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NIOSH
Fire Fighter Fatality Investigation and Prevention Program

Death in the line of duty...

A Summary of a NIOSH fire fighter fatality investigation *March 10, 2004*

Lieutenant Suffers Sudden Cardiac Death After Performing Forcible Entry Requiring Heavy Physical Exertion – Georgia

SUMMARY

On April 14, 2003, at 2145 hours, a 54-year-old male career Lieutenant (LT) was on the roof of the fire building awaiting orders to ventilate when he suddenly collapsed. His Driver/Engineer (D/E), on the roof with him, alerted the Incident Commander (IC), who had crew members bring resuscitation equipment to the roof and begin medical treatment. Although unresponsive, the LT had a pulse, and was still breathing as he was removed from the roof. During the descent, however, he became pulseless and stopped breathing. Once on the ground, cardiopulmonary resuscitation (CPR) was begun as the LT was placed on a backboard and stretcher and loaded into an ambulance. He received advanced life support (ALS) treatment, including defibrillation and intravenous (IV) resuscitation medications, in the ambulance and was transported to the hospital where ALS measures continued for an additional 27 minutes with no improvement in his status and he was pronounced dead. The death certificate and autopsy, completed and performed by the Medical Examiner, listed "cardiac dysrhythmia" due to "atherosclerotic coronary artery disease" as the immediate cause of death and "superimposed physical exertion" as a contributing factor.

The following recommendations address some general health and safety issues. This list includes some preventive measures that have been recommended by other agencies to reduce the risk of on-the-job heart attacks and sudden cardiac arrest among fire fighters. These selected recommendations have not been evaluated by NIOSH, but represent published research, or consensus votes of technical committees of the National Fire Protection Association (NFPA) or fire service labor/management groups.

- ***Provide <u>mandatory</u> annual medical evaluations to <u>ALL</u> fire fighters consistent with NFPA 1582 to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others***
- ***Consider requiring exercise stress tests for fire fighters with two or more risk factors for coronary artery disease (CAD)***
- ***Phase in a mandatory wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity***

Although unrelated to this fatality, the Fire Department should consider this additional recommendation based on safety and economic considerations:

- ***Provide pre-placement medical evaluations consistent with NFPA 1582 to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others***

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- ***Perform an annual physical performance (physical ability) evaluation to ensure fire fighters are physically capable of performing the essential job tasks of structural fire fighting***

- ***Provide adequate fire fighter staffing to ensure safe operating conditions***

- ***Provide fire fighters with medical evaluations and clearance to wear SCBA***

INTRODUCTION & METHODS

On April 14, 2003, a 54-year-old male Fire Department LT was on the roof of a structure fire, preparing to perform ventilation, when he suddenly collapsed. Despite ALS treatment at the scene and at the hospital, the LT died. NIOSH was notified of this fatality on April 22, 2003, by the United States Fire Administration. NIOSH contacted the affected Fire Department on May 12, 2003, to obtain further information. On October 20, 2003, a Safety and Occupational Health Specialist from the NIOSH Fire Fighter Fatality Investigation Team traveled to Georgia to conduct an on-site investigation of the incident.

During the investigation NIOSH personnel interviewed:

- The Assistant Fire Chiefs
- The Public Information Officer
- The Training Director
- The Lieutenant's crew members
- The Lieutenant's wife

During the site-visit NIOSH personnel also reviewed

- Fire Department policies and operating guidelines
- Fire Department training records
- The Fire Department annual report for 2002
- Fire Department incident report
- Fire Department physical examination protocols
- Fire Department ambulance records
- Death certificate
- Autopsy report

INVESTIGATIVE RESULTS

On April 14, 2003, the LT reported for duty at his fire station (Station 3) at 0700 hours. He was assigned to Ladder 3. During the shift, the crew checked out the equipment, then he and his D/E attended a computer class at Station 11 from 0800 hours to 1200 hours. After the class, the crew returned to the station and mowed the grass. Throughout the remainder of the afternoon the crew performed normal station duties. The LT did not have any complaints of chest pain or any other symptoms of illness.

