FIRESCOPE

WHITE PAPER

February 23, 2023

To: FIRESCOPE Board of Directors
23300 Castle Street
Riverside, CA 92518

From: Operations Team, Task Force, & Cancer Prevention Subcommittee

SUBJECT: Challenges and Solutions to Implementing Cancer Prevention Tactics and Change

SUMMARY

In June of 2022, the International Agency for Research on Cancer (IARC) classified the firefighter occupation as a Group 1 known human carcinogen[1]. This indicates that a large body of scientific evidence has demonstrated a causal association between working as a firefighter and the development of cancer.

Firefighters are exposed to a multitude of carcinogenic agents in the line of duty. During fire incidents (structure, vehicle, brush, etc.), firefighters are exposed to products of combustion that include known, probable, and possible chemical carcinogens including, but not limited to, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and per/poly-fluoroalkyl substances (PFAS). During non-fire incidents, firefighters continue to be exposed to carcinogenic agents such as diesel exhaust, ultraviolet light, contaminated PPE, and shift work that disrupts circadian sleep patterns[1].

Exposure to carcinogenic agents in the line of duty results in cancer promoting biological impacts such as DNA damage and mutations, epigenetic changes, oxidative stress, chronic inflammation, and receptor-mediated cellular effects that ultimately contribute to the elevated incidence of cancer and cancer mortality among firefighters[1]. In order to reduce the incidence of cancer in the fire service, exposure to carcinogenic agents in the line of duty must be minimized to the greatest extent possible, while still placing public safety duties first.

Exposure to chemical carcinogens occurs via inhalation, dermal absorption, and ingestion. Effective use of personal protective equipment (PPE) such as self-contained breathing apparatus (SCBA) and structural firefighting turnout gear is essential to minimize exposures on the fire ground. SCBA use, in particular, is highly effective at preventing exposure by inhalation. However, ***PPE alone does not eliminate these exposures***. In fact, ***PPE is considered to be the least effective among measures*** in the Hierarchy of Controls developed by the National Institute of

[1]Demers, Paul A., et al. "Carcinogenicity of occupational exposure as a firefighter." *The Lancet Oncology* 23.8 (2022): 985-986.

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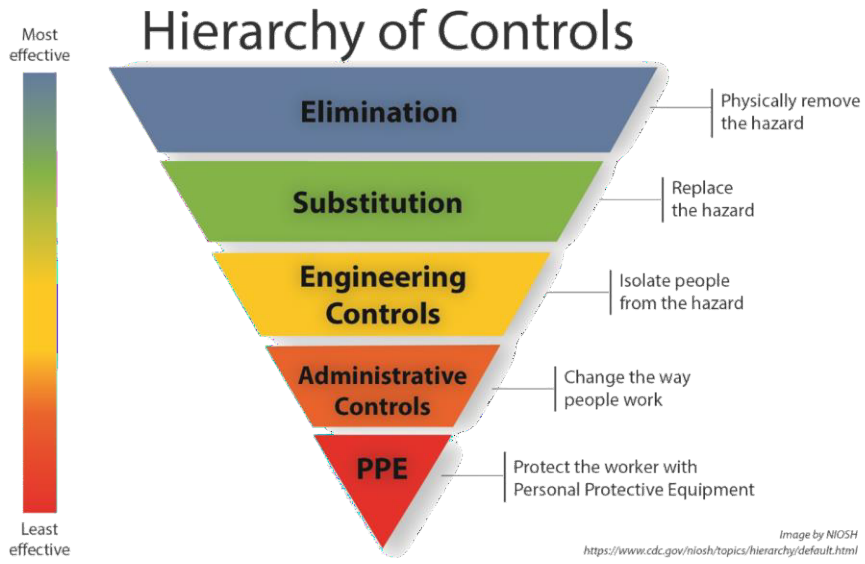
Occupational Safety and Health (NIOSH) to control and minimize exposure to carcinogenic agents. Therefore, it is essential to educate fire service members regarding the types of exposures that occur in the line of duty and the most effective approaches beyond standard PPE use to mitigate these exposures and the associated adverse health outcomes.



FINDINGS

Fire service cancer awareness and education efforts to this point have largely focused on epidemiological data that demonstrate the increased incidence of cancer in the fire service and information regarding routes of exposure to chemical carcinogens (i.e. inhalation, absorption, and ingestion). Concurrently, efforts have been made to develop preventative interventions such as post fire incident contamination reduction measures (e.g. PPE wash down, skin wipes, and showering as soon as possible).

While cancer awareness has certainly become widespread in the fire service, utilization of exposure reducing best practices has lagged far behind. Despite many departments having adopted exposure-reduction policies, members in the field often do not conduct these measures and management does not enforce it. There are multiple reasons for this. Chief among these is the “anonymity” of epidemiological statistics, where firefighters are aware of the elevated incidence of cancer, but don’t think it will happen to them. This stems from a lack of understanding of the mechanisms that increase the risk of cancer among firefighters. Additionally, there is a perception that exposure-reducing interventions are impractical and incompatible with emergency incident priorities.

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RECOMMENDATIONS

To address these barriers, the Cancer Prevention Subcommittee recommends the development of new educational material that focuses on: 1) cancer biology, 2) how to effectively implement exposure-reducing interventions organized around the NIOSH Hierarchy of Controls, and 3) the organizational costs of cancer in the fire service.

Educational material focused on cancer biology is essential for firefighters to understand how occupational exposure as a firefighter increases cancer risk and that these processes start at the beginning of one's career and continue throughout it.

Exposure-reducing interventions and best practices are not likely to be implemented until the stigma of these processes being impractical is overcome. In turn, exposure-reducing interventions need to be streamlined and simplified so that they are easy to adopt in the midst of a fire incident. Understanding how to utilize the NIOSH Hierarchy of Controls, in particular, engineering and administrative controls, will lead to the adoption of exposure-reducing interventions that can be seamlessly implemented during fire ground operations.

Quantifying and disseminating the organizational cost of a firefighter diagnosed with and treated for cancer is essential to underscore the notion that exposure-reducing interventions are not only a best practice from the occupational safety and health perspective, but from the financial perspective as well. Basic estimates of the workers' compensation cost of a single firefighter cancer diagnosis are upwards of $1 million, underscoring the importance of implementing exposure-reducing interventions which have little to no associated cost.

IMPLEMENTATION PLAN

This new educational material will be developed during the Cancer Prevention Subcommittee's 2023 Plan of Work, utilizing the Committee's subject matter experts and peer-reviewed scientific material. All material produced will be consistent and compatible with State Fire Training's Behavioral Health and Cancer Awareness curriculum. In order to maximize interest and uptake, educational modules will be short yet impactful and will be disseminated in multiple formats including but not limited to: PowerPoints, short videos, and one-page infographics.

CONCLUSION

Adoption of effective exposure-reducing interventions and best practices in the fire service has lagged due to knowledge gaps regarding the mechanisms that result in increased cancer risk among firefighters and the accompanying organizational costs. To address these knowledge gaps, the Cancer Prevention Subcommittee recommends development of new educational material endorsed by the FIRESCOPE that focuses on: 1) cancer biology, 2) how to effectively implement exposure-reducing interventions organized around the NIOSH Hierarchy of Controls and 3) the organizational costs of cancer in the fire service. This material is proposed in the Subcommittee's 2023 Plan of Work and designed to be easily digestible and disseminated in multiple formats to maximize uptake.