

**EVALUATION OF FIREFIGHTER HEALTH AND WELLNESS PROGRAMS**

LEADING COMMUNITY RISK REDUCTION

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An applied research project submitted to the National Fire Academy  
as part of the Executive Fire Officer Program

April 2005

## ABSTRACT

The problem was the City of Vancouver Fire Department (VFD) has never taken a quantitative look at its health and wellness program to determine if the program provides for positive health outcomes.

The purpose of the project was to review data regarding the effectiveness of VFD's wellness program.

The research method used was a descriptive research methodology, and was used to answer the following questions:

1. How does the VFD wellness program compare to other programs?
2. Are there objective outcome measurements that can demonstrate the effectiveness of VFD's wellness program?
3. What is the level of satisfaction for participants of the program? Are there adequate facilities to exercise, time for on-duty exercise; and is the medical testing adequate?
4. Are there changes that should be made to the existing program?

Procedures used to conduct research included; (a) studying existing private and public wellness programs; (b) studying existing literature from the public sector; (c) studying research from fire industry standard development organizations; (d) searching literature from healthcare agencies; and, (e) searching literature from the Internet.

The results of the project indicated that there are a variety of different approaches to wellness programs throughout private, public, and fire service organizations. Results showed that there are national standards that exist, but that current wellness programs are limited to a minority of fire departments.

Benefits of the programs revolved around the following issues: (a) firefighter health and longevity; (b) cost; (c) employee participation; and, (d) adequate medical testing.

Recommendations included; (a) continue to fund the program at its current level; (b) target the appropriate audience; (c) begin participation in the peer fitness trainer program; (d) determine feasibility for a wellness program for the entire City of Vancouver; (e) add cancer screening to the medical testing; and, (f) a tobacco cessation program.

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## **INTRODUCTION**

The City of Vancouver Fire Department has never taken a qualitative or quantitative look at its health and wellness program to determine if the program provides for positive health outcomes for its participants. The purpose of the project is to review both qualitative and quantitative data regarding the effectiveness of the Vancouver Fire Department's health and wellness program.

This study uses a descriptive research methodology, which is defined as determining and reporting the present status of something to clarify, and to report the way things are at the present time (United States Fire Administration, 2002, p A-8). The research questions to be answered by this project include the following.

1. How does the Vancouver Fire Department's health and wellness program compare to other programs around the United States?
2. Are there objective outcome measurements that can demonstrate the effectiveness of the Vancouver Fire Department's health and wellness program?
3. What is the level of satisfaction for participants of the health and wellness program? Are there adequate facilities to exercise? Is there adequate time for exercise on duty? Is the medical testing adequate?
4. Are there changes that should be made to the existing program to make it more effective?

## **BACKGROUND AND SIGNIFICANCE**

There has been an ongoing concern throughout the fire service industry about firefighter health and wellness. This topic addresses one of the four operational concerns of

the United States Fire Administration objectives of reducing the loss of life for firefighters (USFA, 2001, p. II-2).

The course that this study will be applied to is the Leading Community Risk Reduction. The link between the course and the study is an effective community risk reduction program, the VFD Wellness program, and the areas of data analysis and application, and program evaluation. It can be applied to three of the four phases of emergency management: preparedness, mitigation, and response. A healthy and stronger firefighter is more capable of performing the tasks that are often required at emergency scenes. Healthier firefighters mitigate health care and disability costs to the organization and the taxpayer. Healthy firefighters are better able to respond to the demands that are placed upon them at the varied types of responses that modern firefighting places on them. A successful health and wellness program accomplishes all three of these categories for fire service personnel and the community that they serve.

One way to deal with the health and safety concerns has been for fire departments to implement a health and wellness program. VFD began their wellness program in 1994 after consolidation with Clark County Fire District 5 (CCFD 5). During the 11 years of the program's existence at VFD, the organization has never taken an overall look to see if the program has resulted in positive health outcomes for suppression and prevention personnel.

Prior to 1994, two different but similar-sized agencies existed in the local firefighting community; the City of Vancouver Fire Department and Clark County Fire District 5. These were neighboring fire departments in the Vancouver area and they consolidated into one department in 1994. Prior to this consolidation, Clark County Fire District 5 – in reaction to the national trend of firefighter deaths and injuries, and the local reality that our firefighters

may not be as fit as they should be to do their jobs – started a health and wellness program in 1991 that included exercise and health screening components. In 1994 when the consolidation occurred between the Fire District and the VFD, the newly consolidated department continued the program. This program contains both mandatory and voluntary components. Participation in the testing component completed with Portland Adventist Medical Center (PAMC) on an annual basis is mandatory and the daily exercise participation while on-duty is mandatory as well. The level, type, and amount of exercise are the voluntary portions of the program. The individual, when on-duty, may determine on a daily basis exactly which type, amount, and level of exercise they will do. They are given 1 hour of productive time (between 0800-1200 and 1300-1700 hours) to accomplish their self-chosen performance goals. During non-productive hours, those wishing to continue their workouts may do so as long as it does not conflict with emergency responses.

Each of the department's eight fire stations has its own workout facility with commercial quality equipments such as free weights, a multi-station weight gym, and several pieces of aerobic equipment, which includes a treadmill, a stationary bike, and a stair climber. Having this equipment in-house facilitates the use of firefighter time while accommodating their emergency response demands, training, and regular duties.

As the Wellness Program Coordinator first for Clark County Fire District 5's wellness program and then for the VFD post-consolidation program, my interest and goal has been the health and wellness of every member of my organization, as well as all members of the fire service in general. The organization spends a significant amount of taxpayer dollars each year on the maintenance of the program and it is my feeling that the taxpayers, the organization, and the firefighters deserve a program that is the most effective use of those

resources. This study should determine how effective the VFD health and wellness program has been since its inception.

If the program is effective, the results will show is a reduction in improvement or maintenance of, clinical blood pressure (BP), total blood cholesterol, and triglycerides. Muscular strength should either increase or be maintained, as well as aerobic capacity. This information will be tracked in the following ways: a.) quantitatively through the use of the annual medical report information from PAMC; and, b.) a survey questionnaire will be sent to all members of the group.

The greater the employee participation in the health and wellness program, the higher the level of positive health outcomes there will be among VFD firefighters. Employees of the VFD who participate in the health and wellness program should have fewer negative health outcomes than employees in those fire departments that have no program. Examples of negative outcomes seen in the recent history of the fire service are hypertension, heart disease, and firefighters prone to muscular and skeletal injuries because of poor muscle strength or lack of flexibility.

Areas of health and wellness will be operationalized as follows: amount of aerobic exercise per week, grip strength, body fat percentage, clinical blood pressure, glucose, total cholesterol, HDL cholesterol, triglycerides, and VO<sub>2</sub> capacity. If the participants use the equipment to achieve aerobic and anaerobic fitness on duty and give their best efforts during the testing at PAMC, there should be decreases in total cholesterol, triglycerides, body fat percentage, and clinical blood pressure. Similarly, there will be increases or maintenance in muscular strength and VO<sub>2</sub> capacity.



PAMC medically tests every employee in the suppression and prevention divisions on an annual basis and these results can be used to track the quantitative levels and amounts of program participation.

For example, if firefighters smoke, their ability to exercise at the proper aerobic level may be adversely affected. If firefighters continue to consume more calories than they expend or consume the wrong types of foods, their ability to participate in aerobic or anaerobic activity may also be diminished due to excess body fat, especially as they age.

Without an effective health and wellness program, the firefighters and prevention officers of the VFD would be at higher risk of coronary artery disease, numerous cancers, elevated risk of on the job injuries, and a host of other duty related problems that are well documented throughout recent history of the fire service. If the current health and wellness program is not the best that it can be, then the taxpayer's dollars that are currently being spent are not being used efficiently.

## **LITERATURE REVIEW**

### **The need for wellness programs among firefighters**

Firefighters need strength and endurance to perform their job. The physical demands of fire suppression rank among the most strenuous of occupations. The simple act of climbing stairs under the load of turnout gear and tools establishes a job-related criterion that exceeds the capacities of a significant portion of the general population (Dotson and Gerkin, 1997, p. 24).

According to the most recent study by the Fallen Firefighter Foundation (Author, 2004, p. 1), over the last decade an average of 100 firefighters die each year from duty-related causes, with 50% of these deaths due to heart attacks. Heart attacks and strokes kill

over 50% of firefighters who die on duty, yet research on their dietary practices is severely lacking. Worksite nutrition education can have a positive effect on the dietary intake of on-duty fire fighters (Bilyk, 1996, p. A-88). This research is key to the issue because of the nature of the schedule of firefighters.

In a message from the Department of Homeland Security/U.S. Fire Administration, in 2004, there were 107 firefighters that died in the line of duty. The balance of these deaths is attributed to non-traumatic injuries, such as heart attacks and strokes (USFA, 2005, p. 1-3).

Professional firefighters generally work some sort of rotational type of shift work such as a 24-hour on and 48-hour off schedule, as is done at VFD. The majority of firefighters at VFD consume three meals together, starting with a communal breakfast at the beginning of shift at 0700. Lunch is generally consumed on an individual basis, with there being a communal dinner in the evening and firefighters are beginning to realize that nutrition plays a key role in the health and effectiveness of any wellness program.

In a research project undertaken at a large Midwestern city, 104 professional firefighters had nutrition questionnaires administered to them and it was found that they had a strong understanding of the importance of physical activity and nutrition to their job performance. The survey showed some low-fat food choices were being made but more low-fat food choices should be included in their diet. It was found that there was a strong correlation between knowledge and attitude, and actual physical activity and dietary intake (Reed, 1996, p. A-23).

It was reported in a nutrition study of firefighters by Gerace in 1996 that as most adults age, they add body weight. When the weight gain is in excess, there are a myriad of

diseases that are often associated with the excess weight, such as an increased risk of coronary heart disease, hypertension, diabetes, and several cancers.

In this same study, it was noted that younger firefighters had more pronounced weight gain than older firefighters. Due to this factor it was felt the preventive measure of a physical activity program should be started that contained an exercise, nutrition, and calorie reduction program. This is true for all adults, because it is so difficult for overweight people to shed excess pounds and maintain their weight loss (Gerace, 1996, p. 593-600).

