Workgroup Summary

Firefighter Cardiovascular Health and Wellness

Overarching Goal:

Establish a comprehensive strategy to reduce cardiovascular disease and cardiovascular events among fire/EMS personnel, including a decrease in cardiovascular fatalities by 25% in ten years and 50% in twenty years. This strategy must include access to appropriate screenings, investments in research, and promotion of evidence-based programs (behaviors or regimes) to minimize risks and enhance cardiovascular health.

Issue:

Although firefighting is recognized to involve exposure to numerous hazards, approximately 50% of LODD (on-duty deaths) are due to cardiovascular-related events—including heart attacks, sudden cardiac arrests, and stroke.[26] In fact, sudden cardiac death results in approximately seven times as many firefighter deaths as burn injuries.[27] In addition to cardiac-related fatalities, there are several hundred non-fatal cardiac events (injuries) that are reported every year (although accurate data is lacking and the number may be significantly higher), resulting in significant lost time, adverse impacts to staffing, and disability-related retirements. It is believed many more firefighters die from cardiac events when they are not on-duty or after retirement, and these deaths are not typically counted in fatality reporting.

The occupational demands of firefighting may trigger acute cardiovascular events or contribute to and exacerbate the chronic development of cardiovascular disease (CVD). On an acute basis, the combination of occupational stressors, including heavy physical exertion and psychological stress, can provoke an acute cardiac event in firefighters with underlying CVD. On a chronic basis, a constant state of sympathetic nervous system arousal, exposure to traumatic events, disrupted sleep cycles, and exposure to particulate matter and other chemicals can adversely affect the circulatory system and the heart leading to different forms of cardiovascular disease.

Cardiovascular disease outcomes can be predicted based on CVD risk factors. Many of these risk factors are affected by behavioral choices and work environment/structure. Data obtained from occupational medical evaluations illustrate that firefighters have concerning rates of traditional CVD risk factors. When considered in aggregate, one study of firefighters found approximately 69% of participants had blood pressure values indicative of hypertension, 33% had elevated blood cholesterol, and 36% were considered obese based on body mass index (BMI). Moreover, when firefighters were grouped by age, 77% of those in their 50s had hypertensive blood pressure values, 40% had high cholesterol values, and 44% were obese.[28]

There is a pressing need to make research and best practices more readily available to the fire service, to invest in funding to better elucidate the role of occupational factors in advancing cardiovascular disease or triggering acute events, and to support the development of comprehensive wellness and fitness programs focused on CVD mitigation and prevention.

Relatedly, with recent Tentative Interim Amendments (TIA) changes to NFPA 1582, which now base cardiorespiratory fitness guidelines on age and sex-based norms for all firefighters (candidates and incumbents), if a firefighter falls below the established percentile, they are placed on restricted duty. If this occurs, the standard requires an individualized assessment plan by a physician. Access to education, materials, research, and best practices (including awareness and support of programs), will ensure these medical assessments are efficient and comprehensive.

In addition, annual medical evaluations with appropriate cardiac screening are an important step in protecting firefighters' cardiovascular health. Research has found that nearly 80% of sudden

cardiac deaths among U.S. firefighters occurred in individuals with autopsy-confirmed evidence of atherosclerosis **and** an enlarged heart (either cardiomegaly or left ventricular hypertrophy).[29] Ironically, most occupational medical evaluations do not screen for these underlying conditions, but rather simply assess risk factors.

Many organizations have called for comprehensive wellness and fitness programs to support firefighter cardiovascular health, mental health, and occupational readiness, and to decrease the risk of cancer. Although many groups have devised fitness programs tailored to the fire service, cardiovascular disease remains perhaps the most intractable cause of death among firefighters. Medical evaluations must adopt more sensitive testing to more effectively identify occult coronary vessel disease in fire/EMS personnel. Further, a great deal of research is needed to better understand what type of programming is most effective for different groups of firefighters.