At 1549 hours, Ladder 3 was dispatched to a call for a brush fire beside a business. No firefighting operations occurred, and the crew returned to their station at 1714 hours. At 2018 hours, Engine 3, Engine 11, Engine 2, Ladder 3, Ladder 11, Squad 20, Battalion 4, Engine 9, Rescue 23, Medic 1, and District Chief 1, (a total of 31 personnel) were dispatched to a commercial business fire (smoke was seen coming from a motorcycle shop). (See Incident Timeline). The structure was a two-story business occupancy of brick front and metal siding (noncombustible construction) comprised of a motorcycle repair shop (the involved business) and four other businesses (including a fence company next door and a metal polishing business to the rear), containing a total of 20,000 square feet. (See photograph). The Fire Department (four engines, two ladders, one squad, one rescue, one medic, one battalion chief, and one district chief) had responded to a fire in the rear and roof of the same business at 0250 hours the same day. Units extinguished the fire and remained on the scene until 0446 hours.

For this incident, units began arriving on the scene at 2025 hours finding smoke showing from

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the roof on Side 1 and Side 2. Engine 23's crew deployed 200-feet of 1¾-inch pre-connected hoseline and prepared to attack the fire. Squad 11's crew was assigned forcible entry on Side 1 and to perform primary search in the affected business. Squad 20's crew was assigned to backup Engine 23 on the attack line. Engine 2 assisted Engine 23 with water supply, then deployed two 1¾-inch hoselines on a gated wye, then stood by as the rapid intervention team (RIT). Engine 3 backed up Engine 23, Ladder 3 (LT and his D/E), and Squad 20 and opened the garage's roll up door for ventilation on Side 2. Battalion 4 arrived on the scene and assumed command [incident commander (IC)]. Squad 20 was reassigned as the Safety Officer and Squad 11 was reassigned to deploy one 200-foot 1¾-inch hoseline on Side 3, check the fence company for fire extension, and perform primary search in the fence company. The LT and his D/E, wearing full turnout gear and SCBA on-air, assisted Squad 11 as they checked the fence company for any sign of fire extension and assisted with breaching the wall between the fence company and the motorcycle shop. It was very hot and dark in the area they were working, and these two operations lasted approximately 30 minutes.

A Squad 11 crew member's low air alarm activated and the Squad 11 crew exited the building. The LT and his D/E remained in the room for approximately five additional minutes. The LT's low air alarm activated, and he and his D/E exited the building and went to rehabilitation (Rehab). They remained in Rehab for approximately 30 minutes, during which time their SCBA cylinders were changed.

At this time, the IC requested a crew to go to the roof and perform ventilation. After volunteering, the LT and his D/E were assigned the task. They donned SCBAs (not on cylinder air), the D/E retrieved a Haligan tool, and the LT retrieved a pick-head ax (weighing approximately 10 pounds). They climbed a 24-foot ground ladder to the roof. The D/E climbed ahead of the LT and after the D/E had climbed onto the roof, the LT handed his tool to the D/E.

There was very little smoke visible on the roof as the D/E checked the roof for hot spots to determine which area to ventilate. Pressurized smoke was emitting from the laps of the tin roof, however the roof was not hot. The D/E saw the LT on his knees and asked if he was OK. The LT said no. The D/E told the LT to remain in place and advised the IC of the roof conditions. The IC advised them to come down from the roof. The LT now had his hands on the roof (on all 4s) and reported feeling "pressure." Shortly thereafter, the LT collapsed and the D/E advised the IC that a fire fighter was down on the roof.

Nearby crew members went to the roof with a Stokes Basket and a cardiac monitor as Rescue 23 retrieved their medical equipment and positioned themselves near the building.

