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OVERCOMING IMPLEMENTATION BARRIERS WITHIN THE FIRE SERVICE TO REDUCE FIREFIGHTER CANCER RATES

by

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June 2020

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Occupational cancer has become the leading cause of line-of-duty deaths within the United States fire service. This epidemic claims the lives of hundreds of firefighters each year, even though the fire service has developed best practices to prevent occupational cancers. This thesis identifies seven barriers that are preventing fire departments from implementing best practices: fire department culture, firefighters' ignorance of the disease and prevention methods, complacency caused by cancer's long latency periods, funding, pathways to compliance with national and departmental policies, groupthink, and motivation. To explain how fire departments can overcome these barriers, this thesis examines the health and safety efforts that two departments have taken and reviews literature from other fire departments, national fire service organizations, subject-matter experts, researchers, and academic studies. This research shows that when fire departments provide their members with the proper tools, training, education, and awareness, they can rise to the occasion and implement best practices to prevent occupation-related cancer.

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OVERCOMING IMPLEMENTATION BARRIERS WITHIN THE FIRE SERVICE TO REDUCE FIREFIGHTER CANCER RATES

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Submitted in partial fulfillment of the
requirements for the degree of

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ABSTRACT

Occupational cancer has become the leading cause of line-of-duty deaths within the United States fire service. This epidemic claims the lives of hundreds of firefighters each year, even though the fire service has developed best practices to prevent occupational cancers. This thesis identifies seven barriers that are preventing fire departments from implementing best practices: fire department culture, firefighters' ignorance of the disease and prevention methods, complacency caused by cancer's long latency periods, funding, pathways to compliance with national and departmental policies, groupthink, and motivation. To explain how fire departments can overcome these barriers, this thesis examines the health and safety efforts that two departments have taken and reviews literature from other fire departments, national fire service organizations, subject-matter experts, researchers, and academic studies. This research shows that when fire departments provide their members with the proper tools, training, education, and awareness, they can rise to the occasion and implement best practices to prevent occupation-related cancer.

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LIST OF ACRONYMS AND ABBREVIATIONS

CAPP	Cancer Awareness and Prevention Program
DSU	Decontamination Support Unit
EMS	Emergency Medical Services
FACE	Firefighters Attacking the Cancer Epidemic
FCSN	Firefighter Cancer Support Network
FDNY	Fire Department of the City of New York
FFHSC	Florida Firefighters Safety and Health Collaborative
HFD	Houston Fire Department
IDLH	immediately dangerous to life or health
LODD	line of duty death
NFPA	National Fire Protection Association
PAH	polycyclic aromatic hydrocarbon
PBCFR	Palm Beach County Fire Rescue
PPE	personal protective equipment
SCBA	self-contained breathing apparatus
SCCC	Sylvester Comprehensive Cancer Center
SDFD	San Diego Fire Rescue Department
UFA	Uniformed Firefighters Association

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EXECUTIVE SUMMARY

> Occupational cancer is something we need to look at and we need a paradigm shift. Cancer is a silent killer, and it is giving us a knockout punch.
>
> —Frank Szabo, Cleveland Battalion Chief[1]

Occupational cancer has become the leading cause of line of duty deaths (LODDs) within the United States fire service.[2] Between 1950 and 1975, fewer than 5 percent of firefighter LODDs were attributed to cancer; in 2017 alone, 74 percent of firefighter LODDs were the direct result of cancer.[3] This epidemic is growing, claiming the lives of hundreds of U.S. firefighters each year, despite the fact that the fire service has specifically developed best practices to prevent occupational cancers.

This thesis posits that fire departments are struggling with seven specific barriers—some organizational, some individual—that prevent them from implementing best practices to prevent or reduce occupational cancer among firefighters. The barriers are: fire department culture, firefighters' ignorance of the disease and prevention methods, complacency caused by cancer's long latency periods, funding, pathways to compliance with national and departmental policies, groupthink, and motivation.

To understand how fire departments can overcome these barriers, this thesis examines efforts that two fire departments have taken to overcome their own barriers to the implementation of health and safety measures. A case study of the Fire Department of the City of New York (FDNY) shows that a fire department can critically self-examine and optimize its internal resources to successfully reduce or overcome implementation barriers.

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[1] Mike Wagner and Lucas Sullivan, "Unmasked: Firefighters and Cancer, A Five Part Series: The Columbus Dispatch," Unmasked, accessed October 29, 2017, http://gatehouseprojects.com/unmasked/.

[2] Olga Khazan, "How Modern Furniture Endangers Firefighters," *Atlantic*, September 11, 2015, https://www.theatlantic.com/health/archive/2015/09/our-toxic-homes/404722/.

[3] Matthew F. Smith and Julie Glenn, "Firefighters Fight for Recognition of Cancers Caused by Workplace Exposure," WGCU News," March 30, 2017, https://news.wgcu.org/post/firefighters-fight-recognition-cancers-caused-workplace-exposure; "Line of Duty Death Database," IAFF Firefighters, accessed June 27, 2018, https://lodd.iaff.org/.

A case study of the Palm Beach County Fire Rescue shows the benefits of partnering with external organizations toward implementation of health and safety measures. This thesis then explores scholarly material from other fire departments, national fire service organizations, subject matter experts, researchers, and a multitude academic studies. The results of this research indicate that fire department leaders can help their departments reduce or overcome implementation barriers by identifying the specific barriers they struggle with, and addressing them with strategic steps.

When fire departments provide their membership with the proper tools, training, education, and awareness, firefighters can rise to occasion and overcome the barriers that are preventing them from implementing health and safety practices to prevent cancer. Fire service leaders must decide if they will continue down the current path of increasing demise among their firefighting brothers and sisters, or if they will take a leap and commit to implementing necessary changes in their organizations.

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To my wife, Sarah, and daughter, Violet, thank you for sacrificing not only your own personal time, but also the time we could have spent together to allow me to pursue this opportunity. You have provided enormous dedication, patience, and advice in this endeavor; without it I would not have survived. To my family, thank you for believing in me and sacrificing your time as well.

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Too many firefighters have lost their lives to this epidemic of occupational cancer. Four firefighters in particular have been close personal losses to me. These four fighters have all lost their battle since I began this master's program back in April 2017. Their sacrifices have provided me the motivation to continue writing this thesis during difficult and challenging times. To these four, I dedicate this thesis.

I am sure that each of you could add a photo of a colleague that you have lost to cancer. Use this person's memory to make changes in your own actions and departments. Change can begin today and can start at any level or rank. No excuses. Throughout our career as firefighters, we train to protect life, especially the lives of our brothers and sisters. However, saving a brother or sister doesn't just mean dragging them out of a burning building. It could be as simple as implementing a mask or decontamination policy, or just telling someone to take a shower after a fire. It is my hope that, by reading this thesis, we can save our brothers and sisters. Even if we only save one life, it will be worth it all.

> Let me be the one who dies for you…. I can't go back and do the right things to protect myself. All I can do is convince you to do the right things so you don't lose everything and your family doesn't suffer.[1]

Firefighter James Lanza[2]

Retired from Ladder 43, Spanish Harlem, "El Barrios Bravest"

(August 15, 1945–April 6, 2017)

Jimmy joined the New York City Fire Department on January 13, 1979. As well as being a firefighter, Jimmy was a United States Navy Vietnam veteran, assisted in the aftermath of Hurricane Katrina, was a board member of the Fire Family Transport Foundation, a volunteer for Red Cross, an American Legion Post 1836 Commander, and a volunteer for Wounded Warriors. Jimmy was my senior firefighter at Ladder 43 and welcomed me into the firehouse in 2005 as a new probationary firefighter. One of my original mentors, Jimmy showed me how to become a great firefighter. His death struck close to my heart. Jimmy had been retired for only a few years when he was diagnosed with a rare form of brain cancer. He succumbed to his battle at the age of 71. He is survived by his sister, Marian Pennachio; nephews, Keith Pennachio (Iraci) and Michael Pennachio (Renee); niece, Stefanie Pennachio; girlfriend, Ingrid Valdez; grand nieces Emily and Ava; and grand nephews Brandon and Andrew.

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[1] Quote from Mark Rine, a Columbus, Ohio, firefighter battling cancer, lecturing an audience of firefighters. Mike Wagner and Lucas Sullivan, "Unmasked: Firefighters and Cancer, A Five Part Series: The Columbus Dispatch," Unmasked, accessed October 29, 2017, http://gatehouseprojects.com/unmasked/.

[2] "FDNY Remembers 9/11 First Responder James Lanza," Spectrum News, April 12, 2017, https://spectrumlocalnews.com/nc/triad/news/2017/04/12/fdny-remembers-9-11-first-responder-james-lanza.

Firefighter Paul Tokarski[3]

Retired from Ladder 164, Douglaston Queens, "Raccoon Lagoon"

(June 4, 1966–March 10, 2018)

Paul joined the New York City Fire Department on April 14, 1991. As a brand new, nervous lieutenant in Douglaston, Queens, Paul gave me valuable advice and lessons learned that I use to this current day. He succumbed to his battle with brain and spinal cancer at the age of 51. He is survived by his daughter, Kole.

Firefighter Michael Hallquest[4]

Retired from Ladder 136, Elmhurst Queens, "The Elmhurst Eagles"

(April 21, 1983–January 2, 2018)

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[3] UFA NYC Firefighters (@UFANYC), "It is with regret we announce the passing of Paul Tokarski…," Twitter, March 13, 2018, https://twitter.com/UFANYC/status/973601606477414400.

[4] NYC Fire Wire (@nycfirewire), "We regret to report, FF Mike Hallquest has lost his long hard fought battle with a brain tumor…," Facebook, January 2, 2018, https://www.facebook.com/nycfirewire/posts/1549812275096313.

Mike joined the New York City Fire Department in May 2005. I never had the pleasure to work personally with Mike while assigned to Engine 287/Ladder 136/Battalion 46 firehouse. However, I had the pleasure of his company during multiple firehouse events and trips. He succumbed to his multiyear battle with brain cancer at the age of 34. He is survived by his wife, Laura, and two children, Emily and Nicholas.

Captain John Moschella[5]

Retired from Engine 26, Garment District New York, "The Bat Cave"

(January 5, 1966–December 8, 2018)

John joined the New York City Fire Department in 1990. I had the great privilege to work with "Johnny Mush" while we were lieutenants at Engine 287. Anyone who knew him would tell you he lit up the room with his outgoing personality and infectious smile, always greeting everyone with a "Hey, buddy." John was diagnosed with stage four colorectal cancer in 2016 and succumbed to this disease in 2018 at the age of 52. John is survived by his wife, Nancy; his parents, Salvatore and Marjorie; and his siblings, Frank, Maria, James, and Matthew.

[5] NYC Fire Wire (@nycfirewire), "Tonight we lost one of Cansaries Bravest…," Facebook, Decmeber 8, 2018, https://www.facebook.com/nycfirewire/posts/1960452407365629.

I. INTRODUCTION

Scientific studies have concluded that, compared to the general population, firefighters face increased rates of occupational cancer.[1] The fire service has developed best practices to combat and reduce these rates, but many fire departments have failed to implement these practices, despite the clear dangers to their personnel.[2] This thesis posits that fire departments are struggling with seven specific barriers—some organizational, some individual—that prevent them from implementing best practices to prevent or reduce occupational cancer among firefighters. The barriers are: fire department culture, firefighters' ignorance of the disease and prevention methods, complacency caused by cancer's long latency periods, funding, pathways to compliance with national and departmental policies, groupthink, and motivation. With these barriers in mind, this thesis asks: How can the fire service overcome implementation barriers to enhance safety and reduce occupational exposure to fireground contaminants that result in cancer-related deaths and disabilities among firefighters?

A. LITERATURE REVIEW

Researchers who examine organizational change efforts have described common barriers.[3] This literature review examines such existing scholarly material and explores why leaders need to manage and understand their employees' perception of change. Studies

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[1] Robert D. Daniels et al., "Mortality and Cancer Incidence in a Pooled Cohort of U.S. Firefighters from San Francisco, Chicago and Philadelphia (1950–2009)," *Occupational and Environmental Medicine* 71, no. 6 (June 1, 2014): 388–97, https://doi.org/10.1136/oemed-2013-101662; Grace K. LeMasters et al., "Cancer Risk among Firefighters: A Review and Meta-analysis of 32 Studies," *American College of Occupational and Environmental Medicine* 48, no. 11 (November 2006): 1189, https://doi.org/10.1097/01.jom.0000246229.68697.90.

[2] Washington State Council of Fire Fighters, *Healthy In, Healthy Out: Best Practices for Reducing Fire Fighter Risk of Exposures to Carcinogens* (Seattle, WA: Sip Publishing, 2016); Olga Khazan, "How Modern Furniture Endangers Firefighters," *Atlantic*, September 11, 2015, https://www.theatlantic.com/health/archive/2015/09/our-toxic-homes/404722/.

[3] Jeffrey A. Eskierka, "Developing a Policy for Decontamination of Firefighter Personal Protective Equipment in the Saint Paul Fire Department" (Dissertation, College of St. Scholastica, 2014), 35; Elaine L. Larson and Catharyn T. Liverman (eds.), *Preventing Transmission of Pandemic Influenza and Other Viral Respiratory Diseases* (Washington, DC: National Academies Press, 2011), 114, https://www.ncbi.nlm.nih.gov/books/NBK209584/.

agree that developing a positive change attitude among employees plays a critical role in the success of any change initiative.[4] By developing an understanding of these important subjects, fire department leaders can help their departments and members recognize and overcome their own unique barriers to change.

1. Barriers to Change

> Everyone has to face obstacles. Everybody has to face hurdles. It's what you do with those that determines how successful you're going to be.
>
> —Craig Sager[5]

Researchers have identified barriers to change in the fire service, health care industry, and the commercial industry. Jeffrey Eskierka of the Saint Paul Fire Department in Minnesota explains that his department struggled to implement a new decontamination policy for protective equipment due to the department's culture, its members' reluctance to make changes, their poor awareness of the inherent dangers of wearing contaminated equipment, and their lack of motivation.[6] Similarly, Alan Cox, writing about fire service culture in his master's thesis, sees certain aspects of culture (such as risk-taking) and symptoms of groupthink (self-censorship, direct pressure, mindguards, and illusions of unanimity) as barriers when a fire department's leadership attempts to change firehouse traditions and institutionalize behavioral changes.[7] Though they both identify multiple

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[4] Renae A. Jones, Nerina L. Jimmieson, and Andrew Griffiths, "The Impact of Organizational Culture and Reshaping Capabilities on Change Implementation Success: The Mediating Role of Readiness for Change," *Journal of Management Studies* 42, no. 2 (March 1, 2005): 361, https://doi.org/10.1111/j.1467-6486.2005.00500.x; Steven M. Elias, "Employee Commitment in Times of Change: Assessing the Importance of Attitudes toward Organizational Change," *Journal of Management* 35, no. 1 (February 1, 2009): 39, https://doi.org/10.1177/0149206307308910.

[5] Tyler Daswick, "What Sports Reporter Craig Sager Taught Us about Life, Love, and Death," *Men's Health*, November 14, 2016, https://www.menshealth.com/trending-news/a19531845/craig-sager-interview/.

[6] Eskierka, "Developing a Policy for Decontamination," 32–35.

[7] Alan Thomas Cox, "The Significance of Fire Service Culture as an Impediment to Effective Leadership in the Homeland Security Environment" (master's thesis, Naval Postgraduate School, 2012), 1–2.

barriers, Eskierka and Cox agree that it is fire department culture that is the main obstacle to organizational change.[8]

Implementation barriers are not unique to the fire service, however. In the health care industry, a study about increasing use of personal protective equipment (PPE) to prevent disease transmission among workers identifies multiple barriers, which fall into three categories:

- individual factors, such as knowledge, beliefs, attitudes, perception of risk, history, and sociodemographics;
- environmental factors, including availability of equipment and negative-pressure rooms; and
- organizational factors, such as management's expectations and performance feedback, workplace policies, and training and education programs.[9]

The study shows that these factors affect how health care workers use PPE, and that by reducing the effects of these factors, workers' compliance will improve.

Researchers have also discovered barriers to change in the commercial industry. Mette Olsen and Eva Boxenbaum's study of the organizational challenges of selling more products to the world's poor reveals multiple external and internal barriers.[10] External barriers include "lack of infrastructure, corruption of local governments, problems with distribution networks, low educational levels, and lack of buying power," and internal barriers within the organization include "cognitive barrier of conflicting mindsets, a process-related barrier of radical change to routines, as well as two structural barriers that appeared to underpin and reinforce them, namely, project evaluation criteria and reward

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[8] Eskierka, "Developing a Policy for Decontamination," 35; Cox, "Fire Service Culture," 3.

[9] Larson and Liverman, Preventing Transmission of Pandemic Influenza, 114.

[10] Mette Olsen and Eva Boxenbaum, "Bottom-of-the-Pyramid: Organizational Barriers to Implementation," *California Management Review* 51, no. 4 (July 1, 2009): 101–09, https://doi.org/10.2307/41166507.

structures."[11] In another study, Yii Teang Tan examines Air New Zealand's implementation of Domestic Express, a new value-based service, and discovers six barriers.[12] Tan refers to these barriers as an organizational minefield; they include "strategy formulation, environment uncertainty, organizational structure, organizational culture, communication, and resource allocation."[13]

Barriers to implementing organization change are not a new phenomenon, and they affect both private and public industry efforts. By applying the lessons learned from various fields, leaders can help their organizations overcome barriers to change.

2. The Good Change Fairy versus the Dreaded Change Monster

> It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.
>
> —Machiavelli[14]

Change can be a difficult process that alters an entire organization's emotional and behavioral outlook. According to David Nadler, change is inherently messy because it is an intensely personal process, and individuals' perceptions of change can differ widely.[15] For some people, change can bring enjoyment and satisfaction for some, but can bring stress and pain for others—real or imagined. By developing a positive change attitude among employees, an organizational leader can positively influence the change process.[16] Without this attitude, however, employees may resist the change process.

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[11] Olsen Boxenbaum, 101, 109.

[12] Yii Teang Tan, "Barriers to Strategy Implementation: A Case Study of Air New Zealand" (master's thesis, Auckland University of Technology, 2004), 86.

[13] Tan, 36, 86.

[14] Gilbert Moore, "His Determination Is 'To Initiate a New Order of Things,'" *LIFE Magazine*, April 12, 1968.

[15] David Nadler, Champions of Change: How CEOs and Their Companies Are Mastering the Skills of Radical Change, 1st ed. (San Francisco, CA: Jossey-Bass, 1998), 3.

[16] Jones, Jimmieson, and Griffiths, "Impact of Organizational Culture," 361; Elias, "Employee Commitment in Times of Change," 39.

Many factors, both tangible and intangible, can influence an individual's reaction to change. Donald L. Kirkpatrick believes that the main reasons people embrace change include their "personal gain from the decision, clear understanding of the reasons for the change, and respect and trust for those making the decision."[17] Similarly, Jeanie Duck believes that change provides individuals with the opportunity to bring about "the most interesting, involving, and meaningful work of their careers."[18] Duck writes that change can bring about "increased success, heightened recognition, and confidence."[19]

On the other hand, employees may have a negative attitude toward the change process and will actively resist it. Donald Kirkpatrick believes the most significant reason people resist change is their lack of inclusion in the change process. Kirkpatrick states that "employees who have not been asked for their input are apt to resent or resist the change if they feel they could have contributed."[20] Similarly, Gary Klein believes that resistance to change comes from the desire to maintain predictability.[21] Furthermore, John Kotter contends that fear of the unknown causes people and organizations to stay inside their comfort zone.[22]

While some individuals resist change, others have learned to accept and welcome its positive influence. By avoiding factors that create a negative employee attitude and developing positive attitudes, leaders can implement change more effectively.[23]

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[17] Donald L. Kirkpatrick, *How to Manage Change Effectively*, 1st ed. (San Francisco: Jossey-Bass, 1985), xiii.

[18] Jeanie Daniel Duck, The Change Monster: The Human Forces That Fuel or Foil Corporate Transformation and Change, 1st ed. (New York, NY: Crown Business, 2001), xiii.

[19] Duck, xiii.

[20] Kirkpatrick, How to Manage Change Effectively, 97.

[21] Gary A. Klein, *Seeing What Others Don't: The Remarkable Ways We Gain Insights*, 1st ed. (New York, NY: Public Affairs, 2013).

[22] John P. Kotter, *A Sense of Urgency* (Cambridge, MA: Harvard Business Press, 2008), 6.

[23] Jones, Jimmieson, and Griffiths, "Impact of Organizational Culture," 361; Elias, "Employee Commitment in Times of Change," 39.

B. RESEARCH DESIGN

In this thesis, I evaluate why firefighters and fire departments are not using or promoting fire service best practices that have been proven to prevent or reduce a firefighter's chances of developing occupational cancer. Through this research, I discovered solutions to overcome implementation barriers that provided the basis for my recommendations. The research framework I used for this thesis involved the following steps:

1. I identified that firefighter LODDs due to occupational cancer are increasing and that firefighters have higher rates of certain types of cancer compared to the general population.

2. I researched how firefighters are exposed to dangerous fireground contaminants that include carcinogens.

3. I conducted research on fire service best practices that have been proven to limit firefighters' exposure to fireground contaminants, thus preventing or reducing their chances of developing occupational cancer.

4. I examined specific barriers that are preventing individual firefighters or their departments from implementing these best practices. During this research, I identified seven specific implementation barriers:

    a. *Culture:* Elements of fire department culture discourage the implementation of best practices aimed at reducing or eliminating a firefighter's risk of developing occupational cancer.[24] These cultural elements include firefighters' acceptance of dirty bunker

[24] Tyler R. Harrison et al., "The Invisible Danger of Bunker Gear Transfer: A Theory-Based Intervention to Increase Post-fire Decontamination to Reduce Cancer Risk in Firefighters" (presented at the National Communication Association Annual Meetings, November 2017, Dallas, TX), 2, https://pdfs.semanticscholar.org/0be3/97dc1032467d6cedbbbc4a5d2e29f0b4cc15.pdf?_ga=2.267953422.1869048956.1588460168-620123867.1583875823; "Eating Smoke Soup," Firefighter Close Calls, January 25, 2018, https://www.firefighterclosecalls.com/334836-2/; Tyler R. Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction in a Fire Rescue Organization: Clean Gear as the New Badge of Honor," *Journal of Contingencies and Crisis Management* 25 (2017): 174, https://doi.org/10.1111/1468-5973.1218.

gear as a false badge of honor, their misapplication of cultural values, and their acceptance of injury and death as an unavoidable part of being a firefighter.[25]

b. *Awareness:* Firefighters are inadequately aware of the threat posed by occupational cancer, the dangers of chemical exposure, the best practices to avoid exposure, and the preventative policies and procedures that have been created and adapted by their departments.[26] Without an understanding of these important subjects, firefighters are placing themselves at an increased risk of developing cancer.

c. *Complacency:* Failure to create and maintain a sense of urgency within their department has allowed firefighters to remain complacent. Firefighters are particularly vulnerable to complacent attitudes because they are repeatedly exposed to hazardous situations, and over time become less concerned and cautious about the risks.[27] This complacency leads firefighters to not wear their PPE, which exposes them to hazards and places them at increased risk for cancer.[28]

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[25] Harrison et al, "Invisible Danger of Bunker Gear Transfer," 2; Firefighter Close Calls, "Eating Smoke Soup"; Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 174.

[26] Natasha Schaefer Solle et al., "Perceptions of Health and Cancer Risk among Newly Recruited Firefighters in South Florida," *American Journal of Industrial Medicine* 61, no. 1 (January 1, 2018): 77, https://doi.org/10.1002/ajim.22785; Wagner and Sullivan, "Unmasked."