Accomplishments:

While cardiovascular incidents remain a leading cause of death among firefighters, the national fire service organizations, and our federal government partners, have long realized this and have made efforts to address the problem.

- There are individual departments on the front edge of testing including angiograms, CT scans, and Echocardiograms. These are identifying occult cardiovascular disease at a rate higher than the national rates.
- The International Association of Fire Fighters (IAFF) is currently exploring unique opportunities with prominent stakeholders to create minimally invasive, low-cost, and highly accessible screening tools capable of assisting in describing the health status of individual firefighters while controlling for and acknowledging additional risk factors. Subsequently, this endeavor serves to advocate for a data repository, alongside other experts who call for the same approach, while ultimately collaborating and developing a framework to better understand cardiorespiratory needs across all roles in the fire service (current state and progression of specific health outcomes over time).
- Additionally, the IAFF played a role in addressing inequities raised by the FEMA Office of Equal Rights. The cardiorespiratory guidelines have been updated and are now based on age and biological sex-based norms, which means that the same relative standard is used for all firefighters (candidates and incumbents). The changes were made to recognize that cardiorespiratory fitness is key health metric and is an integrated measure of the peak functioning of the cardiovascular and respiratory systems – both of which are affected by a person's size and biological sex.
- The IAFF launched Fit to Thrive, a program structured specifically to help more firefighters become more active more often. In just three years, the program has mentored more than 4,000 front-line ambassadors across 800 departments. This represents more than 180,000 firefighters. The critical elements of education, training, and resources are prioritized and provided to support ongoing efforts to improve physical activity habits (as a first step) and physical fitness (as a second step).
- The IAFF also has secured a grant to update the Wellness-Fitness Initiative (WFI) to include guidelines and strategies that promote mindfulness, healthy dietary habits, regular physical activity, sleep quality, and social connectedness alongside experienced individuals. Collectively, these five behaviors will help shape the health and wellness of firefighters, while significantly impacting their risk of cardiovascular disease. Because administrative, organizational, and resource barriers during any implementation process will influence the success of a wellness-fitness initiative, an implementation roadmap is being developed to ensure complementary behavioral change strategies, such that departments have step-by-step processes to best utilize existing knowledge, resources, and ultimately support the success of their program's implementation.
- In 2015, the National Fallen Firefighters Foundation (NFFF) hosted a conference to address cardiovascular disease in the fire service. This meeting was attended by more than 60 representatives of fire service constituency organizations, fire departments, and subject matter experts representing different fields of research associated with occupational health and cardiovascular health. Leading subject matter experts presented the current state of the science

regarding heart disease-related death and disability in the fire service. These experts then worked together with fire service leaders in a consensus-building framework to identify recommendations to lessen cardiovascular events and to identify ways to transition scientific findings and best practices to the fire service to increase the adoption of best practices for cardiovascular disease (CVD) prevention and treatment.