Initial assessment revealed the LT was unresponsive, but had a pulse and was breathing. The cardiac monitor was attached to the LT but the decision was made to extricate him from the roof and he was quickly secured in the Stokes Basket. Ladder 3 had extended it's aerial to the roof and crew members lowered the Stokes Basket down Ladder 3 and onto the ground. During the descent, the LT stopped breathing and became pulseless.

When the LT was on the ground, he was placed onto a backboard and stretcher, and CPR (chest compressions and assisted ventilations via bag-valve-mask) was begun. He was loaded into Rescue 23 where the cardiac monitor revealed ventricular fibrillation (V.fib.) (heart rhythm incompatible with life) and the LT was shocked (defibrillated) three times without a change in his heart rhythm. An IV was placed and intubation was attempted three times

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without success (due to excessive vomitus and the LT's anatomical neck structure), but a Combitube was successfully placed.

Rescue 23 departed the scene at 2155 hours enroute to the hospital emergency department (ED). Cardiac resuscitation medications in accordance with ALS protocols were given enroute. The LT's heart rhythm soon changed from V.fib. to asystole (no heart beat) and back to V.fib. He was shocked five additional times enroute and finally arrived at the ED at 2205 hours.

Inside the ED, hospital personnel suctioned the LT's mouth thoroughly (there was a large amount of vomitus in and around the Combitube and through his nose), deflated and removed the Combitube, and intubated the LT successfully on the second attempt. Tube placement was confirmed with auscultation and chest rise. His abdomen was markedly distended. Additional cardiac resuscitation medications were administered. At one point, the LT had a very wide complex agonal heart rhythm. After a total of 27 minutes of resuscitation efforts in the ED, his heart condition did not improve (he remained in asystole), resuscitation efforts were stopped, and he was pronounced dead at 2232 hours.

Medical Findings. The death certificate, completed by the Medical Examiner, listed "Cardiac dysrhythmia" due to "atherosclerotic coronary artery disease" as the immediate cause of death and "superimposed physical exertion" as a contributing factor. The carboxyhemoglobin level (a measure of exposure to carbon monoxide) was measured and no significant quantity was detected. Pertinent findings from the autopsy, performed by the Medical Examiner on April 15, 2003, included:

- Cardiomegaly (heart weighing 530 grams with normal less than 400 grams[1])
- Atherosclerotic coronary artery disease
  99% stenosis in the right coronary artery
  80-95% stenosis in the circumflex artery
  40-60% stenosis in the left anterior descending artery
- Left ventricular hypertrophy (15 millimeters (mm) thick; normal between 7.6-8.8 mm[2]
- Interventricular septal hypertrophy (16mm thick; normal is 6-11 mm)[3]
- No thromboemboli are recovered from the main, right, or left pulmonary arteries or
- their segmental branches
- No obvious soot in the nares or oral cavity
- Microscopic sections of the right ventricle, left ventricle, and interventricular septum do
- not reveal significant myocardial inflammation, infarct, hemorrhage, fibrosis, or
- neoplasia
- Drug and alcohol tests were negative

On autopsy, the deceased weighed 236 pounds and was 74 inches tall, giving him a body mass index (BMI) of 30 kilograms per square meter (kg/m^2). (A BMI between 30 and 39.9 kg/m^2 is considered obese).[4] According to the LT's wife and Fire Department personnel, the LT walked and hiked regularly. According to his wife, the LT hiked 350 miles in 2001 and 500 miles in 2002. The LT was not taking medications and there was no other evidence to suggest he had hypertension, hypercholesterolemia, hypertriglyceridemia, diabetes, or a positive family history for heart disease. However, a thickened left ventricle suggests hypertension unless the LT frequently had blood pressure measurements which were normal.

DESCRIPTION OF THE FIRE DEPARTMENT

At the time of the NIOSH investigation, this career Fire Department consisted of 575 uniformed personnel. The Department served a population of

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650,000 in an area of 435 square miles. There are 23 fire stations. The FD also provides ALS medical service. Fire fighters work the following schedule: 24 hours on-duty, 48 hours off-duty, 0700 hours to 0700 hours.

