigators reviewed training records for the victim, dispatch radio transcripts and audio recordings from the incident following the fall, aerial ladder training program, and standard operating procedures (SOPs) of the fire department. The NIOSH investigators also reviewed incident photos taken by the sheriff's office crime scene unit, the medical examiner's report, and witness statements taken during the initial Florida State Fire Marshal investigation.

Fire Department

At the time of this incident, this career fire and rescue department operated out of 6 stations with 192 members serving a population of approximately 105,000 within an area of about 23 square miles. The fire department provided fire, EMS, and dive and ocean rescue services within their jurisdiction and surrounding area. Fire department field personnel worked a repeating 24-hour shift with 48 hours off between each 24-hour shift, averaging 18 – 20 calls per shift. The fire department is rated as a Class 3 department by the Insurances Services Organization (ISO).[a] In the ISO rating system, Class 1 represents exemplary fire protection, and Class 10 indicates that the area's fire-suppression program does not meet ISO's minimum criteria.

The fire department required incumbents to pass the International Association of Fire Fighters/International Association of Fire Chiefs (IAFF/IAFC) Fire Service Joint Labor Management Candidate Physical Ability Test and a medical physical before being hired. The department does not offer or require annual health and medical evaluations. Exercise equipment is available at all fire stations and may be used as part of the department's voluntary fitness program. NIOSH investigators

[a] The Insurances Services Organization (ISO) is an independent commercial enterprise that helps customers identify and mitigate risk. ISO can provide communities with information on fire protection, water systems, other critical infrastructure, building codes, and natural and man-made catastrophes. ISO's Public Protection Criteria program evaluates communities according to a uniform set of criteria known as the Fire Suppression Rating Schedule. More information about ISO and their Fire Suppression Rating Schedule can be found at http://www.isogov.com/about/.

were able to review copies of the victim's annual (2007 and 2011) watermanship evaluation. These evaluations included 4 – 5 exercises that evaluated stamina and comfort in the water. *Note: This type of evaluation is not a screening test for underlying heart disease.* Points were awarded for individual time completions with a minimum of 12 points required to pass the test. The victim successfully passed both documented evaluations by completing the following:

- 500 yard swim
- 15 minute tread
- 800 yard snorkel swim
- 100 yard inert rescue tow
- Free dive to a depth of nine feet to retrieve an object.

The department's training division had developed an aerial platform standard operating procedure (SOP) that had been approved by the fire department's administration. Despite approving the SOP, the department had not implemented all portions of the document. No specific information regarding appropriate use or in-station training (outside the training division) was included in the SOP. The SOP covered such topics as the following:

- Stabilizer setup procedures
- Turntable procedures
- Basket/aerial operation procedures
- Load limits
- Training requirements
- Unit staffing
- Raising/stowing the aerial ladder
- Aerial master stream operations
- Aerial rescue operations

Equipment and Personnel

The apparatus involved in this incident was a 2011, 105-ft rear-mounted aerial ladder truck (with a pin-anchored waterway). The fire department took possession of the apparatus in June 2011. Prior to placing the new aerial ladder in service, the department's training division had offered training and

familiarization to personnel for approximately 8 months. The aerial ladder had been in service for six shifts when the incident occurred and had received an aerial service check in November 2011. The gross vehicle weight rating of the apparatus was 74,800 lbs. The apparatus had an automatic transmission, diesel engine, an air brake system, and three axles with ten wheels (two in the front and eight in the rear). The apparatus measured approximately 43 ft (length) x 8 ft (width) x 12 ft (height). When documented by NIOSH investigators, the digital display on the dashboard of the apparatus read 2,549 odometer miles, 2,347 engine hours, and 102 aerial PTO (power take-off) hours. This aerial ladder was designed for positive loads, meaning it should not be rested or supported on a wall or a roof.

During the incident, the front wheels were chocked with both sets of out-and-down stabilizers positioned correctly prior to operating the aerial ladder. The ladder rungs measured approximately 15½ inches apart, the left and right ladder rails (from the inside) measured approximately 21¾ inches across and the ladder rail height measured approximately 16¾ inches. The ladder rungs were coated with a slip-resistant application to enhance footing and hand grips for traversing the ladder. Two sets of foot pegs were also available on the fly section of the aerial ladder for individuals to stand on while working from the ladder. Also, on the inside of the right rail a 12-ft roof hook was placed in a bracket system (originally designed for a pike pole). It was located approximately 83 inches below the first set of foot pegs, which decreased the distance between the left and right rails to approximately 19 inches. *Note: Fire department personnel had complained of clothing getting snagged on the roof hook and bracket system when coming down from the tip of the ladder.*

Personnel involved in the incident included the driver/operator, station lieutenant, and three fire fighters (FF1, FF2, and the victim).