[27] Lance C. Peeples, "The Automatic Alarm Mindset," *Fire Engineering* 153, no. 12 (December 1, 2000), https://www.fireengineering.com/articles/print/volume-153/issue-12/departments/training-notebook/the-automatic-alarm-mindset.html.

[28] John Dixon, "Beware! Complacency Will Kill Us," Firefighter Toolbox, October 11, 2013, http://firefightertoolbox.com/beware-complacency-will-kill-us/.

d. *Funding:* Time and again, funding is a significant deterrent to change or to implementing initiatives in the fire service.[29] Fire department administrators and leaders often have to make difficult fiscal decisions that require them to cut, reduce, or reallocate department funding.[30] Critical items such as apparatus fuel, preventive maintenance, utilities, and bond payments for fire stations are prioritized, while funds for continued education, new equipment, or firefighter incentives are deprioritized.[31] As a result, fire department leaders and administrators are denied the necessary funding to implement best practices that can reduce or eliminate firefighters' risk of developing cancer.

e. *Compliance:* Firefighters and fire departments are failing to comply with department policies and national standards that have been developed and adapted specifically to protect firefighters from exposing themselves to dangerous toxins.[32] This lack of compliance has created an environment where firefighters are routinely exposed to dangerous levels of cancer-causing carcinogens.

f. *Groupthink:* Groupthink has created a destructive environment where fire department members are discouraged from challenging

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[29] Gregory H. Easterling and Scott Prince, "Respiratory Protection Programs for Firefighters: A Survey of Practices for the State of Kentucky," *Public Health Reports* 122, no. 6 (November 1, 2007): 725, https://doi.org/10.1177/003335490712200604.

[30] Mark Wallace, "Fire Department Budget Strategies," *Fire Engineering*, March 2, 2018, https://www.fireengineering.com/articles/2018/03/fire-department-budget-strategies.html.

[31] Wallace.

[32] Michael A. Maglio et al., "Situational Pressures That Influence Firefighters' Decision Making about Personal Protective Equipment: A Qualitative Analysis," *American Journal of Health Behavior* 40, no. 5 (September 1, 2016): 556, https://doi.org/10.5993/AJHB.40.5.2; Zach Despart, "State Launches Probe into HFD Safety Procedures," *Houston Chronicle*, July 9, 2018, https://www.houstonchronicle.com/news/houston-texas/houston/article/State-launches-probe-into-HFD-safety-procedures-13060778.php.

commonly held views, despite their own doubts.[33] This has created a faulty decision-making process through which firefighters have become desensitized to risk, and the deviance of such risk has become normalized.[34] Without a responsible decision-making process, firefighters are failing to implement best practices and placing themselves at increased risk of cancer.

g. *Motivation:* Fire department leaders are continually challenged to maintain motivation among their firefighters.[35] The motivational process can be complex, affected by individual firefighters' needs and the influences of their work environment.[36] This challenge of motivation within the fire service has discouraged firefighter commitment to the implementation process.

5. I researched each of these implementation barriers, looking for their underlying causes and possible solutions.

6. I explored fire departments and other government agencies that have successfully implemented best practices.

7. I selected the best solutions from this research and provided recommendations that individual firefighters and department leaders and administrators can use to overcome their implementation barriers in an effort to reduce their chances of developing occupational cancer.

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[33] James E. Ricciuti, "Groupthink: A Significant Threat to Homeland Security in the United States" (master's thesis, Naval Postgraduate School, 2014); Thomas Owen Landry, "Embracing the Devil: An Analysis of the Formal Adoption of Red Teaming in the Security Planning for Major Events" (master's thesis, Naval Postgraduate School, 2017).

[34] Peeples, "The Automatic Alarm Mindset."

[35] FDNY, "Training Bulletin: Management" (internal document, March 15, 1997), 18.

[36] FDNY, 17.

C. CHAPTER OVERVIEW

Chapter II begins by exploring the growing epidemic of occupational cancer within the fire service, and concludes with a descriptive examination of each implementation barrier. Chapter III examines the efforts two fire departments have taken, the Fire Department of the City of New York (FDNY) and the Palm Beach County Fire Rescue, to overcome their own barriers through the application of the seven-barrier framework (the Appendix provides visual references of material mentioned during the FDNY case study). Chapter IV focuses on the specific steps that fire department leaders and administrators can take to help their departments overcome their implementation barriers. Chapter V examines the three thematic findings of education, leadership, and the benefits of the workgroup. The chapter concludes with recommendations for future research.

II. FRAMEWORK DEVELOPMENT AND ANALYSIS

> If you are unable to understand the cause of a problem, it is impossible to solve it.
>
> —Naoto Kan, former prime minister of Japan[37]

This chapter begins by exploring the problem of occupational cancer within the fire service and the steps that fire department leaders and administrators have taken to prevent or reduce their membership's chances of contracting this terrible disease. The chapter then turns to the specific barriers that are inhibiting these same leaders and administrators from implementing best practices that have been developed to limit firefighters' exposure to fireground contaminants, thus preventing or reducing their chances of developing occupational cancer. The specific examples given in the chapter help to reveal the underlying causes of the barriers to change.

A. UNDERSTANDING THE GROWING EPIDEMIC

Firefighters are facing an epidemic of occupational cancer, with their line of duty deaths (LODDs) due to cancer increasing at alarming rates.[38] This trend is the result of their routine exposure to dangerous fireground contaminants that include known carcinogens. To limit firefighters' exposure to these fireground contaminants, the fire service has developed multiple best practices.[39]

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[37] Rod Baxter, Enterprise Excellence Handbook: A Step-by-Step Guide to Success (Lulu.com, 2016), 227.

[38] Matthew F. Smith and Julie Glenn, "Firefighters Fight for Recognition of Cancers Caused by Workplace Exposure," WGCU News," March 30, 2017, https://news.wgcu.org/post/firefighters-fight-recognition-cancers-caused-workplace-exposure; "Line of Duty Death Database," IAFF Firefighters, accessed June 27, 2018, https://lodd.iaff.org/.

[39] Firefighter Cancer Support Network, "Taking Action against Cancer in the Fire Service," version 2 (white paper, Firefighter Cancer Support Network, August 2013), https://firefightercancersupport.org/wp-content/uploads/2017/11/taking-action-against-cancer-in-the-fire-service-pdf.pdf; Washington State Council of Fire Fighters, *Healthy In, Healthy Out*.

1. Increasing Firefighter LODDs and Cancer Rates

With the evolution of firefighting gear, equipment, training, procedures, and fire-prevention programs, the fire service has recently recorded some of the lowest rates of LODDs.[40] The National Fire Protection Association (NFPA) releases an annual report that details firefighter deaths within the United States; in 2016, according to the most recent report as of this writing, a total of sixty-nine firefighters died while on duty in the United States (see Figure 1), and only fifteen of these deaths were a result of fire—the lowest number of fireground deaths since the NFPA began recording data in 1977.[41]

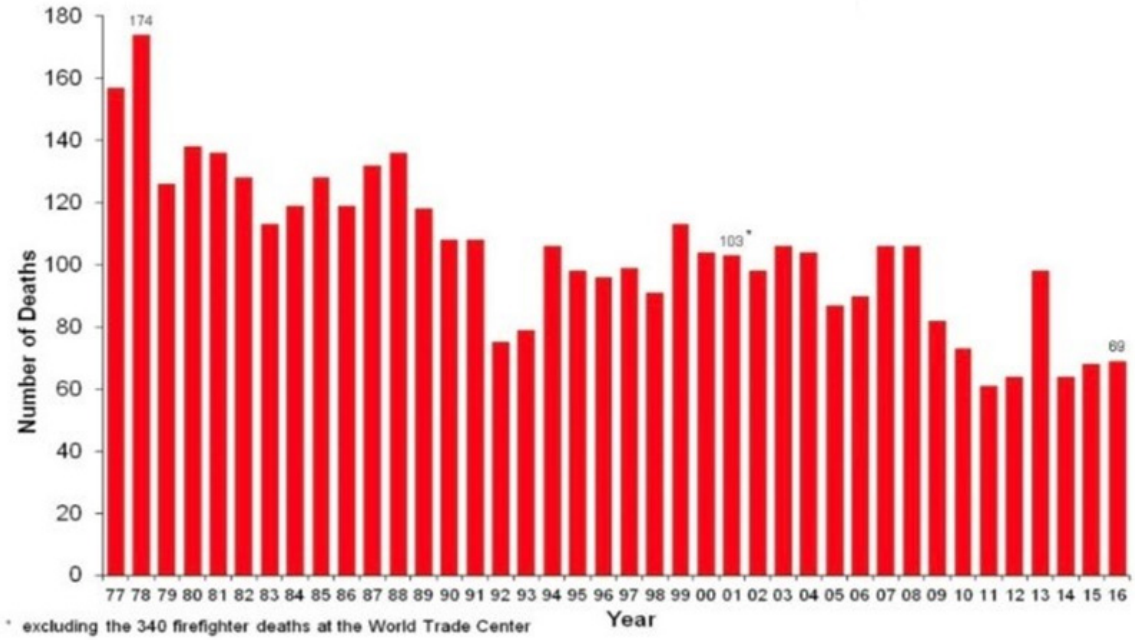

Figure 1. Firefighter Fatalities in the United States, 1977–2016[42]

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[40] Rita F. Fahy, Paul R. LeBlanc, and Joseph L. Molis, "Firefighter Fatalities in the United States" (report, National Fire Protection Association, June 2017), 21, http://www.nfpa.org/news-and-research/fire-statistics-and-reports/fire-statistics/the-fire-service/fatalities-and-injuries/firefighter-fatalities-in-the-united-states.

[41] Fahy, LeBlanc, and Molis, 5, 6.

[42] Source: Fahy, LeBlanc, and Molis, 21.

In contrast, firefighter deaths due to cancer have increased dramatically (see Figure 2).[43] Between 1950 and 1975, fewer than 5 percent of LODDs in the fire service were attributed to cancer.[44] However, according to the International Association of Fire Fighters, from January 1, 2002, to March 31, 2017, 61 percent of firefighter LODDs were caused by cancer, while heart disease, once a major contributor, only accounted for 18 percent of career LODDs for that same period.[45] In the year 2017 alone, 74 percent of firefighter LODDs were the direct result of cancer (see Figure 3), and cancer has become the leading cause of firefighter LODDs in the United States.[46] These statistics represent an alarming trend in the fire service and may even be understated, "because the deaths are self-reported from the local unions in 36 states that have presumptive cancer laws for firefighters."[47]

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[43] Smith and Glenn, "Firefighters Fight for Recognition of Cancers"; Jesse Roman, "Facing Cancer," *NFPA Journal*, May 2017, http://www.nfpa.org/news-and-research/publications/nfpa-journal/2017/may-june-2017/features/facing-cancer?cmp=ffcancer0517%3E.

[44] Smith, "Firefighters Fight for Recognition of Cancers."

[45] Roman, "Facing Cancer."

[46] IAFF Firefighters, "Line of Duty Death Database."

[47] Wagner and Sullivan, "Unmasked:.

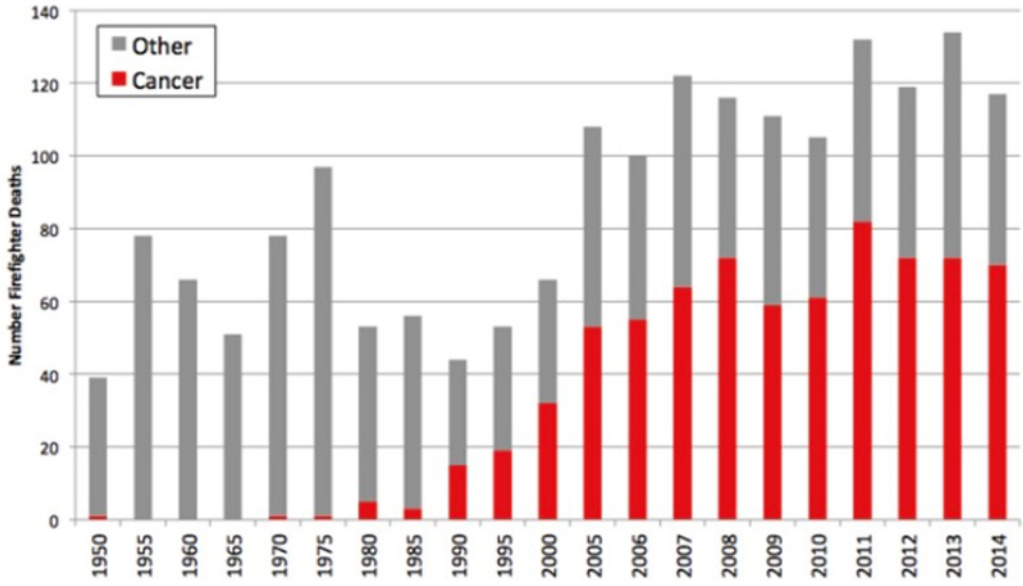

Figure 2. Firefighter Cancer LODDs 1950–2014[48]

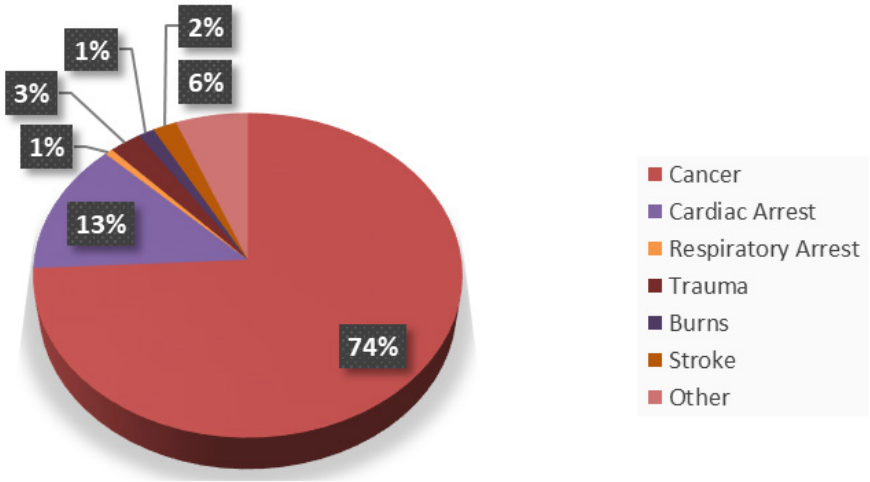

Figure 3. Firefighter LODDs 2017[49]

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[48] Source: "Awareness for Firefighters," First Responder Center for Excellence, accessed April 22, 2018, https://www.firstrespondercenter.org/cancer/awareness/.

[49] Source: IAFF Firefighters, "Line of Duty Death Database."

During the last few decades, researchers have begun to link firefighters' increased risk of cancer with their occupation.[50] Studies have investigated different locations, population sizes, and time frames, and have all concluded that firefighters face an increased risk of cancer when compared to the general population. The most comprehensive study to date was led by Robert Daniels in 2013, while he was working at the National Institute of Occupational Safety and Health (NIOSH). In this study, Daniels and his team evaluated a cohort of 29,993 firefighters from three large American cities: Philadelphia, San Francisco, and Chicago.[51] Their study compared cancer rates among firefighters to rates among the U.S. general population. It concluded that firefighters are at higher risk of developing cancers of the oral, respiratory, digestive, and urinary systems, and face a twofold increased risk of malignant mesothelioma mortality and incidence (see Figure 4).[52] This was the first study to identify an excess of mesothelioma in firefighters, which Daniels and his team attribute to firefighters' exposure to asbestos, a known cause of mesothelioma.

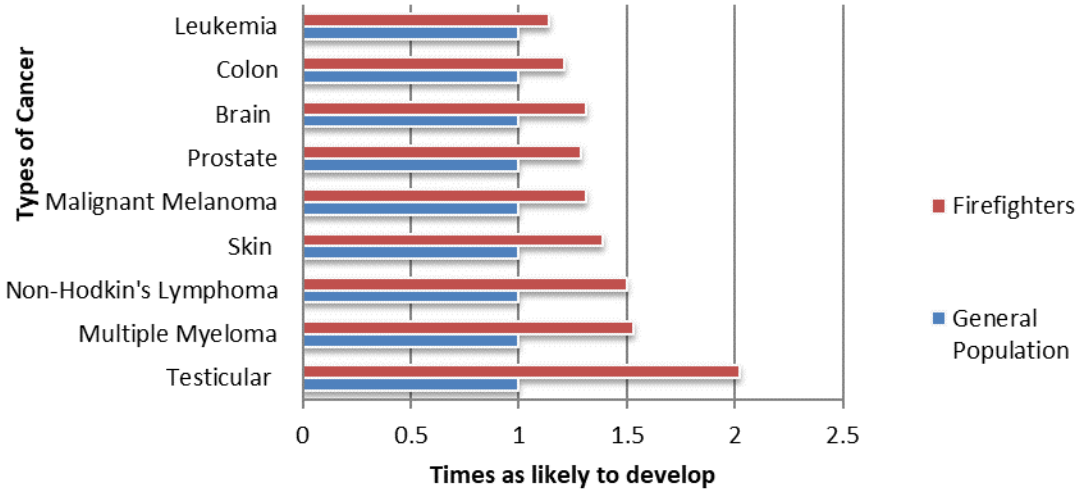

Figure 4. Cancer among Firefighters Compared to the General Population[53]

[50] Daniels et al., "Mortality and Cancer Incidence."

[51] Daniels et al.

[52] Daniels et al., 395.

[53] Source: Daniels et al.

In 2006, Grace LeMasters et al. published a meta-analysis in the journal of the American College of Occupational and Environmental Medicine that reviews thirty-two previous firefighter cancer studies.[54] They conclude that firefighters face an elevated risk of certain types of cancer, such as multiple myeloma, non-Hodgkin's lymphoma, prostate cancer, and testicular cancer.[55] Similar to Daniels et al.'s and LeMasters et al.'s studies, but on a smaller scale, Fangchao Ma et al. studied 34,796 male and 2,017 female Florida professional certified firefighters and concluded that firefighters are consistently healthier than the general Florida population due to healthy worker effect.[56] However, this study also found that male firefighters face increased rates of bladder, testicular, and thyroid cancers and female firefighters face increased rates of overall cancer, and cervical and thyroid cancer.[57] Rebecca Tsai et al.'s study of 3,996 male California firefighters likewise concluded that these firefighters face a significantly elevated risk for melanoma, multiple myeloma, acute myeloid leukemia, and cancers of the esophagus, prostate, brain, and kidney.[58] Tsai et al.'s study is unique in that it describes a higher percentage of minority firefighters compared to previous studies, and concludes that, when compared to their white counterparts, firefighters of other races and ethnicities have higher rates of tongue cancer, testicular cancer, bladder cancer, non-Hodgkin's lymphoma, chronic lymphocytic leukemia, and chronic myeloid leukemia.[59]

Occupational cancer is not unique to firefighters in the United States. In 2013, for example, Eero Pukkala et al. conducted a retrospective cohort study using data from five Nordic countries' cancer registries.[60] This data included the information of 16,422 male

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[54] LeMasters et al., "Cancer Risk among Firefighters," 1189.

[55] LeMasters et al., 1189.

[56] Fangchao Ma et al., "Cancer Incidence in Florida Professional Firefighters, 1981–1999," *Journal of Occupational Environmental Medicine* 48, no. 9 (September 2006): 884–86.

[57] Ma et al., 883.

[58] Rebecca J. Tsai et al., "Risk of Cancer among Firefighters in California, 1988–2007," *American Journal of Industrial Medicine* 58, no. 7 (July 2015): 715, https://doi.org/10.1002/ajim.22466.

[59] Tsai et al., 716, 718.

[60] Eero Pukkala et al., "Cancer Incidence among Firefighters: 45 Years of Follow-up in Five Nordic Countries," *Occupational and Environmental Medicine* 71, no. 6 (May 9, 2014), https://doi.org/10.1136/oemed-2013-101803.

firefighters from 1961 to 2005.[61] They found an increased risk of prostate cancer and skin melanoma among firefighters between the ages of thirty and forty-nine when compared to the general population.[62] Pukkala et al.'s findings were replicated by D.C. Glass et al. in 2015, in a similar cohort study of Australian's part-time and full-time firefighters using the Australian National Death Index and Australian Cancer Database.[63] Glass et al. conclude that firefighters face an increased risk of prostate cancer and melanoma when compared with the general population in Australia.[64] This study was unique because it factored in the number of structural, landscape, and vehicle fires that the firefighters attended during their careers.[65] The researchers found that prostate and kidney cancers were associated with a firefighter's length of service, and attendance at fires increased risk.[66] What differentiates this study from others, however, is that it found that firefighters have reduced risk of mortality and cancer incidence compared to the general population.[67]

Overall, these cancer studies came to a similar conclusion: that firefighters face increased rates of certain types of cancer when compared with the general population. Each study was unique either in its size, sample, demographics, or location, and each contributed evidence to the link between the occupation of firefighting and increased cancer rates. Furthermore, these studies were selected for this thesis because they were all conducted within the last sixteen years, and therefore reflect the current health climate in the fire service. It should be noted, however, that current studies lack significant data about female and minority firefighters.

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[61] Pukkala et al., 398.

[62] Pukkala, 398.

[63] Deborah. C. Glass et al., "Mortality and Cancer Incidence in a Cohort of Male Paid Australian Firefighters," *Occupational and Environmental Medicine; London* 73, no. 11 (November 2016): 761, http://dx.doi.org/10.1136/oemed-2015-103467.

[64] Glass et al.

[65] Glass et al., 762.

[66] Glass et al., 761.

[67] Deborah C. Glass et al., "Mortality and Cancer Incidence among Male Volunteer Australian Firefighters," *Occupational and Environmental Medicine; London* 74, no. 9 (September 2017): 628, http://dx.doi.org/10.1136/oemed-2016-104088.

2. Avenues of Exposure

The cancer studies discussed in the previous section all reveal that higher cancer rates among firefighters are a direct result of their exposure to carcinogens. A firefighter can be exposed to carcinogens through three routes: inhalation, ingestion, or absorption (see Figure 5). These routes of exposures have been scientifically proven through the testing and analysis of firefighters' blood, urine, personal wipe, and air samples. For example, Chantal Caux, Cindy O'Brien, and Claude Viau, writing for *Applied Occupational and Environmental Hygiene* in 2002, analyzed urine samples from forty-three firefighters, taken twenty hours after their exposure to a fire.[68] The analysis concluded that firefighters had elevated levels of polycyclic aromatic hydrocarbons (PAHs), which are products of incomplete combustion and classified as probable or possible carcinogens .[69] Similarly, Jennifer Keir et al., writing for *Environmental Science & Technology* in 2017, examined urine, personal wipes, and air samples of twenty-seven firefighters from the Ottawa Fire Service and found that these firefighters had from 2.9- to a 5.3-fold increase in the amount of PAHs in their urine after a fire.[70] Finally, Susan Shaw et al.'s study of twelve Northern California firefighters' blood notes that firefighters were exposed to polychlorinated and polybrominated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs and PBDD/Fs) and other persistent organic pollutants (POPs) during residential and commercial fires.[71] This dangerous exposure was indicated by the elevated levels in their blood compared to the general population. The U.S. Environmental Protection

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[68] Chantal Caux, Cindy O'Brien, and Claude Viau, "Determination of Firefighter Exposure to Polycyclic Aromatic Hydrocarbons and Benzene during Fire Fighting Using Measurement of Biological Indicators," *Applied Occupational and Environmental Hygiene* 17, no. 5 (May 1, 2002): 379, https://doi.org/10.1080/10473220252864987.

[69] Caux, O'Brien, and Viau, 379; Hussein I. Abdel-Shafy and Mona S. M. Mansour, "A Review on Polycyclic Aromatic Hydrocarbons: Source, Environmental Impact, Effect on Human Health and Remediation," *Egyptian Journal of Petroleum* 25, no. 1 (March 1, 2016): 107–23, https://doi.org/10.1016/j.ejpe.2015.03.011.