Smoking is another important factor in a health and wellness program. According to the Centers for Disease Control (CDC), smoking is a direct cause of coronary heart disease and death. In a study of the years 1995-99, the CDC reported an average annual death rate of over 440,000 people due to the use of tobacco products. Of these deaths, just fewer than 82,000 a year are attributable to coronary heart disease (CDC, 2002, p. 300).

Another factor to be considered is the normal aging process. A clinical symptom of aging is a decline in functional strength. Those who do not do any type of strength training will lose close to 30-40% of muscle mass by age 65. People who do not strength train lose between 6-10 % of muscular strength and flexibility per decade of life starting at age 30. After age 40, regular weight training slows strength loss to 3-5% per decade of life (StrengthFit.com, 2005, p. 1). Other physical declines seen in the aging process are a rise in body fat, loss of height, diminished cardio-respiratory capacity, and increases in blood pressure due to stiffening of the arteries, increases in total cholesterol, serum triglycerides, and maximal oxygen consumption (Quinn, 2005, p. 1).

Looking outside the fire service throughout the rest of the workforce in the United States, the American Lung Association (ALA) cited that in 1999 nearly 70% of the workforce worked under a smoke-free policy. According to a Gallup poll 95% of Americans – smokers and non-smokers – now believe companies should either ban smoking totally in the workplace or restrict it to separately ventilated areas (ALA, 2003, p. 1). The employer's justifications are that the United States Environmental Protection Agency has concluded that the widespread exposure to secondhand smoke in the United States workplace presents a serious and substantial public health hazard. They also found that tobacco smoke is a major source of pollution in most indoor air environments, particularly office work sites, and they classified it as a Group A carcinogen. According to the Environmental Protection Association (EPA), a Group A carcinogen is a chemical or substance that is known to cause cancer (EPA, 2004, p. 1).

Tobacco smoke contains over 4,000 chemicals, which are in the form of gas and particulate matter. Workers have been awarded unemployment, disability, and worker's compensation benefits for illness and loss of work due to secondhand smoke exposure. Smokers also have twice the accident rate of nonsmokers on the job. A smoking employee costs the employer at least \$1,000 per year in a total excess direct and indirect health care costs, compared with a similar non-smoking employee. Overall, smoking costs the U.S. \$150 billion in health care costs and lost productivity annually. This includes \$75 billion in direct health care costs and \$82 billion in lost productivity costs (ALA, 2003, p. 2). It is because of all this information and data that a smoking cessation program is a critical part of a comprehensive wellness program.

Most firefighters respond to all emergency situations, and when the alarm sounds firefighters never know what physical or mental demands will be placed on them. They may be called upon to battle a raging fire, cut people from wrecked cars, or lift a collapsed house off storm victims. Keeping their bodies fit and ready for any situation is a job requirement (Hall, 2001, p. 5).

In recent history there have been several cases where employees have been dismissed from their job because they have failed to maintain the physical standards necessary for firefighters. While occupational fitness standards vary from job to job, in the traditional male-dominated field of firefighting things have changed over the last decade. Women have begun to enter the profession in increasing numbers and there is a concern that there will be a reduction in the physical standards to accommodate them, which has the potential to result in reduced public safety. This can be addressed by making sure the fitness test is appropriate to the job standard, and that the organization has a physical activity program that addresses muscular strength and endurance, anaerobic and aerobic power, agility and flexibility (Kuruganti, 2003, p. 451-457).

In a study by Hennessey, it was found that even though firefighters are well protected by their firefighting clothing (called bunker gear) they are still at as much risk if they are not physically fit as if they had run into a burning building without their self-contained breathing apparatus. While this may be an overstatement, it has been well documented how often firefighters are injured and die from work related exposures (Hennessey, 1991, p. 34).

According to the International Association of Firefighters (IAFF) Death and Injury Survey report from the year 2000, 34 professional firefighters died in the line of duty that year, while another 53 died because of occupational diseases acquired while in performance

of their jobs. Firefighters continue to suffer job-related injuries in numbers that far exceed those of all other occupations, such as mining, manufacturing, farming, and any labor of a manual nature where injuries are prevalent. By contrast firefighters are injured at a rate of nearly one in five in the line of duty. Professional firefighters are over three times as likely to obtain injuries on the job as the average worker in private industry (IAFF, 2001, p. 1).

According to a report for the U.S. Fire Administration (USFA), from 1990-99, firefighter injuries are showing a ten-year trend of decreasing. This is at a decrease of 17% for total firefighter injuries and a decrease of 26% for fire ground injuries. This may be due in part to the national trend of participation in health and wellness programs (USFA, 2001, p. 1-5).

In a 1998 study of two metropolitan fire agencies in Quebec, Canada, it was determined that the significant level of risk due to on the job injuries raises the question about firefighters ability to remain in their jobs as they age. The modal age of these firefighters was between 25 and 29 years, with the mean or average age of 34.9 years. It was found that the younger firefighters were more prone to suffering work related injuries, while the older firefighters were suffering fewer injuries but were prone to have a much longer recovery time. The difference in the numbers of injuries is due to the nature of the job tasks that each age group is generally assigned to. Younger firefighters are usually given the assignments that are more hazardous in nature and they have less experience in performing these tasks safely, as opposed to the more experienced or older employee. This study suggested that departments should model their intervention and wellness strategies to consider the relation between age and work (Cloutier, 2000, p. 513-523).

### **National Initiatives: IAFF/IAFC Wellness/Fitness Initiative**

In 1997, the International Association of Firefighters (IAFF) and the International Association of Fire Chiefs (IAFC) published the Joint Labor Management Wellness/Fitness Initiative. It is the most comprehensive study and organized example of a wellness program. This publication includes medical fitness, physical fitness, emotional fitness, and access to rehabilitation as components of a comprehensive wellness program. This initiative describes a wellness program as not just another departmental program, but as a total commitment to the health, safety, and longevity of all uniformed personnel. It also considers the productivity and performance of fire crews and the cost-effectiveness and welfare of all fire departments.

Specifically, the IAFF/IAFC Initiative lists several benefits of a comprehensive wellness program. Some benefits are quantitative while others are qualitative. They include quantitative methods which are: weight reduction and control, lower cholesterol, triglyceride and blood pressure levels, decreased risk of death, injury or disability from disease, greater strength and stamina, improved performance in physical job activities, better joint function and posture, increased energy, general vitality and mental sharpness, enhanced capacity to recover quickly from strenuous activity or work, increased tolerance for heat-stress and more effective body cooling, and improved mobility, balance, and coordination. They also include qualitative methods which involve heightened job performance and enjoyment from work, enhanced self esteem and self image, more restful and refreshing sleep, and reduction of anxiety, stress, tension, and depression (IAFF/IAFC, 1997, p. 3-4). The initiative also mentions cost effectiveness for the community in terms of reducing injury rates, sick leave usage and disability retirements resulting in less overtime since firefighters are not in need of replacement.

The need for this national initiative is demonstrated each year in the IAFF Death and Injury Surveys. These surveys show that fire fighting remains one of the most dangerous occupations in the United States. Firefighters work long hours; having sporadic high-intensity work that can carry strong emotional involvement. High levels of stress with intense physical demands combined with long-term exposures to toxins, chemicals, and infectious diseases contribute to heart disease, lung disease, and cancer. These are the three leading causes of death and occupational disease disability in the United States (IAFF/IAFC, 1997, p. 3).

The main goal of the program is to get fire organizations across the United States to view health and wellness programs in a different light. Personnel are an organization's most valuable and expensive resource. When the overall cost of the program is compared to just the disability rates in organizations that have implemented this program it is shown to be a cost effective means for reducing disability costs (Liao, 2001, p. 229-242.). Disability costs are exorbitant when firefighters are injured, or worse yet, disabled or killed (Maguire, 2002, p. 625-632).

Other goals of the IAFF/IAFC wellness program are to reduce heart and lung disease, cancer rates, and promote improved job performance. Another goal is to extend the average life expectancy of firefighters (IAFF/IAFC, 1997, p. 4).

Other cost factors are the federal, state, and local regulations that mandate fire service organizations to comply with several different occupational health issues. The National Fire Protection Associations (NFPA) Comprehensive Occupational Medical Program for Fire Departments Initiative 1582 is one of great impact. It is a natural extension of the IAFF/IAFC Wellness Initiative. NFPA 1582 provides another tool for a comprehensive approach to



health and medical services for the firefighter. This standard offers an extensive overview of medical evaluations of firefighters, occupational fitness evaluation of members and the need for job specific rehabilitation (Pratt, 2004, p. 1). Hearing screening, blood borne pathogen exposures, and presumptive occupational health diseases such as lung cancer and heart disease and a host of other medical areas are other examples (IAFF/IAFC, 1997, p. 9-40).

### **City/County Programs**

In 1997, the City of Phoenix Fire Department conducted an audit of their disability retirement program for all city employees. The annualized cost of disability pensions for Phoenix firefighters was \$100, 000. The comparative annualized cost for Phoenix police officers was \$721,000, and for all other city employees was \$623,000. Phoenix Fire Department Officials and Phoenix City Council members attribute the low costs of Phoenix's firefighters as direct result of the department's 19-year commitment to wellness and rehabilitation. Phoenix began their wellness program in 1985, a full 12 years before the 1997 IAFF/IAFC initiative (IAFF, 2000, p. 1).

It was reported in *Fire Chief* Magazine that the San Jose City Fire Department during a 4-year period from 1994 to 1998, lost work days decreased 22%, their incurred cost rate went down 12%, hospitalization payments fell 27%, and indemnity payments fell by 59%. In addition, disability salary payments were 300% less for program participants over non-participants (Scully, 2000, p. 16). In 1999, the San Jose City Fire Department received a C. Everett Koop National Health Award for its success in reducing health care costs while improving health through wellness programs. By focusing employees on the personal wellness program and analyzing specific tasks to develop strength-building and other preventative programs that address risk factors, the San Jose City Fire Department has seen a

22% reduction in lost work days and a 12% decrease in medical payment cost rates (Gunsaulley, 1999, p. 7).

