

Many muscular and skeletal problems result from poor flexibility. For adults, this is typically the most neglected aspect of a physical fitness program. Most individuals can benefit from improved flexibility, regardless of age or gender. With aging, muscles shorten (tighten), diminishing the range of motion in a joint, hindering or halting day-to-day activities and movements. A regular stretching program can help lengthen your muscles, and maintain or restore flexibility.

The benefits of being flexible include

- **Flexibility decreases risk of injury.** Increasing range of motion decreases the resistance in various tissues. An individual is therefore less likely to incur injury by exceeding tissue extensibility, or maximum range of movement of tissues during activity.³⁷
- **Flexibility increases physical efficiency and performance.** A flexible joint has the ability to move farther in its range and requires less energy to do so.³⁸
- **Flexibility increases tissue temperature.** An increase in tissue temperature increases circulation and nutrient transport due to decreased joint viscosity.³⁹
- **Flexibility increases neuromuscular coordination.** An increase in coordination, or ease of movement, occurs because of an increase in nerve impulse velocity. In attuning the central nervous system to the physical demands placed upon it, opposing muscle groups work in a more synergistic or coordinated fashion.⁴⁰
- **Flexibility training reduces muscle soreness.** Postexercise stretching is extremely effective in reducing localized, muscular soreness, typically experienced 12 to 72 hours after exercise.⁴¹

The American College of Sports Medicine, American Heart Association (AHA), Centers for Disease Control and Prevention (CDC), and the U.S. Surgeon General's Office consider strength training to be an integral part of any comprehensive health program and have defined population-specific guidelines.^{42,43} The benefits of a strength training program include

- **Improved body composition, muscle growth, and metabolism.** Effectively designed strength training programs stimulate muscle growth, burning additional calories and lowering the amount of fat on the body. All individuals of any age or gender can build muscle effectively. A 1-pound increase in muscle mass can increase caloric expenditure by 30 to 50 calories per day. Muscle losses attributed to injury, aging, or inactivity can reduce your caloric expenditure by the same amount.⁴⁴
- **Improved physical functioning.** The neuromuscular adaptations to strength training enable one to perform tasks with less physiological stress. Much of the improved efficiency demonstrated with strength training is attributed to neural and hormonal adaptations that increase neural drive to muscles; improve muscle recruitment and synchronization; increase muscle contractile activation; and diminish the protective function of proprioceptors that limit range, intensity, and speed of movements around joints.⁴⁵
- **Decreased risk for osteoporosis and osteoarthritis.** Weight training will increase bone density, which is of great concern as we age or become postmenopausal. Increased bone density reduces the chances of bone fractures and bone degeneration. Additionally, strengthening joints and muscles supporting the joints can reduce joint pain and inflammation significantly.
- **Improved flexibility.** Optimal musculoskeletal function maintains adequate range of motion in all joints. This is of particular importance to the lower back region, where lack of flexibility from insufficient activity or poor posture increases the risk of chronic low back pain.

Ergonomic-Related Disorders

This section has been adapted from the USFA guide: *Fire and Emergency Medical Services Ergonomics—A Guide for Understanding and Implementing An Ergonomics Program in Your Department*.⁴⁶ This guide is considered to be the foremost authority on ergonomic issues in the fire and emergency services.

Ergonomic-related disorders include cumulative trauma disorders and back disorders. Alone, these injuries, which often are developed over time as a result of uncorrected behaviors, postures, and habits, pose threats. When combined with the rough nature of the fireground, with its requirements of increased physicality, strength, and agility, ergonomic-related disorders can increase the risk for prolonged injury and can risk first responder lives if untreated.

Often, ergonomic-related disorders may appear minor, but such disorders can exacerbate fireground sprains and strains severely and transform moderate injuries into more threatening injuries that increase job time lost, and diminish both dexterity and the ability to fight fires effectively. The ergonomic-related disorders discussed in this section often are preventable and treatable through a fitness program, behavioral modification program, and screenings and assessments. Understanding the disorders themselves, their risks, and their causes is critical to the design of an effective health and wellness program.

CUMULATIVE TRAUMA DISORDERS

CTDs can be described as wear and tear on joints and surrounding tissue because of overuse. Potentially, every joint in the body can be affected, but the joints in the lower back and upper limbs receive the most injuries. Cumulative disorders accumulate through time. Acute trauma, by contrast, is injuries that occur as the result of a onetime event, such as a cut or fall. Cumulative trauma is known by a variety of terms, such as musculoskeletal disorders, overuse syndrome, or repetitive motion disorders.

CTDs affect any area of the body where tendons, joints, and nerves are found. Most commonly, CTDs target the upper extremities, which include all of the anatomical components from the shoulder to the fingers. While acute injuries resulting from a single event do occur to the upper extremity, more disorders are currently recognized as the cumulative effect of multiple small, often unrecognized, repetitive injuries, particularly those for the back. Upper extremity CTDs largely affect the origin of muscles (where the muscle attaches to the bone, the tendon, the joints, the blood vessels, and the nerves).

TYPES OF CUMULATIVE TRAUMA DISORDERS

While there are several types of CTDs, most CTDs fall into two main categories:

1. **Tendonitis.** Tendons serve as links that connect muscle to bone and come into play whenever a muscle is used for the motion of a bone structure. In some areas of the body, tendons slide through sheaths. As with any other moving part, overuse of tendons can cause friction, which in turn causes wear and tear and expansion or swelling. When tendons or their sheaths swell, there is pain and tenderness, known as tendonitis.
2. **Nerve compression.** Nerves are found throughout the body and several points exist where it is possible for nerves to be compressed. Pinching of nerves is often caused by making certain awkward motions or assuming certain postures. Other times, compression can be caused by swelling of nearby tendons.

RISK FACTORS

Several on-the-job factors can increase the risk of developing CTDs. The more factors involved and the greater the exposure to each, the higher the chance of developing a disorder. Factors of working conditions include

- **Repetition.** Risk increases with number and frequency of motions made by a particular part of the body.
- **Force.** Risk increases with the amount of exertion required for particular motions.
- **Awkward postures.** Risk increases with positions of the body, which deviate from a neutral position; primarily bent wrists, elbows away from their normal positions at the side of the body, and a bent or twisted lower back.