Training and Experience

The victim had been with this career department for approximately 22 years. Prior to being hired with this department, he had served 7 years with another career fire/EMS department in the area. At the time of the incident, he held the rank of fire fighter/EMT. He had attended many in-house training programs related to fire suppression, EMS, technical rescue, aerial ladders, and dive/ocean rescue. According to department personnel, the victim was very versed and confident when working from the department's aerial ladders and/or platform apparatus.

Prior to placing the new aerial ladder in service, the department's training division had offered training and familiarization to personnel for approximately 8 months. The training encompassed every aspect of the aerial ladder including the features of the apparatus, components, setup and operation, water operations, aerial and fire fighter safety, climbing the ladder, and rescues. Once training was completed, individuals would be designated as tower-qualified (this is not a clearance to drive and operate the aerial ladder truck). The victim had completed 10 hours of training on the new apparatus prior to the incident but had not attended the final training module for the new aerial ladder (ladder operations). *Note: According to the training commander, the victim had completed approximately 38 total hours of aerial ladder training, including operations on aerial apparatus previously used by the department.* During the in-house training on the new aerial ladder, the department's training facility

required all personnel to be protected by a safety belay system to avoid inadvertent falls from the ladder. *Note: NIOSH investigators believe this procedure was also stressed when training in the field.* Also during this training, the ladder was routinely extended to 80 feet at a 65° angle. The manufacturer also offered training (an overview) on the aerial apparatus prior to the department's training being initiated.

Timeline

This timeline is provided to set out, to the extent possible, the sequence of events according to recorded and intelligible radio transmissions. Times are approximate and were obtained from review of the dispatch records, witness interviews, and other available information. Times have been rounded to the nearest minute. This timeline is not intended, nor should it be used, as a formal record of events.

- **1100 Hours**
  Victim's station, including the victim, responded to a motor vehicle incident involving a diesel fuel leak.

- **1530 Hours**
  Aerial ladder truck is positioned at the rear of the station for training and the aerial ladder is raised to 65° and fully extended.

- **1620 Hours**
  Dispatch received a cellular 911 call from the on-duty fire battalion chief advising them that a fire fighter had fallen from the ladder at the station. The battalion chief also requested law enforcement to the incident scene. *Note: Ambulance personnel from this station were already treating and transporting the victim to the hospital.*

- **1621 Hours**
  Ambulance arrives at the hospital with the victim.

- **1624 Hour**
  Time of death is pronounced for the victim.

Personal Protective Equipment

Fire department personnel reported to the NIOSH investigators that at the time of the incident the victim was wearing his station duty pants, uniform polo shirt, sunglasses, ball cap, and steel-toed work boots. The NIOSH investigators reviewed photographs of what the victim was wearing the day of the incident. The victim's boots showed moderate tread wear on the heel and toe surfaces. The victim was also wearing an aerial ladder safety belt (see Photo 1). All participants wore the same type of ladder safety belt (secured around their waists) and also wore either exercise clothing or their station uniforms. Helmets were not worn by any individuals during the training.

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Photo 1. Identical type of ladder safety belt worn by the victim and other fire personnel when climbing the ladder.
(NIOSH photo.)

Weather and Road Conditions

Around the time of the incident, the day was clear with a temperature of 70°F with a relative humidity of 59% and an easterly wind of 6 mph. The aerial ladder truck was appropriately leveled and stabilized on a concrete apron located at the rear of the station.