- In 2016, the National Fallen Firefighters Foundation created the First Responder Center for Excellence for Reducing Occupational, Illness, Injuries, and Deaths, Inc. (FRCE) to provide increased awareness, training, and research to ensure that first responders have the correct tools and information to build and maintain a healthy foundation to reduce injuries and fatalities related to behavioral health, cardiac, cancer prevention as well as overall improved health and wellness. The FRCE hosts a series of articles, research studies, and other information to help public safety personnel better understand cardiac risks and how to mitigate the impact on health, well-being, and ability to save lives.[30]
- The FRCE, with the International Association of Fire Chiefs (IAFC), the IAFC Safety, Health, and Survival Section, the IAFF, and the National Volunteer Fire Council (NVFC), sponsored the P*rovider's Guide to Firefighter Medical Evaluations*.[31]
- The National Fire Protection Association (NFPA) in 2023 began including municipal and non-municipal firefighter sudden cardiac deaths occurring within 24 hours of duty in its annual study of on-duty fatal firefighter injuries. Previously, sudden cardiac deaths were only included if the heart attack occurred while the firefighter was on duty or made a specific physical complaint before going off duty.
- The content of NFPA 1582 *Standard on Comprehensive Occupational Medical Program for Fire Departments* has evolved over the past few years as a result of a few Tentative Interim Agreements (TIAs) issued by the Standards Council that specifically address perceived disparate approaches to evaluating individuals performing the tasks of a firefighter. Chapters 8 (Annual Occupational Fitness Evaluation of Members) and 9 (Occupational Medical Evaluations–Medical Conditions Involving the Endocrine System and Metabolic Function) of NFPA 1582 are particularly relevant.
- NFPA 1580 *Standard for Emergency Responder Occupational Health and Wellness* represents the latest recommendations of the technical committee related to the requisite cardiorespiratory fitness and aerobic capacity of firefighters. It is anticipated to have its 2nd draft posted by October 2024.
- Since 1998, the National Institute of Occupational Safety and Health (NIOSH) has conducted 715 medical fatality investigations. In the past five years, they have completed 15 cardiac fatality investigations, with four still open. Through the Fire Fighter Fatality Investigation and Prevention Program, NIOSH conducts investigations of firefighter line-of-duty deaths to formulate recommendations for preventing future deaths and injuries.
- In 2009, the International Association of Fire Chiefs (IAFC) issued a position statement urging fire chiefs to adopt and implement comprehensive health and fitness programs for their departments.[32] The NFPA 1500 Standard on Fire Department Occupational Safety and Health Program clearly outlines the necessity and mechanisms for establishing a departmental health and fitness program. Compliance with this standard is important because the overall health and fitness of every firefighter is a critical component of a department's operational capabilities. Data has demonstrated that heart attacks and strokes are a leading cause of firefighter deaths, and there is an alarming increase in the nature and extent of cancer cases directly linked to a firefighter's exposure to hazardous environments. Since firefighter injuries and sudden cardiac deaths can be dramatically reduced with a comprehensive health and fitness program, the measurable benefits of such a health and fitness program are cost-effective for both the community and the fire department. The IAFC believes every fire chief should adopt and implement a comprehensive health and fitness program, including annual medical evaluations and cancer screenings that meet NFPA 1582, to ensure the safety and well-being of every firefighter under his/her jurisdiction and should personally pledge to participate in the same program, along with the firefighters, to demonstrate his/her commitment.