- **Contact stress.** Risk increases with excessive contact between sensitive body tissue and sharp edges or unforgiving surfaces on a tool or piece of equipment.
- **Vibration.** Risk increases with exposure to vibrating tools or equipment, whether a hand-held power tool or whole-body vibration.
- **Temperature extremes.** Risk increases with exposure to excessive heat or cold.
- **Stressful conditions.** Risk increases with certain stressful situations at work or due to the nature of the work.

BACK DISORDERS

The back is a complex system consisting of several distinct spinal regions. Lifting, bending, and twisting motions (on or off the job) can cause severe injury and pain. Next to the common cold, back disorder is the reason most often cited for job absenteeism.

TYPES OF DISORDERS

Pulled or strained muscles, ligaments, tendons, and discs are perhaps the most common back problems. Half of the U.S. workforce is likely to experience back problems at least once during a lifetime. Most back disorders result from chronic, or long-term, injury rather than from one specific incident. When back muscles or ligaments are injured from repetitive pulling and straining, the back muscles, discs, and ligaments can become scarred and weakened and lose their ability to support the back. This condition makes additional injuries more likely. Types of back disorders include

- **Lumbosacral strain.** Caused by overuse of the muscles of the lumbar and sacral areas of the back.
- **Sacroiliitis.** Caused by inflammation from overuse of the lumbar muscles of the joints between the lowest and sacral areas of the back, spinal bones (sacrum), and the hip bones (ilium).
- **Lumbosacral sprain.** Caused by overuse of ligaments in the lumbar and sacral areas of the back.
- **Postural low back pain.** Results from overuse of the lumbosacral muscles by maintaining a posture that requires these muscles to work beyond their capabilities.
- **Muscular insufficiency.** Occurs when muscles are unable to bear stresses imposed on them.
- **Herniated disc.** Results when the disc that sits between two spinal bones (vertebrae) bulges from between them.
- **Degenerated disc.** Results when wear and tear on disc slowly destroys its structure.

RISK FACTORS

Back disorders frequently are caused by the cumulative effects of faulty body mechanics such as excessive twisting, bending, reaching, lifting loads that are too heavy, too big, or too far from the body, staying in one position for too long, poor physical conditions, and poor posture. Prolonged sitting stresses the body, particularly the lower back and the thighs. It may cause the lower back to bow outward if there is inadequate support. This abnormal curvature can lead to painful lower back problems, a common complaint among office workers. Other risk factors include

- **Heavy physical work.** Information based on workers' compensation claims and insurance data show that low-back pain is more prevalent in highly physical jobs where the potential for overexertion injuries is greater.
- **Lifting.** Low-back pain is clearly triggered by lifting; the weight, speed, duration, and frequency of lifting affect the onset of low-back pain.
- **Bending, stretching, and reaching.** Bending in combination with lifting appears to be the most common cause for low-back pain; the incident of low-back pain also increases with loads held away from the body.

- **Twisting.** Lifting in combination with twisting has been implicated in low-back pain injuries.
- **Pushing and pulling.** Pulling and pushing account for 9 to 18 percent of all back strains and sprains.
- **Prolonged sitting and standing.** Studies show that jobs involving all standing or all sitting postures are associated with increased risk for low-back pain as compared to jobs involving frequent changes in posture.
- **Vibrations.** As in other CTDs, vibration is a significant risk factor.
- **Accidents.** Traumatic events outside the context of manual lifting, such as slipping, tripping, stumbling, or other incidents, which place unexpected loads on the back, can contribute to chronic low-back pain.

Between complications of CVD, strains, sprains, and other ergonomic-related disorders, firefighting is truly one of the most dangerous occupations. The demands of firefighters are very high and require a focus on health and wellness. This chapter looked at some of the health risks of the emergency services.

CHAPTER IV:

VOLUNTEER PROGRAMS FROM ACROSS THE NATION

Previous chapters of this Guide have addressed why it is important for volunteers and the departments they serve to focus on health and wellness. This chapter looks at programs implemented by various volunteer or combination fire and emergency service departments across the country to assess the strengths and weaknesses of each program. This assessment, or “lessons learned,” is a valuable tool for departments that want to implement their own programs.

Overview of Current Health and Wellness Programs

In 2003, the NVFC State directors identified 16 volunteer departments with current experience with health and wellness programs. The departments varied widely in type, membership size, and community served.

Most of the programs studied began in the early 1990s and, with one exception, remained viable. Less than half of the departments reported a positive reception to the program, and 63 percent noted fire service culture as an impediment to the program. Participation was spread evenly among age groups, but a smaller percentage of women participated than men. The three greatest problem areas with the programs were

- lack of funding;
- lack of well-defined requirements; and
- inability to keep membership motivated.

The departments used many different approaches to health and wellness including screenings, examinations, immunizations, education, behavioral modifications, and fitness programming. Fifty-six percent of the departments analyzed injury reports to customize the health and wellness program to meet the needs of their department.

Most departments acknowledged that, while the time and equipment are available for programming, active participation by the members was quite low. For example, 56 percent of the departments offered training and educational components to improve mental and physical health and quality of life, but the use was only sporadic.

Seventy-five percent of the departments ensured immunizations for Hepatitis B and Tetanus, and provided annual flu shots. Sixty-three percent provided full blood laboratory screening and full medical physical examinations, including chest x-ray, stress test, electrocardiogram (EKG), blood pressure, vision and hearing tests, and testing for high-risk cancers. Fire and emergency service departments noted that various cancers and heart problems were identified early because of the medical exams.

Ten departments had an exercise facility at each station. Facilities featured treadmills and universal weight machines in most cases, and cross-training machines in 50 percent of the responding departments.

Less than one-third of the departments tested body fat percentages and established a body fat reduction plan. An additional five departments contracted with licensed industrial hygienists to address specific injury risks, and only two of the programs included PFTs.

Three-quarters of the departments funded the entire cost of a health and wellness program through a variety of sources. The fundraising method most commonly used to cover program costs was a local tax. In three other cases, funding was provided either directly from the employees or through worker’s compensation.