[70] Jennifer L. A. Keir et al., "Elevated Exposures to Polycyclic Aromatic Hydrocarbons and Other Organic Mutagens in Ottawa Firefighters Participating in Emergency, On-shift Fire Suppression," *Environmental Science & Technology*, October 18, 2017, https://doi.org/10.1021/acs.est.7b02850.

[71] Susan D. Shaw et al., "Persistent Organic Pollutants Including Polychlorinated and Polybrominated Dibenzo-p-Dioxins and Dibenzofurans in Firefighters from Northern California," *Chemosphere* 91, no. 10 (June 2013): 1386–94, https://doi.org/10.1016/j.chemosphere.2012.12.070.

Agency has classified dioxins as "highly toxic and can cause cancer, reproductive and developmental problems, damage to the immune system, and can interfere with hormones."[72] These tests prove, substantially, that firefighters are exposed to deadly carcinogens during a fire.

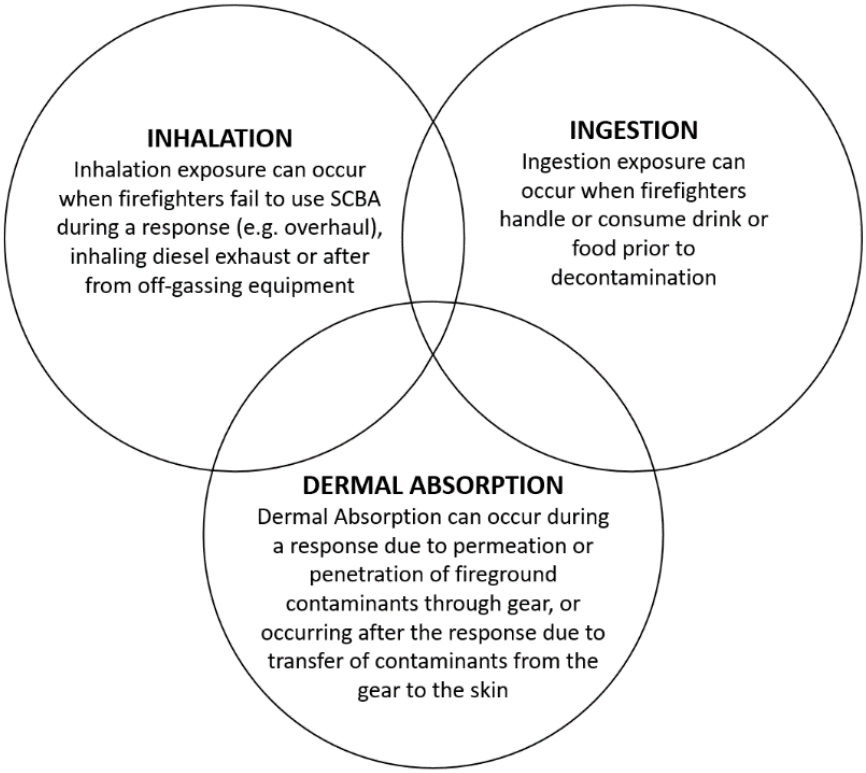

Figure 5. Pathways of Exposure to Carcinogens[73]

[72] "Learn about Dioxin," Environmental Protection Agency, January 28, 2014, https://www.epa.gov/dioxin/learn-about-dioxin.

[73] Kenneth W. Fent et al., "Volatile Organic Compounds Off-gassing from Firefighters' Personal Protective Equipment Ensembles after Use," *Journal of Occupational and Environmental Hygiene* 12, no. 6 (June 3, 2015): 404–14, https://doi.org/10.1080/15459624.2015.1025135.

3. Best Practices for Exposure Prevention

The fire service has identified techniques that can be used or adapted to limit a firefighter's exposure to deadly fireground contaminants. Two recent fire service publications have listed these best practices: a white paper published by the Firefighter Cancer Support Network (FCSN), and a booklet from the Washington State Council of Fire Fighters. Both publications provide fire departments with foundational documents from which to develop policies and procedures to reduce firefighters' risk of exposure to carcinogens.

The white paper was released in 2013 and titled "Taking Action against Cancer in the Fire Service."[74] With the help of fire service personnel and experts from the legal, medical, and social research communities, the FCSN developed eleven best practices to reduce the risk of firefighters developing occupational cancer (see Figure 6).[75] The FCSN white paper was followed in 2016 by the booklet, titled *Healthy In, Healthy Out: Best Practices for Reducing Fire Fighter Risk of Exposures to Carcinogens*.[76] This self-described best practice manual was developed through a partnership between the Kent Fire Department in Washington state and the Washington State Council of Fire Fighters, with funding provided by the state of Washington, Department of Labor and Industries, and Safety and Healthy Investment Projects.

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[74] Firefighter Cancer Support Network, "Taking Action against Cancer."

[75] Firefighter Cancer Support Network, 15.

[76] Washington State Council of Fire Fighters, *Healthy In, Healthy Out*.

WHAT IMMEDIATE ACTIONS CAN I TAKE TO PROTECT MYSELF?

1

Use SCBA from initial attack to finish of overhaul. (Not wearing SCBA in both active and post-fire environments is the most dangerous voluntary activity in the fire service today.)

2

Do gross field decon of PPE to remove as much soot and particulates as possible.

3

Use Wet-Nap or baby wipes to remove as much soot as possible from head, neck, jaw, throat, underarms and hands immediately and while still on the scene.

4

Change your clothes and wash them immediately after a fire.

5

Shower thoroughly after a fire.

6

Clean your PPE, gloves, hood and helmet immediately after a fire.

7

Do not take contaminated clothes or PPE home or store it in your vehicle.

8

Decon fire apparatus interior after fires.

9

Keep bunker gear out of living and sleeping quarters.

10

Stop using tobacco products.

11

Use sunscreen or sun block.

The importance of annual medical examinations cannot be overstated — early detection and early treatment are essential to increasing survival.

Figure 6. Best Practices for Reducing Firefighter Occupational Cancer[77]

[77] Source: Firefighter Cancer Support Network, "Taking Action against Cancer," 15.

New technology and procedures have allowed for testing and validation of these best practices. In 2015, for example, Kenneth Fent et al. demonstrated the dangers of off-gassing of volatile organic compounds (VOCs) from PPE after use.[78] This study confirmed the best practice of rehabilitation away from contaminated ensembles and isolation of contaminated gear on apparatuses.[79] In a separate study in 2017, Fent et al. found that "field decontamination using dish soap, water, and scrubbing was able to reduce PAH contamination on turnout jackets by a median of 85%."[80] Additionally, it was found that "cleansing wipes were able to reduce PAH contamination on neck skin by a median of 54%."[81] This study confirms the effectiveness of two best practices of on-scene decontamination.

Best practices were further substantiated in Keir et al.'s study of Ottawa firefighters, which concluded that chemicals entered the Ottawa firefighters' bodies mainly through skin contact, and "that adequate post-event skin and PPE decontamination will effectively reduce combustion emission exposures and the associated health risks."[82] Finally, Caux, O'Brien, and Viau confirmed the best practice of wearing a self-contained breathing apparatus (SCBA) at all times.[83] Firefighters who wore their SCBAs for the entire length of the study "had no measurable t,t-muconic acid."[84] Muconic acid is a useful indicator of exposure to benzene, a byproduct of combustion and pyrolysis which that is carcinogenic to humans.[85]

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[78] Fent et al., "Volatile Organic Compounds," 404.

[79] Fent et al., 413.

[80] Kenneth W. Fent et al., "Contamination of Firefighter Personal Protective Equipment and Skin and the Effectiveness of Decontamination Procedures," *Journal of Occupational and Environmental Hygiene* 14, no. 10 (October 3, 2017): 801, https://doi.org/10.1080/15459624.2017.1334904.

[81] Fent et al.

[82] Keir et al., "Elevated Exposures to Polycyclic Aromatic Hydrocarbons."

[83] Caux, O'Brien, and Viau. "Firefighter Exposure to Polycyclic Aromatic Hydrocarbons," 382.

[84] Caux, O'Brien, and Viau, 382.

[85] "What Causes Cancer? Benzene and Cancer Risk," American Cancer Society, accessed July 6, 2018, https://www.cancer.org/cancer/cancer-causes/benzene.html.

B. IMPLEMENTATION BARRIERS

Ideas are easy. Implementation is hard.

—Guy Kawasaki, venture capitalist[86]

Seven key barriers are preventing firefighters from implementing best practices for preventing exposure to cancer-causing carcinogens: fire department culture, awareness, complacency, funding, compliance, groupthink, and motivation (see Figure 7).[87] These barriers have created an environment where firefighters are unnecessarily exposed to fireground contaminants that are causing them to face cancer-related deaths and disabilities. This section uses a two-step process to examine these barriers: first the barrier is identified and discussed, and then the barrier is connected specifically to the fire service.

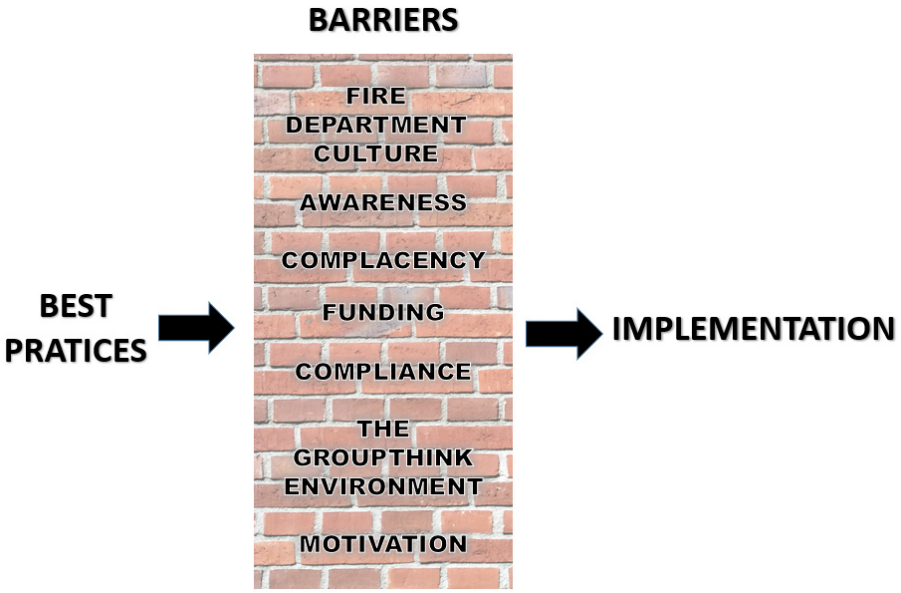

Figure 7. The Seven Barriers to Implementation of Best Practices

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86 "Ideas Are Easy, Implementation Is Hard," *Forbes*, November 4, 2004, https://www.forbes.com/2004/11/04/cx_gk_1104artofthestart.html#3a1146b31efe.

87 More than seven barriers to implementation of fire service best practices may exist. However, after conducting research of previous change efforts in the fire service, healthcare industry, and commercial industry, and being a founding member and active participant of the FDNY's Contamination Reduction Workgroup (discussed in Chapter III), I chose these seven barriers due to their influence on an organization's change effort. Addressing other barriers seen during research would not produce the same return on investment.

1. Culture

> You can have all the right strategy in the world; if you don't have the right culture, you're dead.
>
> —Patrick Whitesell, executive chairman[88]

The American fire service has developed an organizational culture over the course of its history that has unique cultural artifacts, values, and assumptions. Elements of this culture may discourage firefighters, or fire departments, from implementing best practices to reduce their risk of occupational cancer. For example, firefighters have historically believed that dirty bunker gear portrays a sense of machismo and signifies that a firefighter is reliable, knowledgeable, and professionally competent.[89] But this a cultural artifact is a false badge of honor; studies have confirmed the dangers of wearing dirty bunker gear.[90] Firefighters' acceptance of this cultural artifact puts themselves, their colleagues, and their families at an increased risk of exposure to dangerous fireground contaminants.[91]

The misapplication of fire service's cultural values has created a work environment where fire service best practices are discouraged or ignored. As another example, fire department leaders and fellow firefighters often allow their coworkers to use their SCBA improperly during fires, based on their loyalty to that individual.[92] This misapplication of the cultural value of loyalty places the firefighter at increased risk of exposure to dangerous fireground contaminants.

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[88] "Why Some of the Most Innovative Leaders Have an Open Door Policy," Fast Company, accessed July 21, 2018, https://www.fastcompany.com/3027128/why-some-of-the-most-innovative-leaders-have-an-open-door-policy.

[89] Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 2.

[90] Fent et al., "Volatile Organic Compounds"; Fent et al., "Contamination of Firefighter Personal Protective Equipment."

[91] Fent et al., "Volatile Organic Compounds," 413; Ronald E. Powers, "Cancer Rates in Children of Kitsap County Firefighters" (applied research project, National Fire Academy, 2015), 40, https://www.hsdl.org/?abstract&did=804429.

[92] Firefighter Close Calls, "Eating Smoke Soup."

The fire service has nurtured the belief that firefighter injuries and deaths are an unavoidable part of the job.[93] Because of this acceptance, firefighters routinely ignore fire service best practices and engage in unsafe practices. For example, during a focus group of Palm Beach County Fire Rescue firefighters discussing cancer in the fire service, a firefighter named Tony stated, "We're not gonna be able to prevent it. It's not a matter of if, it's a matter of when. Because I think anyone sitting here [is gonna get] some type of cancer, I have no doubt in my mind."[94] The overestimation of cancer risk by firefighters, to the point of fatalism, prevents them from engaging in behaviors to help reduce their risk of cancer.[95]

2. Awareness

> We can be blind to the obvious, and we are also blind to our blindness.
>
> —Daniel Kahneman, psychologist[96]

Researchers have found that firefighters and their leadership have varying, and sometimes inadequate, levels of awareness about cancer prevention.[97] Specifically, they lack knowledge of the threat of occupational cancer, the dangers of chemical exposure, the best practices to avoid exposure, and the policies and procedures that have been created and adapted by their departments to prevent exposure.[98] One survey, conducted by the *Columbus Dispatch* in a five-part series investigating cancer in the Ohio fire service, confirms this inadequate awareness.[99] The investigation involved two statewide surveys, one in 2007 and another a decade later in 2017; in all, the newspaper polled 1,288 active

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[93] "16 Firefighter Life Safety Initiatives," Everyone Goes Home, accessed August 28, 2018, https://www.everyonegoeshome.com/16-initiatives/.

[94] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 174.

[95] Harrison et al., 175.

[96] Daniel Kahneman, *Thinking, Fast and Slow* (New York, NY: Farrar, Straus and Giroux, 2013), 24.

[97] Solle et al., "Perceptions of Health and Cancer Risk," 77.

[98] Solle, et al., 77; Wagner and Sullivan, "Unmasked."

[99] Wagner and Sullivan.

Ohio firefighters and 360 fire chiefs.[100] Approximately 48 percent of the firefighters surveyed do not believe that cancer is their greatest occupational risk; this contrasts the fact, mentioned previously, that cancer is the leading cause of firefighter LODDs, as reported by the International Association of Fire Fighters.[101] Also according to the surveys, 14 percent of chiefs are unaware of their department's written policies about firefighting and cancer prevention.[102] Finally, the surveys reveal that approximately 33 percent of Ohio firefighters are unaware of the link between chemical exposure and cancer.[103]

3. Complacency

> The trouble with you is that you think you have time.
>
> —Jack Kornfield, author[104]

Firefighters are particularly vulnerable to complacent attitudes, as they are repeatedly exposed to hazardous situations; over time, they become less concerned and therefore less cautious about the risks they face.[105] This complacent attitude can prevent firefighters from wearing their PPE, thus unnecessarily exposing them to hazardous situations and environments.

Some fire departments routinely respond to thousands of false automatic fire alarms every year.[106] According to Peter J. Finley's research study of sixty-seven fire departments throughout the United States, the frequent false alarms, which can account for nearly 19 percent of fire-related responses and which rarely communicate actual fires, lull firefighters

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[100] Wagner and Sullivan.

[101] Wagner and Sullivan; Khazan, *Thinking, Fast and Slow*.

[102] IAFF Firefighters, "Line of Duty Death Database."

[103] IAFF Firefighters.

[104] Jack Kornfield, "Letting Go," September 13, 2017, https://jackkornfield.com/letting-go/.

[105] Peeples, "Automatic Alarm Mindset."

[106] Peter J. Finley, Jr., "Residential Fire Alarm Systems: The Verification and Response Dilemma" (applied research project, National Fire Academy, November 2001), 11.

into complacency in their duties and responsibilities.[107] Finley's survey found that less than 3 percent of alarm activations were actual fires.[108] As a result of this low probability of fire and the repetitiveness of false alarms, firefighters fail to wear proper protective gear or carry proper tools at some incidents.[109]

4. Funding

> An ounce of prevention is worth a pound of cure.
>
> —Benjamin Franklin[110]

The challenge of obtaining funding is a significant deterrent for fire department leaders who seek change, or who are trying to implement initiatives. Fire department administrators and leaders must often make difficult fiscal decisions that require them to cut, reduce, or reallocate department funding. Critical items as apparatus fuel, preventive maintenance, utilities, and bond payments for fire stations are prioritized, while funds for continued education, new equipment, or incentives are deprioritized.[111] As a result, fire department leaders and administrators lack the necessary funding to implement best practices that might reduce firefighters' risk of developing occupational cancer.

A 2007 survey of Kentucky fire departments (116 of 120 counties submitted responses) attempted to quantify the departments' respiratory protection practices, barriers to program implementation, and medical evaluation programs.[112] Participants in this survey ranked lack of funding (48 percent) as the greatest barrier to their programs' implementation.[113] Similarly, Philip Weiser examined the process of procurement or adaptation of interoperable communication systems for emergency departments, and he

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[107] Peeples, "Automatic Alarm Mindset."

[108] Finley, "Residential Fire Alarm Systems," 31.

[109] Dixon, "Beware."

[110] "Ounce of Prevention, Pound of Cure," University of Cambridge, October 9, 2012, http://www.cam.ac.uk/research/news/ounce-of-prevention-pound-of-cure.

[111] Wallace, "Fire Department Budget Strategies."

[112] Easterling and Prince, "Respiratory Protection Programs for Firefighters," 725.

[113] Easterling and Prince, 725.

cited lack of funding as one of three barriers to implementation.[114] Anecdotal evidence confirms these studies: on July 9, 2018, the *Houston Chronicle* published an article discussing a state probe being conducted by the Texas State Commission into the safety standards at the Houston Fire Department (HFD). In this article, HFD Chief Sam Peña states, "It is going to take some time [to implement best-practice programs] because we are so far behind in that investment."[115] The article further states that the "lack of support from previous mayoral administrations … has created significant financial challenges" for the HFD.[116] A follow-on article states that the HFD's safety gaps "cannot be addressed with the department's current budget."[117] These examples validate that lack of funding is a barrier to implementation of fire service best practices.

5. Compliance

> If you think compliance is expensive- try non-compliance.
>
> — Paul McNulty, former U.S. deputy attorney general [118]

Firefighters routinely ignore departmental PPE policies that require them to wear their SCBA during overhaul and other operations, which puts them at increased risk of exposure to cancer-causing carcinogens.[119] And the departments themselves are failing to comply with state laws that mandate compliance with NFPA standards aimed at protecting firefighters.[120] The *Columbus Dispatch* found that, even though the vast majority of Ohio fire departments require their firefighters to wear SCBAs at all times in hazardous environments, the firefighters frequently fail to do so; approximately 77 percent of survey

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[114] Philip J. Weiser, "Communicating During Emergencies: Toward Interoperability and Effective Information Management," *Federal Communications Law Journal* 59, no. 3 (June 2007): 29.

[115] Despart, "HFD Safety Procedures."

[116] Despart.

[117] "State Probes Houston FD Safety Procedures," Firehouse, July 10, 2018, https://www.firehouse.com/safety-health/cancer-prevention/news/21012629/tx-state-investigation-probe-houston-safety-procedures-firefighters.

[118] Meinrad Dreher, *Treatises on Solvency II* (New York, NY: Springer, 2015), 284.

[119] Maglio, 556.

[120] Despart, "HFD Safety Procedures."

respondents stated that they don't always wear their SCBA, and an additional 3.9 percent answered that they never wear their SCBA, from the beginning of the fire to the end.[121] The surveys reveal a trend in lack of compliance with required safety standards.

6. Groupthink

> When all think alike, no one thinks very much.
>
> —Albert Einstein[122]

The fire service's organizational culture and characteristics make it particularly vulnerable to groupthink, a concept defined by Irving Janis in the 1970s and '80s as "a mode of thinking that people engage in when they are deeply involved in a cohesive in-group."[123] Groupthink has created a destructive environment where fire department members are discouraged from challenging commonly held fire department views, despite their own doubts.[124] As a result, firefighters have developed a faulty decision-making process that has desensitized them to—and normalized—risk, and prevents them from implementing best safety practices.[125]

Janis describes four foundational conditions and eight symptoms of groupthink.[126] The first condition is isolation from outsiders.[127] Firehouses often operate 24 hours a day, 7 days a week, 365 days a year. During this time, members respond to emergencies and conduct normal firehouse operations. A majority of a firefighter's time is spent isolated

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[121] Wagner and Sullivan, "Unmasked.

[122] Thomas Stewart Poetter, Thomas Lee Goodney, and Jennifer L. Bird, *Critical Perspectives on the Curriculum of Teacher Education* (Lanham, MD: University Press of America, 2004), 33.

[123] Jerry Laughlin, "American Fire Stations and 24-Hour Shifts: Breeding Grounds for Problems from Groupthink?" *International Fire Service Journal of Leadership and Management* 2, no. 2 (2008): 25; Irving Lester Janis, *Groupthink: Psychological Studies of Policy Decisions and Fiascoes* (Boston, MA: Cengage Learning, 1982).

[124] Ricciuti, "Groupthink"; Landry, "Embracing the Devil."

[125] Lance C. Peeples, "Firefighter Safety: The Normalization of Deviance," *Fire Engineering*, May 1, 2013, https://www.fireengineering.com/2013/05/01/227245/firefighter-safety-the-normalization-of-deviance/.

[126] Janis, *Groupthink*.

[127] Golkar Hassan, "Groupthink Principles and Fundamentals in Organizations," *Interdisciplinary Journal of Contemporary Research in Business* 5, no. 8 (December 2013): 226.

from the public, within the firehouse. When outsiders do enter a firehouse they are often portrayed as intruders.[128] In addition to this physical isolation, firefighters often share similar social backgrounds, training, hobbies, and political ideologies.[129] This leads to Janis's second condition, a lack of a normative decision-making process. Janis believes that groupthink noticeably increases when decision-makers are in stressful situations, and that decision-makers may feel that their self-esteem is threatened because of "the tremendous burden of having to decide about impenetrable, morally complex issues."[130] When firefighters are under stress, they may furthermore feel that the next emergency could be their last.[131]

The third condition is group uniformity, wherein a group's solidarity increases significantly "whenever a collection of individuals faces a common source of external stress, such as the threat of being injured or killed."[132] Firefighting teams are highly cohesive as a result of the dangers they routinely face together. The esprit de corps and amiability fosters an environment where independent critical thinking is supplanted by groupthink.[133] This leads to Janis's fourth and final condition, a lack of impartial leadership. Janis believes that leaders who use an overly directive style often become strong advocates of their own views and discourage any disagreement.[134] Because fire department leaders must make immediate, life-altering decisions during emergencies, fire departments are based on a paramilitary model that discourages impartial leadership.[135]

In addition to the four foundational conditions, Janis's eight symptoms of groupthink are also present within the fire service. The first symptom is that in-group

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[128] Laughlin, "American Fire Stations," 27.