The City of Riverside, California, Fire Department of showed a 23% reduction in medical costs and a 10% reduction in days off on workers' compensation benefits over a three-year period. A cost-benefit analysis of Riverside's fitness program revealed a \$104,644 savings over three years. The Riverside program shows that the Phoenix Fire Department is not the only example of a successful program (Ball, 1999, p. 66).

The City of Stillwater, Oklahoma Fire Department has had a fitness program since 1982. They have partnered with Oklahoma State University in offering their firefighters medical and fitness exams. The data that has been gathered supports the fact that firefighters who regularly participate in aerobic and strength training programs maintain a higher level of fitness and health than those who do not participate. It is found that work capacity, overall strength, flexibility, body fats, blood pressure, lipids, and overall health are maintained when individuals choose to participate in regular physical activity. As one would expect, those who choose not to participate in regular physical activity have steadily declined in the same health and fitness indicators (Stillwaterfire, 2004, p. 1-3)

In 1999 and 2000, the City of Houston, Texas Fire Department (HFD) undertook a 16-week study of 651 of their firefighters with Alamo Physiological Research Institute. It was found that 57% of the participants were below an average level of cardiovascular capacity, or equal to that of a sedentary individual. Given this, the City of Houston had TriData Corporation make recommendations as to what type of program they should undertake to correct this inefficiency. TriData recommended that HFD should allocate a minimum of 1 hour a day during on duty time for physical training. They should also outfit

all fire stations with a full complement of exercise equipment and develop a health education program (Houston Fire, 2003, p. 1-5).

### **Private Industry**

There is justification for health and wellness programs in the corporate world as well. However, corporate programs are more focused on cost/benefit outcomes while fire department programs are focused on health outcomes, injury prevention, and mortality reduction. A detailed study undertaken for Johnson and Johnson by 24-hour Fitness USA 2002, found that an evaluation of the financial health impact of a large-scale corporate health and wellness program showed that participating employees have significantly lower medical expenses and achieve overall health benefits in such risk categories as high cholesterol, hypertension, and smoking. Corporate America participates in health and wellness programs because of their impressive financial dividend (McArdle, 2001, p. 960).

Additionally, a study at McDonnell-Douglass found that their Wellness and Employee Assistance Program produced a savings to cost ratio of 4:1. This means that for every one dollar spent on their wellness program, they saved four dollars in medical claims and reduced absenteeism. This represents an estimated \$5.1 million in savings, \$4.3 million in reduced medical claims and \$800,000 in reduced absenteeism. Employees who received assistance through the program produced fewer medical claims, had fewer absences and stayed with the company longer than employees who received treatment outside the program for similar problems (Tri Fit Inc., 1994, p. 1-3).

Florida Power and Light Company revamped its cafeteria menus to include meals that are less than 400 calories. Anheuser-Busch Corporation raffled away a \$5,000 vacation package for people who got health checks. Motorola Corporation built its employees a fitness

center where they can lift weights and run on treadmills. Motorola offers \$240 annually for employees to spend on fitness club memberships. Anthony Carroll, the manager of the Motorola Worksite Wellness Center, said that companies could save money in the form of lower health insurance costs for employees, less absenteeism and greater productivity. He said that for every dollar that Motorola spends on their wellness program, they save \$3.93 (Shelton, 2004, p. 1).

This trend toward corporate health programs is being driven by health and medical care costs. As a nation, we spend almost a trillion dollars on medical care services. Ninety-five percent of this is spent on direct care, with the other 5% being allocated to population-wide health improvement measures (O'Connell, 2004, p. 16-17). It is felt by O'Connell that roughly 40% of all deaths are caused by behavior patterns that could be modified or prevented. As a consequence, there should be more emphasis on prevention, and less on medical care. This is why corporations are moving towards wellness programs that include smoking cessation classes, stress management, and diet and nutrition counseling.

Other businesses have also seen the benefit of a wellness program. The Bank of America recently held a health promotion program for their retirees. The Coca Cola Corporation saw a decline in healthcare claims, saving \$500 annually for each employee who joined the company's Health Works fitness program. The DuPont Corporation saw its comprehensive health promotion program have an effect on employee absences. Workers in their wellness program exhibited a 14% decline in disability days, compared to a 5.8% decline in employees that did not participate. The Prudential Insurance Company found that its healthcare liability dropped from \$574 to \$312 for each employee enrolled in its wellness program (O'Connell, 2004, p. 16-17).

According to a report in the Washington Post, about 95% of large employers (with 200-plus employees) and about one third of smaller employers offer programs to improve the health of workers. But many programs are small because employers lack the quantitative evidence of a monetary payoff for their employees. Long term, serious studies are costly and it is difficult to quantify all of the benefit and impact that a comprehensive wellness program should have. This is why it is critical to undertake proper documentation and study of any wellness program. Accurate tracking of employees is critical, but it must be done in a manner that ensures strict medical information confidentiality (Anonymous, ISHN, 2004, p. 14).

### **Firefighter Wellness Program at VFD**

The VFD health and wellness program requires that all personnel receive annual health screening. Portland Adventist Medical Center's Health for Life has done the annual wellness screening for the organization since program inception. PAMC gives the organization a corporate report every year for tracking program effectiveness.

VFD operates with Administrative Guidelines (AGs) instead of operational procedures or rules and regulations like the majority of fire service organizations. The organization mandates through the AGs, participation in the exercise and testing portion of the program. These guidelines say that each employee must participate at their level of choosing for one hour a shift. No one watches the employees to see that they are exercising at a particular anaerobic or aerobic level. AGs are not rules, only guidelines that employees are asked to consider when performing tasks or making decisions. This means the employees are free to choose at which level and the total amount of exercise that they feel is required. No levels of fitness are ever mandated, other than the guidelines that PAMC must follow, such as the Washington Industrial State and Health Administration (WISHA) laws. These pertain

to the respiratory standards stating firefighters must be fit enough to wear a self-contained breathing apparatus (SCBA). Dr. Ted Levin of PAMC takes the quantitative data from the annual wellness results and using a qualitative approach, uses his medical opinion to certify all employees that are required to wear a SCBA are fit for duty. This approach is qualitative because there are no hard and fast numbers that guide Dr. Levin through the process. He uses his best medical judgment considering the wellness results and looks at the WISHA Respiratory Questionnaire that each employee seeking certification must fill out. There are no hard and fast criteria, which would automatically eliminate a firefighter from failing this standard.

It is the employee's choice at what level they choose to participate in the testing at PAMC. An example would be how long they choose to remain on the treadmill, or how much weight they choose to leg or bench press during health testing at PAMC. Again, no levels of fitness are mandated at any level of the program, either testing or exercise.

The Vancouver Fire Department's program goals are similar to those of the IAFF/IAFC National Wellness/Fitness Initiative. The VFD program is not punitive in any manner, and all results are measured against the individual's previous examinations and assessments and not against any standard or norm.

Confidentiality of medical information is a critical aspect of the program. The department and the Union Local 452 have a written agreement that guarantees medical confidentiality. VFD only has access to the Respiratory Fit for Duty letter that is required by WISHA. Any life threatening or long term health issues are to be discussed with the employee, and it is the employee's responsibility to report to the employer any work restrictions or necessary accommodations the employer could be asked to consider providing.

PAMC maintains all employee medical files. The only file maintained by the employer is the Respiratory Fit for Duty certification.

The VFD wellness program is not just another program. It is a commitment to the health, safety, and longevity of all uniformed personnel. The productivity and performance of all fire crews should be maintained. The wellness program is intended to be a cost effective tool that benefits all facets of the department and the public the employees are dedicated and sworn to serve.

To facilitate this, each fire station is equipped with commercial quality aerobic equipment consisting of treadmills, stationary bikes and stair climbers. Each station also has a multi-station weight machine that allows three people to use it a once. Free-weights, abdominal mats, and roman chairs are also provided at each station. The 1-hour mandatory fitness period is to be facilitated by the captain of each company during productive work hours. Participation is mandatory, but since no levels of performance or standards are required, the individual tracks their own progress and sets their own level or degree of exercise.

PAMC has provided nutrition and exercise counseling and a multitude of other wellness related sessions to employees at both an individual level, station house level, and to the department at large via the Clark County Vocational Television Viewing (CVTV) channel. Due to the 24 hour, 3-shift nature of VFD's schedule it is broadcast live once and then replayed several times throughout the month on the CVTV training channel.

Each year, every member of the Suppression and Fire Prevention Division goes over to PAMC and receives medical testing. Exactly what testing varies according to one's age and current health level (Appendix A, AG 400.8).

## PROCEDURES

### **Definition of Terms**

ACE. American Council on Exercise, “Nonprofit organization committed to enriching quality of life through safe and effective physical activity” (ACE Website, 2005).

Aerobic. “Depending on free oxygen or air, enhancing respiratory, and circulatory efficiency” (Dict.die.net, 2005).

Anerobic. “Not requiring air or oxygen for life, failing to enhance respiratory efficiency” (Dict.die.net, 2005).

Carcinogen. “A substance that causes cancer (or is believed to cause cancer).” (MSDS Hyperglossary, 2004).

Cardiovascular. Pertaining to or involving the heart and blood vessels” (Dict.die.net, 2005).

Cessation. “A ceasing or discontinuance” (Webster’s Dictionary, 1913).

Cholesterol. “An animal sterol that is normally synthesized by the liver, the most abundant steroid in animal tissue” (Dict.die.net, 2005).

Clinical. “Scientifically detached, unemotional” (Dict.die.net, 2005).

Consolidation. “The act of combining two into an integral whole” (Dict.die.net, 2005).

Coronary Artery Disease. “A stage of arteriosclerosis involving fatty deposits inside the arterial walls” (Dict.die.net, 2005).

Coronary Heart Disease. “A condition in which the coronary arteries narrow from an accumulation of plaque” (Hyperdictionary, medical dictionary, 2004).

Correlation. “A reciprocal relation between two or more things; a statistic representing how closely to variables co-vary” (Dict.die.net, 2005).