Update on Model Program Elements from Previous Report

In the previous two versions of this Guide, published in 1992 and 2003, 14 of the 16 departments studied were featured as case studies in an attempt to help departments build their programs using the experience of other volunteer departments. Some of these departments were profiled through an IAFC initiative funded by a USFA cooperative agreement. Although not all of the components were exactly replicable, they provided benchmarks against which volunteer departments could compare their programs. Following is the current status of programs from six of the previously studied departments.

Brodhead Fire Department, Wisconsin

Beginning in 2006, the Brodhead Fire Department began taking steps to make sure that individuals joining the department meet health standards. Since that time, all new members are required to have a complete medical physical with labs, EKG stress test, hearing test, lung capacity test, and complete medical history review with a doctor that the fire department has chosen. The department has failed several applicants, but also alleviated potential problems as well as helped notify those individuals of health issues that they should address with their own medical professional. Although this medical requirement has affected its membership numbers slightly, the department would rather have fewer members who are healthy and capable of performing firefighting duties than more members who may not be physically fit for the job. The department is confident that all new members are healthy and capable of performing the demanding tasks of firefighting. The department's long-term goal is to incorporate mandatory annual physicals for all members, but this will depend on future funding.

Chesterfield County Fire and EMS, Virginia

The Chesterfield Fire and EMS Health and Fitness Program recognizes that its firefighters have different fitness needs to keep them in good condition, as members are of different ages, genders, and levels of physical fitness. The department, along with the assistance of health and fitness professionals, has developed a comprehensive fitness program that provides different levels of fitness training for uniformed members. Each quarter, the program increases intensity and focuses on specific types of fitness and cardiovascular exercises to promote continued improvement in both strength training and cardiovascular endurance.

Once a year, the members are evaluated with a fitness performance test to determine individual improvement and to focus on areas that need additional attention. These tests include flexibility, strength, cardiovascular endurance, and body fat measurements. This program is designed to improve each member's physical conditioning and wellness to help the department better perform its duties.

Hartford Emergency Services, Vermont

Hartford Emergency Services is a combination department that serves a population of 10,000. Their volunteers are paid on a per-call basis. To increase members' support, the department developed the fitness program by working with both volunteer and career firefighters.

Under the IAFF-IAFC program, they have initiated the following program components:

- Two certified peer fitness trainers work with the membership to develop individual routines and to keep logs and records.
- Fitness evaluations are conducted twice a year on all members that are in the program and exercising.
- All members of the department are given a yearly physical to determine if they are fit for duty. This physical conforms to OSHA and NFPA requirements (Health and Life Style Questionnaire, Hearing Test, Vision Test, Blood Analysis, Chest X-Ray, 12 Lead, Spirometry, Physical Exam by Doctor, and TB test).
- Health classes, lectures, and relevant literature also are offered, free of charge.
- All career personnel are required to work out for a minimum of 45 minutes every day that they are on duty. It is voluntary, yet highly encouraged, for all volunteer personnel to take part in the program as well.

Howland Fire Department, Ohio

The Howland Fire Department in Warren, Ohio, also had experienced moderate success with its health and fitness program, which it implemented in 1989. Department officials report that 95 percent of all members—up from 75 percent in the 2003 study—participate in the program in some way. Forty percent of the membership—an increase from 25 percent in the previous study—participates 3 days per week. Department officials attribute any lack of interest among members to time constraints due to increased call volume. Due to recent union contract negotiations, the contract now requires all paid members to participate in a physical fitness program.

The program includes pre-acceptance medical screening, monthly physical fitness evaluation, and cardiovascular-focused fitness equipment. To enhance the program, the department added a “jump-stretch” program, which focused on low impact stretching warm-ups to make members more flexible, and recently added an elliptical machine to their gym. Additionally, the department has paid specific attention to maintaining the fitness equipment.

Lacey Fire Department, Washington

The Lacey Fire District in Lacey, Washington, has increased the breadth and scope of its health and fitness program since its inception in the mid-1980s. In 2007, the District implemented a peer fitness program initially providing training for three members to serve as PFTs. Additionally, they provided an assortment of fitness and strength equipment for members’ use in dedicated fitness space at each fire station. The fitness area and equipment is available to all members, and on-duty emergency response personnel have a voluntary on-duty workout time opportunity. A Division Chief is responsible for the Health and Safety program.

Most of the department’s 180 members participate in the program. The program’s popularity and high participation rates are attributed to the demonstrated support of the program by management and the personal commitment to fitness by the members.

Plantation Fire Department, Florida

The Plantation Fire Department in Plantation, Florida, created its health and fitness program in the early 1990s. The program incorporated a screening and evaluation component, which included full blood laboratory screenings, annual flu shots, and rehabilitation following injuries. The program also included an educational piece, with nutrition and weight management, exercise, back care, stress management, and heart disease counseling provided to members. The department purchased universal machines and stationary bicycles for all stations, and medical examinations were paid by the department.

As of 2008, Plantation Fire Department has pared down its health and fitness program, retaining only the benefits that the city provides to its employees, such as the use of exercise equipment, by membership, at three city-managed exercise facilities, and other medical and testing programs.

Plantation Fire Department officials indicated that the program’s demise was mainly due to its high cost and little interest among membership. In addition, the city already provided certain benefits to all city employees and volunteers at no cost or for reasonable fees.

CHAPTER V:

DEVELOPMENT OF A HEALTH AND WELLNESS PROGRAM FOR VOLUNTEER FIRE AND EMERGENCY SERVICES DEPARTMENTS

The previous chapters examined why health and wellness programs are essential and what departments across the Nation are doing with their programs. This chapter focuses on how a volunteer or combination department can develop a health and wellness program of its own.

The development of a health and wellness program involves both the implementation of program components and the establishment of a program administration and supporting groundwork. This chapter begins with a look at the major program components, followed by a discussion of the administration of a health and wellness program. Chapter VI brings all of the recommendations together with a step-by-step program implementation guide.

Program Components

A comprehensive health and wellness program includes the following components:

- regular fitness screenings and medical evaluations;
- fitness program (cardiovascular, strength, and flexibility training);
- behavioral modification (smoking, hypertension, diet, cholesterol, diabetes);
- volunteer education; and
- screening volunteer applicants.

When a program combines all of these components, volunteers pay more attention to their personal health and wellness, which will improve the department overall. If a department cannot implement the entire program at once, it is far better to initiate some of these components than to do nothing.