[129] Laughlin, 27.

[130] Paul 't Hart, "Irving L. Janis' Victims of Groupthink," *Political Psychology* 12, no. 2 (1991): 258, https://doi.org/10.2307/3791464.

[131] Laughlin, "American Fire Stations," 26.

[132] Laughlin, 25.

[133] Laughlin, 26.

[134] David Patrick Houghton, "Understanding Groupthink: The Case of Operation Market Garden," *Parameters* 45, no. 3 (2015): 76.

[135] Laughlin, "American Fire Stations," 27.

members share an illusion of invulnerability.[136] This illusion provides members with "some degree of reassurance about obvious dangers and lead[s] them to become over optimistic and willing to take extraordinary risks."[137] This illusion of invulnerability within the fire service was recently discussed in a *FireRescue* article, in which Matthew Tobia states that firefighters value their tough identities and tend to believe three things: "(1) they are fearless; (2) they do not believe that the laws of nature apply to them; and (3) they have an unrealistic perception of their own invincibility."[138]

The second symptom of groupthink is members' belief in the group's inherent morality.[139] Janis says that "this belief inclines the members to ignore the ethical or moral consequences of their decisions."[140] This can be seen in the fire service, for example, when supervisors catch firefighters misusing department property or drinking alcohol while on duty, and fail to act.[141] Reporter Elizabeth Hume describes such an incident in the Sacramento Fire Department, when two captains were caught drinking and misusing a department vehicle by another supervising captain, who failed to report the incident to the battalion chief.[142] A different captain who eventually reported the incident contributed the initial failure to report to the good old boy syndrome present in the Sacramento Fire Department's day-to-day operations.[143] Jerry Laughlin, writing for the *International Fire Service Journal of Leadership and Management*, perhaps sums it up best when he states, "we're heroes, we can do no wrong."[144]

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136 Janis, *Groupthink*, 35.

137 Irving Lester Janis, Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes (Boston, MA: Houghton Mifflin Company, 1972), 85.

138 Matthew Tobia, "Cancer and the Fire Service," *FireRescue*, December 1, 2014, https://www.firerescuemagazine.com/articles/print/volume-9/issue-12/command-and-leadership/cancer-and-the-fire-service.html.

139 Janis, Victims of Groupthink, 86.

140 Janis, 86.

141 Elizabeth Hume, "Ex-firefighter Calls Bosses Lax," *Sacramento Bee*, July 16, 2004, https://www.sacbee.com/latest-news/article2571238.html.

142 Hume.

143 Hume.

144 Laughlin, "American Fire Stations," 28.

Rationalization is Janis's third symptom of groupthink.[145] Janis says that "victims of groupthink ignore warnings; they also collectively construct rationalizations in order to discount warnings and other forms of negative feedback that, taken seriously, might lead the group members to reconsider their assumptions each time they recommit themselves to past decisions."[146] This symptom of groupthink is routinely illustrated when firefighters attempt to suppress emotional traumatic situations or use dark humor. In 2013, Gisette Alvarado conducted a study of 128 urban firefighters to better understand the effects of trauma calls, and found that humor was the firefighters' number one coping mechanism.[147] This type of normalizing allows firefighters to transform "their perspective of a situation to make it easier to deal with on a continual basis," and helps them "cope with the tragic sights they view in performing their rescue duties."[148]

The fourth symptom of groupthink is stereotyped perceptions of the enemy.[149] The enemy is seen as so weak, stupid, or evil that any attempt at negotiating their differences seems fruitless.[150] This symptom has manifested in the fire service through sexual stereotyping, as shown in Ellen Rosell's 1995 survey of 206 female firefighters.[151] The survey showed that 42.7 percent of women surveyed noted some form of "sexual stereotyping in task assignments."[152] Additionally, half of harassed respondents believed that they were "dealing with job related sexual stereotyping."[153] Women firefighters were being perceived and treated by male firefighters as outsiders or lower-status employees.[154]

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[145] Janis, Victims of Groupthink, 86.

[146] Janis, 86.

[147] Gisette E. Alvarado, "Gallows Humor as a Resiliency Factor among Urban Firefighters with Specific Implications on Prevalence Rates of PTSD" (dissertation, Azusa Pacific University, 2013), 87.

[148] Karen Myers, "A Burning Desire: Assimilation into a Fire Department," *Management Communication Quarterly* 18, no. 3 (February 2005): 365, https://doi.org/10.1177/0893318904270742.

[149] Janis, Victims of Groupthink, 86.

[150] Janis, 86.

[151] Ellen Rosell, Kathy Miller, and Karen Barber, "Firefighting Women and Sexual Harassment," *Public Personnel Management* 24, no. 3 (1995): 344, https://doi.org/10.1177/009102609502400306.

[152] Rosell, Miller, and Barber, 344.

[153] Rosell, Miller, and Barber, 344.

[154] Rosell, Miller, and Barber, 340.

Self-censorship is Janis's fifth symptom of groupthink.[155] Janis states that "victims of groupthink avoid deviating from what appears to be group consensus; they keep silent about their misgivings and even minimize to themselves the importance of their doubts."[156] In Karen Myers's study of the assimilation of probationary firefighters within the Cactus City Fire Department in Texas, probationary firefighters displayed self-censorship when they showed deference to more senior crew members and expressed that they were expected "to be seen and not heard."[157] This leads to the sixth groupthink symptom, an illusion of unanimity. Janis states that "victims of groupthink share an illusion of unanimity within the group concerning almost all judgements expressed by members who speak in favor of the majority view."[158] This illusion is amplified by the false perception that everyone in the group agrees with the group's decision, and that an individual's silence is seen as consensual agreement.[159] This is seen in the firehouse when probationary firefighters believe "that they are expected to speak only when spoken to."[160]

Janis believes that the perpetuators of groupthink apply the seventh symptom, direct pressure, "to any individual who momentarily expresses doubts about any of the group's shared illusions or who questions the validity of the arguments supporting a policy alternative favored by the majority."[161] This type of direct pressure in the fire service was seen during Janice Yoder's 1997 study of twenty-four African American woman firefighters.[162] These women believed that their hiring had been influenced by a controversial affirmative action policy.[163] As a result of this policy, they were being

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155 Janis, Victims of Groupthink, 87.

156 Janis, 87.

157 Myers, "A Burning Desire," 361.

158 Janis, Victims of Groupthink, 87.

159 Ricciuti, "Groupthink," 25.

160 Myers, "A Burning Desire," 361.

161 Janis, Victims of Groupthink, 87.

162 Janice D. Yoder and Patricia Aniakudo, "'Outsider within' the Firehouse: Subordination and Difference in the Social Interactions of African American Women Firefighters," *Gender and Society* 11, no. 3 (1997): 324.

163 Yoder and Aniakudo, 331.

pressured by the majority-male firefighters to continually "prove their physical prowess, knowledge of firefighting, and commitment to the cohesiveness of the team."[164] However, they felt that no one proof was ever sufficient enough for their male counterparts.[165]

Janis's final symptom of groupthink is the presence of mindguards, which he defines as a self-appointed individual who seeks to enforce conformity by "putting social pressure on any member who begins to express a view that deviates from the dominant views of the group, to make sure that he will not disrupt the consensus of the group as a whole."[166] Senior or tenured firefighters can function as mindguards. These unofficial fire department powerbrokers perpetuate a well-established belief system in which, if probationary firefighters perform certain actions (cleaning firehouse, washing rig, cooking, making coffee, etc.) and demonstrate deference to more senior members, they are rewarded with access to the department's more desirable social circles.[167]

7. Motivation

> Motivation is the art of getting people to do what you want them to do because they want to do it.
>
> —Dwight D. Eisenhower[168]

Fire department leaders are continually challenged to maintain motivation among their firefighters.[169] The motivational process can be complex, affected by individual firefighters' needs and the influences of their work environment.[170] This challenge of motivation within the fire service has discouraged firefighters' commitment to implementing safety measures. Some fire departments have used social media to drive or

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164 Yoder and Aniakudo, 331.

165 Yoder and Aniakudo, 331.

166 Janis, Victims of Groupthink, 41.

167 Cox, "Significance of Fire Service Culture," 45–46; Myers, "A Burning Desire," 361.

168 Kurt Mortensen, Persuasion IQ: The 10 Skills You Need to Get Exactly What You Want (New York, NY: AMACOM, 2008), 196.

169 FDNY, "Training Bulletin: Management," 18.

170 FDNY, 17.

motivate their firefighters. To make social media messages more targeted and meaningful, fire departments align these communications with firefighters' basic psychological needs and motivations, as described by Maslow's hierarchy of needs (e.g., safety needs, social needs, and self-esteem).[171] The three examples of social media posts shown below have been taken from the Facebook page of the Fire Department of the City of New York (FDNY).[172]

The social media post shown in Figure 8 targets firefighters who are on level two of Maslow's hierarchy of needs (security and safety needs). This post highlights the personal benefits firefighters can gain from cleaning their contaminated gear, one of the identified best practices. The post in Figure 9 targets those on level three of Maslow's hierarchy (social needs) by making a direct appeal to firefighters, asking them to take a personal pledge to reduce their risk of contracting occupational cancer. This personal pledge creates an opportunity for firefighters to belong to a group. And the post in Figure 10 targets firefighters on level four of Maslow's hierarchy (ego or self-esteem needs). Firefighters have historically believed that dirty or salty bunker gear signifies that they are reliable, knowledgeable, and professionally competent.[173] This social media post directly attacks this false image and calls out those who support this image as being naïve. This particular post had an accompanying hashtag in its description section, #MondayMotivation.[174]

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[171] For a description of the hierarchy of needs, proposed by psychologist Abraham Maslow in the 1940s, see Saul McLeod, "Maslow's Hierarchy of Needs," Simply Psychology, updated March 20, 2020, https://www.simplypsychology.org/maslow.html.

[172] New York City Fire Department (FDNY) Facebook page, accessed August 7, 2018, https://www.facebook.com/FDNY

[173] Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 2.

[174] New York City Fire Department (FDNY)," FDNY, July 30, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1807045342665432/?type=3&theater

Figure 8. Social Media Post Targeting Firefighters' Security and Safety Needs[175]

Figure 9. Social Media Post Targeting Firefighters' Social Needs[176]

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[175] Source: "New York City Fire Department (FDNY)," FDNY, August 7, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1820751814628118/?type=3&theater

[176] Source: "New York City Fire Department (FDNY)," FDNY, June 28, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1757458720957428/?type=3&theater

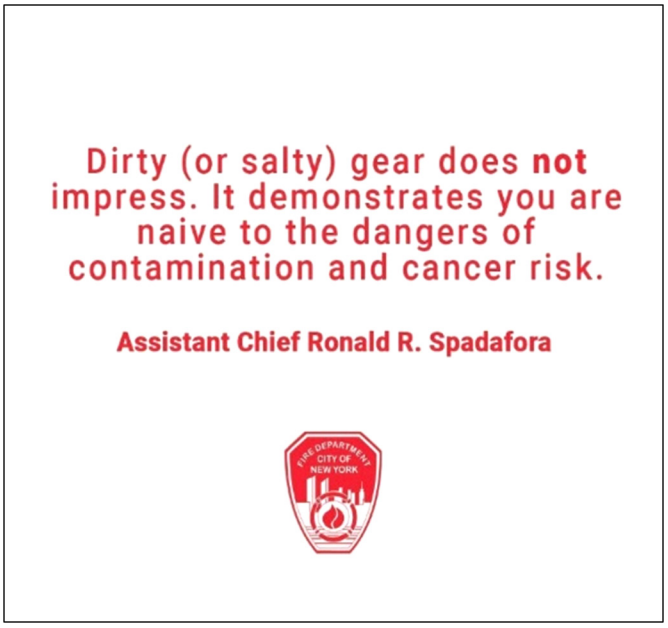

Figure 10. Social Media Post Targeting Firefighters' Ego or Self-Esteem Needs[177]

C. CONCLUSION

This chapter has introduced the growing threat of occupational cancer within the fire service. With specific examples, it has shown the presence of seven unique barriers that are preventing fire department leaders and administrators from implementing best practices aimed at preventing or reducing a firefighter's chances of developing occupational cancer. While this chapter has identified the problem, the next chapter looks for the solutions.

[177] Source: "New York City Fire Department (FDNY)," FDNY, July 30, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1807045342665432/?type=3&theater

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III. CASE STUDIES

> Do not wait; the time will never be "just right." Start where you stand, and work with whatever tools you may have at your command, and better tools will be found as you go along.
>
> —Napoleon Hill, author[178]

This chapter examines the efforts that two fire departments have taken to overcome their barriers to the implementation of certain health and safety measures. The Fire Department of the City of New York (FDNY) has optimized existing internal resources to achieve safety measures, while the Palm Beach County Fire Rescue has developed two vital partnerships with external organizations. Though both departments have made solid progress, the work to overcome their implementation barriers will continue long after this thesis is published. My analysis of these two departments herein uses the seven-barrier framework discussed in Chapter II; the barriers are, briefly: culture, awareness, complacency, funding, compliance, groupthink, and motivation.

A. FIRE DEPARTMENT OF THE CITY OF NEW YORK

Through critical self-examination and the optimization of its internal resources, the FDNY's Contamination Reduction Workgroup has successfully reduced or overcome the barriers that prevent fire departments from implementing health and safety measures; this is best exemplified by the increasing amount of decontaminated PPE cleaned by the FDNY's in-house cleaning facility, and by the number of social media followers reached by posts about the workgroup's initiatives. The FDNY case study shows that fire departments can look inward and make the most of their people's talents and expertise.

1. Description and Background

With the publishing of new scientific research and studies, the FDNY's leadership recognized in 2017 that it could do more to reduce its members' exposure to fireground

[178] Richard Scott, *I Don't Have Time* (Croydon, UK: Filament Publishing, 2010), 97.

contaminants that cause cancer-related deaths and disabilities. In July 2017, the department decided to form the Contamination Reduction Workgroup, composed of representatives from across the FDNY varying in rank and discipline. The department believed a wide diversification would help the group gather support and share different viewpoints, and legitimize its recommendations among the department. Representatives in the workgroup included those from departments such as Operations (Haz-Mat Operations, Decontamination Support Unit, and Rescue Operations); Safety; Training; Bureau of Health Services; Emergency Medical Services (EMS); Uniformed Firefighters Association; Uniformed Fire Officers Association; Fire Marshal; Facilities; and Fleet Services. I am a founding member of the workgroup, and have been an active participant in the group since its inception.

The workgroup's initial task was to examine the FDNY's existing practices, policies, and equipment for reducing cancer risk. In addition, the group was to examine initiatives being developed and implemented to complement existing protocols. The workgroup's goal was to reduce FDNY firefighters' chronic exposure to the dangerous byproducts of combustion.

a. Examining Existing Practices, Policies, and Equipment

Even before establishing the Contamination Reduction Workgroup in July 2017, the FDNY long recognized the threat from byproducts of combustion. The FDNY has historically taken a leading role implementing initiatives and programs to reduce a firefighter's exposure to these carcinogens. The workgroup critically examined eight of these major initiatives, focusing on those that allowed them to review the department's compliance, to learn from past successes, and to identify areas of needed improvement.

- *Installation and use of the Nederman Vehicle Exhaust System in every FDNY firehouse and EMS station*: This initiative, pioneered by FDNY

Firefighter Dominic DeFranco in the late 1980s, has greatly improved the long-term health and safety of FDNY personnel.[179]

- *Two sets of firefighter bunker gear:* Each FDNY firefighter is issued two sets of bunker gear, which allows them to send a set of dirty or contaminated gear to be laundered while still retaining one set of clean gear.

- *Annual PPE cleaning:* In accordance with NFPA 1851 Standard ("Selection, Care, and Maintenance of Protective Ensembles for Structural Firefighting and Proximity Fire Fighting), the FDNY requires a firefighter's bunker gear to be cleaned by a certified independent service provider once a year.[180]

- *Decontamination support unit:* The FDNY's in-house laundering facility, the Decontamination Support Unit (DSU), is based in the Queens neighborhood of Corona, New York, and is staffed by one officer, one firefighter, and sometimes one light duty firefighter. This facility can be operated twenty-four hours a day, seven days a week, based on user demand. This facility is responsible for multiple tasks, including picking up contaminated firefighting gear from field units, washing it, drying it, and returning it to its users.

- *Firefighter hoods:* During fires, the hoods that protect firefighters' neck and ears become contaminated with dangerous smoke particulates. FDNY firefighters are issued two hoods, allowing one to be washed while the other is being worn.

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[179] Fire Department City of New York (FDNY), *Reduce Your Risk: FDNY's Approach to Reducing Occupational Exposure to Fireground Contaminants* (New York, NY: ProBooks, 2018), 40, http://www.fdnypro.org/reduceyourrisk/.

[180] FDNY, "All Unit Circular 310: Personal Protective Equipment (PPE)" (internal document, FDNY, July 1, 2018).

- *PPE transport bags*: Red bags are issued to firefighters to transport their PPE gear to and from firehouses. The bags prevent cross-contamination between contaminated PPE and a firefighter's personal vehicle.[181]

- *SCBA mask-use policy:* The FDNY's mask-use policy requires firefighters to use their SCBA whenever they are exposed to an environment deemed immediately dangerous to life and health (IDLH). Furthermore, firefighters are issued their own personal face pieces, designed to limit air loss and inhalation of dangerous chemicals.[182]

- *Annual medical evaluations:* FDNY firefighters are required to have an annual medical exam at the department's Bureau of Health Services. The exam consists of a vital sign evaluation (blood pressure, pulse rate, height, weight, oxygen saturation), an electrocardiogram (EKG), a pulmonary function test, a urine and blood laboratory test, a cardio pulmonary fitness evaluation (stair mill test), immunizations, a tuberculosis test, a hearing and vision test, a chest X-Ray (every three years), a face piece fitting, and a physician evaluation.[183]

b. Gaps Recognized and New Initiatives Considered

By examining the FDNY's past initiatives and current practices, the workgroup identified the following gaps.

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[181] FDNY, "All Unit Circular 310 Addendum 4: Transportation of Firefighter Personal Protective Equipment (PPE)" (internal document, FDNY, February 12, 2018).

[182] FDNY, "Training Bulletin: Scott 4.5 Positive Pressure Self-Contained Breathing Apparatus (SCBA)" (internal document, FDNY, August 24, 2010).

[183] "FDNY: Bureau of Health Services (BHS) Medical Assessment Frequently Asked Questions," City of New York, December 11, 2015, http://www1.nyc.gov/assets/fdny/downloads/pdf/join/medical-assessment-faqs-12-15.pdf.

- *Laundering capabilities:* The workgroup recognized that firefighters were underutilizing the DSU cleaning facility, which means they were not always decontaminating their PPE after a fire.[184]

- *Hood cleaning:* Firefighters were unnecessarily exposing themselves by wearing hoods that had been contaminated during previous fires. This caused otherwise avoidable chronic exposure to fireground contaminants.

- *Manuals:* The workgroup found that FDNY manuals need to be updated to reflect new research, equipment, and decontamination procedures.

New scientific research and technology have provided the FDNY with the unique opportunity to consider two new initiatives as well.

- *Decontamination wipes:* Studies show the benefit of firefighters using decontamination wipes at the scene of a fire.[185]

- *Digital/social media:* The workgroup saw an opportunity to share research and best practices with firefighters, their families, and the public in an effort to expand its message.[186]

The workgroup tasked its members to research and provide recommendations in these areas, and met bi-weekly to discuss progress and barriers, to exchange information, and to gather advice.

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[184] I drew this conclusion based on personal observations of the DSU facility and analysis of the facility's monthly tracking data and staff.

[185] Fent et al., "Contamination of Firefighter Personal Protective Equipment," 801.

[186] FDNY Facebook, accessed July 18, 2018, https://www.facebook.com/FDNY; FDNY Instagram, accessed July 18, 2018, https://www.instagram.com/fdny/; FDNY Twitter, accessed July 18, 2018, https://twitter.com/FDNY.

c. Initial Recommendations

In August 2017 the workgroup sent a letterhead report to FDNY leadership listing its initial recommendations, broken down into two categories: health and safety, and education.[187]

- *Health/safety and contamination reduction*: The major objective of the health and safety recommendations was to "significantly limit the exposure of FDNY members to cancer causing contaminants both on and off the scene of a fire."[188] The recommendations include:

  a. Develop and implement a hood exchange policy.
  b. Institute a policy for showering within one hour after a fire.
  c. Prohibit the wearing or storage of firefighter PPE in living areas of firehouse.
  d. Procure and distribute wipes for use by firefighters immediately after an exposure or contamination.
  e. Review and amend FDNY manuals to require cleaning on interior of apparatus and update current decontamination procedures.
  f. Create a policy to exchange gloves.
  g. Establish a zero-tolerance policy for professional advanced gear cleaning.
  h. Establish a cleaning cycle for EMS bunker gear.

- *Education*: The workgroup recognized the importance of educating firefighters about the routes of exposure, the health risk of exposure, and the steps they can take to minimize their exposure to the hazards of modern fireground contamination. This education would cause a change in

[187] Frank Leeb, "Contamination Reduction Workgroup—Initial Recommendations" (official memorandum, New York, NY: FDNY, August 11, 2017).

[188] Leeb.

culture and that would help firefighters embrace the new initiatives. The workgroup made two recommendations:

a. Employ or partner with a marketing firm to develop a campaign.
b. Include a training segment about contamination reduction in all ranks of training programs.

In November 2017, the leadership of the workgroup was invited to present its recommendations to the chief of department and fire commissioner; they were immediately met with approval. In January 2018, the workgroup presented the recommendations to the remaining FDNY staff chiefs and were met with similar support.

d. Steps Taken

With the full support of the department's leadership, the workgroup began to take the necessary steps to implement its recommendations. These steps included providing fire department leadership with guidance, documentation, and language for rules and procedures that could be implemented.[189] The workgroup focused on the following.

- *Buckslip and Uniformed Firefighter Association (UFA) message*: To deal with the underutilization of the DSU cleaning facility, the workgroup recommended issuing a buckslip—an official notification used to quickly reinforce an existing FDNY procedure, pending an official release of either a training or procedural manner. This buckslip presented a reminder about the DSU cleaning facility's availability to clean contaminated bunker gear, and highlighted the procedure to have it done. On February 1, 2018, the FDNY leadership published the official buckslip. A similar Safety Message was released to UFA members on February 16.

- *Social media posts:* Together, the Contamination Reduction Workgroup, FDNY Foundation, FDNY Pro, and the Office of Public Information created multiple social media posts regarding the workgroup's

[189] FDNY, Reduce Your Risk, 14.

contamination reduction initiatives; the posts were shared from @fdnypro and @fdny on Facebook, Twitter, and Instagram.[190]

- *Partnership with the Probationary Firefighter School (PFS)*: The Probationary Firefighter School has provided a valuable testing platform for some of the workgroup's recommendations. During the second probationary firefighter class of 2017, the PFS made several changes to its daily routine and training to help introduce the firefighters to best practices for reducing contamination and exposure to carcinogens, such as hood cleaning, use of wipes, and showers after a live fire training.

- *Meetings and conversations with industry experts:* The workgroup invited experts from both inside and outside the FDNY to shift the focus and introduce fresh thinking toward problems. These experts included representatives from firefighter gear manufacturers and gear laundering companies. In addition, members of the workgroup attended national workshops and conferences that concentrated on fire service occupational health and cancer risk reduction to gain new perspectives and network.

- *Updates to FDNY manuals*: The workgroup recommended amendments and revisions to the department's manuals, which are the basis for all promotional exams in the FDNY; all potential promotional candidates must study the manuals before they are promoted.