- In 2017, the IAFC released the *Emergency Services Road Map to Health & Wellness*,[33] concise, readily applicable, research-based information on the importance of a comprehensive fire personnel wellness program, educational resources, and sample documents. The Fire Department Guide to NFPA 1582 was deployed in 2013 by the IAFC Safety, Health & Survival (SHS) Section to provide a tool for departments to better understand and use NFPA 1582: Standard on Comprehensive Occupational Medical Program for Fire Departments. In 2015, the SHS Section, with support from the IAFC, took on the challenge to better understand the status of firefighter-specific medicals in the U.S. and to find a way to get every firefighter an annual medical. The Emergency Services Road Map to Health & Wellness, released in Dec. 2017, is the result of that process.
- The National Volunteer Fire Council (NVFC) launched the Heart-Healthy Firefighter Program in 2003 to combat the alarming trend of heart attacks in the fire service. The program promotes fitness, nutrition, health awareness, and resources for all members of the fire and emergency services, both volunteer and career. Resources are designed to help individuals take control of their health as well as help departments implement a health and wellness program.
- The NVFC has released several guides to help departments focus on cardiovascular health, including Volunteer Fire Service Culture: Essential Strategies for Success (2018), Addressing the Epidemic of Obesity in the United States Fire Service (2011), Securing Sponsors for Department Health and Wellness Programs, and the Heart-Healthy Firefighter Resource Guide (2011, but currently in the process of being updated for rerelease in 2025). The NVFC also worked with USFA on the Health and Wellness Guide for the Volunteer Emergency Services (2009) and with USFA and Women in Fire on Emerging Health and Safety Issues Among Women in the Fire Service (2019).
- In addition, the NVFC offers courses and webinars in its on-demand training platform on topics including creating a department health and safety culture, firefighter physicals, obesity in the fire service, and stress management. The organization has also released position statements on diabetes in the fire service and firefighter medical assessments, and it promotes smoking cessation resources through its Put It Out campaign. It has released a series of videos on health tips, functional fitness demonstrations, physicals, smoking cessation, and other heart health topics. The NVFC also works to encourage heart health best practices through promotional tools including posters, articles in the annual Firefighter Strong print newsletter, and sessions at the annual NVFC Training Summit.
- Colorado State University created the Cardiac One Risk Evaluation (CORE) program in partnership with the Colorado Firefighter Heart, Cancer and Behavioral Health Trust ("the Trust") to offer mobile screening for cardiovascular disease risk factors. The purpose of this program is to increase the number of firefighters who have received basic screening and education on their own cardiovascular disease risk. To be eligible for benefits from the Trust for cardiovascular-related incidents, members must have this basic screening, which may also be done by primary care physicians. However, we recognized the need to provide this screening and education in healthcare deserts in Colorado.
- Colorado State University has also contacted the Trust regarding data sharing on non-fatal incidents. The Trust has agreed to share de-identified data on the more than 100 claims that have been filed since their inception.
- The National Institute of Standards and Technology (NIST) is developing a model for real-time heart health monitoring in firefighters.

Recommendations:

Compile resources in a central repository from stakeholder organizations highlighting research and best practices in cardiovascular health for fire and EMS personnel.

- Stakeholder organizations have conducted a considerable amount of research on firefighter and EMS cardiovascular health and have developed materials outlining best practices, however, there is no central location to access these materials. The creation of a central "clearing house" where the fire and emergency services could access the latest information, research, and best

practices for firefighter cardiovascular health would help close this information gap.

- To this end, Workgroup members have begun compiling studies, procedures, and other resources. We recommend that USFA should launch an online portal by the end of 2024. Stakeholders (including representatives of the national fire service organizations and institutions with expertise in researching firefighter cardiovascular health) should be drafted to assist in the development of the portal.

Address cardiovascular health in firefighter and EMS populations with identified high risks.

- Significant risk factors for cardiovascular disease include age, tobacco use, obesity, hypertension, dyslipidemia, and elevated blood glucose. There is also evidence that occupational factors in the fire and emergency services (impacting all firefighters and EMS personnel, including volunteer, career, and wildland firefighters) can be related to the acceleration of cardiovascular disease.
- To address this, it is important to develop awareness tools to educate the fire and emergency services on the multiple risk factors related to cardiovascular health. The development and distribution of these resources should be an ongoing effort by the USFA and the national fire service organizations.
- Additionally, there is a need for a provider guide, with an emphasis on age and other risk factors impacting cardiovascular health in the fire service, focused on educating providers about specific risk factors in subpopulations (e.g. older volunteer firefighters). We recommend that the development of this provider guide be completed by the national fire service organizations in advance of the 2025 United States Fire Administrator's Summit on Fire Prevention and Control.

Develop programming to promote cardiovascular health in the fire and emergency services.