REGULAR FITNESS SCREENINGS AND MEDICAL EVALUATIONS

Regular screenings and medical evaluations are an important foundation for a successful, comprehensive health and wellness program. NFPA 1582, *Standard on Comprehensive Occupational Medical Program for Fire Departments* provides a set of guidelines for medical testing and screening, which simplifies the development of this component.

Fitness Screening. Prior to participation in any fitness program, adults should be effectively screened in accordance with American College of Sports Medicine (ACSM) Guidelines. These guidelines will classify individuals as a low, moderate, or high risk for participation in any fitness program. Individuals classified as high risk should be referred to a high-risk intervention program, closely supervised by medical personnel. These individuals will incur the greatest risk for cardiac complication and increased health care costs. They may be at risk from the exercise program itself, if it is not properly modified to their capabilities.

Individuals classified as moderate risk should participate only in moderately strenuous programs without having had a medical exam within the past year. Nor should they undergo testing without medical supervision. Individuals classified as low risk can participate in an exercise program that can be vigorous in nature or undergo testing without medical supervision.

Annual Medical Examinations. The risks that confront a first responder necessitate a regular evaluation of health and wellness. Identifying risks might preclude a volunteer from riding for a period of time. In this circumstance, however, the first responder should not take this action as a punishment, but rather be aware that it is for his or her health and safety as well as that of other department members and the community they serve.

The examinations should be standardized for all members. Some departmental programs have developed partnerships with a local health practitioner who offered a discounted rate and provided standardized examinations for volunteers. Such a physician would work with the health and wellness coordinators, in addition to the members, providing a much-needed perspective on the condition of the membership in that specific department.

NFPA 1582 suggests the following items be reviewed as part of the medical examination; any problems identified should be rectified before the firefighter is allowed to respond to emergencies:⁴⁷

- vital signs—namely pulse, respiration, blood pressure, and, if indicated, temperature;
- dermatological system;
- ears, eyes, nose, mouth, throat;
- cardiovascular system;
- respiratory system;
- gastrointestinal system;
- genitourinary system;
- endocrine and metabolic systems;
- musculoskeletal system;
- neurological system;
- audiometry;
- visual acuity and peripheral vision testing;
- pulmonary function testing;
- laboratory testing, if indicated;
- diagnostic imaging, if indicated; and
- electrocardiography, if indicated.

Although having a common practitioner would be ideal for conducting all of these tests consistently, some fire and emergency service personnel will want to use their own physician. These first responders should be provided with a common medical examination form, developed by the department, to standardize the process and to ensure comparable results.

FITNESS PROGRAM

A well-designed fitness program should include both physical activity and exercise. It is designed to improve individual physical condition and endurance and to reduce the risk of heart attacks and other major problems facing firefighters and EMS personnel.

Physical activity is defined as bodily movement produced by the contraction of skeletal muscle, which increases energy expenditure—in simple language, moving around.

Exercise is planned or structured movement, repetitive in nature. It is intended to improve or maintain one or more of the following components of physical fitness:

- cardiorespiratory fitness;
- muscular strength;
- muscular endurance;
- flexibility; and
- body composition.

Exercise and training programs now have evolved beyond the simple focus of the health-related aspects of physical fitness to include the skill-related aspects vital to first responder performance. The fire service has shifted its emphasis to training programs that improve the overall quality of life by maximizing the carryover gains from training into the activities of emergency response.

Surveys indicate that about 25 percent of the American population engages in no physical activity, and an additional 37 percent undertake insufficient physical activity. Nationally, dropout rates for those beginning an exercise program are alarming, reaching 50 percent or more by the end of the first 6 months. The reasons are complex and multifaceted, influenced by factors associated with each individual, the environment, and the stage of behavioral readiness and features of the program itself.⁴⁸

Moderate-Intensity Program. Historically, attention has focused solely on exercise, promoting its benefits and virtues. Recent research, however, has demonstrated numerous health benefits associated with regular participation in intermittent, moderate-intensity physical activity in addition to exercise. Consequently, the CDC have amended and expanded their emphasis to include greater awareness of participation in physical activity and the quantities and intensities necessary to achieve health benefits, which are lower than previously thought to be necessary. This does not discount the added benefits of more intense, longer duration exercise. There are benefits from increased activity that more people (and firefighters) may be willing to maintain.

According to former U.S. Surgeon General Richard Carmona: “Significant health benefits can be obtained by including a moderate amount of physical activity on most, if not all days of the week. Through a modest increase in daily activity, most Americans can improve their health and quality of life... Additional health benefits can be gained through greater amounts of physical activity. People who maintain a regular regimen of activity that is of longer duration or of more vigorous intensity are likely to derive greater benefit.”

Moderate intensity activities are equivalent to walking 3 to 4 mph (15 to 20 minutes to walk a mile). These casual daily activities are the easiest to promote and implement and are key to any successful fitness program.

Figure 2 shows how anyone can increase physical activity in his or her daily lives even while not committing to a regular workout routine.

Figure 2: Physical Activity Pyramid.⁴⁹



Source: Institute for Research and Education, 1996.

Some additional examples of moderate activity:

- washing/waxing a car (45 to 60 min);
- washing windows/floors (45 to 60 min);
- playing volleyball/touch football (45 min);
- gardening or raking leaves (30 to 45 min);
- basketball game (15 to 20 min);
- bike riding (30 min);
- moderate- to high-tempo dancing (30 min);
- swimming laps (15 to 20 min); and
- brisk walking (30 min).

Cardiovascular Program. The goals of the cardiovascular portion of the fitness program are to improve performance, improve health, prevent injury, decrease the risk of heart attack, and increase heat tolerance. The first step is to increase daily activity. Not only will this improve health, but it also creates a more positive, active image for first responders in the community.

At the next level, participants could engage in moderate intensity exercise for 30 or more minutes a minimum of three times per week. This can include such activities as a brisk walk or a bicycle ride. Firefighters and EMS personnel should set a pace with which they are comfortable and increase the pace as they wish.

As participants become comfortable with the moderate level, they could transition to a higher intensity exercise. Once again, participants set their own pace. Depending on the needs of the individual, this exercise could be performed in a gym, at the department, or at home.