- *Enforcement of the FDNY's existing annual laundering policies*: The workgroup created a detailed list of firefighters whose gear had missed

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[190] The FDNY Foundation is the official nonprofit organization of the New York City Fire Department, whose mission is to "promote fire and life safety education and help the FDNY better protect New York. The FDNY Foundation funds awareness and outreach programs for the public, training and support for FDNY members and assists in providing the technology and equipment that helps keep the FDNY the premiere Fire Department in the world." See "Mission," FDNY Foundation, accessed May 9, 2020, http://www.fdnyfoundation.org/mission/.

FDNY Pro is a public website, run by the FDNY Foundation, that gives users access to unique blogs, podcasts, stories, photos, books, and *WNYF Magazine*. It is available at http://www.fdnypro.org/.

annual cleaning, and released the list to their direct supervisors along with the necessary steps to remedy the situation.

- *Reminder email:* After second-alarm or more serious fires, the Safety Command sends a reminder email to each unit that was dispatched to the fire. This email reminds the units about the dangers of contaminated gear and the availability of the DSU cleaning facility. Website links for the DSU are included on this email.

2. Implementation Barriers

The FDNY Contamination Reduction Workgroup faced a number of implementation barriers, and used a number of methods to address them. To change the FDNY's existing fire department culture, for instance, the workgroup promoted a change in perception of dirty bunker gear as a dangerous false badge of honor. Through social media, the workgroup promoted the motto "clean is the new salty."[191]

The workgroup also realized that FDNY membership lacked awareness in two areas. First was the availability and ease of use of the in-house laundering facility and its procedures. This barrier was overcome when the FDNY leadership released its buckslip and the UFA released its safety message, and by sending reminders to units after second-alarm or more serious fires. Second, the workgroup concluded that the department needed education about the dramatic rise of firefighter occupational cancer and the dangers of contaminated gear. The workgroup has begun to tackle this barrier by holding presentations for the probationary firefighter class (beginning with the second class of 2017), department leaders, and both firefighter unions (the Uniformed Fire Officers Association and the Uniformed Firefighter Association). Furthermore, with the help of FDNY Pro, FDNY Foundation, and the Office of Public Information, the workgroup has released multiple social media posts regarding its contamination reduction initiatives to raise awareness about best practices. Through its presentations and social media activity, the workgroup has attempted to build a sense of urgency in the fire department. An appeal has been made

[191] FDNY, Reduce Your Risk, 16.

stressing the fact that firefighters are statistically dying younger as a result of cancer—something that cannot be ignored.

Due to the tedious and often time-consuming process of obtaining additional funding from the city government for new fire department initiatives, the workgroup purposively focused its early initiatives and recommendations on existing departmental resources. With the help of department members, the workgroup created educational videos, posters, and social media posts.[192] The underutilized laundering capacity at the DSU provided the workgroup with another no-cost initiative.[193] Finally, the fire academy was able to rebalance its existing budget to procure wipes, and to adjust its training schedule to give probationary firefighters time to shower after a live burn exercise.[194]

After examining quartermaster records, the workgroup found that some fire department gear had missed its annual cleaning. To address this, the workgroup released the names of members not in compliance with the annual cleaning to their direct supervisors, along with instructions for members to have their gear cleaned. The Contamination Reduction Workgroup also took care to discourage groupthink. Members were selected from a diversity of ranks and positions within the FDNY; the group invited experts from outside the FDNY to provide fresh perspectives and focus; and they attended workshops and conferences on fire service occupational health and cancer risk reduction. Finally, members where encouraged to play devil's advocate during presentations about procedures and policies.

To generate motivation for change, the workgroup provided membership with information about the occupational risks that exist for firefighters and their families. This was a direct appeal to the firefighters' desire to protect their loved ones, and to motivate them to reduce their exposure to fire ground contaminants by following best practices.

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[192] See, for example, Figures 12–15 below.

[193] This conclusion is based on my personal observation of the DSU facility and analysis of the facility's monthly tracking data and staff.

[194] FDNY, Reduce Your Risk, 53.

3. Case Study Outcomes

There are two strong methods for measuring the success of, and therefore justifying, the FDNY Contamination Reduction Workgroup's initiatives. The first is collecting and plotting data from the DSU to illustrate the amount of contaminated PPE cleaned before, and then during, the initiative process. The second method is measuring the activity on the FDNY's social media posts related to the workgroup's initiatives (e.g., likes, shares, retweets, engagement).

a. Decontamination Support Unit Data

To measure the success of its PPE cleaning imitative, the workgroup obtained numerical data from the FDNY's Decontamination Support Unit. The DSU is responsible for all in-house laundering of contaminated firefighter gear. The data, shown in Figure 11, covers a large nineteen-month period. Three notable events are labeled: when the Contamination Reduction Workgroup was formed (July 3, 2017), when the FDNY buckslip was released on February 1, 2018, and when the UFA safety message was released on February 16, 2018.

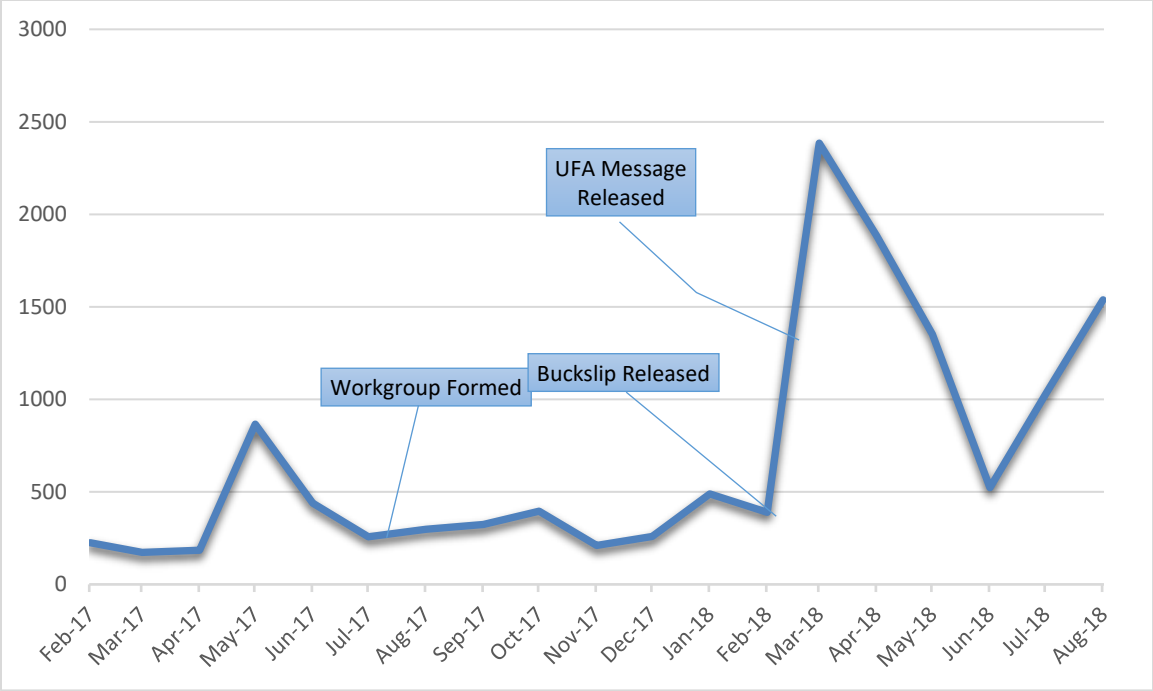

Figure 11. PPE Items Cleaned by FDNY Decontamination Support Unit[195]

The figure shows a dramatic increase in PPE cleaning. During January 2018, the DSU decontaminated 390 items of firefighter PPE; in February, after the release of the buckslip and UFA message, the DSU decontaminated 2,395 items—a 514-percent. This dramatic increase, however, was followed by a fourth-month-long decrease, and the number dropped to 1,538 items in July 2018. Despite this decrease, as of August 1, 2018, the number of PPE items decontaminated remains approximately 394 percent above pre-initiative levels.

I attribute this dramatic increase to education: before the initiative, firefighters lacked awareness about the availability of the FDNY's in-house laundering service and the ease of its use. This was resolved with the release of the FDNY buckslip and the UFA safety message. I also believe that there was less contaminated gear left in field units as result of the surge in February 2018.

[195] Adapted from FDNY Captain Joseph McGee, personal communication, August 1, 2018.

b. FDNY's Social Media Engagement

The @fdny accounts on Facebook, Instagram, and Twitter have approximately 943,000 followers.[196] The workgroup's seventeen social media posts on these channels, developed through coordination with FDNY Pro, the FDNY Foundation, and the Office of Public Information, have created a quantifiable digital metric of "reach."[197] This section describes the first social media post and the three most popular posts to date.

The first post influenced by the workgroup's recommendations was posted on January 1, 2018, and shows a photograph of a firefighter and his family, hanging next to the firefighter's PPE. Imposed on the image is the statement, "Resolve to keep yourself, personal protective equipment (PPE), tools and apparatus as clean as possible—for your health, future and family."[198] The working group hoped this post would help firefighters see the link between keeping their gear clean and improving not only their own health but also their family's health.

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[196] FDNY Facebook, accessed July 18, 2018, https://www.facebook.com/FDNY; FDNY Instagram, accessed July 18, 2018, https://www.instagram.com/fdny/; FDNY Twitter, accessed July 18, 2018, https://twitter.com/FDNY.

Though the Contamination Reduction Workgroup concedes that not all members of the FDNY or their families have or use social media, we believe we would be remiss to not engage the members who do. We see social media as a valuable tool to engage both FDNY members and their families, to help foster a cultural change in the department.

[197] Reach refers to the number of social media followers who actually see the content. Randy Taylor, "Social Media Engagement: Reach vs. Impressions," *Taylor Digital* (blog), June 14, 2017, https://www.taylordigital.com/blog/social-media-engagement-reach-impressions/.

[198] "New York City Fire Department (FDNY)," FDNY, January 1, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1565752066794762/?type=3&theater

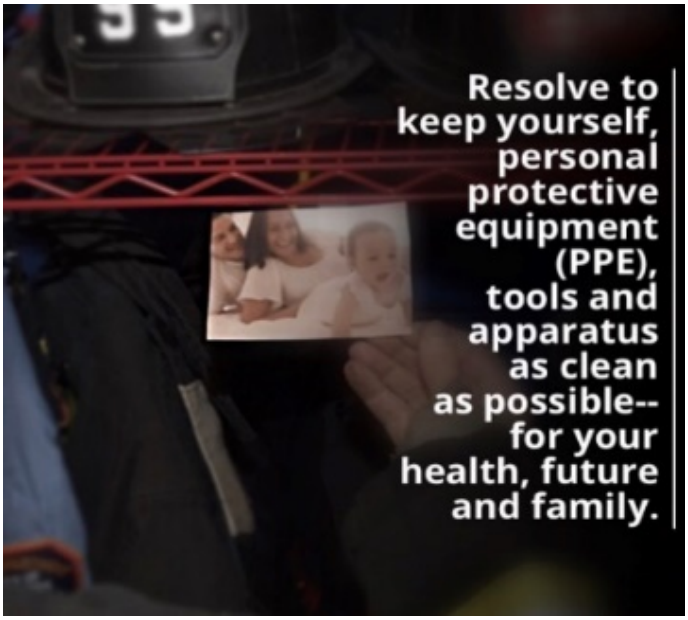

Figure 12. The First FDNY Social Media Post[199]

Table 1. Engagement from the First FDNY Social Media Post[200]

	Facebook	**Instagram**	**Twitter**
Reaches	53,341	39,745	16,625
Likes	12	700	24
Shares/Retweets	24	--	13

[199] Source: FDNY Pro (@fdnypro), "Welcome 2018! #MondayMotivation from the #FDNY Safety Command … Resolve to keep yourself, personal protective equipment (PPE)…," Facebook, January 1, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1565752066794762/?type=3&theater.

[200] Adapted from Joseph Malvasio, email to author, July 18, 2018.

The third of the seventeen social media posts was the workgroup's most popular one, and was posted on January 29, 2018. This post introduces two disturbing statistics about occupational cancer and chemical absorption, and two best practices to prevent them. The working group hoped this post would create a sense of urgency among firefighters. See Figure 13 for the post and Table 2 for its social media engagement.

Figure 13. The Third Social Media Post[201]

Table 2. Engagement from the Third FDNY Social Media Post[202]

	Facebook	**Instagram**	**Twitter**
Reaches	100,951	62,000	21,285
Likes	51	1,800	58
Shares/Retweets	358	--	46

[201] Source: FDNY Pro (@fdnypro), "Welcome 2018! #MondayMotivation from the #FDNY Safety Command … Showering and changing your work duty uniform…," Facebook, January 29, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1592987354071233/?type=3&theater.

[202] Adapted from Joseph Malvasio, email to author, July 18, 2018.

The seventh social media post was the workgroup's second most popular one, posted on April 2, 2018. The post shows a photograph of a firefighter using his fire-department-issued personal gear bag to transport his PPE. The working group hoped this post would raise awareness about the best practice of isolating gear. See Figure 14 for the post and Table 3 for its social media engagement.

Figure 14. The Seventh FDNY Social Media Post[203]

Table 3. Engagement from the Seventh FDNY Social Media Post[204]

	Facebook	**Instagram**	**Twitter**
Reaches	65,072	64,500	24,216
Likes	82	2310	48
Shares/Retweets	55	--	28

[203] Source: FDNY Pro (@fdnypro), "Welcome 2018! #MondayMotivation from the #FDNY Safety Command … Use a gear bag…," Facebook, April 2, 2018, https://www.facebook.com/fdnypro/photos/a.1157827950920511/1660075884029046/?type=3&theater.

[204] Adapted from Joseph Malvasio, email to author, July 18, 2018.

The fourth social media post was the workgroup's third most popular and was posted on February 5, 2018. The post shows a fully dressed firefighter in proper PPE, coupled with four statistics about line-of-duty injuries. The workgroup hoped this post would raise awareness about the benefits of wearing gear properly at all times. See Figure 15 for the post and Table 4 for its social media engagement.

Figure 15. The Fourth FDNY Social Media Post[205]

Table 4. Engagement from the Fourth FDNY Social Media Post[206]

	Facebook	Instagram	Twitter
Reaches	74,899	50,300	26,768
Likes	21	1,311	58
Shares/Retweets	197	--	52

[205] Source: "New York City Fire Department (FDNY)," FDNY, February 5, 2018, https://www.facebook.com/photo/?fbid=1599919880044647&set=a.1157827950920511

[206] Adapted from Joseph Malvasio, email to author, July 18, 2018.

Figure 16 shows a summary of the reach that each of the working group's seventeen social media posts has generated. The dates at bottom of chart represent the separate posts; the "total reaches" axis was calculated by adding together the reaches from each social media platform (FDNY's Facebook, Instagram, and Twitter) for each post.

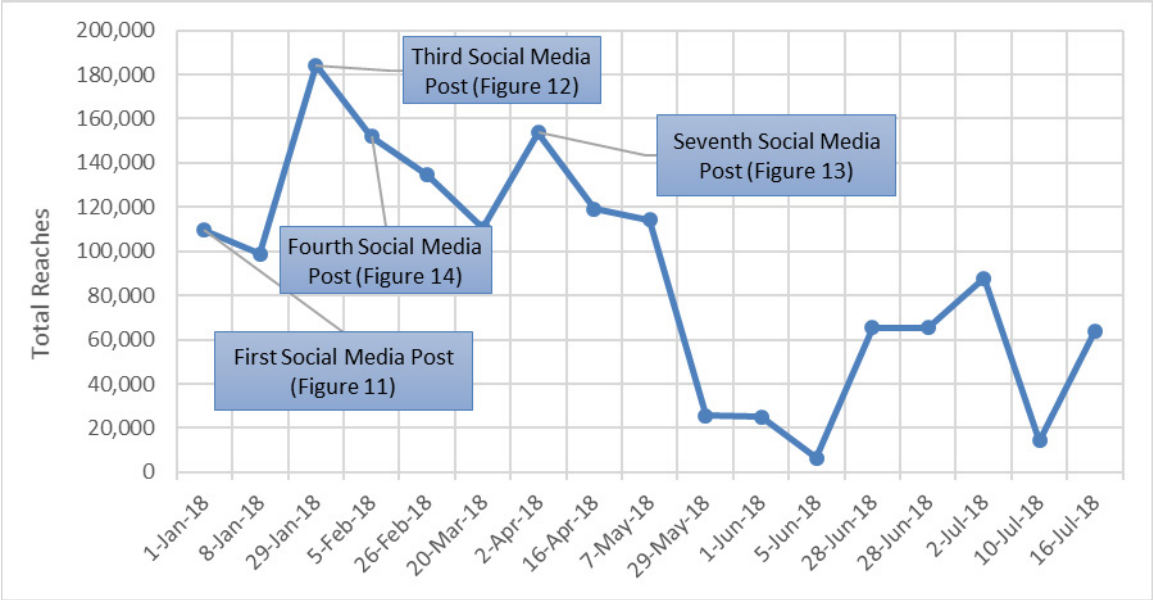

Figure 16. The FDNY's Social Media Reach for Posts Concerning the Contamination Reduction Workgroup's Initiatives[207]

The social media posts had mixed success. In total, these seventeen posts have generated 1,530,508 total reaches.[208] Soon after launching the posts, the group had its most successful post—on January 29, 2018, the "Reduce Your Risk" post reached 184,236 people. The next five posts reached more than 100,000 people, but reach declined sharply for posts thereafter. The least successful social media post was posted on June 5, 2018, and reached only 6,378 people.

[207] Adapted from Joseph Malvasio, email to author, July 18, 2018.

[208] Joseph Malvasio, email to author, July 18, 2018.

B. PALM BEACH COUNTY FIRE RESCUE (FLORIDA)

Through the creation of an internal team and its subsequent partnerships with two external agencies, the Palm Beach County Fire Rescue (PBCFR) garnered valuable research, time, equipment, and personnel to supplement existing departmental resources.

1. Description and Background

During his battle with stage 4 multiple myeloma, Fire Captain Garland "Butch" Smith, Jr., who passed away on January 1, 2017, worked tirelessly and selflessly to address the rising rates of firefighter cancer within the PBCFR. In January 2014, PBCFR leadership, in partnership with the Florida chapter of the Firefighter Cancer Support Network (FCSN), formed a volunteer firefighter cancer prevention team called FACE (Firefighters Attacking the Cancer Epidemic).[209]

a. Developing a Partnership

At the end of 2014, the FACE team partnered with the Sylvester Comprehensive Cancer Center (SCCC) at the University of Miami, which gave the group the unique opportunity to examine the effectiveness of its previous initiatives and to develop new research initiatives. Two studies were conducted as a result of the collaboration between the leadership of the PBCFR and the SCCC's communications team.

The first study, titled "Resilience, Culture Change, and Cancer Risk Reduction in a Fire Rescue Organization: Clean Gear as the New Badge of Honor," entailed 150 hours of observation, ride-alongs, and focus groups at fifteen PBCFR stations. The purpose of this study was to advance an "approach to culture change and resilience to show how one fire rescue organization is striving for organizational resilience in the face of their own internal crisis—in their words, an 'epidemic' of cancer, where cancer has surpassed heart disease

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[209] "Garland, 'Butch' F. Smith Jr," Palms West Funeral Home, accessed June 15, 2018, http://www.palmswestfuneralhome.com/obituaries/Garland-Butch-Smith/; Todd J. Leduc and Samuel A. Eaton, "Fire Service Cancer Drives Regionwide Collaboration in Florida—Firefighter Health," *Fire Engineering* 170, no. 6 (June 2017), http://www.fireengineering.com/articles/print/volume-170/issue-6/features/fire-service-cancer-drives-regionwide-collaboration-in-florida.html.

and injuries as the leading cause of firefighter deaths."[210] Prior to this study, no systematic study had ever been done examining how firefighters identify their cancer risk or how they perceive their work as it relates to this risk. During both field observations and focus groups, the researchers presented several questions to the firefighters:

- **Research question #1:** "How do firefighters perceive their risk as part of the "cancer crisis?"[211]
- **Summary of answer:** "Attempts to address the cancer crisis are driven by knowledge and beliefs about cancer. Firefighters are (overly) aware of and concerned with cancer risk and believe that organizational culture change can reduce some risks."[212]
- **Research question #2**: "What cultural meaning do firefighters associate with the cultural artifact of bunker gear?"[213]
- **Summary of answer:** "Culture change is driven by both top-down (hierarchy) and bottom-up (culture) processes, with a goal of "meeting in the middle" to create routine practices (resilience)."[214]
- **Research question #3:** "How do fire rescue organizations address competing tensions of desire to change to reduce risk versus stability that comes from hierarchy and established practices?"[215]

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[210] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 171.

[211] Harrison et al., 173.

[212] Harrison et al., 174.

[213] Harrison et al., 173.

[214] Harrison et al., 174.

[215] Harrison et al., 173.

- **Summary of answer:** "Culture change is fraught with tensions between the need for short-term efficacy of the organizational mission… versus long-term risk reduction (cancer)."[216]

- **Research question #4:** "How do occupational demands in the fire service facilitate or hinder attempts to reduce risky cultural practices?"[217]

- **Summary of answer:** "The elements of culture and hierarchy that instill resilience in the face of everyday risks may make it more difficult for individual resilience in the face of uncertain risk."[218]

The second study, titled "The Invisible Danger of Bunker Gear Transfer: A Theory-Based Intervention to Increase Post-fire Decontamination to Reduce Cancer Risk in Firefighters," consisted of an intervention study at nine PBCFR stations composed of 141 firefighters. The purpose of this study was to evaluate how firefighters are responding to new decontamination processes and the "effectiveness of the messages used to convince firefighters the need to engage in decontamination practices to reduce cancer risk."[219] This study tested the effectiveness of using a theory-based communication intervention and evaluation specifically created for the fire service so as to increase firefighters' decontamination activities, therefore reducing their exposure to carcinogens. These intervention messages and materials were based on three theoretical models: the integrated model of behavioral prediction, the extended parallel process model, and the health belief model. The researchers took six steps during this study:

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[216] Harrison et al., 174.

[217] Harrison et al., 173.

[218] Harrison et al., 174.

[219] Harrison et al., 173.

1. **Step one:** A discussion about the subject of firefighter cancer and accurate account of firefighters' risk of contracting the disease. The first study, "Resilience, Culture Change, and Cancer Risk Reduction," found that firefighters had an almost fatalistic view of firefighters and cancer.

2. **Step two:** A discussion about firefighter culture as it pertains to dirty gear. This discussion emphasized reframing a firefighter's viewpoint of dirty gear as a badge of honor to the new image of clean gear as a badge of honor. The messages portrayed during this discussion emphasized there was a shift in the fire service's culture norms toward clean gear. This message was reinforced using quotes from fellow firefighters in an attempt to add credibility and relevance.

3. **Step three:** Creation of a video to demonstrate how the normal activity of a firefighter can lead to unseen risk. In this video, a firefighter is covered in invisible dye, the type often seen at a crime scene. The video then demonstrates how easily contaminated firefighters can cross-contaminate their firehouse, coworkers, personal car, and family during a normal daily routine.

4. **Step four:** A discussion about the perceived barriers firefighters have to cleaning gear, as identified in the previous study. During this discussion, the barriers were proven to be false or methods to overcome them were presented. Direct quotes from firefighters were used to add credibility and relevance.

5. **Step five:** Implementation of a video demonstrating the fire department's new procedure for post-fire decontamination.

6. **Step Six:** Production and distribution of magnets, posters, and bumper stickers that promote the new desired behaviors and cultural norms.

b. Steps Taken

The FACE team has taken many steps to educate PBCFR firefighters and reduce their exposure to fire ground contaminants. Some of these initiatives include:

- *Intervention message:* As mentioned, the FACE team's partnership with the SCCC helped them implement an effective intervention message for the department.