Investigation

On the day of the incident, following lunch, FF1 and FF2 had discussions about climbing the station's aerial ladder. *Note: Prior to lunch, around 1100 hours, the station (including the victim) responded to a diesel fuel leak following a motor vehicle collision. The victim assisted with controlling the diesel fuel leak.* One of the fire fighters was fearful of heights and felt that by continuously climbing the aerial ladder he would decrease his fear of heights. The other fire fighter was new at the station and had not had a chance to climb the aerial ladder since it had been placed in service. Around 1530 hours, FF1 asked the station lieutenant if they could raise the aerial ladder; permission was granted. The driver/operator of the aerial ladder agreed to assist in setting up the aerial ladder. FF1 drove the aerial ladder to the rear of the station, and the driver/operator and FF2 assisted FF1 in setting and raising the aerial ladder. The aerial ladder was appropriately leveled with stabilizers in place and jack safety pins

placed; the front wheels were chocked and the ladder was cleared of all overhead hazards before raising it over the front of the apparatus to 65° and fully extending the sections (105-ft).

FF1 retrieved a ladder safety belt from the aerial ladder and climbed first. After climbing approximately 10 ladder rungs he stated that the ladder rungs did not appear to be aligned. While still on the ladder, he asked the driver/operator on the turntable to check the alignment light. The driver/operator readjusted the ladder sections and the alignment light was confirmed. FF1 continued his climb to the top and then descended without difficulty. FF2, with a ladder safety belt on, climbed the ladder next and remembered that when he had reached the tip of the ladder he saw the victim come out from the station. When FF2 finished his climb he came off the turntable and began exercising on the ground by doing push-ups and lifting free weights. The victim put on a ladder safety belt and climbed the ladder next. When he came down off the ladder, the victim stated his legs felt wobbly and that he was out of shape. *Note: The victim had climbed the ladder the shift before (2 days prior) with no difficulties, but he had some chest discomfort and tiredness while swimming (4 days prior).* The victim then held FF1's legs at waist level while FF1 performed push-ups on the turntable. Following this exercise, FF1 climbed the ladder again and FF2 recalled that during this time the station lieutenant came out from the station to see how the crew was doing.

After FF1 finished his second climb, he left the turntable to do some exercises on the ground while FF2 climbed the ladder a second time. The driver/operator went back into the station to exercise. The station lieutenant then decided to climb the ladder with her crew. She put on a ladder safety belt and then climbed the ladder without difficulty. Following her climb, she stayed on the turntable while the victim climbed for a second time. He stopped approximately 20 ft up on the ladder and asked the station lieutenant to check the light as he pointed to the ladder rungs. The lieutenant and FF1 did not understand what the victim was talking about, because they were observing that the ladder rung alignment light was illuminated. The victim then continued his climb without difficulty. FF1 and FF2 were performing exercises on the ground during the victim's climb. FF2 recalled looking up the ladder to see why it was taking the victim so long to come down. FF2 noticed that the victim was at the tip of the ladder for a longer than normal time period. He thought that the victim was taking in the sights. *Note: The victim had not folded down the foot pegs on the inside of the ladder rails to stand on, nor was his ladder safety belt locked into the laces of the ladder.* FF2 put his head down for a moment and heard a noise from the ladder. He immediately looked up to see the victim tumbling down the ladder (within the rails) and a roof hook falling from the ladder (the roof hook was located in a bracket on the inside of the right ladder rail). FF2 stated the victim tumbled head-over-heels twice before tumbling over the right ladder rail. The victim struck the officer-side rear stabilizer before coming to rest partially under the truck. FF1, FF2, and other personnel immediately began live-saving measures before transporting the victim to the closest hospital. The victim was pronounced dead in the emergency department.

Contributing Factors

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident:

- Aerial apparatus standard operating procedures not fully developed and implemented to include measures to protect training participants from inadvertent falls and the safe and proper use of aerial apparatus
- Apparatus used as part of an unstructured training evolution and circuit training exercise
- Possible unknown medical problem experienced by the victim.

Cause of Death

According to the death certificate, the medical examiner listed the victim's cause of death as due to multiple blunt forces injuries. NIOSH investigators cannot say beyond a reasonable doubt why the victim fell from the ladder. It should be noted that during the week leading up to the incident, the victim had complained of not feeling well and even had chest discomfort while swimming, causing him to stop several times. *Note: Swimming was a normal activity for the victim.* Autopsy findings regarding the victim's cardiovascular system included focal myocardial fibrosis, organizing myocardial infarction, arterionephrosclerosis, and the left anterior descending coronary artery showed 30% calcific atherosclerotic stenosis.

Recommendations

Recommendation #1: Fire departments should ensure that standard operating procedures regarding proper use and operation of aerial apparatus are developed, implemented, and enforced.