It may be possible to develop partnerships with a nearby fitness center. Then, fire and emergency service personnel would have access to a wide range of equipment and fitness expertise. This can also benefit the department, as using the fitness center will reduce the time commitment for the volunteer coordinator and reduce liability concerns. On the negative side, the use of a fitness center may cost more money, be inconvenient for the volunteers, and involve more self-motivation. A more detailed discussion about developing partnerships is provided later in this chapter under Program Administration.

Exercising in a department facility can foster a sense of camaraderie among the volunteers. Team competitions and participation in community events also can provide motivation for greater participation in fitness programs. Cardiovascular exercise can be performed in the department with the aid of only a few machines. Treadmills, stationary bicycles, elliptical machines, stair climbers, and rowing machines can serve volunteer departments adequately. These machines require a modest initial cost but, in the long term they may reduce costs of membership fees to fitness centers.⁵⁰

Strength Training. The goals of strength training are to protect against injury, improve performance, maintain the appropriate body composition, and improve health. An appropriate strength-training regimen includes a progressive weight lifting and calisthenics program. These exercises should be performed two to four times per week, working the major muscle groups twice a week.

A weight-training regimen includes a minimum of one to three sets of six to 12 repetitions each day at a comfortable weight. Individuals should begin with one set at a lower weight level and work up to three sets at a higher weight level. Participants, however, need to progress at their own pace. Ideally, the selection of exercises should emulate first responder activities for the weight training to improve job performance.

A calisthenics routine may include situps, pullups, and crunches plus a selection of exercises aimed at strengthening and stabilizing the core muscle group. Here too, participants progress at their own pace.

Weight lifting and calisthenics can be done at a fitness center, in the department, or at home. Although a fitness center offers a wide range of strength training machines, most departments could provide barbells, dumbbells, Smith presses, and weight stations at minimal costs.⁵¹

Flexibility Training. The goal of flexibility training is to prevent injuries, especially to the lower back. Participants engage in moderate stretching, holding each stretch for 10 to 30 seconds. Although stretching is encouraged prior to exercise or physical activity, the greatest gains in flexibility are made after exercise, when muscles are warm. Therefore, stretching should be done both as a warmup and after exercise. Strength and flexibility go hand-in-hand. Increasing both simultaneously will improve first responder performance and decrease the risk for injury.

BEHAVIORAL MODIFICATION PROGRAM

Behavioral modification is another core component of a comprehensive health and wellness program. Firefighters and emergency services personnel will want to address any preexisting health conditions and personal behaviors that heighten their risks of CVD or other injuries. CVD is by far the leading cause of firefighter deaths in the United States. Smoking, hypertension, an unhealthy diet, unmanaged cholesterol, unmanaged diabetes, and high blood glucose levels are all contributors to CVD, and each can be modified. (See Appendix B for a detailed discussion of the medical physiology of each of these contributing factors to CVD.)

Smoking. Smoking cessation is one of the most important interventions for preventing CVD. Smoking cessation reduces the risk of the first heart attack by 65 percent.⁵² The strategies to reduce the risk of CVD associated with smoking are straightforward:

- Individuals can attend a smoking cessation program, employ nicotine replacement therapy, or discuss medication options with their physician. Over-the-counter and prescription medications are available to help overcome the smoking addiction.
- Departments can aggressively promote smoking cessation programs available through local hospitals and other health agencies and consider sponsoring programs for their employees.
- Departments can ban smoking among personnel at the station.
- Departments can implement regulations that protect personnel from second-hand smoke at the station.

Hypertension. Strategies to reduce the risk of CVD associated with hypertension are varied and often overlapping. The degree of risk and the appropriate interventions depend on the degree of hypertension and the presence of additional risk factors. Individuals with elevated blood pressure, even high-normal blood pressure, should consult with their physician. During the consultation, the physician needs to be made aware of the types of job stresses encountered in emergency response. The physician may recommend drug therapy to treat hypertension, but lifestyle modifications also should be used in conjunction with medication. In fact, lifestyle modifications may be sufficient to avoid medication or to prevent the need for medication.

Diet. An appropriate diet is an important factor in the prevention of CVD. In general, the three primary objectives of diet modification are

1. Attaining ideal body weight.
2. Ensuring a well-balanced diet high in fruits and vegetables.
3. Restricting saturated fats and simple, refined carbohydrates (sugars). In general, less than 30 percent of daily calorie intake should be from fats (with less than 10 percent of calories coming from saturated fats). Cholesterol intake should be less than 300 mg/day. Because of growing evidence that Omega-3 fatty acids protect against CVD, it is commonly recommended that individuals eat fish one or two times per week.⁵³

Lowering caloric intake is important in weight reduction. A loss of excess body fat is associated with decreased blood pressure. A 2-pound reduction in body weight is associated with a 1.6-mmHg reduction in systolic blood pressure and a 1.3-mmHg reduction in diastolic blood pressure. The higher an individual's blood pressure is, the higher the risk for CVD.⁵⁴

Reducing salt intake is beneficial for individuals with elevated blood pressure. Sodium restriction is associated with a decrease in blood pressure in most people.⁵⁵ Salt restriction can be achieved by avoidance of salty foods (e.g., potato chips, olives), by not using or restricting the amount of salt while cooking or seasoning foods, and by avoiding processed food. Other recommended dietary changes include decreasing alcohol and caffeine consumption and increasing fruits, vegetables, and fish in the diet.

Reducing Cholesterol. As discussed in detail in Appendix B, the risk of CVD is heightened with unmanaged cholesterol. In general, the strategies for managing cholesterol levels fall into two categories: life-style modification and drug therapy. Drug therapy may be necessary for individuals who are at high risk for cardiovascular disease (risk factors discussed in Appendix B). If cholesterol levels are a concern, firefighters and emergency services personnel should consult with a physician to see which combination of strategies is right for their individual needs.

The primary lifestyle modifications that affect high cholesterol involve diet and exercise, in addition to drug therapy. In all cases, drug therapy should occur in conjunction with dietary therapy and increased physical activity. In many instances, drug treatment for high cholesterol levels is a long-term treatment strategy, and it is imperative that individuals continue to take their medication. Very often individuals will not “feel better” when they are taking the medication, but the cardiovascular system is “working better.”