- *Post-fire decontamination:* This initiative concentrated on cleaning PPE once a firefighter exits the IDLH environment, and focused on firefighters using personal wipes and decontamination of PPE both at the fire scene and back at the fire station. The initiative was initially implemented as a pilot program in two battalions but has since expanded department wide.[220]

- *Mandatory on-scene hood swap program:* This program is managed by the PBCFR operations chief post-fire.[221]

- *Mandatory annual cleaning:* In March 2016, the PBCFR implemented a mandatory advanced inspection and cleaning program for PPE.[222] Firefighters' PPE, including their bunker gear jacket, boots, gloves, and hood, are cleaned by an independent service provider annually. A compliance officer tracks members' compliance with the program.[223]

- *Heating, ventilation, and air conditioning systems:* The team directed the department's facilities divisions to change all the fire stations' HVAC

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[220] Leduc and Eaton, "Fire Service Cancer."

[221] Leduc and Eaton.

[222] James Schaffner, "2016 Advanced Inspection & Cleaning of PPE" (official memorandum, Palm Beach County, FL: Palm Beach County Fire Rescue Department, February 11, 2016).

[223] Michael C. Mackey, "Care and Cleaning of Fire Fighting Personal Protective Equipment (PPE)" (official memorandum, Palm Beach County, FL: Palm Beach County Fire Rescue, February 15, 2015).

systems to a positive-pressure mode. This will minimize or eliminate the cross-transfer of emissions into the living quarters of the fire stations.[224]

- *Personnel exposure reporting (PER):* The researchers at SCCC, with the help of PBCFR, created a website where firefighters can log their exposures after fires. It is hoped that researchers will use this data to begin identifying patterns and eventually reduce risk.[225]

- *Carcinogen exposure reduction policy:* In June 2016, members of the FACE team, with the support of PBCFR administration, released a carcinogen exposure reduction policy. This policy provides "guidance and direction to all personnel in protecting themselves from possible toxins and carcinogenic environments and minimizing exposure to carcinogens and other toxins."[226]

2. Implementation Barriers

The FACE team has been challenged by a number of implementation barriers, which it has combatted with a few different methods. To change the PBCFR's existing fire department culture, the FACE team has concentrated on educating its firefighters about the dangers of dirty gear and the increased rates of cancer. This "increased knowledge of cancer risk caused by dirty gear has led South Florida firefighters to push for a culture shift focused on cancer prevention by promoting gear cleaning"[227] Furthermore, to increase the scope and impact of this cultural shift, the team began to foster relationships with other fire departments. These relationships provide the team with increased resources "to identify the very best prevention practices available, and to strengthen and deepen the study and the initiative's impact."[228]

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[224] Leduc and Eaton, "Fire Service Cancer."

[225] Personal Exposure Reporter, https://per.miami.edu/register.

[226] Michael C. Mackey, "Firefighting Carcinogen Exposure Reduction" (official memorandum, Palm Beach County, FL: Palm Bach County Fire Rescue, June 29, 2016).

[227] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 173.

[228] Leduc and Eaton, "Fire Service Cancer."

Like the FDNY working group, the FACE team determined that PBCFR are not aware of their risk of developing cancer, nor of the best practices to prevent it. To overcome this barrier, the team provided its membership, with the help of the SCCC, with educational videos, materials, and presentations. The videos address topics such as cross-contamination and post-fire, on-scene gross decontamination. Educational materials included magnets, posters, and bumper stickers. Figure 17 shows an example of once such poster. As a result of this education, PBCFR firefighters now have a "high level of perceived cancer risk."[229]

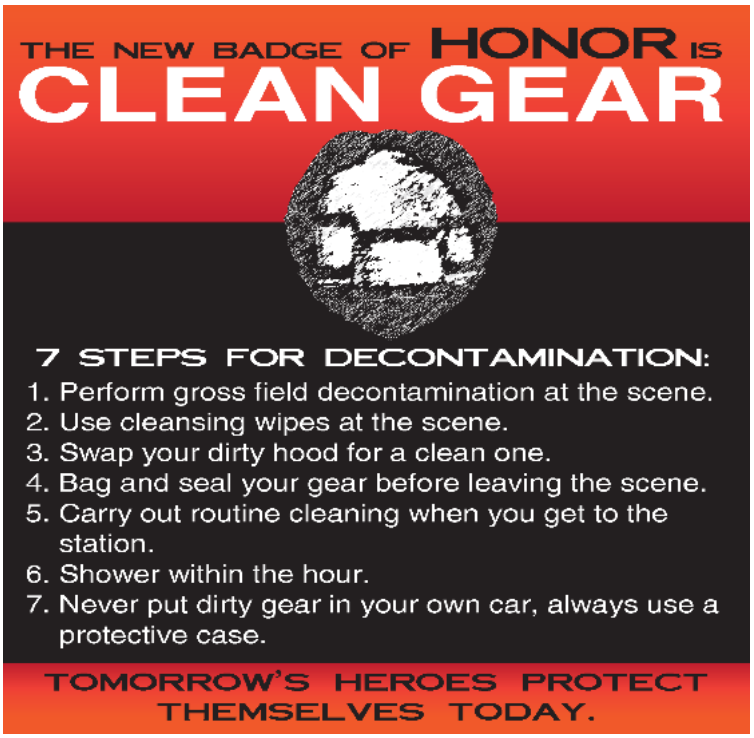

Figure 17. Example of Poster: 7 Steps for Decontamination[230]

To keep the membership abreast of the FACE team's progress, the team began releasing a quarterly newsletter. This internal newsletter, titled "FACE of Progress," updates the PBCFR membership on new initiatives, procedures, and policies, encourages

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[229] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 174.

[230] Source: Sylvester New Badge of Honor, accessed June 24, 2018, http://www.sylvesternewbadgeofhonor.com/home.

members to participate, recruits volunteers, and keeps stakeholders apprised of internal advancements as well as state-wide and national momentum and impact. In late 2016, the team expanded into a full, state-wide Florida Firefighters Safety and Health Collaborative team, which began releasing a new newsletter called "The Collaborative Connection."[231]

To increase awareness about and participation in the Firefighter Cancer Initiative (FCI), the SCCC created two videos for statewide release. The first video provides a broad overview of the science and research of the entire project and encourages firefighters to participate.[232] The second video goes into more detail, discussing the many projects under the initiative.[233] However, "Merely disseminating a written or spoken message, no matter how persuasive, is not sufficient."[234] The message must be adaptable, so it can address new and evolving concerns. The FACE team acknowledged this when developing its post-fire, on-scene gross decontamination procedure. PBCFR firefighters had expressed concern about the effects this new procedure would have on their personal safety and job performance—such as concerns about steam burns from wet gear, decreased mobility, and the efficacy of the field decontamination process. Firefighters were also concerned about the amount of time the process takes and about other competing demands for their time.[235] To begin to combat these concerns, the FACE team created a video called "FACE Team—Live Fire Decon Confidence Burn," which demonstrates the safety "of the on-scene decon procedures when repetitively re-entering the fire environment or when called to a new incident with wet gear."[236]

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[231] Florida Firefighters Safety and Health Collaborative (FFSHC), "The Collaborative Connection: May 2018" (internal newsletter, FFSHC, May 2018).

[232] Sylvester Comprehensive Cancer Center, "Firefighter Cancer Initiative, Part 1," YouTube video, uploaded by Stacy Bias, November 12, 2016, https://www.youtube.com/watch?v=1LMrE28Buc0&feature=youtu.be.

[233] Sylvester Comprehensive Cancer Center, "Firefighter Cancer Initiative, Part 2," YouTube video, uploaded by Stacy Bias, November 12, 2016, https://www.youtube.com/watch?v=VBDxnFvCFek&feature=youtu.be.

[234] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 178.

[235] Harrison et al., 178.

[236] Sylvester New Badge of Honor.

To overcome financial barriers, the PBCFR FACE team has worked closely with department leadership and rank-and-file members, has brought in external stakeholders, and has used grant funding from the state government to conduct research and set up initiatives. The FACE team comprises of PBCFR members with varied expertise (e.g., biochemistry, leadership), as well as external stakeholders with expertise in risk management, or from the FCSN and SCCC, who provide valuable industry connections.[237] The two studies discussed above were supported specifically by State of Florida Appropriation #2382A, which was also used to launch the Firefighter Cancer Initiative in 2015.[238] This initiative, for which PBCFR has become an active participant, was created to "study firefighters' exposure to carcinogens; their risks for developing cancer; and methods of education for prevention, screening, and early detection."[239] Finally, as a result of the relationships fostered between firefighters, communication researchers, and advertising and public relations practitioner faculty, videos and materials were created to effectively address key elements of behavioral change theories.[240]

To increase compliance with the department's mandatory advanced inspection and cleaning program for PPE, PBCFR created a process and levied responsibility for it to departments' established compliance officers. Officers must maintain an accurate database of bunker gear cleaned annually by their independent service provider, and division chiefs of operation receive a noncompliance list each December. The compliance officer must also create a make-up schedule for this gear.[241]

The FACE team—and subsequent Florida Firefighters Safety and Health Collaborative (FFHSC)—has also discouraged groupthink. Early on in their process, the FACE team developed relationships with two external stakeholders, the SCCC at the

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[237] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 173.

[238] Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 1; Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 180.

[239] "About," Sylvester Comprehensive Cancer Center, accessed June 22, 2018, https://umiamihealth.org/sylvester-comprehensive-cancer-center/research/firefighter-cancer-initiative/about.

[240] Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 11.

[241] Mackey, "Care and Cleaning of PPE."

University of Miami, and the FCSN. These external organizations provided the team with valuable information and new perspectives. Additionally, the FFHSC has worked with many other fire service organizations, including the Florida Fire Chiefs Association, the State of Florida Fire Marshal's Office, and the Florida Bureau of Fire Standards and Training. These departments have recommended and helped to develop "firefighter cancer prevention training curriculum, policies and procedures that can be utilized for the Florida fire service of any other department nationally."[242] The FFHSC has also become geographically diverse. The FFHSC state FACE team is currently composed of a diverse group of twenty-five fire service leaders from departments in five different regions of Florida who, along with the FCSN, have a sole purpose of fostering firefighter cancer prevention.[243] Finally, the FFHSC has developed seven characteristics it believes are essential for founding members of new FACE teams in other fire departments; the members should be:

- committed and their involvement is for effective change
- formal and informal leaders in the department
- influential members of both union and management
- represented by different sections in the department (firefighters, mechanics, investigators, airport, varied ranks etc.)
- active and retired (many "retirees" bring leadership and have a lot to offer)
- involved in risk management, risk reduction

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[242] "State FACE Recommendations," FFSHC, accessed June 17, 2018, https://www.floridafirefightersafety.org/state-face-team/state-face-recommendations.

[243] "Surviving the Fire Service Conference," Nova Southeastern University, 2018, https://nsubso.nova.edu/conference/presenters.html; Florida Firefighters Safety and Health Collaborative, accessed June 6, 2018, https://www.floridafirefightersafety.org/.

- commit[ted] to building sustainability, ensure team roster includes younger members as well.[244]

These characteristics prioritize teams that are diverse in rank, job responsibility, leadership, and age.

To generate motivation for change, the FACE team provided its membership with educational material about the occupational risks for firefighters. This material included statistical data of cancer rates for firefighters, the harmful effects of improper decontamination, and the possible danger to family members. The material was aimed to raise awareness, appeal to self-risk, and create a desire to protect one's family—three aims tackled by SCCC's "Bunker Gear Transfer: The Invisible Danger" video.[245] The video begins by showing current firefighter cancer rates compared to the general population, then demonstrates, through the use of crime scene powder, how firefighters can cross-contaminate themselves, their firehouse, their personal cars, and their family during the course of a normal daily routine. The video hopes to motivate firefighters "to engage in decontamination processes after a fire, including showering, routine cleaning of gear, bagging gear before transport, and using wipes on scene."[246]

3. Case Study Outcomes

The two academic studies conducted by the SCCC at the University of Miami provide this case study with an academic measurement of success. The authors of the first study, "Resilience, Culture Change, and Cancer Risk Reduction in a Fire Rescue Organization: Clean Gear as the New Badge of Honor," believe their results show that "the work of the FACE team and increased concerns about cancer are driving change in the culture of the fire department."[247] This conclusion is based on an observed shift in the number of firefighters who perceive dirty gear as a badge of honor. Historically, 80 percent

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[244] "Start A FACE Team," FFHSC, accessed June 22, 2018, https://www.floridafirefightersafety.org/state-face-team/start-a-face-team.

[245] Sylvester New Badge of Honor.

[246] Sylvester New Badge of Honor.

[247] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 175.

of firefighters saw dirty gear as a sign of a reliable and experienced firefighter; the study indicates that this has now reduced to about 20 percent.[248] The authors captured this shift in perception with statements from firefighters during the research process, including: "It's not this badge of honor anymore to have the melted shield or anything like that."[249] Another firefighter stated,

> Times have changed. My first shift, first day, first call, [we were] rookies [going on a] structural fire. [There was] smoke pouring, black smoke, the LT [lieutenant] at the time, he looked at me, and I'll never forget that, he looked at me and goes 'Son, don't do as I do' and he went inside that apartment, pouring black smoke, no SCBA, no mask, nothing. . .You don't see that anymore. [The LT] has got stage 4 prostate cancer. I don't know whether it's because of the fire service, or whatever, but he's one of the older dinosaurs.[250]

The researchers believe the PBCFR was witnessing a cultural reframing about exposure to fireground carcinogens. This cultural shift and adjustment of occupational practices will take time; new recruits who have new attitudes and training will slowly begin to rise up through the ranks, where they can influence routine and stable change.

The SCCC researchers concluded that the intervention to improve post-fire decontamination practices and decrease firefighters' exposure to carcinogens showed "significant increases in attitudes, norms, self-efficacy, and response-efficacy, decreases in perceived barriers, and increased intention to engage in decontamination processes."[251] With improved decontamination behaviors, firefighters will have less exposure to carcinogens, which will be met with an eventual "corresponding decrease in cancer risk that results from those exposures."[252] Furthermore, the results of this study reinforce the use of theoretical elements in messages designed for interventions in the fire service.

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[248] Harrison et al., 175.

[249] Harrison et al., 175.

[250] Harrison et al., 175.

[251] Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 1.

[252] Harrison et al., 11.

C. CONCLUSIONS

The FDNY is the second largest urban fire department in the world, and the PBCFR is a medium-size suburban fire department; the case studies demonstrate that every type of fire department, be it large or small, career or volunteer, can confront barriers that are preventing them from implementing improved health and safety practices. The case studies show frameworks that any fire department can use to create its own success story. Medals and awards are not the prizes in such success stories—the prize is the health and wellbeing of firefighters.

The FDNY and PBCFR case studies reveal three thematic solutions. The first lies in the positive effects of an educational and training program about the dangers of firefighter occupational cancer and the best practices to prevent. The FDNY's Contamination Reduction Workgroup, with the help of FDNY Pro, the FDNY Foundation, the Office of Public Information, and department and union leadership, created and distributed videos, posters, social media posts, and departmental messages to educate membership and raise awareness about best practices. This educational messaging was reinforced with presentations by the workgroup to a probationary firefighter class, fire department leadership, and firefighter unions. In the PBCFR, the FACE team provided its membership, with the help of the SCCC, with educational videos, materials, and presentations. These videos addressed topics such as cross-contamination and post-fire, on-scene gross decontamination. Furthermore, membership was provided with educational materials such as magnets, posters, and bumper stickers.

The second thematic solution is seen in the enormous influence that fire department leadership can have on the implementation process. FDNY department leadership played a central role in recognizing the gap between current scientific research and the best practices that were being followed by the FDNY. To fill this gap, leadership created and empowered the Contamination Reduction Workgroup, and gave their full support for the workgroup's recommendations. PBCFR leadership worked closely with the FACE team, brought in external stakeholders, and took advantage of external funding from the state government to reduce risk to firefighters and improve their overall health.

The final thematic solution is seen in the benefit that a workgroup or committee can provide a fire department that is attempting to overcome barriers to implementing best practices. The FDNY's Contamination Reduction Workgroup and the PBCFR's FACE team provided department leadership with valuable analysis, research, and recommendations to improve compliance with best practices.

IV. OVERCOMING IMPLEMENTATION BARRIERS IN THE FIRE SERVICE

> Obstacles don't have to stop you. If you run into a wall, don't turn around and give up. Figure out how to climb it, go through it, or work around it.
>
> —Michael Jordan[253]

This chapter examines specific steps that fire department leaders and administrators can take to help their departments overcome the barriers they are facing to implementing best practices for preventing occupational cancer. These steps are based on analysis of the previous chapter's two case studies, as well as practices and recommendations from other individual fire departments, national fire service organizations, subject matter experts, researchers, and academic studies. The same three thematic solutions discovered during the analysis of the FDNY and PBCFR case studies appear again in the solutions herein: the power of education, the influence of leadership, and the benefit of a workgroup.

A. CHANGING FIREFIGHTING CULTURE

To help overcome the hindering aspects of fire department culture and to generate cultural change, fire department leaders can adapt Edgar Schein's three-step organizational culture model, shown in Figure 18. Leaders must understand that, as the model shows, fire department culture is layered like an onion. The outer layer holds the department's cultural artifacts, the middle layer holds espoused beliefs and values, and the core of the onion holds underlying assumptions. While the outer layer is "fairly easy to adapt and easy to change," as the layers peel away and delve deeper into the subconscious, they are harder and harder to alter.[254]

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[253] T.J. Allan, "How Michael Jordan's Mindset Made Him a Great Competitor," USA Basketball, November 24, 2015, https://www.usab.com:443/youth/news/2012/08/how-michael-jordans-mindset-made-him-great.aspx.

[254] Ather Shabbar, "Promoting Inclusion through Organizational Culture Change" (master's thesis, OCAD University, 2017), 12.

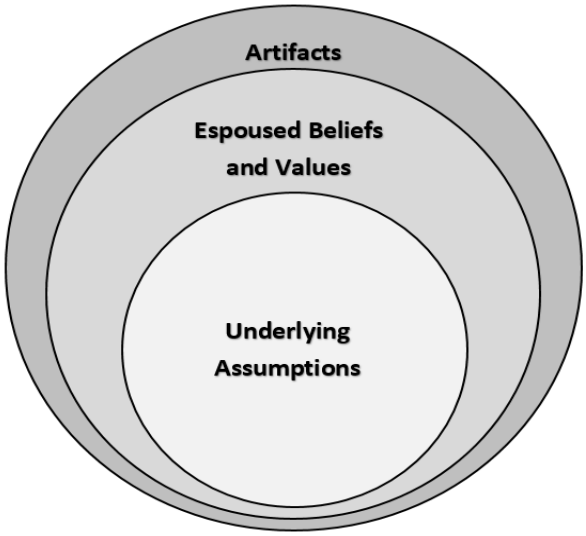

Figure 18. Schein's Model of Organizational Culture[255]

To create true cultural change within a fire department, all three layers need to be addressed. Fire service leaders must go beyond simply telling firefighters to stop wearing dirty bunker gear; they must go deeper into their firefighters' subconscious to address the core of the onion.

1. Creating or Modifying Existing Cultural Artifacts

> Managers who retain old cultural artifacts that reinforce elements of the old culture they want to change, are leaving in barriers to their success.
>
> —James Higgins and Craig Mcallaster[256]

To manage a shift in organizational culture, leaders must manage their organization's cultural artifacts.[257] They can accomplish this by creating new cultural artifacts or modifying existing ones to fit the new culture.[258] Though there are many old

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[255] Adapted from Shabbar, 12.

[256] James M. Higgins and Craig Mcallaster, "If You Want Strategic Change, Don't Forget to Change Your Cultural Artifacts," *Journal of Change Management* 4, no. 1 (March 1, 2004): 64, https://doi.org/10.1080/1469701032000154926.

[257] Higgins and Mcallaster, 63.

[258] Higgins and Mcallaster, 63.

cultural artifacts in the fire service, none are as strongly symbolic as a firefighter's dirty bunker gear.[259] To change the symbolic meaning of this culture artifact, fire department leaders and administrators can look to "a program of training and education for fire personnel to increase awareness of the inherent danger in the current cultural practice of wearing contaminated personal protective equipment ensembles."[260] By aligning the department's values and assumptions with a change in its cultural artifacts, leaders can encourage acceptance of new practices.

2. Modifying Espoused Beliefs and Values

> Never underestimate the power of your values. They can be a powerful ally or a powerful enemy.
>
> —Antony Bell, film director[261]

To change a fire department's organizational culture in a way that encourages best practices, fire department leaders must recognize and manage their department's organizational values.[262] The following steps can help leaders achieve such change:

- *Identify existing formal and informal beliefs and values:* In an article for *Fire Engineering*, Mark Wallace writes that "the first step in understanding any organization and the strategic issues it faces is to have a good understanding of the values those in the organization share and live by at all times."[263] To identify their department's values, fire department leaders can establish and workgroup, and ask that group to analyze the department's formal, written values, as well as and the informal values

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[259] Harrison et al., "Resilience, Culture Change, and Cancer Risk Reduction," 173.

[260] Eskierka, "Developing a Policy for Decontamination," 2.

[261] Antony Bell, *Great Leadership: What it Is and What it Takes in a Complex World* (Mountain View, CA: Davies-Black, 2006), 153.

[262] Jim Crawford, "Influencing Cultural Change," *Fire Rescue Magazine*, December 1, 2013, https://www.firerescuemagazine.com/articles/print/volume-8/issue-12/fire-prevention-and-education/influencing-cultural-change.html.

[263] Mark Wallace, "Fire Department Strategic Planning 101," *Fire Engineering* 162, no. 2 (February 2009), https://www.fireengineering.com/articles/print/volume-162/issue-2/features/fire-department-strategic-planning-101.html.

that are actually practiced.[264] This values audit may reveal some desired, detrimental, contradictory, or even missing values.[265]

- *Promote desirable beliefs and values:* If leaders promote desirable values—those that are desirable both for the organization and for individual firefighters—firefighters will begin to do "what is right just because it is right."[266]

- *Change undesirable beliefs and values:* Firefighters will resist altering their core beliefs and values if they don't understand, or can't justify, why they are being asked to change.[267] During the course of a firefighter's career, fire department leaders have three opportunities to influence or change these values: during recruitment, training, and promotions. "We typically recruit and hire for talent and potential, rather than character, thinking that after a period of time (typically the probationary process), the new member will embrace the department values. This creates the possibility that down the road, the new member will run into trouble because their personal values conflict with the organization's stated values."[268] By altering the department's recruitment program, leaders can begin to target and hire new firefighters who possess the values they desire.[269] Training is especially important in a firefighter academy, as

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[264] Paul H. Stein and Ettore A. Berardinelli, "Improving Your Organization: Everyone's a Teacher," *Fire Engineering* 163, no. 4 (April 2010), https://www.fireengineering.com/articles/print/volume-163/issue-4/Features/improving-your-organization-everyones-a-teacher.html.

[265] H. Michael Drumm, "Identifying the Core Values of the City of Markham Fire Department" (applied research project, National Fire Academy, March 2000), 233, https://www.hsdl.org/?view&did=804681.

[266] Kimberly Alyn, "Leadership Lessons: Focus on Values, Not Policy," Firehouse, December 5, 2014, www.firehouse.com/home/article/10286812/firefighter-leadership.

[267] Cox, "The Significance of Fire Service Culture," 13.

[268] Marc Revere, "Defining Organizational Values," *Fire Rescue* 5, no. 1 (January 2010), https://www.firerescuemagazine.com/articles/print/volume-5/issue-1/news/defining-organizational-values.html.

[269] Crawford, "Influencing Cultural Change."