Discussion: NFPA 1500 *Standard on Fire Department Occupational Safety and Health Program* states, a fire department shall prepare and maintain written policies and standard operating procedures that document the organizational structure, membership, roles and responsibilities, expected functions, and training requirements, including the following: The types of standard evolutions that are expected to be performed and the evolutions that must be performed simultaneously or in sequence for different types of situations.[1] The fire department training division had developed standard operating procedures (SOPs) that governed aerial ladder operations; however, this proposed SOP did not address appropriate use of an aerial ladder. Written policies and SOPs enable individual fire department members an opportunity to read and maintain a level of assumed understanding of operational procedures and appropriate use. The NIOSH Alert, *Preventing Injuries and Deaths of Fire Fighters*, identifies the need to establish and follow fire fighting policies and procedures.[2] To be effective, policies and procedures should be fully developed, implemented, enforced, and periodically revised. Being able to safely operate an aerial apparatus and work from the ladder is paramount. An operator is tasked with negotiating the large apparatus through traffic, correctly positioning it at an incident for maximum use, avoiding overhead hazards such as power lines and structures, and potentially working under stressful situations. Fire fighters working on or from an aerial ladder must be aware of the hazards associated with climbing the ladder, limitations from wearing structural fire fighting gear, and safety requirements (e.g., ladder safety belt, head protection). Also, an operator should always be stationed at the primary control panel.[3] A strong foundation established through SOPs and annual training will better adapt the aerial apparatus operator and fire fighter to make sound and safe decisions on the apparatus' operation and use. Fire departments should develop policies and

procedures addressing when and how an apparatus, especially an aerial ladder, should be used during emergency and non-emergency situations (e.g., training).

During this incident, the aerial ladder was positioned so that personnel could practice climbing the ladder and incorporate the climb as part of an exercise routine. The department's aerial platform SOP had not been fully implemented by fire department administration and the SOP did not contain guidance on aerial platform/ladder appropriate use or in-station training (outside the training division).

Recommendation #2: Fire departments should ensure that a "safe discipline" is maintained at all times, including training.

Discussion: Fire fighters must work and train from elevated aerial platforms and ladders, and they must be protected from hazards such as fire and smoke, falling objects, falling from the apparatus, and elevated structures (e.g., power lines, tree limbs, and balconies). Preparations for training sessions should allow for ample planning and evaluation before any training begins. Planning and evaluation may include the following:

- Type of training to be performed
- Review of department policies and procedures
- Type of tool, equipment, and/or apparatus to be trained on
- Hazards associated with the training
- Required PPE or safety equipment
- Designated safety personnel
- Evaluation of the skills performed during training
- Incumbents are physically fit or feel well enough to participate
- Approval of the training to be performed

Maintaining a "safe discipline" is a responsibility of all members of the department whether during an emergency incident or during training.

During this incident, fire fighters at the station decided to climb up and down the aerial ladder to get better acquainted at climbing the ladder. *Note: Some participants included the aerial ladder climb as part of their exercise routine.* All participants were tower/ladder qualified to work from the ladder. Those who climbed the ladder wore ladder safety belts and were aware of the department's and manufacturer's requirement to lock into the ladder laces if they stopped at any point on the ladder. No one was wearing a helmet, including the victim. Protective helmets should be worn in any work

environment that presents a significant risk of head injury. OSHA 29 CFR 1926.100(a) states, "Employees working in areas where there is a possible danger of head injury from impact, or from falling or flying objects, or from electrical shock and burns, shall be protected by protective helmets."[4]

Also, during this incident, the aerial ladder was repositioned while another fire fighter was still on the ladder. A qualified driver/operator did not stay on the turntable while fire fighters climbed up and down on the ladder. No safety belay system was used during this training to protect individuals from inadvertent falls. *Note: The training division required all training participants training on an aerial apparatus to be protected by a safety belay system.*

Fire departments should consider appointing a qualified safety officer (meeting the qualifications defined in NFPA 1521)[5] at all skills training environments (training division or station) if the training poses potential hazards related to injury or death. NFPA 1521 chapter 5.3.4 also states, "the health and safety officer shall ensure that safety supervision is provided at all live training activities."[5] The safety supervision should be provided throughout the training and continue throughout breakdown and termination of the training. Maintaining a "safe discipline" during and after (tear down and cleanup) training is of the same importance as maintaining a "safe discipline" on a fire ground incident throughout the fire and during salvage and overhaul.