Diabetes. “Any of several metabolic disorders marked by excessive urination and persistent thirst” (Dict.die.net, 2005).

Glucose. “A monosaccharide sugar that has several forms; an important source of physiological energy; high levels are related to diabetes (Dict.die.net, 2005).

Group A Carcinogen. Class of known chemicals or substances that cause cancer in humans. (EPA, 2004)

HDL Cholesterol. Good cholesterol, as opposed to LDL cholesterol, a lipoprotein that transports cholesterol in the blood, high levels are thought to be associated with decreased risk of coronary heart disease” (Dict.die.net, 2005).

Hypertension. A common disorder in which blood pressure remains abnormally high (a reading of 140/90 or higher) (Dict.die.net, 2005).

Lipid. “Essential structural component of living cells” (Dict.die.net, 2005).

Longevity. Duration of service” (Dict.die.net, 2005).

Mean. “A quantity having an intermediate or average value between several others” (Dict.die.net, 2005).

Mitigate. “To make less severe or harsh or to lessen the seriousness or extent of.” (Wordnet dictionary, 2004)

Mode or modal. “The most frequent value in a distribution” (Dict.die.net, 2005).

Mortality. The ratio of deaths in an area to the population of that area; subject to death or dying” (Dict.die.net, 2005).

Myriad. “Too numerous to be counted; a large indefinite number” (Dict.die.net, 2005).

Non-punitive. “Something that does not inflict any punishment” (Wordnet dictionary, 2004)

Presumptive. “To afford reasonable grounds for belief or acceptance” (Wordnet dictionary, 2004).

PSA Test. Prostate-Specific Antigen Test, “Blood test that detect cancer by measuring antigen in the blood” (WebMD Health, 2005).

Punitive. “Pertaining to punishment or inflicting punishment” (Dict.die.net, 2005).

Qualitative. “Involving distinctions based on qualities, not quantities” (Dict.die.net, 2005).

Quantitative. “Expressible as a quantity or relating to or susceptible of measurement” (Dict.die.net, 2005).

SCBA. Self contained breathing apparatus, “A device worn by an individual that contains an amount of respirable air worn by the user in smoky or non-breathable atmospheres” (PTCL Safety Glossary, 2005).

Sedentary. Characterized by, or requiring, much sitting” (Dict.die.net, 2005).

Stroke. “A sudden loss of consciousness resulting when the rupture or occlusion of a blood vessel leads to a lack of oxygen in the brain” (Dict.die.net, 2005).

Symptom. “Anything that accompanies X and is regarded as an indication of X’s existence” (Wordnet dictionary, 2004).

Traumatic. Of or relating to a physical injury or wound to the body; psychologically painful” (Dict.die.net, 2005).

Triglyceride. “A glyceride formed by the replacement of three hydrogen atoms in glycerin in acid radicals, an important energy source forming much of the fat stored by the body” (Dict.die.net, 2005).

VO<sub>2</sub>. The amount of oxygen measured in milliliters, one can use in one minute per kilogram of body weight” (Sports Coach, 2005).

### **Primary analysis data collection**

Employees of the VFD will be the study group. The sampling frame will be each employee in the Suppression and Prevention divisions from the City of Vancouver Fire Department from 1994 through 2004. A consolidation of two separate fire departments, Clark County Fire District 5, and the City of Vancouver occurred in 1994. The Fire District began their wellness program and testing with PAMC in 1991. VFD employees began their wellness program after consolidation. Since the Fire District 5 employees started their wellness program and medical testing in 1991, including that information on roughly one-half of the group would skew the data because of the three-year head start that District employees had on the employees of VFD.

All employees required to participate in the wellness program receive a baseline exam from PAMC consisting of a full physical and testing before anyone begins participation in the program. This testing will be used as a starting point for VFD employees, and the annual results will be tracked from that point forward.

A cover letter was constructed and a survey was distributed to every member of the group via e-mail (Appendices B and C). The cover letter explains the reasons for the need and the content of the questionnaire. Every respondent receives confidentiality, as names are not required on the questionnaire. Reminder e-mails and direct contact shall follow the survey where necessary. Questions will primarily be closed ended using Likert or Guttman response scales where appropriate. Since program inception in 1994, there has not been a serious confidentiality breach of confidential medical information. Hopefully this will reassure the respondents to have confidence that this process is only undertaken for the betterment of the program, and not to be used in an attempt to discipline anyone or have any

negative consequences in any way. Confidentiality has always been a program goal, and I have been the Program Coordinator since its inception. The survey was sent to 155 Suppression members, 10 Chief Officers, and 8 Fire Prevention members making a total of a possible 173 respondents. 104 surveys were completed and returned, 4 from Fire Prevention, 8 from Chief Officers, and 92 from the Suppression Division. This is over a 60% percent return rate.

### **Measurement.**

With regard to the operationalized areas variable, VFD has PAMC conduct an annual health and wellness screen on every individual in the Suppression and Prevention Divisions. PAMC publishes an annual report and maintains medical records, which will provide a quantitative look at the program and the VFD employees' results.

The annual results from PAMC were used to measure employee participation. This is necessary because while participation in testing is mandatory – a level that achieves positive results is not. If the employees are fully participating in the program, their annual numbers should either improve or, at worst, remain steady as they age if the program is to be considered effective.

### **Secondary and archival analysis data**

The medical information collected by PAMC since 1994 that is distributed in their annual corporate wellness report as secondary data to track the health and wellness of the group was used. The sampling frame and strategy will be the same as that of the primary data source; consisting of all of the members of VFD that were tested at consolidation in 1994 through 2004.

PAMC documents and collects health data during the employees' annual wellness testing. Employees report annually to the hospital and have blood drawn, urine collected, have eye and hearing exams, lung function tests, body fat tests, muscular strength and flexibility tests, and either a full stress treadmill using the Bruce or Balke protocols, or a Rockport walk test. Whether the employee is given the treadmill stress test or Rockport walk test is determined by a person's age, family medical history or current medical history, such as tobacco use within the last five years, body fat of over 21 percent, or hypertension (Appendix A).

The data is collected and stored using full medical screening and confidentiality protocols that exist in the healthcare industry (Appendix D). Categories that are reported are: age, aerobic capacity categorized by computed VO<sub>2</sub>, body fat percentage, clinical blood pressure, total cholesterol, HDL (good) cholesterol, triglycerides, glucose, and muscular grip strength (each category has a standard range that is explained in Appendix E).

The grip strength and norms are based on the Canadian Standardized Test of Fitness (CSTF) (Canada, 1986, p. 9). This test is the largest and most comprehensive study of physical activity ever undertaken, and these norms are based on the results of 15,519 persons. The first VO<sub>2</sub> chart is also from the CSTF study. The second VO<sub>2</sub> chart is that of the Astrand study, norms based on a study of the Swedish population, and the final chart is that of the American Heart Association.

Regarding the survey that was sent to all VFD personnel, the coding scheme for the data is a straightforward approach because the survey questions are closed ended. A numerical category is already assigned to each answer and was compiled by hand and tracked

accordingly. For the open-ended questions in the study, a process similar to that used by Bruce Strait in 1967 in his smoking cessation study was used (Singleton, 1999, p. 458).

Coding for the PAMC data has already been accomplished, using a percent distribution scale broken into stratified comparable categories, such as age groups or Likert type response categories.

Limitations are as follows: the medical information that PAMC publishes in its report is of an individual nature, but does not differentiate between males and females. There is medical data on five females mixed in with the data from 150 plus males during the 11 years of testing at PAMC. This will lead to some minor skewing of certain data such as grip strength, cholesterol, and VO2 categories, because of the differences in makeup between the norms for males and females.

Another area that affects or limits the study is several VFD personnel have retired from the department throughout the testing period, and there have been additions through the hiring process as well. Without the removal or separation of individuals that are no longer with the organization at the end of the period in the study, or those that entered the study at some point after the beginning, the data will be marginally skewed. A select control group of the 50 individuals that were only with the organization in 1994 and are still with the organization today were not studied. This was not currently possible because of an inability to maintain employee medical information confidentiality.

## **RESULTS**

The first question this study addressed was:

- 1. How does the Vancouver Fire Departments health and wellness program compare to other programs around the United States?**

After viewing several different private industry health and wellness programs, the fire service in general with the IAFF/IAFC 10 City Wellness Fitness Initiative, and specifically the VFD health and wellness program leads the private sector in development and application of a comprehensive program. Private industry is generally more concerned about the overall health costs with regard to their bottom line and how a program can save them dollars on their employee health insurance and reduced sick leave and employee efficiency.

When the VFD health and wellness program is directly compared to the IAFF/IAFC 10 City Health and Wellness Initiative, it is missing a few important program components. With regard to medical testing, VFD currently does not have a physician's exam as a component of the annual screening, nor does it have any cancer screening. Specifically what the IAFF/IAFC Wellness Initiative recommends are breast exams, mammograms, and pap smears for women firefighters. For male firefighters it recommends a Prostate Specific Antigen test and a testicular exam. Then for all firefighters it recommends a digital rectal exam, a fecal occult blood test, and a skin exam. Under the fitness section the IAFF/IAFC program recommends that each organization have in-house peer fitness trainers. Currently, VFD has not taken the step toward these important components.

While it is important that a comprehensive program should have all of the IAFF/IAFC components, the VFD program compares favorably to it. Considering how few departments around the United States have any program whatsoever, the members of VFD are fortunate to have the program that we do. The programs at San Jose, Houston, Stillwater, and Riverside fire departments add credence to this.

Another consideration is cost. In 2004, VFD spent in excess of \$45,000 for the medical testing component of its wellness program. Testing costs fluctuate from year to year

due to the nature of the testing and costs, but this is a close average for the last several years. Cost considerations are usually one of the main reasons cited for organizations not to conduct ongoing medical evaluations for their employees. VFD personnel are fortunate to have this program funded, and the organization and both Union Locals 452 and 4378 are committed to its continuance because it is an article in all three of the current labor contracts.