In 2002, the Department responded to 74,946 calls, including: 53,210 medical calls, 9,552 other calls, 3,466 fires, 1,972 rescue calls, 426 hazardous materials calls, 12 false alarms, and 6,308 calls not otherwise specified.

Training. The Fire Department requires all new fire fighter applicants to pass a fire fighter entry-level test, complete a preliminary orientation, pass a background investigation, provide required documentation (birth certificate, high school/college transcripts, fire/EMS certifications, etc.), pass a physical performance evaluation (similar to the candidate physical ability test), and an oral interview prior to being hired contingent on passing 1) a polygraph, 2) a psychological examination, 3) a drug screen and a pre-placement physical exam performed by a County-contracted physician. The newly hired fire fighter candidate is then sent to the 16-week Fire Recruit School to become certified as National Professional Qualification Fire Fighter I and II, Hazardous Materials Operations level, Fire and Life Safety Educator I, and Emergency Vehicle Operator. The new fire fighter then completes an emergency medical technician (EMT) class while on shift.

The physical performance evaluation consists of the following timed events while wearing full turnout gear and self-contained breathing apparatus:

- Fully raise the top (fly) section of a 35-foot, 2-section extension ladder and safely lower it completely by using the attached rope (halyard)
- Carry a hose pack (150-feet of 1¾-inch fire hose), weighing approximately 50 pounds, up three flights of stairs, deposit it on the landing, and return to ground level without stopping
- Complete 50 acceptable impacts with a six pound sledge hammer
- Extend 150-feet of dry 1¾-inch fire hose and 100-feet of dry 3-inch fire hose coupled to a water thief appliance (gated wye) without stopping
- Remove a 14-foot ladder from a rack, carry it a short distance (approximately 20-feet), then replace it on an identical rack without touching the ladder on the ground
- Locate a designated exit with the aid of natural light by crawling on hands and knees through a second floor maze
- Completely open a fire hydrant valve while using a hydrant wrench
- Drag a 140-pound simulated victim 120 feet backward without stopping

Recurrent training occurs daily on each shift. The State requires all fire fighters to complete a basic 60-hour fire fighter course and requires paid fire fighters to complete 120 hours of training during the first year of employment. The State also requires 120 hours of annual refresher training; the Fire Department requires 240 hours. EMTs and Paramedics recertify annually. The Lieutenant was certified as a Fire Fighter I and II, Driver/Operator, EMT, Hazardous Materials Operations, Fire Officer I, and Fire Service Instructor. He had 24 years of fire fighting experience.

Pre-placement Evaluations. The FD requires a pre-placement medical evaluation for all fire fighter candidates, regardless of age. Components of the evaluation include:

- A complete medical history
- Physical examination
- Vital signs
- Vision screening

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- Audiogram
- Blood analysis: comprehensive metabolic panel (14) complete blood count
- Urine dipstick
- Drug screen
- Chest x-ray if over age 35
- Resting electrocardiogram (EKG)
- Hepatitis screening (Hepatitis A, B, and C)
- HIV screening
- Pulmonary Function Test (spirometry)
- Tuberculosis screening (skin PPD)

These evaluations are performed by a contract physician hired by the County, who then makes a decision regarding medical clearance for fire fighting duties. This decision is forwarded to the County Human Resources Director.

Periodic Evaluations

Periodic medical evaluations are not required by this Department. Fire fighters may elect to undergo a general health screening and wellness program administered by a contract health center. Components of this screening for males under age 40 and all women include the following:

- A complete medical history
- Physical examination
- Blood work: comprehensive lipid panel with complete blood count (CBC)
- Hemoccult
- Urinalysis
- Mantoux test (tuberculosis skin test)
- Spirometry
- Body composition (anthropometric) measurements (height, weight, skin fold measurements)
- Resting 12-lead EKG
- Submaximal ergometer (bike) graded exercise stress test (12-lead EKG with blood
- pressure monitoring)
- Vision screening (visual acuity, peripheral vision, and color blindness)
- Audiometric testing
- Chest x-ray