Recommendation #3: Fire departments should consider adopting a comprehensive wellness and fitness program, including annual medical evaluations consistent with NFPA standards and annual physical performance (physical ability) evaluations for all fire fighters.

Discussion: It is uncertain whether the victim suffered from overexertion or a medical event that may have contributed to him falling from the ladder. However, NIOSH investigators believe that the adoption of a comprehensive wellness and fitness program, including annual medical evaluations and annual physical ability evaluations, has merit and should be considered by all fire departments. Such programs have the potential to provide early detection and/or reduction of risk factors associated with cardiovascular disease. Structured and approved exercise routines are paramount when implementing fitness programs within a department. Exercise equipment (e.g., free weights, resistance bands, or cardiovascular machines) needs to be evaluated by department safety and health personnel before it is approved within the stations for use. Fire departments should shy away from using aerial ladders as part of their exercise workout routine. Exercise equipment such as a versa climber can provide the same health benefits of going up and down on an aerial ladder without exposing individuals to inadvertent falls. Climbing an aerial ladder for training should be reserved for supervised training evolutions where safety and health of the individual is considered prior to ever beginning the training evolution and closely monitored until the evolution is completed and cleaned up.

Worksite health promotion programs have been shown to increase productivity, reduce absenteeism, and reduce the number of work-related injuries and lost work days.[6-8] Fire service health promotion programs have been shown to reduce coronary artery disease risk factors and improve fitness levels, with mandatory programs showing the most benefit.[8-10] The cost effectiveness of these health promotion programs was reported in a study conducted by the Oregon Health and Science University, which reported a savings of more than $1 million for each of four large fire departments implementing

the IAFF/IAFC wellness/fitness program compared to four large fire departments not implementing a program. These savings were primarily due to a reduction of occupational injury/illness claims with additional savings expected from reduced future nonoccupational healthcare costs.[11]

Guidance for fire department wellness/fitness programs to reduce risk factors for cardiovascular disease and improve cardiovascular capacity is found in NFPA 1583 *Standard on Health-Related Fitness Programs for Fire Fighters*, the IAFF/IAFC Fire Service Joint Labor Management Wellness/Fitness Initiative, the National Volunteer Fire Council's health and wellness guide, and in *Firefighter Fitness: A Health and Wellness Guide*.[12-15]

Guidance regarding the content and frequency of annual medical evaluations can be found in NFPA 1582 *Standard on Comprehensive Occupational Medical Program for Fire Departments* and in the IAFF/IAFC Fire Service Joint Labor Management Wellness/Fitness Initiative.[13, 16] These guidelines help to determine a fire fighter's medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others.

NFPA 1500 recommends that fire department members who engage in emergency operations be annually evaluated and certified by the fire department as having met the physical performance requirements identified in paragraph 10.2.3 of the standard.[1] This is recommended to ensure fire fighters are physically capable of performing the essential job tasks of structural fire fighting. The physical ability test could be performed as part of the fire department's annual training program. Additionally, guidance on the use of appropriate exercise equipment, exercise routines, and proper technique may assist in lowering the rate of accidental injury, overexertion, or fatigue.

To ensure improved health and safety of candidates and members, and to ensure continuity of medical evaluations, it is recommended that all fire departments consider implementing such programs. As with any program, there may be economic issues for implementation, especially for smaller fire departments. To overcome the financial obstacle of medical evaluations, the fire departments could urge current members to get annual medical evaluations from their private physicians. Another option is having the annual medical evaluations (vital signs, height, weight, visual acuity, and EKG) completed by paramedics and emergency medical technicians within the department. This information could then be provided to a community physician (perhaps volunteering his or her time), who could review the data and provide medical clearance (or further evaluation, if needed). The more extensive portions of the medical evaluations could be performed by a private physician at the fire fighter's expense (personal or through insurance), provided by a physician volunteer, or paid for by the fire department, city, or state. Sharing the financial responsibility for these evaluations among fire fighters, the fire department, the city, the state, and physician volunteers may reduce the negative financial impact facing today's fire service, thus helping to rule out any potential health problems that could result in an injury or death.