**2. Are there objective outcome measurements that can demonstrate the effectiveness of the Vancouver Fire Department's health and wellness program?**

Looking at the medical result from the 11 years of testing that PAMC has done for the department, it has been broken it down into different categories; the department averages as a whole, by year, and the department averages by age groups 20-29, 30-39, 40-49, and 50+. The data for 1994 for the entire department shows an average age of 39.25 years. This contrasts with the average in 2004 of 39.6 years, showing the average age has increased less than six months in age. According to PAMC, the most important fitness category is that of computed VO<sub>2</sub>, and that category remained the same at 47.75 over the period, showing no increase or decrease.

Where the VFD is at as a group depends on which table is consulted. PAMC recommends using the CSTF table, and for a 30-39 year old male, which is our average age for a firefighter in 2004, we are in the excellent category at 47+. The average body fat of this group decreased by .5%, going from 18.5% in 1994 to 18% in 2004; this is not a large decline, but certainly a step in the right direction and puts us at the top of the scale for normal percentage of body fat. Average grip strength increased by 6 points, going from 121 in 1994 to 127 in 2004. This places us in the excellent category for 30-39 year old males. Average glucose dropped 1.75-points being 94.5 in 1994 decreasing to 92.75 in 2004, which places us



below the upper end of 100 in the normal category. Triglycerides increased by 5.25-points going from 120.5 in 1994 and increasing to 125.75 in 2004, which places us midway between the ideal category of below 100 and below the upper end of normal at 150. Total cholesterol decreased by 5.5-points going from 191 in 1994 to 185.5 in 2004, placing us just above the ideal range of below 180 and well below the upper end of the normal rating of 200. HDL or good cholesterol went from an average of 41 in 1994 to 46.25 in 2004, which places us in the normal category of above 45. Systolic BP dropped 8-points going from an average of 127 in 1994 to an average of 119 in 2004, which places us just below the upper end of the normal category. Diastolic BP remained constant in 1994 to 2004 by staying at 76.5, which keeps us in the upper end of the normal category.

Interpreting these averages is subjective. While the average age of the department rose by less than half of a year in age, the VO<sub>2</sub> remained constant for the group over the 10-year period, keeping firefighters within the excellent category. Overall body fat did decline by .5% which moved the group to a better score overall, and grip strength did increase by 6-points, which moved the group higher in the excellent category. Blood glucose levels declined which kept the group in the normal category, but triglycerides increased. We are still under the threshold of normal in triglycerides, but we need to do a better job of nutrition education to get this number below 100. The total cholesterol decreased by 5.5-points and HDL cholesterol increased by 5.25-points. Again we need to do nutritional counseling for the entire organization so that we are in the ideal categories for cholesterol. Systolic BP dropped 8-points and diastolic remained constant, which brought us into the normal category for blood pressure. On average, VFD had six health categories show improvement (systolic BP, total cholesterol, HDL cholesterol, glucose, grip strength and body fat), two remain static

(diastolic BP and computed VO<sub>2</sub>), and one decline (triglycerides). It is clear that by looking at the overall group as a whole, the wellness program has made some improvements, but there are areas that we can still make some important and significant gains.

Perhaps a better look at the information is to view it by age categories. In the 20-29 age group the average age in 1994 was 26.2, going to 26.9 in 2004, a half-year increase in age. It is within this group that there is the most movement of personnel each and every year. The majority of our new hires fall into this category, and it is imperative that we hire healthy individuals to begin their career, which usually approaches three decades in length. For this group, computed VO<sub>2</sub> improved from 52.3 in 1994 to 52.6 in 2004. Percentage of body fat went from 11.9% in 1994 to 13.5% in 2004; a 1.6% increase. Grip strength improved from 119 in 1994 to 133.33 in 2004; a 14.33-point increase. Glucose dropped from 91 in 1994 to 87 in 2004; a 4-point improvement. Triglycerides increased from 82 in 1994 to 116 in 2004; a 34-point increase. HDL cholesterol increased from 43 in 1994 to 48 in 2004; a 5-point improvement. Total cholesterol increased from 157 in 1994 to 168 in 2004; an 11-point increase. Diastolic BP increased from 70 in 1994 to 73 in 2004; a 3-point increase. And finally, systolic BP dropped from 123 in 1994 to 117 in 2004; a 6-point improvement.

Within the 20-29 year category, VFD had five categories show improvement (systolic BP, HDL cholesterol, glucose, grip strength and computed VO<sub>2</sub>). Four categories declined (diastolic BP, total cholesterol, triglycerides, and body fat). It is here within the 20-29 age group that we can have a significant impact by beginning their nutritional education and eating habits corrected for a lifetime. Three of the four categories that declined are directly related to diet, and the fourth, diastolic BP, is closely related to diet as well.

In the 30-39-age category computed VO<sub>2</sub> in 1994 was 49.9 and it increased to 50.6 in 2004, a .7-point improvement. Body fat increased from 16.3% in 1994 to 16.9% in 2004; a .6% increase. Grip strength increased from 124.35 in 1994 to 130.68 in 2004; greater than a 6-point improvement. Glucose decreased from 93.29 in 1994 to 92.05 in 2004; greater than a 1-point improvement. Triglycerides decreased from 122.45 in 1994 to 118.21 in 2004; greater than a 3-point improvement. HDL cholesterol increased from 40 in 1994 to 46.69 in 2004; over a 6-point increase. Total cholesterol decreased from 190 in 1994 to 183.57 in 2004; over a 6-point improvement. Diastolic BP decreased from 79 in 1994 to 75.60 in 2004; over a 3-point improvement. Systolic BP decreased from 128 in 1994 to 120 in 2004; an 8-point improvement. Within the 30-39-age category then, VFD had 8 categories show improvement (systolic BP, diastolic BP, total cholesterol, HDL cholesterol, triglycerides, glucose, grip strength, and computed VO<sub>2</sub>). Only one category declined (body fat). It is with this group that we are doing our best job, and the increase was just .6 percent.

In the 40-49-age category computed VO<sub>2</sub> was 44.5 in 1994 and it increased to 45.7 in 2004; a 1.2-point improvement. Average body fat went from 20.8% in 1994 to 19.7% in 2004; a 1.1% improvement. Average grip strength went from 112.77 in 1994 to 128.22 in 2004; a 16.5-point improvement. Average glucose went from 95 in 1994 to 95.75 in 2004; a .75-point increase. Triglycerides went from 169.75 in 1994 to 127.92 in 2004; almost a 42-point improvement. HDL cholesterol went from 37.41 in 1994 to 47.25 in 2004; almost a 10-point improvement. Total cholesterol went from 202.68 in 1994 to 194.06 in 2004; over an 8-point improvement. Diastolic BP went from 82.75 in 1994 to 79.18 in 2004, over a 3-point improvement. Systolic BP went from 132.27 in 1994 to 122.21 in 2004; a 10-point improvement. Within the 40-49-age category, VFD had seven categories show improvement

(systolic BP, diastolic BP, total cholesterol, HDL cholesterol, triglycerides, grip strength, and body fat). Two categories remained constant (glucose and computed VO<sub>2</sub>). This age group has done well also, only remaining static in the two categories of VO<sub>2</sub> and glucose, while improving in all of the others.

In the age 50 and above category, computed VO<sub>2</sub> was 44.2 in 1994 and went to 42.2 in 2004; a 2-point decline. Body fat went from 24.8% in 1994 to 21.9% in 2004; a 2.9% improvement. Grip strength went from 129.33 in 1994 to 116.54 in 2004; almost a 13-point decline. Average glucose went from 98.67 in 1994 to 96.46 in 2004; a 2-point improvement. Average triglycerides went from 107.67 in 1994 to 140.46 in 2004; a 33-point increase. HDL or good cholesterol went from 43 in 1994 to 43.58 in 2004; a .6-point improvement. Total cholesterol went from 214 in 1994 to 195.69 in 2004; an 18-point improvement. Diastolic BP went from 74.67 in 1994 to 77.48 in 2004; almost a 3-point increase. Systolic BP went from 122.67 in 1994 to 117.04 in 2004; a 5.5-point improvement.

Within the 50 years and above category, VFD had four categories show improvement (systolic BP, total cholesterol, glucose, and body fat). One category remained constant (HDL cholesterol), and four categories declined (diastolic BP, triglycerides, grip strength, and computed VO<sub>2</sub>). (Appendix F) This age group is the other category that we must focus our efforts on. The areas that this age group has issues with are primarily exercise related and secondarily diet related.

**3. What is the level of satisfaction for participants of the health and wellness program? Are there adequate facilities to exercise; adequate time for exercise on duty; and is the medical testing adequate?**

These questions can best be answered by looking at the results of the survey. A good cross-section of personnel across all facets of the organization answered the survey, 62 firefighters, 30 captains, 8 chief officers and 4 fire prevention officers responded to the survey for a total of 104 respondents. With regard to amount of time on the job, 30 had less than 5 years of service, 12 had between 6 and 10 years of service, 20 had between 11 and 15 years of service, 16 had between 16 and 20 years of service, and 26 had over 20 plus years of service demonstrating all segments of seniority were well represented.

In question 3 of the survey (some respondents checked more than one box, so an exact percentage is not possible to be determined at each level or category) it was asked of the respondent how often they exercise on their days off. Thirty-three of the respondents exercise each of their days off, with another 34 exercising 75 percent of the time on their days off. Twenty-six people responded that they exercised at least half of their days off, with another 27 saying they exercised 25% of their days off. Only 4 of the 104 respondents said that they failed to exercise at all on their days off. Ninety-six percent of the respondents are doing some sort of exercise at the 70-80 percent of target heart rate or aerobic level. Clearly the wellness program has had a great impact of the realization of firefighters that they must exercise to remain healthy throughout their entire career, and that just working out on duty isn't sufficient.