Managing Diabetes and Reducing Blood Glucose Levels. Diabetes often coexists with other risk factors for cardiovascular disease. Clustered, these risk factors are termed “metabolic syndrome X” and include abdominal obesity, hypertension, dyslipidemia, and an inability to use glucose effectively (diabetes). Therefore, a person with diabetes must very aggressively control other risk factors. A diabetic should lose excess body weight, exercise regularly, and eat a diet low in simple sugars and carbohydrates. Because of the complexity of the disease, its relationship to heart disease, and the difficulty controlling blood glucose levels, a diabetic person should consult regularly with a physician about a diet and exercise program and the need for medication.

EDUCATING MEMBERSHIP

Education is another core component of a comprehensive health and wellness program and is an important step to shift the culture of the fire and emergency services. Education includes health (nutrition and fitness), orthopedic, and ergonomic seminars or workshops. By using interest surveys and determining needs, seminars can be tailored to include back care, nutrition, supplements, stress management, resiliency training, diet, heart disease, smoking, and injury prevention. Short seminars can be included in the department's regular training or business meetings.

Some groups or individuals within the community may be willing to conduct the seminars at little or no cost. The department might find speakers willing to volunteer their time by contacting the local YMCA, health clubs, college, Chamber of Commerce, or medical community (including hospitals).

SCREENING VOLUNTEER APPLICANTS

Another component in the health and wellness program is recruiting people with good fitness habits. Recruiting healthy individuals to serve as first responders may reduce firefighter fatalities from heart attacks and other medical conditions. Physically fit individuals also may be at less of a risk of incurring traumatic injuries. Two examples of screening processes are a wildland firefighter pack test (featured in Chapter IV) and a candidate physical agility test. Both screening processes look at the challenges that face potential first responders.

The members of the IAFF-IAFC Wellness/Fitness Task Force developed the Candidate Physical Agility Test (CPAT) to establish a nondiscriminating, fitness-based test for hiring firefighters. The CPAT is administered along with other recruiting and mentoring practices. The CPAT is comprised of eight events in which the candidate must wear a 50-pound weighted belt. (A belt is used as opposed to structural turnout gear and SCBA so as not to give an advantage to experienced firefighters seeking employment.) The eight events include

- stair climb (climbing stairs with a 25-pound simulated hose pack);
- ladder raise and extension (placing and raising ground ladder to the desired floor or window);
- hose drag (stretching and advancing hoselines, charged and uncharged);
- equipment carry (removing and carrying equipment from fire apparatus to fireground);
- forcible entry (penetrating a locked door, breaching a wall);
- search (crawling through dark areas to search for victims);
- rescue drag (victim removal from a fire building); and
- ceiling pull (pulling a ceiling to check for and locate fire extension).

Although the CPAT was designed for recruitment to career departments, it can be applied to volunteer departments as well.

Program Administration

The administration of a health and wellness program is crucial to its success. If the program is not made a priority or is mismanaged, members may refuse to participate. On the other hand, proper management and leadership might create a positive culture change in the department.

HEALTH AND WELLNESS COORDINATORS

NFPA 1583 recommends: “The fire chief shall appoint a health and fitness coordinator (HFC). The HFC shall:

- Be either a member of the fire department or a qualified outside agent.
- Have access to the fire department physician or other subject matter expert for consultation.
- Be the administrator of all components of the health-related fitness program.
- Act as a direct liaison between the fire department physician or other subject matter expert and the fire department.
- Act as a direct liaison to the fire department’s health and safety officer.”⁵⁶

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In short, coordinators are to be the program’s advocates within the department and to be coaches for the volunteers. With proper support from the officers, especially the chief, these coordinators could change the health and wellness culture within the department. Preferably, coordinators should be trained through an accredited peer fitness-training program. They coordinate all program marketing, manage data collection, and generate monthly reports for department management.

Coordinators should be available for year-round training, programming, and consultation. They will need to divide their time between addressing individual program prescription and training, monitoring performance, task analysis, injury prevention, and administration. Depending on the size of the department, multiple coordinators might be necessary.

LIABILITY EXPOSURE

Liability is a major concern of volunteer departments that have health and wellness programs, and an even greater concern for those looking to start one. Although there is no way to eliminate liability, there are ways to reduce it. When creating a program, a department should work with its insurance company and its legal counsel or the community’s counsel.

Insurance companies address these types of concerns every day and generally are inclined to offer assistance beforehand to help prevent a claim.

More importantly, departments need to keep in mind the risks that come with not implementing a health program. With first responder injury rates high, and many injuries preventable, it is likely that implementing a program will reduce injuries and save departments money in the long run.

FUNDING ALTERNATIVES

Creating a full health and wellness program, as outlined in this chapter, could prove costly to a department, especially a small-budget volunteer organization. There are many opportunities to help reduce costs, receive grants to cover expenses, or forge partnerships to eliminate costs. This section looks at some of the options and alternatives in funding a health program.

USFA's guide, *Funding Alternatives for Fire and Emergency Medical Services*,⁵⁷ presents a number of ideas for funding different types of programs, including a health and wellness program. One might argue that health and wellness of firefighters and EMS personnel should be a priority and be paid for from the fire service's budget. Since the current budget may be inadequate and the probability of its increase politically uncertain, other sources of funding may need to be considered. Some ideas include

- **Fees for service.** A way to raise funds for the budget that could be set aside for a health and wellness program.
- **Grants.** Funding is available from a number of sources that could be sought to help offset the cost of the program. An opportunity that each department should look at is the USFA Assistance to Firefighters Grant (AFG) program, which is highlighted later in this section.
- **Interacting and networking.** Contact State fire and EMS offices, associations, organizations, public officials, or decisionmakers and make sure they recognize the importance of health and wellness in the fire service.
- **Foundations and corporate donations.** Large foundations, community service clubs, and corporations often provide funding or in-kind donations (such as equipment) if they believe the need is present and the program is worthwhile.
- **Partnerships.** As discussed in greater detail later in this section, partnerships can minimize costs and improve relations in the community.
- **Fundraising.** This is always a good option, and one that ensures members have invested their time into the health and wellness program. Department-sponsored events such as bingo and casino nights or raffles that are specifically targeted to raising funds for first responder health and safety are likely to be supported by the community.

No matter what method is employed, each department needs to ensure that the programs are funded and supported adequately.