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References

1. NFPA [2007]. NFPA 1500 standard on fire department occupational safety and health program. 2007 ed. Quincy, MA: National Fire Protection Association.

2. NIOSH [1994]. NIOSH alert: preventing injuries and deaths of fire fighters. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 94-125 [http://www.cdc.gov/niosh/fire.html].

3. IFSTA [2000]. Aerial apparatus driver/operator handbook. 1st ed. Stillwater, OK: Fire Protection Publications, International Fire Service Training Association.

4. Occupational Safety and Health Administration (OSHA). 29 CFR 1926. 100(a) Head protection.

5. NFPA [2008]. NFPA 1521 standard for fire department safety officer. 2008 ed. Quincy, MA: National Fire Protection Association.

6. Stein AD, Shakour SK, Zuidema RA [2000]. Financial incentives, participation in employer sponsored health promotion, and changes in employee health and productivity: HealthPlus Health Quotient Program. J Occup Environ Med *42*(12):1148–1155.

7. Aldana SG [2001]. Financial impact of health promotion programs: a comprehensive review of the literature. Am J Health Promot *15*(5):296–320.

8. Dempsey WL, Stevens SR, Snell CR [2002]. Changes in physical performance and medical measures following a mandatory firefighter wellness program. Med Sci Sports Exerc *34*(5):S258.

9. Womack JW, Humbarger CD, Green JS, Crouse SF [2005]. Coronary artery disease risk factors in firefighters: effectiveness of a one-year voluntary health and wellness program. Med Sci Sports Exerc *37*(5):S385.

10. Blevins JS, Bounds R, Armstrong E, Coast JR [2006]. Health and fitness programming for fire fighters: does it produce results? Med Sci Sports Exerc *38*(5):S454.

11. Kuehl K [2007]. Economic impact of the wellness fitness initiative. Presentation at the 2007 John P. Redmond Symposium, Chicago, IL, October 2007.

12. NFPA [2008]. NFPA 1583 standard on health-related fitness programs for fire department members. 2008 ed. Quincy, MA: National Fire Protection Association.

13. IAFF, IAFC [2008]. The fire service joint labor management wellness/fitness initiative. 3rd ed. Washington, DC: International Association of Fire Fighters, International Association of Fire Chiefs.

14. NVFC [2008]. Health and wellness guide for the volunteer fire and emergency services. Green Belt, MD: National Volunteer Fire Council [http://www.nvfc.org/files/documents/HealthWellness_guide.pdf]. Date accessed: February 2012.

15. Schneider EL [2010]. Firefighter fitness: a health and wellness guide. New York, NY: Nova Science Publishers.

16. NFPA [2007]. NFPA 1582 standard on comprehensive occupational medical program for fire departments. 2007 ed. Quincy, MA: National Fire Protection Association.

17. IAFF. The IAFF/IAFC fire service joint labor management wellness-fitness task force. International Association of Fire Fighters. [http://www.iafc.org/displaycommon.cfm?an=1&subarticlenbr=389]. Date accessed: May 2012.

Investigator Information

This incident was investigated by Stacy C. Wertman, Safety and Occupational Health Specialist and Matt Bowyer, Engineer with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch, Division of Safety Research, NIOSH located in Morgantown, WV. An expert technical review was provided by Hanover Fire and EMS Division Chief W. Edward Buchanan, Jr. He is the immediate past president of the International Society of Fire Service Instructors and current Chair of the Congressional Fire Service Institute, National Advisory Committee. He is also on the Executive Advisory Boards for FDIC and Fire Engineering, and author of the *Volunteer Training Officer's Handbook*. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division.

NIOSH would like to thank the State of Florida Fire Marshal's Office, Bureau of Fire Standards and Training, for their assistance during the NIOSH investigation.

Additional Information

International Association of Fire Fighters/International Association of Fire Chiefs Fire Service Joint Labor Management Wellness-Fitness Task Force[17]

The IAFF, IAFC and 10 pairs of local unions and their municipalities joined together to form the Fire Service Joint Labor Management Wellness-Fitness Task Force. The Task Force has dedicated itself to developing a holistic, positive rehabilitating and educational approach to wellness and fitness programs in the fire service. The Task Force has developed the following three programs.

- The Fire Service Joint Labor Management Wellness/Fitness Initiative

- The Candidate Physical Ability Test
- The Fire Service Peer Fitness Trainer Certification

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