Question 4 from the survey was how often they exercised on duty. Since the organization has an AG that requires mandatory exercise each shift, this figure should be close to 100% as well. Seventy-five of the 100 respondents who answered this question met the general criteria established by AG 400.8 of daily participation. A 75% participation rate is good, but not the rate that is possible given the cost of the program, and the benefit to the individual,

organization, and the customers we serve. However, the answer to the question 5 of the survey leads us to the reason that people are not fully participating. Fifty-four respondents (over half of the sample) replied in question four that they had a lack of time to participate or exercise on duty. Given the call volume that VFD currently experiences with our level of staffing (over 20,000 calls in 2004 with 11 staffed units) and our ongoing training and maintenance programs, crews find it exceedingly difficult to conduct a meaningful workout during many shifts. This has been the biggest complaint heard in the organization and it is clearly delineated in their answer to question 5 of this survey.

Question 6 from the survey asked if the respondent felt the wellness program has had an effect of their career or personal health. There were 107 responses, which means close to 80% said they felt the program had made a difference to them. There were 17 neutral responses, with only 5 negative responses to this question. Clearly the respondents have realized the significance of this program. Continuing with this line of reasoning is question 7, which asks if the respondent feels that the medical testing is necessary. Of a total of 97 responses, 93 realized the annual testing is a necessary component of the program. Question 8 from the survey spoke specifically to frequency of testing, and again, respondents recognized annual testing is the necessary frequency.

Question 9 from the survey spoke to the amount of medical testing that we do, and the majority of respondents were satisfied with our current level of testing. There was a large contingent (41 respondents) that felt more tests were needed. This leads to question 10, which was what types of testing did people think we needed? At 53 responses, the largest response was for cancer screening. Thirty-three respondents felt a physician's exam was

necessary and another 24 felt that chest x-rays were necessary. These three categories are all consistent with the IAFF/IAFC 10-City Initiative protocols.

In the final question, the respondents were asked if there was testing that we currently do that should or could be eliminated? Top answers were the lifestyle questionnaire, grip strength tests, and other strength tests. The lifestyle questionnaire has been a matter of contention for several years because the same survey questions have been asked of each respondent each year of testing for 11 years. A small minority of the respondents only suggested the strength training changes.

Overall, the results of the survey were very pleasing. Response participation was significant and opinions expressed were generally positive, supportive, and constructive. The most critical factor from the feedback is the lack of on-duty participation in the program, but given current call volume and levels of staffing, this issue is difficult to address without a reduction in call volume, an increase in staffing, or both. These issues are something the organization is struggling with given our ever-increasing response times, and the lack of time for working out only adds fuel to the fire of trying to find new ways to do business.

**4. Are there changes that should be made to the existing program to make it more effective?**

Since money is always an issue, the first area to be focused upon, given the data, is dietary education. Our contract with PAMC allows us access to their nutritional and exercise specialists on a bi-monthly basis, but we haven't used this option in several years. A CVTV video time will be scheduled in 2005. In addition at least one nutritional session will be conducted and one exercise session will be conducted so that it may be rebroadcast periodically through the year. Also, each person is entitled to a 1-hour follow-up consultation

at the end of their medical testing with PAMC personnel, but very few VFD personnel take advantage of this offer. What has been done in the past was on shift group consultations of discussions about results in general. This fall, at the end of annual testing I will see that these sessions are again conducted, and re-emphasize the ability of people to take advantage of their one-on-one counseling sessions, especially those in our target groups of 20-29 and 50 and above.

With regard to testing, the administration will be petitioned to include more screening for appropriate groups that are at risk; specifically, PSA testing for those males over age 40 with family history, and all males over age 50. Colorectal screening for everyone over 40 is another test we should pursue. Given the current makeup of our organization and the current costs of these minimal tests, the increase in testing dollars should be under \$1,000.

Another change, which would have great impact for minimal cost, is having several peer fitness trainers on shift. The department holds a recruit academy on an annual basis to train incumbent firefighters. The organization pays a certified trainer approximately \$2,000 a year to train these candidates for one-hour a day four days a week for 12 weeks. For the cost of sending one person through the peer fitness trainer program we could have this training done in-house by one of our own, and then see if the peer fitness trainer program is effective. If found to be an effective adjunct to our program and all available information says that it would be, then the department should host a class locally and train at least three members as peer fitness trainers per each shift. If the class was held locally, and we filled the rest of the spots with personnel from other local departments, the cost would be minimal to the organization, and the benefit would be significant.



Given the nature of the shift work and location of the workplace, it is difficult to get outside trainers to the firefighters at their individual stations. Having expertise in-house would be the optimal way to assist people wanting assistance with their workout techniques.

Another important change that could be made, but would be costly, would be to have one full-time person for the entire City of Vancouver become the wellness coordinator and oversee all health type programs and issues. My duties as a battalion chief take up the vast majority of my time, and since my duties as the department's wellness coordinator are done in conjunction to my battalion chief duties, these duties are restricted to my free time. Therefore, I have only a moderate impact on our program. VFD cannot afford a full-time administrator to this program, but if the City of Vancouver broadened the concept to other agencies such as police, parks, water, sewer, etc., they could possibly afford this position through an economy of scale. The City of Vancouver has in excess of 1,000 employees, and while all employees may not have the exposure and occupational issues of firefighters, a comprehensive health and safety program has been proven by private industry to show that it has both physical and financial benefits for the employees and the organization.

### **DISCUSSION**

I was unable to find another organization of comparable size in numbers of personnel, call volume, fire stations, and demographic make up as to those of our own. Other local departments that have such a program are either too small or too large as to be a valid comparison.

My views of the findings are that we have made significant progress with the health and safety of the firefighters and support personnel of VFD over the 11-year study period, and the medical data and surveys support this view. As I mentioned earlier in the paper, however,

there is still room for improvement, and now that the organization has this information we can target our improvements to the people or groups that need it the most. The 20-29 and 50 and older groups are our main target group, and we need to focus on nutritional counseling, better workout techniques, and try and find ways to make better or more productive use of our time. Increased levels of staffing and ways to reduce call volume would help, but this takes a significantly greater monetary commitment from the public, something the local public has generally been hesitant to do in recent years within our service area.

The implications of this study is that VFD was a leader in the fire service industry in 1994 by beginning a comprehensive wellness program with the majority of the components of the IAFF/IAFC Initiative. This program takes a significant contribution of both time and taxpayers dollars. The qualitative and quantitative results show that the efforts have made a significant difference in the culture and attitudes of the employees of the organization. There is still room for program improvement and employee participation, but significant change in the culture of the fire service, and at an organization such as VFD takes time. This program must be continually viewed as a long-term commitment by the organization and its employees as it has been over the last 11 years. Healthcare and medical insurance costs have exceeded the rate of inflation at a tremendous rate over the last decade and will probably continue to do so over the near term. As has been shown by both private industry and fire service organizations that have comprehensive wellness programs, the up-front costs of a health and wellness program pay significant dividends in reduced employee absence, disabilities, and injuries.

Another factor that drives the wellness testing are the bodies that regulate the fire service in Washington such as the State Legislature and WISHA. These bodies have made several

components of our testing a requirement because of presumptive legislation and job or worksite requirements. Examples are Hepatitis A, B, C, the Human Immunodeficiency Virus, and heart disease. These are currently presumptive in the state of Washington for firefighters. This trend will most likely continue, and it will benefit VFD to continue with the program and look for ways to fund additional testing or motivate those employees that are found to be at risk during testing.

### **RECOMMENDATIONS**

- I. Continue to fund the VFD wellness program to its current level.
- II. Target our 20-29 and 50 and older populations in the areas of nutrition and better exercise techniques.
- III. Work with PAMC and CVTV to videotape one nutrition and one exercise video in 2005.
- IV. Begin the peer fitness trainer program by sending one person to become ACE certified in 2005, then host a class in 2006 for at least eight more in-house peer fitness trainers to facilitate better use of the exercise facilities and training programs for personnel that need it.
- V. Recommend to the City of Vancouver that they look at ways to begin a comprehensive wellness program for all city employees and have this program overseen by a qualified medical person whose sole job is the betterment and direction of the program.
- VI. Add PSA and colorectal screening testing for at risk populations at VFD.
- VII. Implement a non-punitive tobacco cessation policy.

The first recommendation of continuing with the program will result in improved firefighter health and safety through stronger, fitter firefighters. The benefit of this is reduced overall costs to the department and the taxpayers we serve.

The second recommendation will target specific areas where we can make the biggest gains in health for our personnel and give them the specific information they need for the greatest improvement.

The third recommendation is specific to what Vancouver Fire Department's largest problem is with regard to what this study identified as our greatest area of deficiency is with our wellness program, nutrition, and better exercise techniques.

The fourth recommendation is tied directly to recommendations two and three and will help deliver the message directly to the personnel with certified trainers who are on shift departmental personnel.

The fifth recommendation of expanding the program will assist not only with the administration of the VFD program, but should result in overall savings to the City of Vancouver and improved health for all city employees.

The sixth recommendation would add two tests for portions of the group that are at risk, as identified by numerous medical and safety studies. These tests detect early cancers, and early treatment is cost effective for the organization and will add years to the individuals' life.

The seventh and final recommendation would reduce the employees' exposure to tobacco, a substance known to be carcinogenic, and add years and quality to their life, as has been shown by numerous studies over the last few decades.

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## Appendix A

### VANCOUVER FIRE DEPARTMENT ADMINISTRATIVE GUIDE

#### AG #400.8

**SUBJECT:** EMPLOYEE ASSISTANCE PROGRAMS  
**PURPOSE:** Promote all-around employee wellness.  
**APPROVED:** April 1, 1995  
**REVISED:** July 1, 2001  
**SEE ALSO:** City Policy Manual, Union Contract, [AG #200.9](#)  
**PAGE:** 1 of 4

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#### 1. Employee Assistance

The Vancouver Fire Department shall fully support the City of Vancouver's on-going program designed to maintain and enhance the physical and emotional well being of its employees and their families. These programs offer wellness education, group support, and individual counseling to assist with such concerns as physical fitness, critical incident stress, family crisis, and substance abuse (The City of Vancouver recognizes substance abuse as a disease responsive to treatment and rehabilitation.).

All interactions with professional and peer counselors shall remain confidential. Participation in these programs shall in no way affect an employee's future service or career advancement, nor shall it protect an employee from disciplinary action for continued substandard performance or rule infractions.