Assistance to Firefighters Grant

This section is from FEMA's "Fiscal Year 2008 Assistance to Firefighters Grants Program and Application Guidance."⁵⁸ The purpose of the AFG program is to award 1-year grants directly to fire departments to enhance the safety of the public and firefighters with respect to fire and fire-related hazards. This program supports departments that lack the tools and resources necessary to protect the health and safety of the public and their firefighting personnel with respect to fire and fire-related hazards.

FEMA may award AFG funds for the purpose of establishing or expanding wellness and fitness initiatives for firefighting personnel. For the fiscal year 2008 AFG, fire department wellness/fitness activities must offer periodic health screenings, entry physical examinations, and immunizations. Applicants for grants in this activity must currently offer, or plan to use grant funds to provide, all three benefits in order to receive consideration for funding for any other initiatives under this activity. High priority also is given to formal fitness and injury prevention projects. Lower priority is given to stress management, injury/illness rehabilitation, and employee assistance.

In accordance with the recommendations of the criteria development panel, the greatest benefit will be realized by supporting applications for new wellness and fitness programs. Therefore, higher competitive ratings will be given to applicants that lack wellness/fitness programs. Applicants that already provide the three requisite benefits and wish to expand their wellness and fitness program will receive lower consideration than departments that are seeking to initiate a wellness and fitness activity. Finally, because participation is critical to achieving any benefits from a wellness/fitness activity, higher competitive ratings will be given to departments whose wellness and fitness activities mandate participation and are open to all personnel.

Eligible expenditures in the firefighter Wellness and Fitness activity include the following:

- Procurement of medical services from trained medical professionals (MDs or RNs) to ensure the firefighting personnel are physically able to carry out their duties.
- Costs for personnel, physicals, physical fitness equipment (including shipping charges and sales tax as applicable), and supplies directly related to performance of physicals or physical fitness activities. Ineligible expenditures include the following items:
 - Transportation expenses.
 - Contractual services with anyone other than medical professionals listed above (e.g., health-care consultants, trainers, and nutritionists).
 - Fitness club memberships for firefighters and their families.
 - Cash incentives.
 - Noncash incentives (t-shirts or hats of nominal value, vouchers to local businesses, or time off).
 - Purchase of medical equipment.
 - Construction of facilities to house a fitness activity, such as exercise or fitness rooms, showers, etc.
 - Purchase of real estate.

Partnerships and Contracts. Implementing a health and wellness program can be both expensive for the fire or EMS department and time-consuming for the program coordinator. A complete program includes access to fitness machinery, health expertise, medical examinations, and inoculations. Many volunteer departments cannot easily afford this monetary commitment. Additionally, the program coordinator must have time for organizing, implementing, and tracking the various aspects of the program. To meet these challenges, departments can form mutually beneficial partnerships with outside organizations and businesses.

Some departments contract with local gyms, wellness centers, or other businesses that specialize in fitness/wellness programs. This provides firefighters and EMS personnel access to quality fitness machinery and the expertise of personal trainers and physical therapists. Many gyms offer group discounts for fire departments; this can be a relatively inexpensive method of providing the necessary space and equipment for fitness training. These arrangements can prove to be ineffective however; although fitness facilities may be available, many lack the needed support in programming for the first responders. Departments should consider forging agreements with facilities or businesses that will offer support in delivering task-specific programming that will prove most beneficial to firefighters and the department's investment. Even departments that use equipment within the department can benefit from contracting with a gym for assistance from personal trainers and physical therapists. Doing so can prevent injury and save time for the program coordinator.

Some departments have found that using gyms is inconvenient; firefighters and EMS personnel have to travel to the gym and exercise on their own time. Accessibility is a major factor that needs to be considered when forging partnerships or entering into contracts. If volunteers will not travel to the facility, there is little use in the partnership.

Departments also can form partnerships to provide medical attention to their volunteers. Some general practitioners offer discounted annual physicals by contract to the departments. In turn, the physician can advertise himself or herself as the physician for the local department. (The department could give them a certificate to that effect.) This is not only a cost-effective method of supplying annual physicals, but it enhances better coordination and consistency. Once the doctor has a list of the participating volunteers, he or she can contact them to schedule annual physicals. The doctor then is responsible for the scheduling and recordkeeping. The program coordinator need only read the doctor's summary reports to check for compliance. Contracting with a single doctor's office also provides a greater degree of uniformity in decisions of fitness for duty.

Partnerships between fire and emergency services departments and gyms or doctors can be mutually beneficial. The departments receive discounted services of a higher quality than they could provide internally. The gyms or doctors receive increased business and a positive local image. This type of relationship also can be formed on a larger scale. For instance, departments can contact groups such as the YMCA and the AHA to possibly fund and provide services to their fitness programs. Several local departments may find it beneficial to do this as a collaborative effort.

A relationship between the fire service and nonprofit organizations and the media can also offer opportunities to improve the general health of volunteer firefighters and EMS personnel. Nonprofits may be able to provide funding sources, equipment, or program guidance. Additionally, they can attract the attention of the news media, potentially shedding light on the important issue of first responder health. The current atmosphere of overwhelming support for first responders thereby can be harnessed to improve the condition of the fire and emergency services.

There are numerous other possibilities for programs between fire departments and nonprofit organizations. For instance, statistics show that heart disease is a leading cause of line-of-duty firefighter deaths. The AHA has supported departments that are trying to reduce their risk of heart disease through programming. One way to accomplish this is to challenge firefighters and EMS personnel to reach certain goals, such as a certain ideal weight or a specific amount of weekly exercise, and then ask the partner organization to provide the necessary information and materials. Challenges of this nature offer attainable goals and an opportunity for publicity.

Each department should develop a list of organizations to outreach for assistance. The type of organizations to consider contacting include

- YMCAs, health clubs, wellness centers;
- hospitals, medical offices, physical therapists;
- offices of nutritionists or dieticians;
- colleges and universities (medical centers, health departments, fitness centers);
- national health organizations (e.g., AHA);
- national service organizations (e.g., Lions, Rotary);
- fitness stores (e.g., Sports Authority, bicycle stores);
- health stores (e.g., General Nutrition Centers); and
- NVFC.