Field testing (physical agility testing) is performed in the fourth and eighth month after the health screening. This testing includes:

- Body weight, blood pressure, body fat composition, and pulse rate
- Total number of standard push-ups (no rest)
- One-minute sit-ups
- Hamstring/low back flexibility assessment
- 1½-mile completion (walk/run)

Components of the screening for males over age 40 include all the above with the addition of the following: Prostate specific antigen (PSA)

If the screening identifies any health problems, the fire fighter is advised to see their personal physician. The contract physician provides a summary to the FD, including fire fighter clearance and respirator clearance forms. Approximately 50% of Fire Department members participate. The LT had not participated in this program.

Medical clearance for respirator use is not required. While blood pressure is taken prior to the recruit physical performance evaluation, prior medical clearance is not required.

If an employee is injured at work, or is ill and off work for more than thirty days, the employee must be evaluated by their personal physician, who forwards their recommendation regarding "return to work" to the County contract physician, who makes the final determination. The employee must then complete a physical performance evaluation or physical ability test (as described above).

Exercise (strength and aerobic) equipment is located in most fire stations. The FD is in the process of

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purchasing new exercise equipment for all its fire stations. Voluntary wellness/fitness programs are in place for the Department, however the type of exercise performed is left to the individual fire fighter. Health/wellness maintenance information is available from the County. There is no annual physical performance evaluation, however, the LT exercised regularly by walking and hiking.

DISCUSSION

In the United States, coronary artery disease (atherosclerosis) is the most common risk factor for cardiac arrest and sudden cardiac death.[5] Risk factors for its development include age over 45, male gender, family history of coronary artery disease, smoking, high blood pressure (systolic >140 millimeters of Mercury [mm Hg] or diastolic > 90 mm Hg), high blood cholesterol (total cholesterol > 240 milligrams per deciliter [mg/dL]), obesity/physical inactivity, and diabetes.[6] The victim had four of these risk factors (age over 45, male gender, smoking, and overweight).

The narrowing of the coronary arteries by atherosclerotic plaques occurs over many years, typically decades.[7] However, the growth of these plaques probably occurs in a nonlinear, often abrupt fashion.[8] Heart attacks typically occur with the sudden development of complete blockage (occlusion) in one or more coronary arteries that have not developed a collateral blood supply.[9] This sudden blockage is primarily due to blood clots (thrombosis) forming on the top of atherosclerotic plaques. The deceased did not have a blood clot on autopsy but he did have evidence of atherosclerotic disease in his coronary arteries with 99% narrowing of the right coronary artery, and 80% to 95% narrowing of the circumflex coronary artery.

Atherosclerosis in a coronary artery may cause ischemic heart disease. This occurs when the blood flow within a coronary artery, probably the right coronary artery in this case, is limited to the point where the oxygen needs of the heart muscle cannot be met. Chronic ischemic heart disease causes hypertrophy of the heart muscle and cardiomegaly. All of these factors, independently and in combination (ischemia, left ventricular hypertrophy, cardiomegaly, or myocardial infarction), increase the risk of cardiac arrhythmia.

It is also possible/probable that the LT suffered a heart attack. The term "probable" is used because autopsy findings (thrombus formation), blood tests (cardiac isoenzymes), or ECG findings are required to "confirm" a heart attack [myocardial infarction (MI)]. The victim did not have a coronary artery thrombus on autopsy; he died prior to the cardiac isoenzymes becoming positive, and he had no heart beat to show the characteristic findings of a heart attack on his ECG.

Angina is the most common presenting symptom of myocardial ischemia and underlying CAD, but in many persons the first evidence of CAD may be myocardial infarction or sudden death.[10] On the other hand, some individuals may not experience angina with ischemia, as evidenced by up to 20% of heart attacks being "silent," i.e., painless.[7] The LT did not report any episodes of chest pain during physical activity, while performing duties as a fire fighter, or off-the-job.