#### 2. Wellness

The purpose of the Wellness Program is to achieve employee health and fitness. The department is committed to assisting the employee. It must be recognized however, that employees must commit themselves toward that goal for the program to be successful. The department will work to make the environment conducive to success, but it is up to the individual to get the most of what is being offered.

Wellness is a city-sponsored program designed to help employees and their families enhance their physical well being through education and incentives.

- A. The fire chief shall appoint a department Wellness Coordinator to assist employees in their participation and represent the department on the Wellness Committee.
- B. Monthly bulletins shall be posted at each station to keep employees informed about wellness activities and events.

## Appendix A (Continued)

### VANCOUVER FIRE DEPARTMENT ADMINISTRATIVE GUIDE

#### 3. Wellness Program Guide

##### Medical Pre-Screening

The “on” year fitness evaluation will be given initially to all Local 452 members and new hires. The “on” year test will be given in this manner:

- Under age 30 without *medical history* - every third year
- Age 30 - 39 without *medical history* - every other year
- Age 40 and up - every year

*Medical history* pertains to:

1. Blood pressure 140/90 or higher.
2. Family history of heart disease.
3. Non-smoker for five years.
4. Body fat of more than 21 percent by caliper.

Should a person under 40 have one or more of the four *medical history* categories, they will be tested every year regardless of age.

The “off” year test will be given to all who do not receive the “on” year test.

##### “On” Year Test

- 12 lead maximal treadmill test
- body fat measure by hydrostatic weighing
- lipid profile
- blood pressure
- muscular strength and flexibility
- lung function
- urinalysis, CBC, chem screen
- lifestyle questionnaire
- individual one-hour follow up consultation
- audiometric testing

## Appendix A (Continued)

### VANCOUVER FIRE DEPARTMENT ADMINISTRATIVE GUIDE

#### **“Off” Year Test**

- sub-maximal rockport walking test
- body fat caliper pinch test
- lipid profile
- muscular strength and flexibility
- audiometric testing
- lung function
- computer lifestyle report
- group one-hour follow up consult

The results of the medical pre-screening will be confidential between the doctor and the employee. Any medical condition discovered during the screening which may adversely affect the employee's overall job performance will be followed up with a medical referral. The employee will also be strongly encouraged to be forthcoming to the employer for the protection of himself and those who rely upon him with information which could affect his ability to perform his job.

If the medical screening results, or if an employee's physician, advise against working out, the employee must submit a physician's statement to the employer outlining the reason for the restriction and for how long the restriction applies.

#### **Fitness Period**

A one-hour fitness period will be set aside on shift, between 0800 and 1700 hours, but preferably between 1600 and 1700 hours. This time period will be a high priority in terms of daily scheduling and task accomplishment. The company officer, at his discretion, may allow individuals to work out at different times of the day to facilitate equipment usage, scheduling conflicts, etc., but must still provide the one hour opportunity to work out.

The company officer must make every effort to ensure that the workout is a positive experience for the participants. It is also the company officer's responsibility to see that the workout activity engaged in by his crew does not pose an unnecessary risk of injury or possible disability.

## **Appendix A (Continued)**

### **VANCOUVER FIRE DEPARTMENT ADMINISTRATIVE GUIDE**

#### **Compulsory**

Participation in the wellness program will be compulsory; however, no fitness levels will be required. It is anticipated that if all employees participate in the program, a higher level of fitness will result. It is hoped that all employees will feel it important to maintain and improve their health and be motivated to maintain or increase their current level of fitness.

Reasons for not participating are minimal. At company officer discretion, crews may skip participation that shift if activity during alarm responses or training caused enough physical exertion to make further exercise counterproductive, e.g., working structure fires, large grass fires, highrise drills.

Temporary or minor illness may not be used as an excuse for lack of participation. An employee who does not feel capable of participating at any level of performance during the required hour is considered as unable to perform at a fire scene, and thus, should not be on duty.

#### **Attire**

Minimum appropriate attire for responding to an alarm in the middle of working out will be turnout pants and boots, and department T-shirt or department sweatshirt.

#### **Program Administration**

The wellness program coordinator is responsible for medical testing scheduling, equipment maintenance and general overseeing of the program.

The coordinator will select one representative from each shift to assist in equipment selection, maintenance, and program direction. These four will comprise the Wellness Committee.

#### **4. Respiratory Protection Program**

The Respiratory Protection Program for Vancouver Fire Services is required by law (WISHA) *General Occupational Health Standards, Chapter 296-62 WAC, Part E, Respiratory Protection*, and is intended to ensure the safety of all employees who wear respiratory protection to perform the duties of the job.

**Appendix A (Continued)**VANCOUVER FIRE DEPARTMENT  
ADMINISTRATIVE GUIDE

This program is specific to the City of Vancouver Fire Services and is intended to protect its members. The Chief or his/her designee is responsible to act as the Respiratory Program Administrator, and the Program Administer is responsible for the effectiveness of the program and will see that the program is fully implemented.

The Respiratory Protection Program Guideline Document will be used to administer the program and will be updated as needed.

**Appendix B**  
**Cover letter for VFD Wellness Survey**

Greetings!

Attached you will find a brief one page survey regarding the health and wellness program at Vancouver Fire Department. I am undertaking this survey for a number of reasons: the betterment of the program, determining where we are with the program, how effective the program is, and how we can make the program better for the individual, the department and the taxpayer.

**All information contained within the survey will be held in strict confidence!** The information will not be used as leverage against someone personally or professionally. This survey is being undertaken because of a Political Science project at WSU and for a research paper for the National Fire Academy. No names will appear anywhere in the compilation of the surveys or the results.

Do not place your name anywhere on the survey unless you wish to add further information or wish me to contact you for some reason.

Please take the time to truthfully answer all the questions, whether you feel the input is positive or negative. I am seeking a critical and comprehensive overview of the attitudes of **everyone** that is reached by the program. I appreciate your time and efforts to help me evaluate this worthwhile program.

Thank you!

Terry Sott

## Appendix C

### Overall Summary VFD Wellness Program Survey

1. What is your present rank/position with the organization?  
Firefighter\_62\_ Captain\_30\_ Chief Officer\_8\_ Fire Prevention\_4\_ Other\_0\_

2. How many years of service to this organization do you have?  
Years: 0-5\_(30)\_ 6-10\_(12)\_ 11-15\_(20) 16-20 \_\_ (16) 20+\_\_(26)\_\_

The next questions pertain to working out, exercising, or any physical activity at an approximate 70-80 percent aerobic capacity or target heart rate.

3. On your days off, how often do you exercise?  
Every day\_33\_ 75% of time\_34\_ 50% of time\_26\_ 25% of time\_27\_ Never\_4\_\_\_\_  
(Some people checked more than 1 box)

4. At work, how often do you exercise?  
Every shift\_38\_ 75% of time\_37\_ 50% of time\_10\_\_\_\_ 25% of time\_10\_ Never\_5\_\_\_\_  
(If you answered something other than every shift, please answer question #5.)

5. If you do not consistently exercise at work, what is the main reason for not doing so?  
Lack of time\_\_54\_\_ Facility problem\_8 (88,89) Equipment problem\_4\_\_\_\_ Other  
(Please explain)\_\_\_\_

6. Has the wellness program had an effect on your career or personal health?  
Yes\_85\_\_\_\_ Neutral\_17\_\_\_\_ No\_5\_\_\_\_ (Some people checked more than 1 box)

The next questions pertain to the annual wellness testing with Portland Adventist.

7. Do you feel the annual wellness screening is a necessary component of the wellness program?  
Yes\_\_93\_\_ No\_4\_\_\_\_

8. We receive wellness testing on an annual basis. Is this the correct frequency?  
We need testing more than once a year \_1\_\_ we receive the right amount of testing\_95\_\_ we should be tested less than once a year \_4\_\_\_\_

9. Please rate the amount of medical testing we currently do:  
More testing needed\_41\_\_\_\_ Right amount of testing\_\_47\_\_ less testing needed\_\_2\_\_\_\_  
(If you answered more testing needed, go to question 10. If you answered less testing needed, then go to question 11)

**Appendix C (Continued)****Overall Summary  
VFD Wellness Program Survey**

10. If you feel the program needs additional testing, what are the other types of testing/screening you feel the program should add?

Physician's exam\_\_33\_\_ Cancer screening\_\_53\_\_ Chest X-ray\_\_24\_\_ Other\_\_PSA, Colonoscopy, Back X rays, Hep tests, Digital rectal exam, sleep apnea, NIDDM, IDDM\_\_\_\_\_

11. If you feel the program needs less testing, what are the types of testing or screening you feel the program should remove? Questionnaire, grip strength, strength tests.



## **Appendix D**

### **Adventist Health Medical Center Notice of Privacy Practices**

#### **Our Pledge Regarding Medical Information**

We understand that medical information about you and your health is personal. We are committed to protecting medical information about you. We create a record of the care and services you receive in our facilities. We need this record to provide you with quality care and to comply with certain legal requirements. Physicians (personal, consultants, specialists) involved in your care may have different policies or notices regarding the doctor's use and disclosure of your medical information created and/or maintained in the doctor's office or clinic.

#### **We Are Required By Law To:**

- Make sure that medical information that identifies you is kept private;
- Give you this notice of our legal duties and privacy practices with respect to medical information about you; and
- Follow the terms of the notice that is currently in effect.