"new recruits will quickly pick up and adapt to unspoken expectations and help enforce them on the next round of recruits."[270] In addition to academy training, routine training for firefighters can help reinforce the values fire department leaders are trying to promote.[271] And by altering the promotional process, leaders can specifically target and promote firefighters or officers who demonstrate those values. As Jim Crawford writes in *Fire Rescue Magazine*, "Unless we change the promotional process to include the values and behaviors we really want to see, we're going to get stuck perpetuating an old way of thinking."[272]

- *Add new department values:* As mentioned, workgroup's value audit may reveal that some desired values are missing from the department's mission or vision statement. To encourage their acceptance, leaders can add new values to their department's existing statements and then "regularly repeat them in training and department meetings."[273]

3. Reinforcing a Safety Culture

> The most dangerous phrase in the language is, "We've always done it this way."
>
> —Rear Admiral Grace Hopper[274]

To change a firefighter's underlying assumption that injury and death are an acceptable part of the job, fire department leaders can encourage the growth of a safety culture within their departments through the following techniques:

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[270] "Creating a Culture of Ethics and Integrity in the Fire Service," PowerDMS, March 8, 2018, https://www.powerdms.com/blog/creating-culture-ethics-integrity-fire-service/.

[271] Crawford, "Influencing Cultural Change."

[272] Crawford.

[273] PowerDMS, "Creating a Culture of Ethics."

[274] Nick Polson and James Scott, *AIQ: How People and Machines Are Smarter Together* (New York, NY: St. Martin's, 2018), 122.

- *Evaluate department training programs and staff:* Fire department leaders should be "conscious of the behavioral influences that are incorporated within the content of their training programs, as well as the manner in which training is being delivered."[275] Training instructors' attitudes, beliefs, and behaviors may actually be "more influential than the program content itself."[276] Fire department leaders can encourage a safety culture by ensuring that training is done with a high degree of safety.[277]

- *Encourage individual responsibility:* Leaders should encourage their members to follow the department's established safety procedures and tactics, personally avoid unsafe behaviors and errors, wear appropriate PPE during emergencies, and participate "in safety-oriented extra-role behaviors to protect their fellow firefighter." [278] Leaders should take care, however, to focus on one behavior at a time. They might ask the department members to ask themselves: "As a firefighter, what one behavior can you change? As the apparatus driver, what one behavior can you change? As the company officer, what one behavior can you change? As a chief officer, what one behavior can you change?" [279]

- *Stop rewarding heroic acts that violate safety guidelines:* "Most of the awards for valor usually involve … doing things you aren't supposed to do. It's in our nature to want to save someone. If nothing goes wrong

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[275] U.S. Fire Administration, *National Safety Culture Change Initiative*, FA-342 (Washington, DC: FEMA, April 2015), 17, https://www.usfa.fema.gov/downloads/pdf/publications/fa_342.pdf.

[276] U.S. Fire Administration.

[277] U.S. Fire Administration.

[278] Todd D. Smith, Franklin Eldridge, and David M. DeJoy, "Safety-Specific Transformational and Passive Leadership Influences on Firefighter Safety Climate Perceptions and Safety Behavior Outcomes," *Safety Science* 86 (July 1, 2016): 92, https://doi.org/10.1016/j.ssci.2016.02.019.

[279] Burton Clark, "Your Behavior Comes from Ben Franklin's DNA: Fast, Close, Wet, Risk, Injury, Death," Firehouse, October 22, 2011, //www.firehouse.com/safety-health/article/10460367/your-behavior-comes-from-ben-franklins-dna-fast-close-wet-risk-injury-death.

despite ignoring the rule, you'll be praised for saving someone."[280] Rewarding risky behavior communicates to firefighters that such actions are acceptable.[281]

B. RAISING AWARENESS

From the minute firefighters enter the academy until the last day of their career, continual training and education are reinforced—a necessity of the ever-evolving changes in modern building construction, firefighting equipment, and procedures. Through education and training, firefighters can become more proficient with a particular subject or tool. The subject of cancer prevention should be no different. "The only way to achieve actual safety is to have knowledge and understanding about the environment we work in."[282] Creating or adapting an educational program is an easy and cost-effective way to raise awareness about the dangers of occupational cancer and how to prevent it.

1. Developing an Educational and Training Program

Fire department leaders can start an educational campaign with two simple tools: signs and videos. Signs are a cheap and easy way to increase awareness about an issue, and can be created and disseminated with existing departmental resources. Examples and templates are abundant online.[283] Currently, the Cleveland Fire Department and Uniformed Firefighters Association (UFA) use signs at fire stations to promote cancer awareness and discourage cross-contamination respectfully.[284] Figure 19 shows a sign that is distributed by the UFA to all New York City firehouses. These signs have been placed at entrances to living areas in firehouses, such as kitchens, sitting rooms, television rooms, house watch areas, offices, bunkrooms, gyms, and other such areas where PPE and bunker

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[280] U.S. Fire Administration, National Safety Culture Change Initiative, 13.

[281] U.S. Fire Administration, 13.

[282] Stefan Svensson, "The Only Way to Firefighter Safety Is through Knowledge," Fire Engineering, August 13, 2012, https://www.fireengineering.com/articles/2012/08/the-only-way-to-firefighter-safety-is-through-knowledge.html.

[283] Sylvester New Badge of Honor.

[284] Wagner Sullivan. "Unmasked."

gear are not routinely stored or worn. The sign is a visible reminder to prevent cross-contamination within the firehouse.

Figure 19. Uniformed Firefighters Association's "No Bunker Gear" Sign[285]

Similar to signs, videos can increase awareness about firefighter occupational cancer, encourage best practices, and summarize information or data. When properly shot and edited, videos can be even more powerful than a message from a live person; and videos that are both emotionally and intellectually honest can be surprisingly influential if viewed by the right group of people at the right time.[286] Large and well-resourced fire departments can create videos using their own communication teams, but, small departments or those with limited budgets can take advantage of free, generic videos available online.[287]

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[285] Source: Mike Schreiber, email to author, July 18, 2018.

[286] John P. Kotter, "Four Ways to Increase the Urgency Needed for Change," *Harvard Business Review*, April 15, 2009, https://hbr.org/2009/04/four-ways-to-increase-the-urge.

[287] Sylvester New Badge of Honor

2. Adapting External Educational and Training Policies and Resources

Fire departments that are unable to create a new educational and training campaign simply can use or adapt existing campaigns, materials, and personnel from other fire departments, universities, foundations, and networks. These organizations can provide valuable policies, procedures, and videos, among other resources, that can be used as a foundation. Some prominent organizations and their resources include:

- *Boston Fire Department:* The Boston Fire Department created a website called Take No Smoke, where fire departments can access current scientific research, testimonial videos, and educational videos.[288]

- *Firefighter Aid:* In 2015, Firefighter Aid launched its Cancer Awareness and Prevention Program with the support of the San Diego Fire-Rescue Department (SDFD) Local 145, San Diego Fireman's Relief Association, and the Firefighter Cancer Support Network.[289] This program includes "a mandatory cancer training class and video that all SDFD personnel must attend and watch, warning identifiers, behavioral and cultural changes to prevent cancer, and posters of peers strategically placed throughout every SDFD Fire Station and Apparatus." [290] Details of this program, posters, policy memos, and videos are available on the Firefighter Aid website.

- *Firefighter Cancer Support Network:* Through its website, the FCSN and its partners provide fire departments with many articles, scientific studies, policies, guidelines, directives, and procedures.[291] In addition, the FCSN provides instructors to fire departments to conduct cancer-prevention training, and the training has reached thousands of firefighters across

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[288] Take No Smoke, accessed July 31, 2018, https://www.takenosmoke.org/.

[289] "Cancer Prevention Program," Firefighter Aid, accessed July 31, 2018, https://www.firefighteraid.org/capp-program.

[290] Firefighter Aid.

[291] Firefighter Cancer Support Network, accessed July 31, 2018, https://firefightercancersupport.org/.

country.[292] As of 2016, the FCSN also provides a train-the-trainer program.[293]

- *First Responder Center for Excellence:* The First Responder Center for Excellence website provides training documents, posters, reports, and videos, along with the Fire Service Occupational Cancer Tool Kit.[294] This kit provides a "repository of information gathered by fire service partners, as well as the broader scientific community."[295] Fire departments leaders can use this kit to find "summaries and links to current research studies, specific cancer risk and cancer-related death statistics, training links, best practices guides, multimedia presentations, and state specific presumptive legislation resources."[296]

- *Florida Firefighters Safety and Health Collaborative:* The FFSHC offers a free program on its website to fire departments looking to enhance or maintain an effective safety committee or safety program.[297] The website also includes stand operating guidelines and policies that a fire department could adapt. (This organization was discussed in detail in Chapter III Section B).

- *Illinois Fire Service Institute:* With the help of Underwriters Laboratories (UL) and the National Institute of Occupational Safety and Health, the

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[292] Timothy Elliot, "FCSN: We Help Firefighters and Their Families Cope with Cancer," *Speaking of Fire* (Spring 2016): 6, 6–7, https://www.ifsta.org/sites/default/files/sofcanceredition.pdf.

[293] "Who We Are," Firefighter Cancer Support Network, accessed July 31, 2018, https://firefightercancersupport.org/who-we-are/.

[294] "Cancer," First Responder Center for Excellence, accessed July 31, 2018, https://www.firstrespondercenter.org/cancer/.

[295] "The Fire Service Cancer Toolkit," Fire Service Occupational Cancer Alliance, September 2017, https://www.firstrespondercenter.org/cancer/toolsresources/.

[296] Fire Service Occupational Cancer Alliance.

[297] Florida Firefighters Safety and Health Collaborative.

Illinois Fire Service Institute provides academic research data, translation, and teaching tools (webinars, online programs) on its website.[298]

- *National Fallen Firefighters Foundation:* The National Fallen Firefighters Foundation created a cancer awareness and prevention video called "The Silent Killer."[299] This video is generic and can be used throughout the fire service.

- *University of Cincinnati and the Cincinnati Fire Department Partnership:* This educational training video shares multiple testimonials and best practices to avoid cancer.[300]

- *University of Miami's Sylvester Comprehensive Cancer Center:* The SCCC website provides videos and materials that are designed to educate firefighters about the cancer risks they face and processes that help reduce those risks.[301] (This organization was discussed in detail in Chapter III Section B).

C. BATTLING COMPLACENCY

To overcome complacency and establish a true sense of urgency within the fire service, department leaders and administrators can employ four tactics: bringing the outside in, behaving with urgency every day, finding opportunity, and avoiding false urgency.[302]

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[298] "Cardiovascular & Chemical Exposure Risks in Today's Fire Service," Illinois Fire Service Institute, accessed July 31, 2018, https://www.fsi.illinois.edu/CardioChemRisks/#!/.

[299] National Fallen Firefighters Foundation, "The Silent Killer: Firefighter Cancer," Vimeo video, 2016, https://vimeo.com/155710892.

[300] University of Cincinnati, "UC Fire / Cancer Prevention," YouTube video, uploaded by UC Fire, February 15, 2017, https://www.youtube.com/watch?v=NUstR1doDR8&list=PLmDE3nH0H3RGJmseAWe1w5WYBZVNxyuLW&t=0s&index=6.

[301] Sylvester New Badge of Honor.

[302] Kotter, *A Sense of Urgency*, 63, 116, 123, 11.

1. Bringing the Outside In

Bringing the outside in starts by exposing members to troubling data about cancer in their occupation.[303] Some examples include:

- *Firefighter cancer deaths are dramatically rising:* Cancer has become the leading cause of firefighter LODDs in the United States.[304] Between 1950 and 1975, less than 5 percent of line of duty deaths (LODDs) within the fire service were attributed to cancer.[305] However, from January 1, 2002, to March 31, 2017, 61 percent of firefighter LODDs were attributed to cancer.[306] For the year 2017 alone, 74 percent of LODDs were the result of cancer.[307]

- *Firefighters face increased cancer rates compared to the general population:* One study found that "firefighters have a 9 percent higher risk of being diagnosed with cancer and a 14 percent higher risk of dying from cancer than the general U.S. population."[308]

- *Firefighters' children may face increased rates of cancer:* A study of Washington state firefighters determined that "one out of every 204 children of Kitsap County career firefighters has cancer."[309] The study shows that children of Kitsap County career firefighters are 27.4 times more likely to be diagnosed with cancer than the general population.[310]

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303 Kotter, A Sense of Urgency, 63.

304 Khazan, "How Modern Furniture Endangers Firefighters."

305 Smith and Glenn, "Firefighters Fight for Recognition of Cancers."

306 Roman, "Facing Cancer."

307 IAFF Firefighters, "Line of Duty Death Database."

308 Daniels et al., "Mortality and Cancer Incidence."

309 Khazan, "How Modern Furniture Endangers Firefighters," 34.

310 Khazan.

- *Female firefighters face high rates of cancer:* The San Francisco Fire Department has one of the largest populations of women firefighters in the United States (16 percent of its firefighters).[311] "Of that number, 15 percent of female firefighters between 40 and 50 years old have been diagnosed with breast cancer, which is six times the national average."[312]

- *Firefighter cancer is a national problem, not just confined to one department or one region:* In the Seattle Fire Department, 36 percent of the 975 firefighters hired before 1977 have been diagnosed with cancer.[313] At Miami Dade Fire Rescue, 32 percent of firefighters have been diagnosed with some form of cancer.[314] In the Boston Fire Department, a firefighter is currently diagnosed with cancer every three weeks.[315] These high rates of cancer are also being seen in younger firefighters. Over the last few decades, the age of diagnosis for Boston firefighters has steadily dropped from the 60s to the 50s, and is now increasingly in the 40s.[316]

Another method to overcome complacency within fire departments is to bring outside experts and consultants into the organization. Outsiders can provide an organization with external data, ideas, or wisdom.[317] Between the different apparatus, uniform, tool, bunker gear, meter, and personal protective equipment, the list of fire

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[311] Tom Costello, "San Francisco Fire Department Sees Spike in Breast Cancer Rate," NBC News, February 26, 2018, https://www.nbcnews.com/health/cancer/san-francisco-fire-department-sees-spike-breast-cancer-rate-n847276.

[312] Costello.

[313] Kathy Mulday and Casey McNerthney, "Cancer Takes Heavy Toll on Seattle Firefighters," Wildfire Today, September 15, 2008, http://wildfiretoday.com/2008/09/15/cancer-among-seattle-firefighters/.

[314] Keith Tyson, "Cancer & the Fire Service," Firemen's Association of the State of New York, accessed August 17, 2018, https://fasny.com/news/cancer-fire-service/.

[315] Roman, "Facing Cancer."

[316] Roman.

[317] Kotter, A Sense of Urgency, 89.

department vendors can easily be a mile long. Fire department leaders can take advantage of these resources and invite experts to meetings as an information-gathering exercise.[318]

2. Behaving with Urgency Every Day

To maintain a daily sense of urgency, fire departments can adapt three techniques:

- Move with speed by responding immediately to requests for meetings, phone calls and emails on high priority issues.
- Speak with passion about the need to maintain urgency.
- Match words with deeds: Don't just talk the talk, fire department leaders need to walk the walk. Let your organization visually see your sense of urgency.[319]

3. Finding Opportunity in Crisis

A close colleague's cancer diagnosis, or cancer-related death, is a familiar event in the fire service these days. These emotional events can spur leaders to implement new departmental changes geared toward preventing further diagnoses and deaths. For example, inspired by the death of Tom Quensel, a close colleague and veteran fire investigator, Captain John Gulotta, head of safety in the Tucson Fire Department, implemented a new department policy that requires fire investigators to wear a light mask during fire scene investigations.[320]

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[318] Kotter, 89.

[319] Kotter, 116.

[320] Sam Salzwedel, "UA and TFD Team up to Research Cancer in Firefighters," KVOA, October 26, 2017, http://www.kvoa.com/story/36696633/ua-and-tfd-team-up-to-research-cancer-in-firefighters.

4. Avoiding False Urgency

Although urgency is important, fire department leaders who rely on false urgency will drain much-needed energy and productivity from their organization.[321] False urgency can arise from meeting after meeting, report after report, project after project, task force after task force, and PowerPoint after PowerPoint, taken to the extreme.[322] This type of frenetic activity is all for a show and produces little meaningful output. Positive urgency, on the other hand, includes "action which is alert, fast moving, focused externally on the important issues, relentless, and continuously purging irrelevant activities to provide time for the important and to prevent burnout."[323]

D. FINDING FUNDING

To overcome funding challenges, fire department administrators can consider four methods: optimizing existing resources; implementing low-cost, high-impact solutions; developing revenue sources; and prioritizing preventative measures.[324]

1. Optimizing Internal and External Fire Service Resources

Administrators and fire department leaders can learn to optimize existing fire service resources, which can provide low- or no-cost solutions.[325] Some fire departments, for instance, lack simple written policies and procedures that address cancer prevention. In such cases, the department can re-task some of its existing staff to examine policies, find

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[321] John Kotter, "Complacency and False Urgency Impede Change," American Management Association, January 24, 2019, https://www.amanet.org/training/articles/complacency-and-false-urgency-impede-change.aspx.

[322] Kotter, A Sense of Urgency, 11.

[323] Kotter, 11.

[324] Jeffrey Payne, "Optimizing Fire Department Operations Through Work Schedule Analysis, Alternative Staffing, and Non-Productive Time Reduction" (master's thesis, Naval Postgraduate School, 2014), 71, https://www.hsdl.org/?view&did=760178; Washington State Council of Fire Fighters, *Healthy In, Healthy Out*, 4; Gerri Kelly, "UA Receives $1.5 Million to Study Cancer in Firefighters," University of Arizona Health Sciences Office of Public Affairs, November 30, 2016, http://opa.uahs.arizona.edu/newsroom/news/2016/ua-receives-15-million-study-cancer-firefighters; Benjamin M. Miller et al., *Understanding the Economic Benefit Associated with Research and Services at the National Institute for Occupational Safety and Health* (Santa Monica, CA: RAND, 2017), https://www.rand.org/pubs/research_reports/RR2256.html.

[325] Payne, "Optimizing Fire Department Operations," 71.

gaps, and create new policies. If departments lack the resources to create resources from scratch, they can find example policies and procedures online and adapt them to suit their department's needs.[326]

2. Implementing Low-Cost, High-Impact Solutions

Any fire department administrator can become easily overwhelmed when calculating the cost of purchasing new, or updating old, equipment. These administrators can take advantage of some low-cost, high-impact alternatives until they can procure funding for high-cost items such as annual physicals, two sets of turnout gear, extractors, direct-source diesel capture systems, and health and wellness programs. Some examples of low-cost items that any size department can begin to use include:

- Two to three mil, 42-gallon garbage bags for isolating and transporting contaminated gear, equipment, and hoses from a fire scene to limit a firefighter's exposure
- Latex or nitrile gloves for handling contaminated PPE
- N95 particulate respirator masks to provide firefighters inhalation protection
- Disposable wipes or a hand wash station at fire scenes that allow firefighters to remove dangerous contaminants from their skin
- Station shoes to limit cross-contamination in the firehouse[327]

The Puget Sound Regional Fire Authority provides an example of a small fire department implementing a low-cost, high-impact item.[328] Using the existing fire engine's

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[326] "Library," Firefighter Cancer Support Network, accessed July 16, 2018, https://firefightercancersupport.org/resources/library/; Florida Firefighters Safety and Health Collaborative.

[327] Washington State Council of Fire Fighters, *Healthy In, Healthy Out*, 4.

[328] The Puget Sound Regional Fire Authority is a small suburban Washington state fire department of 259 employees and 11 fire stations that serves approximately 177,000 citizens. "About Puget Sound Fire," Puget Sound Regional Fire Authority, accessed April 22, 2018, https://pugetsoundfire.org/about/.

heat exchanger and a few small attachments, the department created a warm water decontamination shower attachment for its firefighter engine companies. These attachments for the engine cost around $70, and have given firefighters a cheap and accessible opportunity to decontaminate themselves and their gear while on scene.[329]

3. Developing Untapped Sources of Revenue and Experience

Sometimes fire departments are forced to rely on financial assistance in the form of local, state, or federal grant money to supplement their department's budgets or initiatives. Federal grants come from either the Urban Areas Security Initiative or the State Homeland Security Program, which are administered by the Homeland Security Grant Program—which is in turn run by the Federal Emergency Management Agency (FEMA). In fiscal year 2018, these two grants were forecasted to disseminate $982 million to thousands of applicants.[330] To strengthen a grant application, fire department administrators can partner with a college or university. In addition to the monetary benefit of this relationship, the fire department will gain valuable access to experienced researchers, and other benefits of their accompanying institutions. In 2016, leaders of the Tucson Fire Department and researchers at the Mel and Enid Zuckerman College of Public Health at the University of Arizona started a partnership to study firefighter best practices through the measurement of blood and urine samples.[331] This three-year, $1.5 million study was made possible through a FEMA grant.[332]

4. Prioritizing Preventative Measures

Sick and injured fire department members can cause great financial hardships for their organizations. In the past, this monetary burden was difficult to quantify due to lack

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[329] Beth Gallup, email to author, January 23, 2018.

[330] "Homeland Security Grant Program," FEMA, accessed July 17, 2018, https://www.fema.gov/homeland-security-grant-program.

[331] The Tucson Fire Department (TFD) serves the city of Tucson, Arizona, and has approximately 778 employees and 21 stations, serving a population of 530,706. Brittney Spangle, "Tucson Fire Department 2017 Annual Report," 2017, 24; Tucson Fire Department, March 4, 2014, https://www.tucsonaz.gov/fire; Kelly, "UA Receives $1.5 Million to Study Cancer in Firefighters."

[332] Kelly, "UA Receives $1.5 Million to Study Cancer in Firefighters."

of scientific research about the economic benefits of preventive measures. A report recently released by the RAND Corporation, however, has filled this gap.[333] In this 2017 report, researchers provide quantifiable estimated dollar figures for the economic benefit of preventing injuries and death related to occupational cancer. A summary of these numbers is provided in Table 5. This report gives fire department leaders a new vehicle to appeal to politicians, city managers, insurance companies, and voters to justify requests for increased expenditures for preventive measures.[334]

Table 5. Monetary Losses of Firefighter Cancer[335]

Type of Cancer	Fatal Cases	Non-fatal Cases
Buccal and pharynx cancers (oral)	$827,945	$193,551
Colon, excluding rectum	$848,927	$202,349
Esophagus	$865,312	$237,964
Kidney and renal pelvis	$884,674	$236,958
Lung	$814,963	$255,695
Malignant mesothelioma	$700,866	$236,221

E. IMPROVING COMPLIANCE

To encourage implementation of best practices for health and safety, fire service leaders must develop new pathways to compliance. They can do so by creating new, and rebalancing existing, enforcement mechanisms, and increasing PPE compliance.

1. Creating Enforcement Mechanisms

Enforcement mechanisms can be classified into two categories: positive and negative. Positive enforcement mechanisms provide rewards or incentives to encourage member compliance; negative enforcement mechanisms threaten punishment or use

[333] Miller et al., Understanding the Economic Benefit.

[334] FDNY, Reduce Your Risk, 35.

[335] Adapted from FDNY, 35.

disincentives.[336] One of the most effective methods to encourage compliance with safety practices among firefighters is legal and financial penalties.[337] Kristina Peterson found that "firefighters acknowledge that they take safety precautions more seriously if there are tangible personal penalties for ignoring them."[338] Examples of financial and legal penalties include "days off without pay, denied promotions, demotions or loss of job, and loss of death benefits in the event of a line of duty death."[339]

2. Rebalancing Existing Enforcement Mechanisms

For fire department leaders it can be difficult to maintain a delicate balance between positive and negative enforcement mechanisms. Enforcement mechanisms can fail because they are sometimes too strict and therefore unlikely to be enforced. Fire department leaders can start to create this balance by examining their own departments enforcement mechanisms. Then by adjusting these mechanisms, they can begin to increase compliance of best practices within their organization.