INCENTIVES FOR PARTICIPATION

Participation rates in health programs are dependent largely on the specific programs implemented and the participation incentive used. A key to increase involvement is to provide incentives for volunteer participation. Naturally, the more reasons a person has to participate, the more likely he or she is not only to join, but to engage actively in the program.

Nonincentivized programs generate poor levels of participation, but traditional "achievement awards" (e.g., workout equipment, certificates) demonstrate a 20- to 40-percent participation rate. Financial or personal incentives are most effective. Average participation, or use rates, for such incentive-based programs average 50 to 60 percent.⁵⁹ Examples of effective incentives that could be offered include

- cash or gift drawings;
- schedule priority;
- choice of firehouse duties;
- recognition at banquets or meetings; and
- financial rewards for program completion.

Departments should check local, State, and Federal guidelines regarding gaming and cash prizes/tax reporting guidelines before granting incentive prizes.

Fired Up for Fitness Challenge

The Fired Up For Fitness Challenge is an interactive NVFC-created program where firefighters and EMS personnel can design and implement their individual fitness program. Participants measure personal progress by recording their physical activity and results such as weight loss, as well as compare their progress with fellow first responders across the Nation. Participants also receive rewards as they reach certain benchmarks of activity hours.

CHAPTER VI:

IMPLEMENTING A HEALTH AND WELLNESS PROGRAM

Chapter V addressed the components and administration of a model health and wellness program for volunteer fire and emergency service departments. This chapter looks at how to combine these components into an effective program and implement the program at the department level.

The most important step in implementing a health and wellness program is planning. An effective implementation plan should address two basic areas: department planning and assessment; and data collection, analysis, and program evaluation.

Department Planning and Assessment

As discussed in Chapter V, the foundation of an effective health and wellness program, especially for volunteers, is customizing it to meet the needs of the participants. There is no model plan that will work for all departments in all places, but there are model elements and core components that should be implemented. These elements and components were laid out in Chapter V.

CREATING THE VISION

When implementing a program, a small steering committee should first develop a vision for the department's program. When developing the vision for the program, the committee should identify the major issues that affect the volunteers and the impact of those issues on both the individual and department (some of the issues that affect many, if not all, volunteers were discussed in Chapters II and III). It is very important that a representative sample of the volunteers is consulted while developing the vision. The vision should provide guidance on how to develop and implement an individualized program for the department, so making sure the targeted participants have input is critical.

IMPLEMENTATION STEPS

With a vision developed, the department could begin the program planning, implementation, and integration process. The following areas need to be addressed during this process:

1. **Select health and wellness coordinator(s).** As discussed in Chapter V, the coordinators should be the advocates and leaders within the department for the health and wellness program. The coordinators might come from the steering committee itself or be identified by the committee while developing the vision for the program.
2. **Consult with legal counsel and insurance company.** Legal counsel and insurance companies can help diminish liability of injury and risk. Additionally, some insurance companies may give the department credit for implementing a program aimed at reducing the risk of fireground injuries and deaths.
3. **Select program components.** The department should consult with a qualified medical or fitness professional in selecting the components, or pieces of each component, to ensure the program is customized for the needs of the individual department. Departments with an older volunteer base, for example, most likely will require a different program than a department with a mix of younger and older volunteers. (All of these components are discussed in much greater detail in Chapter V.)
4. **Create a fitness component.** The fitness component should address cardiovascular fitness, muscular strength and endurance, flexibility, and body composition. The fitness component could begin with a simple encouragement to increase moderate intensity activities such as walking the dog, swimming laps, or playing basketball. Over time, the department should provide opportunities for volunteer firefighters and EMS personnel to participate in more intense workouts, whether at the department or a gym.

5. **Create a behavioral modification component.** A behavioral modification component should include smoking cessation, hypertension and cholesterol reduction, and diet modification components. Behavioral modification will help to address pre-existing health conditions that heighten risks to cardiovascular health.
6. **Include screenings and assessments before participating in a fitness program.** Most experts agree that prior to participation in any fitness program, individuals should be screened and assessed to determine risk and workout needs.
7. **Include a regimen of regular fitness health screenings and annual medical evaluations.** Volunteers should receive annual medical evaluations. In several cases, departments that have instituted a physical program discovered potentially serious health issues, and the problems were corrected before they grew serious.
8. **Educate firefighters and emergency services personnel about health risks, nutrition, fitness, and other wellness topics.** Education is one of the most important steps that a department can take to help change the health and wellness culture.
9. **Identify department facility needs.** If a department chooses to have the fitness equipment in the facility, a review of the space requirements for each piece of equipment (including electrical outlets, floor support needed, etc.) needs to be completed. Even if a department chooses to partner with a gym, the coordinators might want a bulletin board to advertise program components, a shelf or closet to keep program materials, and a file cabinet to hold program files. These facility needs are important and must be considered early in the planning process.
10. **Develop the program budget.** Creating a health and wellness program most likely will prove quite costly, which makes it a challenge, especially for smaller volunteer departments. The steering committee, or coordinators, should develop a realistic budget that funds the purchase of any startup supplies and equipment; the implemented program components, any rewards and incentives, as well as additional funding for unforeseen expenditures.
11. **Identify funding sources.** Chapter V gives several options to fund a health and wellness program without draining the department's general fund. Possible sources to cover or diminish costs include grants, in-kind donations, foundation or corporation donations, partnerships, or a general fundraising drive.
12. **Devise marketing strategies for participation.** First responders must be convinced that they should invest their free time and energy into a health and wellness program when they are already volunteering time to the department. Ideas to consider when developing marketing strategies include offering incentives (discussed in Chapter V) and discussing the importance of participation (discussed in Chapters II and III).
13. **Make health and wellness a priority.** Once the components have been selected and the program is implemented, health and wellness needs to be made a priority to fully integrate the program into the culture of the volunteers. If department leadership and health and wellness coordinators are actively advocating participation (in both words and actions), the volunteers will see that the department has identified health and wellness as a priority and will be more likely to participate.

Data Collection, Analysis, and Evaluation

Once the program is underway, health and wellness coordinators need to review the program continuously and make changes as needed. To determine what changes are needed, coordinators will need to collect data and feedback actively from membership on a regular basis. Table 5 looks at different areas that should be evaluated, how to collect the data, and what the data state about the program.