## Appendix E

### Medical Category Norms

	IDEAL	NORMAL	BORDERLINE	HIGH RISK
<b>Total Cholesterol</b>	Below 180 mg/dl	Below 200 mg/dl	200-239 mg/dl	240+ mg/dl
<b>HDL</b>	Higher the better (60+)	Women over 55 Men over 45	N/A	Below 40
<b>Triglycerides</b>	Below 100 mg/dl	Below 150 mg/dl	150-199 mg/dl	200-499 High 500+ Very high
<b>Fasting Glucose</b>	N/A	70-100	100-125 (Pre-diabetes range)	126 and over (Diabetes range)

#### Grip strength norms, Men (Kg)

Age (years)	20-29	30-39	40-49	50+
Excellent	120+	120+	117+	108+
Desirable	111-119	111-119	108-116	100-107
Needs improvement	97-110	97-110	94-107	87-99
Caution	Less than 97	Less than 97	Less than 94	Less than 87

Grip strength norms are based on the Canadian standardized test of fitness

#### Astrand VO<sub>2</sub> max Norms, Men (ml O<sub>2</sub>/kg/min)

Age (years)	20-29	30-39	40-49	50+
Olympic	65+	61+	56+	50+
Athletic	58-64	54-60	49-55	45-49
Excellent	52-57	48-53	44-48	40-44
Good	48-51	44-47	40-43	36-39
Average	40-47	36-43	32-39	27-35
Fair	35-39	31-35	26-31	22-26
Low	Below 35	Below 31	Below 26	Below 22

#### American Heart Association VO<sub>2</sub> max Norms, Men (ml O<sub>2</sub>/kg/min)

Age (years)	20-29	30-39	40-49	50+
Excellent	49+	45+	43+	41+
Good	39-48	36-44	34-42	31-40
Average	31-38	27-35	25-33	23-30
Fair	23-30	20-26	18-24	16-22
Low	Below 23	Below 20	Below 18	Below 16

## Appendix E (Continued)

### Medical Category Norms

Body fat percentage table	
<b>Athlete</b>	Less than 10%
<b>Lean</b>	10-15%
<b>Normal</b>	16-18%
<b>Above average</b>	19-20%
<b>Overfat</b>	21-25%
<b>Obese</b>	Above 25%

Blood pressure norms	Systolic		Diastolic
<b>Normal</b>	120 or lower	AND	80 or lower
<b>Prehypertensive</b>	120-139	OR	80-89
<b>High</b>	140 & up	OR	90 & up

## Appendix F VFD Medical Data Summary

Year	Summary	Age	Systolic BP	Diastolic BP	Total Cholesterol	HDL Cholesterol	Triglycerides	Glucose	Grip Strength	Body Fat	Computed VO2
1994	Average (20-29)	26.2	123.33	69.87	156.53	42.80	81.87	91.13	119.00	11.9	52.3
1995	Average (20-29)	26.6	124.75	76.38	157.53	37.20	127.07	95.87	130.56	15.0	53.5
1996	Average (20-29)	27.0	123.07	74.13	155.07	35.93	99.80	87.07	125.00	14.4	53.0
1997	Average (20-29)	27.0	121.65	75.76	170.24	45.41	87.82	85.88	136.88	14.0	50.0
1998	Average (20-29)	27.6	120.77	75.85	167.08	48.31	85.08	85.62	142.69	14.7	51.9
1999	Average (20-29)	27.7	121.18	76.94	173.12	43.88	126.00	85.29	130.12	14.7	52.8
2000	Average (20-29)	26.8	122.88	75.50	175.69	45.44	118.94	89.31	119.19	15.7	51.0
2001	Average (20-29)	26.5	121.65	73.94	181.24	48.76	113.24	86.24	118.24	17.7	50.5
2002	Average (20-29)	26.3	121.33	73.87	171.40	49.80	99.27	86.20	131.36	16.7	51.4
2003	Average (20-29)	26.8	124.42	76.21	183.84	50.11	131.68	86.58	135.76	15.8	50.7
2004	Average (20-29)	26.9	117.16	73.26	168.42	47.63	116.16	86.58	133.33	13.5	52.6
	Totals	295.4	1342.18	821.71	1860.15	495.27	1186.92	965.76	1422.13	164.1	569.6
	11 yr Average	26.9	122.00	74.70	169.10	45.00	107.90	87.80	129.30	14.9	51.8
1994	Average (30-39)	33.5	128.02	78.98	190.08	40.09	122.45	93.29	124.35	16.3	49.9
1995	Average (30-39)	34.1	121.83	77.73	184.27	41.22	115.20	96.17	131.79	17.2	48.6
1996	Average (30-39)	34.3	123.47	79.00	188.61	43.19	105.32	90.69	132.13	16.7	47.8
1997	Average (30-39)	34.7	123.29	79.88	192.63	49.23	102.82	89.49	136.29	18.4	48.8
1998	Average (30-39)	35.0	119.32	75.84	181.92	48.81	117.34	89.48	138.73	17.1	47.0
1999	Average (30-39)	35.1	120.80	77.80	186.47	46.00	110.08	88.90	122.98	17.7	48.0
2000	Average (30-39)	34.9	120.23	78.14	179.51	47.30	122.31	89.01	119.41	16.2	49.8
2001	Average (30-39)	34.5	120.03	75.52	171.23	48.92	129.40	92.26	121.11	17.0	49.5
2002	Average (30-39)	35.0	115.48	75.48	176.05	48.05	119.33	89.56	129.42	17.2	48.5
2003	Average (30-39)	35.0	117.93	78.92	183.77	51.20	112.92	90.95	131.28	18.2	47.6
2004	Average (30-39)	34.9	120.03	75.59	183.57	46.69	118.21	92.05	130.68	16.9	50.6
	Totals	381.0	1330.44	852.86	2018.12	510.69	1275.37	1001.87	1418.17	189.1	536.0
	11 yr Average	34.1	120.90	77.50	183.50	46.40	115.90	91.10	128.90	17.2	48.7
1994	Average (40-49)	44.3	132.27	82.75	202.68	37.41	169.75	95.00	112.77	20.8	44.5
1995	Average (40-49)	44.8	125.51	79.09	193.77	36.00	176.31	99.65	131.64	21.2	41.6
1996	Average (40-49)	44.6	125.30	79.79	200.80	38.60	132.84	93.40	126.30	20.9	42.5
1997	Average (40-49)	45.0	123.54	78.93	205.15	47.87	148.36	91.75	132.60	21.5	42.9
1998	Average (40-49)	44.9	117.65	75.90	196.20	47.08	140.14	89.25	131.53	21.1	42.6
1999	Average (40-49)	44.5	122.96	79.19	207.69	43.50	148.72	92.65	114.85	21.8	41.8
2000	Average (40-49)	44.6	122.22	79.48	203.72	45.31	132.96	92.41	115.48	20.4	45.0
2001	Average (40-49)	43.9	122.14	75.41	198.67	46.63	137.16	89.78	116.10	20.3	51.2
2002	Average (40-49)	44.2	116.66	78.17	197.96	45.57	136.64	96.06	124.59	21.3	44.4
2003	Average (40-49)	43.7	117.16	79.56	197.78	49.96	129.25	93.33	131.44	19.5	45.9
2004	Average (40-49)	43.7	122.21	79.18	194.06	47.25	127.92	95.75	128.22	19.7	45.7
	Totals	488.1	1347.60	867.50	2198.50	485.20	1580.10	1029.00	1365.50	228.6	488.1
	11 yr Average	44.4	122.50	78.90	199.90	44.10	143.60	93.50	124.10	20.8	44.4

## Appendix F (Continued)

### VFD Medical Data Summary

Year	Summary	Age	Systolic BP	Diastolic BP	Total Cholesterol	HDL Cholesterol	Triglycerides	Glucose	Grip Strength	Body Fat	Computed VO2
1994	Average (50+)	53.0	122.67	74.67	214.00	43.00	107.67	98.67	129.33	24.8	44.2
1995	Average (50+)	46.0	125.05	79.45	195.43	37.06	170.49	100.83	129.73	22.0	41.1
1996	Average (50+)	51.0	138.67	86.00	225.20	40.20	205.40	99.60	125.60	23.0	39.4
1997	Average (50+)	50.8	128.10	76.30	241.30	47.10	196.80	96.20	129.30	25.5	38.8
1998	Average (50+)	50.9	125.44	81.00	218.81	45.94	187.31	93.44	134.60	23.5	39.6
1999	Average (50+)	51.1	125.53	81.88	207.94	41.88	192.59	95.35	112.25	22.1	40.9
2000	Average (50+)	51.4	124.15	80.62	182.54	40.23	169.92	97.23	112.50	22.0	40.7
2001	Average (50+)	51.5	123.74	76.68	188.74	42.58	164.47	97.47	106.22	21.9	43.5
2002	Average (50+)	52.0	115.91	77.57	195.96	43.35	154.57	96.09	119.95	22.4	40.1
2003	Average (50+)	52.3	118.45	80.55	188.09	44.41	135.95	92.95	124.68	21.7	40.2
2004	Average (50+)	52.9	117.04	77.48	195.69	43.58	140.46	96.46	116.54	21.9	42.2
	Totals	562.91	1364.70	872.20	2253.70	469.30	1825.60	1064.30	1340.70	250.9	450.8
	11 yr Average	51.20	124.10	79.30	204.90	42.70	166.00	96.80	121.90	22.8	41.0
1994	Average (20-29)	26.2	123.33	69.87	156.53	42.80	81.87	91.13	119.00	11.9	52.3
1994	Average (30-39)	33.5	128.02	78.98	190.08	40.09	122.45	93.29	124.35	16.3	49.9
1994	Average (40-49)	44.3	132.27	82.75	202.68	37.41	169.75	95.00	112.77	20.8	44.5
1994	Average (50+)	53.0	122.67	74.67	214.00	43.00	107.67	98.67	129.33	24.8	44.2
1994	Totals	157.0	506.30	306.30	763.30	163.30	481.70	378.10	485.50	74.0	190.9
1994	Group Average	39.3	127.00	76.50	191.00	41.00	120.50	94.50	121.00	18.5	47.8
2004	Average (20-29)	26.9	117.16	73.26	168.42	47.63	116.16	86.58	133.33	13.5	52.6
2004	Average (30-39)	34.9	120.03	75.59	183.57	46.69	118.21	92.05	130.68	16.9	50.6
2004	Average (40-49)	43.7	122.21	79.18	194.06	47.25	127.92	95.75	128.22	19.7	45.7
2004	Average (50+)	52.9	117.04	77.48	195.69	43.58	140.46	96.46	116.54	21.9	42.2
2004	Totals	158.4	476.40	305.60	741.70	185.10	502.80	370.90	508.80	72.0	191.1
2004	Group Average	39.6	119.00	76.50	185.50	46.25	125.80	92.75	127.00	18.0	47.8