- Cardiovascular health is necessary for operational effectiveness, safety, and the health of fire and EMS personnel. We need to consider holistic programming that addresses modifiable cardiovascular disease risk factors, cardiovascular health, and cardiorespiratory function.
- We must develop a framework that addresses the continuum of optimal cardiovascular health to avoid severe cardiovascular disease (or a cardiac event) and create messaging to help focus attention on improving health at the earliest point possible. All firefighters should be focused on modifiable risk factors irrespective of time in service and maintain this focus throughout their careers. Firefighters with cardiovascular disease risk factors (such as high blood pressure, cholesterol, prediabetes, and the use of tobacco products) should have access to programming that aims to address these risk factors. There should be a joint framework of education and wellness programs that will address knowledge gaps and preventative measures, including prevention and wellness habit changes. This should be an ongoing effort undertaken by USFA, in partnership with the national fire service organizations.
- We further recommend the development of an annual training module, similar to the asbestos training module[34] required of all firefighters, with a focus on cardiovascular health and other risk factors facing firefighters and EMS personnel. The training module should be developed by the national fire service organizations, with an emphasis on the North American Fire Training Directors (NAFTD) and the International Society of Fire Service Instructors (ISFSI).

There need to be developed more sensitive instruments to capture fatal and non-fatal cardiovascular events among all firefighters.

- An estimated 10-11% of firefighter fatalities are due to unspecified medical conditions[35] that may be cardiac-related, suggesting that the actual number may be higher than those reported. Additionally, there is a lack of data on the number of non-fatal cardiovascular events experienced by firefighters and EMS personnel.
- We recommend expanding the scope of the National Firefighter Registry to capture health information beyond cancer exposures, including fatal/non-fatal cardiovascular events experienced

by firefighters and EMS personnel. Because the Firefighter Cancer Registry Act[36] specifically creates the NFR to determine cancer incidents in firefighters, Congress would likely need to pass legislation expanding the authority. We recommend the government relations representatives for the national fire service organizations explore legislation to expand the authority of the NFR in the 119th Congress.

- Additionally, we recommend the National Uniform Billing Committee (governing body for forms and codes use in medical claims billing in the United States) update the emergency room intake form to capture volunteer and secondary employment information. We believe the number of fatal and non-fatal cardiovascular incidents among firefighters is underreported. This is due in part to the fact that volunteer and secondary employment information is not captured when volunteer firefighters are admitted to the emergency room. Efforts to update the emergency room intake form in the past have been met with resistance, but we believe now is the time to revisit the issue.
- The Workgroup proposes that the National Fire Protection Association add a limited number of questions to its Annual Fire Experience Survey that query municipal fire departments (career, volunteer, and combination) about the number of non-fatal cardiac incidents among personnel in the prior year and the impact of those incidents on fire department operations.
- Explore the feasibility of developing a surveillance system to capture on-duty non-fatal cardiovascular incidents experienced by municipal and non-municipal firefighters. As with the occupational injury surveillance efforts, including the United States Fire Administration's collection of information on firefighter fatalities, information on non-fatal cardiac incidents could be used to identify the extent of the underlying problem and identify potential areas of intervention.
- Engage the Heart Trusts (or similar entities) that are tracking cases for reimbursement for data collection for non-fatal incidents (while keeping them anonymized).

Establish educational programs with targeted communications regarding hypertension and other comorbidities of cardiovascular disease in the fire service.

- There exists a need to increase awareness regarding hypertension and other comorbidities early and aggressively. Examples of comorbidities include, but are not limited to, obesity, use of tobacco products, interrupted sleep, diet/nutrition, lack of exercise, dehydration, and chronic stress. The lifestyle association with continued exposure to traumatic events contributes to pathophysiological changes.
- The national fire service organizations should consider developing model procedures and the promotion of best practices to encourage fire/EMS personnel to monitor their blood pressure as a sensitive marker of cardiovascular risk.

ADDITIONAL RESOURCES:

- https://firstrespondercenter.org/document/a-healthcare-providers-guide-to-firefighter-physicals/
- https://www.iafc.org/topics-and-tools/resources/resource/guide-to-the-nfpa-1582-annual-physical
- https://www.iafc.org/about-iafc/positions/position/iafc-position-health-and-fitness-programs-for-every-department
- https://www.iafc.org/topics-and-tools/resources/resource/emergency-services-road-map-to-health-wellness