Firefighting is widely acknowledged to be one of the most physically demanding and hazardous of all civilian occupations.[11] Firefighting activities are strenuous and often require fire fighters to work at near maximal heart rates for long periods. The increase in heart rate has been shown to begin with responding to the initial alarm and persist through the course of fire suppression activities.[12-14] Even when energy costs are moderate (as measured by oxygen consumption) and work is performed in a

thermoneutral environment, heart rates may be high (over 170 beats per minute) owing to the insulative properties of the personal protective clothing.[15] Epidemiologic studies have found that heavy physical exertion sometimes immediately precedes and triggers the onset of acute heart attacks.[16-19] At the scene, the deceased assisted in breaching an interior wall while wearing full turnout gear and breathing air from his SCBA. This is considered a very heavy level of physical exertion.[11,20] The physical stress of responding to the alarm, performing ventilation, and his underlying atherosclerotic CAD contributed to this fire fighter's probable MI, cardiac arrest, and sudden death.

To reduce the risk of sudden cardiac arrest or other incapacitating medical conditions among fire fighters, the NFPA has developed guidelines entitled "Standard on Comprehensive Occupational Medical Program for Fire Departments," otherwise known as NFPA 1582.[21] To screen for CAD, NFPA 1582 recommends an exercise stress test (EST) for asymptomatic fire fighters with two or more risk factors for CAD [family history of premature (less than age 60) cardiac event, hypertension (diastolic blood pressure greater than 90 mmHg), diabetes mellitus, cigarette smoking, and hypercholesterolemia (total cholesterol greater than 240 mg/dl)].[21] This recommendation is consistent with recommendations from the American Heart Association/ American College of Cardiology (AHA/ACC) and the Department of Transportation (DOT) regarding EST in asymptomatic individuals.[22,23]

On the other hand, the U.S. Preventive Services Task Force (USPSTF) indicates that there is insufficient evidence to recommend screening middle age and older men or women in the general population, however, "screening individuals in certain occupations (pilots, truck drivers, etc.) can be recommended on other grounds, including the possible benefits to public safety."[24]

Since the deceased was over 45 years of age, asymptomatic, and had one risk factor for CAD, the performance of an EST is not recommended by NFPA 1582. If an EST had been performed, his CAD might have been detected, resulting in further evaluation and treatment, and possibly preventing his sudden cardiac death.

RECOMMENDATIONS

The following recommendations address health and safety generally. This list includes some preventive measures that have been recommended by other agencies to reduce the risk of on-the-job heart attacks and sudden cardiac arrest among fire fighters. These recommendations have not been evaluated by NIOSH, but represent published research, or consensus votes of technical committees of the NFPA or fire service labor/management groups.

Recommendation #1: Provide mandatory annual medical evaluations to ALL fire fighters to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others.

Guidance regarding the content and frequency of periodic medical evaluations and examinations for fire fighters can be found in NFPA 1582, Standard on Comprehensive Occupational Medical Program for Fire Departments,[21] and in the report of the International Association of Fire Fighters/International Association of Fire Chiefs (IAFF/IAFC) wellness/ fitness initiative.[25] The Department is not legally required to follow any of these standards.

The success of medical programs hinges on protecting the affected fire fighter. The Department must 1) keep the medical records confidential, 2) provide alternate duty positions for fire fighters in rehabilitation programs, and 3) if the fire fighter is not medically qualified to return to active fire fighting duties, provide

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permanent alternate duty positions or other supportive and/or compensated alternatives.

Recommendation #2: Consider requiring exercise stress tests for fire fighters with two or more risk factors for coronary artery disease (CAD).

NFPA 1582 and the IAFF/IAFC wellness/fitness initiative both recommend EST for fire fighters.[21,25] The NFPA recommends tests for those with two or more CAD risk factors. The EST could be conducted by the fire fighter's personal physician or the Department's contract physician. If the fire fighter's personal physician or the contracted physician conducts the test, the results must be communicated to the County physician, who should be responsible for decisions regarding medical clearance for fire fighting duties.

Recommendation #3: Phase in a mandatory wellness/fitness program for fire fighters to reduce risk factors for cardiovascular disease and improve cardiovascular capacity.

NFPA 1500, Standard on Fire Department Occupational Safety and Health Program, requires a wellness program that provides health promotion activities for preventing health problems and enhancing overall well-being.[26] NFPA 1583, Standard on Health-Related Fitness Programs for Fire Fighters, provides the minimum requirements for a health-related fitness program.[27] Physical inactivity is the most prevalent modifiable risk factor for CAD in the United States. Additionally, physical inactivity, or lack of exercise, is associated with other risk factors, namely obesity and diabetes.[28] In 1997, the International Association of Fire Fighters (IAFF) and the International Association of Fire Chiefs (IAFC) published a comprehensive Fire Service Joint Labor/ Management Wellness/Fitness Initiative to improve fire fighter quality of life and maintain physical and mental capabilities of fire fighters. Ten fire departments across the United States joined this effort to pool information about their physical fitness programs and to create a practical fire service program. They produced a manual and a video detailing elements of such a program.[25] The Fire Department should review these materials to identify applicable elements for the Department. Other large-city negotiated programs can also be reviewed as potential models. Wellness programs have been shown to be cost effective, typically by reducing the number of work-related injuries and lost work days.[29-31] A similar cost savings has been reported by the wellness program at the Phoenix Fire Department, where a 12-year commitment has resulted in a significant reduction in their disability pension costs.[32]

The following recommendations were unrelated to this fatality, but were safety issues identified by NIOSH during its evaluation:

Recommendation #4: Provide pre-placement medical evaluations consistent with NFPA 1582 to determine their medical ability to perform duties without presenting a significant risk to the safety and health of themselves or others.

The FD requires all recruits to complete a pre-placement physical evaluation. However, the evaluation should include a lipid profile and baseline electrocardiography (EKG) (for all recruits) for detecting specific illnesses as well as developing a baseline for later comparison.[21]

Recommendation #5: Perform an annual physical performance (physical ability) evaluation to ensure fire fighters are physically capable of performing the essential job tasks of structural fire fighting.

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NFPA 1500 requires fire department members who engage in emergency operations to be annually evaluated and certified by the fire department as meeting the physical performance requirements identified in paragraph 8-2.1.[26]

Recommendation #6: Provide adequate fire fighter staffing to ensure safe operating conditions.

Currently, the FD staffs its engines with three personnel and its ladders with four personnel. NFPA 1710 requires that "on-duty personnel assigned to fire suppression shall be organized into company units and shall have appropriate apparatus and equipment assigned to such companies."[33] Those companies may respond with two apparatus, depending on the seating configuration of the apparatus to ensure four personnel arrive on scene.[33] Personnel assigned to the initial arriving company shall have the capability to implement an initial rapid intervention crew (IRIC),[33] which requires four personnel (two to enter the structure and two standing by outside). NFPA 1500 recommends that "members operating in hazardous areas at emergency incidents shall operate in teams of two or more."[26] Understaffing causes those members on-scene to work harder and for longer periods of time. Additionally, it requires the use of extra fire companies in order to meet the demand for manpower. Engine and Ladder Companies should be staffed with four personnel at a minimum.

Recommendation #7: Provide fire fighters with medical evaluations and clearance to wear SCBA.

OSHA's Revised Respiratory Protection Standard requires employers to provide medical evaluations and clearance for employees using respiratory protection.[34] Such employees include fire fighters who utilize SCBA in the performance of their duties. These clearance evaluations are required for private industry employees and public employees in States operating OSHA-approved State plans. Georgia is not a State-plan State, therefore, public sector employers are not required to comply with OSHA standards. However, we recommend voluntary compliance.

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INVESTIGATOR INFORMATION

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INCIDENT TIMELINE

2018 hours: Engine 3, Engine 11, Engine 2, Ladder 3, Ladder 11, Squad 20, Battalion Chief 4, Engine 9, Rescue 23, Medic 1, and District Chief 1 (DC 1) dispatched

2019 hours: Second complainant advises it will be some type of warehouse on fire…It will be on the right side after the storage place but before the convenience store…smoke showing.

2021 hours: Engine 23 dispatched as a backup
Engine 11 return to quarters
Squad 11 dispatched as a backup

2022 hours: Battalion 2 dispatched as a backup
....Motorcycle Shop is the business name…stated the FD was out there last date (yesterday)

2023 hours: Battalion 2 enroute

2025 hours: Air/Light 9 dispatched as a backup
Engine 3 on the scene
Squad 20 on the scene
Squad 11 on the scene and advises one story commercial (building) with black smoke showing from the roof
Rescue 23 on the scene

2026 hours: Ladder 3 on the scene
Engine 2 on the scene

2029 hours: Engine 9 on the scene

2030 hours: Battalion 4 on the scene
Squad 11 advises there is possibly someone still in the business
Ladder 11 on the scene

2031 hours: Battalion 2 on the scene

2032 hours: Command advises…two 1¾-inch (hoses)…possible water supply…def. interior mode

2034 hours: Engine 23 on the scene

2035 hours: District 1 on the scene
Medic 1 on the scene

2036 hours: Air/Light 9 on the scene

2042 hours: Battalion 4 requests Car 10 (fire investigator)

2043 hours: Battalion 4 requests power company

2047 hours: Power company clear…will call back with estimated time of arrival

2053 hours: Public Information Officer (PIO) and Level 2 pages sent

2054 hours: Fire investigator will advise when he is not busy

2056 hours: 981 (fire investigator) dispatched as a backup
981 enroute

2058 hours: Engine 11 arrived in quarters

2103 hours: Car 11 (PIO) dispatched as a backup
PIO enroute

2107 hours: District 1 advised a 150-feet to 175-feet strip, still offensive mode, two 1¾-inch (hoses)

2112 hours: PIO on the scene

2115 hours: District 1 advises still doing primary search

2116 hours: District 1 requests two more engines

2118 hours: Engine 11 dispatched as a backup
Engine 12 dispatched as a backup
Engine 11 and Engine 12 enroute

2119 hours: District 1 requests RH 20 (rehabilitation unit)
RH 20 dispatched

2120 hours: RH 20 enroute

2124 hours: Engine 12 on the scene

2127 hours: 981 on the scene

2129 hours: Engine 11 on the scene

2138 hours: District 1 advises Power Company on the scene

2140 hours: Car 99 (light duty personnel) dispatched as a backup
Car 99 enroute
Car 99 arrived in quarters

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2142 hours:	982 (light duty personnel) dispatched as a backup
	983 (light duty personnel) dispatched as a backup
2144 hours:	RH 20 arrived on the scene
2145 hours:	District 1 advises Rescue and Car 1 (Fire Chief), heart attack on Ladder 3 on the roof
	Rescue 2 dispatched as a backup
	District 1 advises fireman down on the scene, possible heart attack
2146 hours:	Additional PIO sent in reference to fire unit
2148 hours:	Rescue 2 on the scene
2150 hours:	Rescue 23 begins medical treatment
2151 hours:	Rescue 3 dispatched as a backup
	District 1 advises fire fighter moved from the roof, preparing for transport, putting him in the back of the Rescue
2152 hours:	Car 2 (Assistant Chief for Operations) dispatched as a backup
2154 hours:	Car 2 enroute
2155 hours:	Rescue 23 transporting Code 1 (lights/ siren) with one patient
2205 hours:	Rescue 23 arrived at the hospital
	Fire under control with current units
2207 hours:	Battalion 3 requests to have critical incident stress debriefing team on standby
2223 hours:	District 1 advises fire contained in overhaul mode

Photograph. The involved business occupancy