3. Increasing Personal Protective Equipment Compliance

To promote compliance with PPE policies and procedures, fire department leaders can provide regular training and education on safety practices and the potential health risks of the occupation.[340] The training that occurs for new firefighters at the fire academy is the most valuable educational opportunity; lessons learned at the fire academy can instill PPE compliance as a value.[341] Robert Avsec believes that "firefighters who truly

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[336] Julian Ouellet, "Enforcement Mechanisms," Beyond Intractability, September 2004, https://www.beyondintractability.org/essay/enforcement-mechanisms.

[337] Kristina Peterson et al., *Fire Fighter Fatality Investigation and Prevention Program: Findings from a National Evaluation* (Research Triangle Park, NC: RTI Press, 2010), 32, https://doi.org/10.3768/rtipress.2010.rr.0007.1003.

[338] Peterson et al., Fire Fighter Fatality Investigation and Prevention Program, 32.

[339] Peterson et al., 32.

[340] Robert Avsec, "How to Increase Firefighter PPE and SCBA Compliance," PPE101, June 25, 2018, https://www.ppe101.com/2018/06/how-to-increase-firefighter-ppe-and-scba-compliance/.

[341] Maglio et al., "Situational Pressures," 563.

understand the what, why and how regarding their PPE are better prepared to resist negative pressure from others who choose not to comply."[342]

Researchers have found that "firefighters are more inclined to wear their PPE when leaders set a personal example by wearing their own PPE."[343] This demonstrates to firefighters that their leaders both promote and embrace their organization's safety policies.[344] To be successful, however, leaders must lead by example in "real time," not just in policies and procedures.[345] Another technique leaders can use to increase PPE compliance is to encourage firefighters to look out for one another by making sure their peers are using their PPE properly.[346] The San Diego Fire-Rescue Department has adapted this technique in their new Cancer Awareness and Prevention Program (CAPP). "Firefighters who verbally agreed to buy in to CAPP's slogan were given a CAPP logo helmet sticker at the end of the training as an indication that they have requested to be 'called out' by their peers when engaging in unsafe behaviors."[347]

Enforcement mechanisms will be less necessary, however, if department leaders take advantage of existing technologies to make PPE more comfortable. According to a survey of attendees conducted at the 2007 National Safety Congress, the main reason (62 percent of those surveyed) for failure to wear proper PPE was the discomfort it causes.[348] When asked how PPE could be improved, an overwhelming majority (75 percent) stated that they would make PPE more comfortable.[349] During a recent study on firefighter PPE noncompliance, a firefighter stated, "I think part of it's just a lack of good

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[342] Avsec, "How to Increase Firefighter PPE."

[343] Avsec.

[344] Avsec.

[345] Maglio et al., "Situational Pressures," 565.

[346] Maglio et al., 564.

[347] National Fallen Firefighters Foundation, "Fire Service Health & Safety Report" (report, National Fallen Firefighters Foundation, October 2017), A16, https://ulfirefightersafety.org/docs/NFFF_Supplement1017.pdf.

[348] Donna McPherson, "Balancing PPE Protection with Comfort, Fit & Style," *Professional Safety* 53, no. 3 (March 2008): 50.

[349] McPherson, 50.

equipment that's not so cumbersome, you know, because if you had something that was lightweight, fresh air, easy to use, hey, yeah, I'll throw that on versus nothing or versus leaving this big old nasty thing on."[350] By increasing PPE comfort, fire department leaders can possibly increase firefighter compliance rates.

Furthermore, the national standard states that self-contained breathing apparatuses shall have a National Institute of Occupational Safety and Health–certified rated service time of at least thirty minutes.[351] Fire departments can begin using larger, forty five-minute-air cylinders. This action, in combination with the adaption of the new end-of-service-time indicator (EOSTI) national standard (33 percent instead of 25 percent), could allow firefighters increased work and exit time, thus possibly decreasing their chances of violating department mask policies.[352]

Finally, air monitoring devices give firefighters a visual reference point for the quality of the air they are breathing.[353] Without these devices firefighters have "no correlation back to the fact that smoke may be the culprit for feeling ill after a fire or causing long-term health effects."[354] By providing firefighters with on-scene air monitoring devices, fire department leaders might increase firefighter mask compliance.

F. OVERCOMING GROUPTHINK

To overcome the detrimental effects of groupthink within the fire service, fire department leaders and administrators can use or adapt several techniques, to include increasing awareness, employing strategic scheduling and staffing, enforcing group-

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[350] Maglio et al., "Situational Pressures," 562.

[351] National Fire Protection Association, *NFPA 1981: Standard on Open-Circuit Self-Contained Breathing Apparatus (SCBA) for Emergency Services* (Quincy, MA: National Fire Protection Association, 2019), 12, https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1981.

[352] National Fire Protection Association, 19.

[353] Rob Schnepp, "Forward," in *Smoke: Atmospheric Monitoring: The Comprehensive Guide* (Indianapolis, IN: Fire Smoke Coalition, 2012), https://www.raesystems.com/sites/default/files/content/resources/ebook_atmospheric-monitoring.pdf.

[354] Schnepp.

oriented discipline and accountability, fostering advocacy, using outside experts, and forming decision-making groups.[355]

1. Increasing Awareness of Groupthink through Education

Fire service leaders and administrators must have a healthy understanding of the conditions, threats, and prevention methods related to groupthink. One way this can be accomplished is by providing awareness and prevention training to all fire department members.[356] This training can be further reinforced by stressing the observable consequences of groupthink. Fire department supervisors are the ideal target for special training as they are often in a position to manage group decisions.[357]

2. Employing Strategic Scheduling and Staffing

Fire department administrators can also avoid groupthink by introducing shorter work shifts, diversifying their department staff, and rotating their department personnel. By reducing the normal twenty-four-hour work shift, fire department leaders can help reduce a firefighters' idle hours per shift. This will, however, lead to increased staffing expenses.[358] Diversification may create temporary relief, but these diverse members may soon yield to the pressure of ostracism and group preferences.[359] Periodically rotating officers can also help to avoid groupthink, as the rotation can prevent officers from feeling excessive group conformity and will subject the firefighters to a variety of management styles.[360]

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[355] Laughlin, "American Fire Stations," 31–32; Carr Boyd, "Cognitive Bias and Group Think in the Fire Service," *Carolina Fire Rescue EMS Journal* (July 5, 2011), http://www.carolinafirejournal.com/Articles/Article-Detail/ArticleId/1585/Cognitive-Bias-and-Group-Think-in-the-Fire-Service; Landry, "Embracing the Devil," 23; Irving Lester Janis, "Groupthink," *Psychology Today Magazine* (November 1971): 89.

[356] Laughlin, "American Fire Stations," 31.

[357] "Firehouse Gunman Prank: Would You Have Stopped It?" FireRescue1, accessed March 26, 2018, https://www.firerescue1.com/cod-company-officer-development/articles/1167517-Firehouse-gunman-prank-Would-you-have-stopped-it/.

[358] Laughlin, "American Fire Stations," 31.

[359] Laughlin, 32.

[360] Laughlin, 32.

3. Enforcing Group-Oriented Discipline and Accountability

Another effective way to reduce groupthink is through increased accountability. Jerry Laughlin believes that "if an individual firefighter violates a rule," leaders should "hold the company officer more accountable, along with the individual. If the rest of the station crew knew about a transgression but failed to act to prevent harm, hold the rest of the station crew accountable."[361]

4. Fostering Devil's Advocacy and Using Crew Resource Management to Improve Decision-Making

Encouraging communication at all ranks and experience levels not only increases the sharing of information but also overcomes the effects of groupthink.[362] Fire department leaders should encourage their subordinates to communicate important observations and information to them no matter their level of experience or expertise.[363] Certain levels of criticism and airing of objections and doubts should be encouraged.[364] "The leader must create an environment of inquiry, granting others the permission to ask questions."[365] This will improve communication and create a better decision-making environment.

5. Using Outside Experts

In addition to the benefits outside experts can provide to battle complacency, they can also help departments battle groupthink.[366] While experts can come from within the organization as well, they should not be in the targeted decision-making group.[367]

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[361] Laughlin, 32.

[362] Boyd, "Cognitive Bias and Group Think."

[363] Boyd.

[364] Landry, "Embracing the Devil," 23.

[365] "Deciding How to Decide," Firefighter Nation, September 2, 2012, https://www.firefighternation.com/articles/2012/09/deciding-how-to-decide.html.

[366] Janis, "Groupthink," 89.

[367] Janis, 89.

6. Forming Multiple Independent Decision-Making Groups

By establishing several autonomous decision-making groups or committees to work on the same critical issue, procedure, or policy, fire department leaders can help reduce the effects of groupthink.[368] Groupthink is avoided further when leaders employ education and embrace administrative changes recommended by the groups. This fosters a dynamic, innovative, and adaptive environment that challenges commonly held views and allows department members to shape new constructs.

G. GENERATING MOTIVATION

To encourage the use of best practices for cancer prevention, fire department leaders can motivate members by developing a reward system and providing education.

1. Developing a Reward and Recognition System

Different people have different amounts of motivation, and different people respond best to different types of motivation.[369] There are two general types of motivation, intrinsic and extrinsic. Intrinsic motivation is when we do something because we want to and because it is inherently interesting, challenging, and enjoyable.[370] Extrinsic motivation is when we do something "in order to attain some separable outcome."[371] Members of the fire service may require a combination of both intrinsic and extrinsic motivators. In a dissertation entitled "Systematic Approaches to Motivating Fire Service Employees," Allen Church argues that firefighters are more intrinsically than extrinsically motivated. Firefighters' motivation appears "to come mostly from within, as opposed to requiring external motivating factors to maintain their motivation with the workplace."[372] However,

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[368] Janis, 89.

[369] Richard M. Ryan and Edward L. Deci, "Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions," *Contemporary Educational Psychology* 25, no. 1 (January 2000): 54, https://doi.org/10.1006/ceps.1999.1020.

[370] Ryan and Deci, 55.

[371] Ryan and Deci, 60.

[372] Allen Dale Church, "Systematic Approaches to Motivating Fire Service Employees" (dissertation, Grand Canyon University, 2013), 131.

Church also found that "firefighters required some levels of extrinsic motivation within the workplace, at least more than fire chiefs, when it came to factors associated with recognition or noneconomic rewards."[373]

To build intrinsic motivation for firefighters, department leaders can assign them new or more challenging responsibilities; firefighters like to be involved and to develop their skills.[374] Furthermore, leaders can provide firefighters with verbal reinforcement and positive feedback; this could be as simple as a saying "nice job."[375] Sometimes simply acknowledging that firefighters "performed their jobs under adverse conditions in a stressful environment is often more valuable than any physical or monetary reward."[376]

To build extrinsic motivation, fire department leaders can also recognize their firefighters for a good job performance, both publicly and privately.[377] Such praise can improve a firefighter's productivity, performance, and desire to improve.[378] To develop public recognition, fire department leaders can start recognizing their members within local newsletters or local media, and at community meetings.[379] To bolster work recognition, fire department leaders can reward firefighters that have good job performance with either promotions or special assignments.[380]

2. Motivating Firefighters through Education

According to protection motivation theory, we are motivated to protect ourselves (i.e., adopt a recommended action) if we perceive a high probability of risk, if we believe

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[373] Church, 131.

[374] Church, 138, 139.

[375] Edward L. Deci, "Effects of Externally Mediated Rewards on Intrinsic Motivation," *Journal of Personality and Social Psychology* 18, no. 1 (April 1971): 105–15, http://dx.doi.org.libproxy.nps.edu/10.1037/h0030644.

[376] Nancy K. Grant and David H. Hoover, *Fire Service Administration* (Burlington, MA: Jones & Bartlett Learning, 1994), 167.

[377] Church, "Systematic Approaches to Motivating Fire Service Employees," 135.

[378] Church, 133–135.

[379] Church, 135.

[380] Church, 135.

the consequences will be serious, and if we know the recommended preventive behavior is effective and easy for us to perform.[381] Similarly, the health belief model, developed in the 1950s, proposes that we are more inclined to adopt a health-related action if we think we are highly susceptible to an adverse health threat, the threat is severe, and the benefits of the action are significant yet there are few barriers to carrying it out.[382]

Fire department leaders can develop an education program that generates motivation for change by informing members about the risks of occupational cancer and discusses the simple steps that can be taken to prevent it.[383] Leaders should be cautious, however, about overestimating the degree of risk to the point of fatalism, which can actually "prevent behavior to reduce those risks"; "accurate perceptions of risk," on the other hand "combined with steps to reduce risk lead positive behavior change."[384] When firefighters are motivated, they have improved performance, productivity, morale, and job satisfaction. This motivation carries through to "emergency scene as well as when conducting other fire department business."[385]

H. CONCLUSION

The seven implementation barriers each presents its own unique challenges. By identifying the barrier and using the methods recommended here, fire department leaders can help their departments reduce or overcome the barriers they face when attempting to implement best practices for health and safety. When provided with the proper tools, training, and awareness, fire departments and their members can rise to occasion and overcome these barriers.

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381 "Protection Motivation Theory," University of Twente, February 27, 2017, https://www.utwente.nl/en/bms/communication-theories/sorted-by-cluster/Health%20Communication/Protection_Motivation_Theory/.

382 "Health Belief Model," University of Twente, February 27, 2017, https://www.utwente.nl/en/bms/communication-theories/sorted-by-cluster/Health%20Communication/Health_Belief_Model/.

383 Stefan Magnusson and David Hultman, *Healthy Firefighters-the Skelleftea Model Improves the Work Environment* (Karlstad, Sweden: Swedish Civil Contingencies Agency, 2015), https://www.msb.se/RibData/Filer/pdf/27621.pdf.

384 Harrison et al., "The Invisible Danger of Bunker Gear Transfer," 175.

385 Church, "Systematic Approaches to Motivating Fire Service Employees," 9.

V. FINDINGS, RECOMMENDATIONS, AND CONCLUSION

> The burning platform, upon which the man found himself, caused the man to shift his behaviour, and take a bold and brave step into an uncertain future … now, we have a great opportunity to do the same.
>
> —Stephen Elop, Nokia's chief executive[386]

This chapter begins by discussing the cause-and-effect relationship between the seven barriers that are preventing the fire service from implementing best health and safety practices. The chapter then turns to the three common themes discovered during the case studies analysis in Chapter III and the solutions investigation in Chapter IV: the power of education, the influence of leadership, and the benefits of a workgroup. My recommendations for fire department leaders are intertwined among these themes.

A. FINDINGS AND RECOMMENDATIONS

The focus of this thesis was to identify the barriers that are preventing the fire service from implementing best health and safety practices for cancer prevention, and to identify methods that can help fire department leaders overcome them so as to reduce firefighters' exposure to fire ground contaminants. Two case studies in which two fire departments overcame their implementation barriers to establish best practices reinforced the findings.

Although the barriers are presented in this thesis individually, they affect each other. Therefore, when a fire department leader or administrator employs a method to overcome one implementation barrier, other barriers are likely to be affected. Figure 20 shows a visual representation of this interconnectedness.

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[386] Elop said this in response to overwhelming industry competition, to describe how the company must take a radical new approach. Charles Arthur, "Nokia's Chief Executive to Staff: 'We Are Standing on a Burning Platform,'" *Guardian*, February 9, 2011, https://www.theguardian.com/technology/blog/2011/feb/09/nokia-burning-platform-memo-elop.

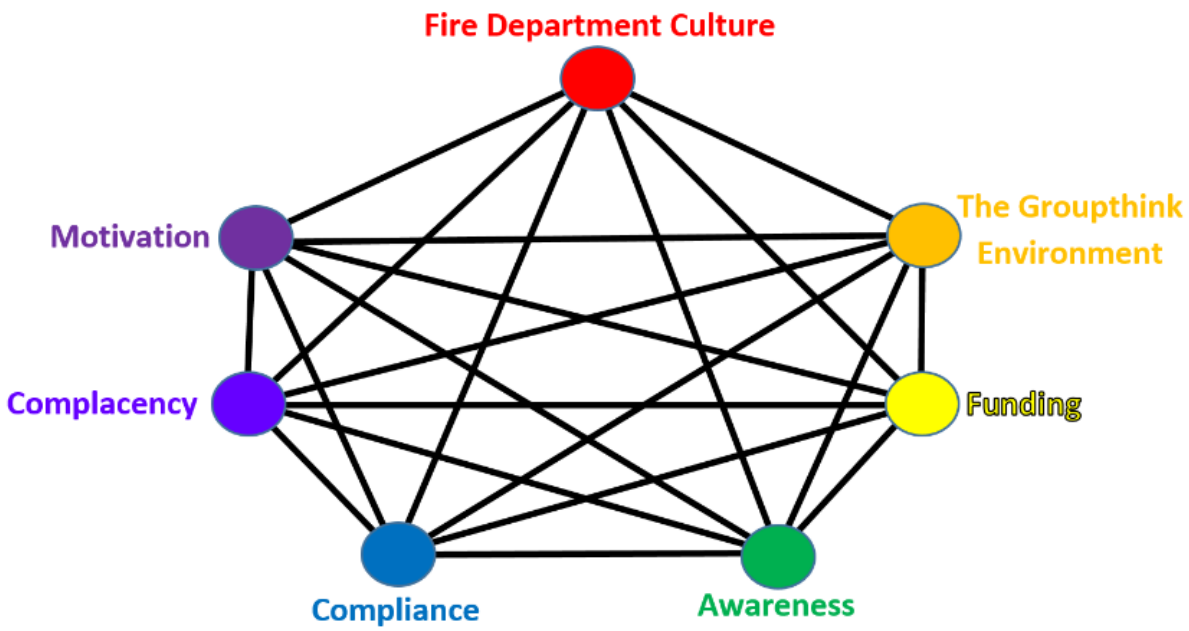

Figure 20. Interconnected Barriers

For example, increasing firefighters' awareness about the dangers of occupational cancer, and educating them about the best practices to prevent it, could mitigate the need for enforcement and result in increased compliance. In other words, safety knowledge can be an antecedent to safety compliance.[387] Furthermore, if fire department leaders or administrators can procure funding for certain safety equipment, they may, as a result, increase department compliance rates to meet state or national safety standards. Furthermore, promoting desirable personal and organizational cultural values and providing firefighters with a positive safety culture can maximize firefighters' motivation to improve their safety knowledge, which, in turn, "helps to improve employee compliance, thereby resulting in safer behaviors and fewer injuries."[388] Because the barriers are interconnected, one individual action taken by a fire department leader or administrator could create positive cascading effects. The research and case studies in this thesis revealed

[387] Maglio et al., "Situational Pressures," 558.

[388] Alyn, "Leadership Lessons"; International Association of Fire Chiefs, 12.

that effective actions arise from three common themes: education, leadership, and workgroups.

1. The Power of Education

All ranks of the fire service need an educational and training program that teaches the dangers of firefighter occupational cancer and the best practices to prevent it. Specifically, this program should cover such topics as: the danger of wearing contaminated PPE, the need for compliance with department PPE standards, and firefighters' increased risk of cancer diagnosis and death. Other, broader, topics covered during this training should include: promotion and reinforcement of desirable cultural values, and awareness and prevention training about the conditions and threats of—as well as methods to prevent—groupthink.

For this education to be effective, it must be reinforced multiple times during a firefighter's career.[389] Opportunities for education include during annual trainings, at promotional schools, and at the fire academy. The fire academy is a particularly important venue, as it is when leaders can impress lessons and cultural values upon new firefighters. All firefighters can remember back to the nervousness and excitement that came with the first day at the fire academy, as they embarked on a new career; they can also remember how impressionable they were during this time, and how easily influenced they were by what they saw and were taught. Fire academies should specifically dedicate classroom time to teaching probationary firefighters about the dangers of occupational cancer and how to prevent it. Instructors and leaders can use signs and videos containing research, cancer statistics, firefighter and firefighter family testimonials, and fire service best practices. These visual media can be created through internal department resources, or can be adapted from external educational resources. Either way, educational material should specifically target probationary firefighters—not higher-ranking firefighters. To further reinforce the

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[389] Madalene Milano, Bill McInturff, and James L Nichols, "The Effect of Earned and Paid Media Strategies in High Visibility Enforcement Campaigns," *Journal of Safety Research* 35, no. 2 (January 2004): 213, https://doi.org/10.1016/j.jsr.2004.03.004; Milano believed that it would take "3–4 impressions required for a person to recognize a message; 7–8 impressions required for a person to remember a message; and 6–18 impressions required for a person to change his/her attitude or behavior as a result of the message."

importance of the material, it should be added to fire academy manuals and included on exams.

In addition to classroom training, probationary firefighters should be taught the following during the hands-on portion of their academy training:

- *Use of SCBA in an environment that is immediately dangerous to life or health:* Fire academy instructors should be honest with their students and warn them that they will face pressure to not wear their SCBA during a fire, or to remove their face piece during overhaul. Instructors should encourage probationary firefighters to continue wearing their mask even when faced with social pressure.

- *On-scene decontamination after every training fire:* For instance, firefighters can stay on air while getting washed down, isolate their gear, and use hand wipes to clean their skin after a fire. Probationary firefighters should be allowed to shower within an hour after live fire training.

- *Methods to clean gear:* Probationary firefighters can be taught how to properly clean their gear (including SCBA, tools, hose, bunker gear, and personal hood).

- *Methods to transport gear:* Firefighters often use their personal cars to transport their gear from firehouse to firehouse. They should be taught methods for properly isolating the gear so as not to contaminate their personal vehicles.

Probationary firefighters are the future leaders of the fire department. By educating and impressing upon them the dangers of occupational cancer and the importance of following best practices, we can reverse the dangerous trend of cancer-related illness that plagues the fire service today. The effects of these changes will take time, but one of the most significant impacts can happen at the fire academy, to build a solid foundation from day one.

2. The Influence of Leadership

The second common theme discovered was the enormous influence that fire department leadership can have on the implementation process when it comes to best practices. This may be unsurprising, as leadership is often listed as one of the most critical elements when implementing any major organizational change.[390] To begin, every fire department leader can take personal actions to influence change:

- *Lead by example:* Fire department leaders can encourage the acceptance of policies and procedures by personally adopting and modeling them. "When these acts occur, firefighters believe their leadership are committed to safety and they then reciprocate and perform in a manner that enhances safety. They comply with protective measures, follow standard operating procedures and exhibit safety participation or citizenship-type safety behaviors, which not only protects themselves but their fellow firefighter."[391] For example, when leaders wear all their safety gear while in an IDLH environment, their subordinate firefighters are more likely to wear their own gear. When leaders clean their safety gear after a fire, subordinate firefighters will do the same. Through these actions and verbal encouragement, a leader can inspire others to change their own behaviors.

- *Behave with urgency every day:* Though they should take care to avoid creating a false sense of urgency, leaders should act and speak with passion about the dangers of occupational cancer and the best practices to prevent it every day.

- *Encourage communication*: Encouraging communication at all ranks and experience levels not only facilitates information-sharing, it also prevents groupthink. Fire department leaders should encourage their subordinates

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[390] Clement, Ronald W. "Culture, Leadership, and Power: The Keys to Organizational Change." Business Horizons 37, no. 1 (January 1994): 33–39. https://doi.org/10.1016/S0007-6813(05)80225-3.

[391] Smith, 96.

to communicate important observations and information to them, no matter their level of experience.[392] Certain levels of criticism and airing of objections and doubts should be encouraged. An environment that encourages communication will lead to better decision-making.

- *Enforce group-oriented discipline and accountability*: Leaders should hold both supervisors and firefighters more accountable. As Laughlin recommends, "If an individual firefighter violates a rule, hold the company officer more accountable, along with the individual. If the rest of the station crew knew about a transgression but failed to act to prevent harm, hold the rest of the station crew accountable."[393]

- *Find opportunity in crisis:* A close colleague's cancer diagnosis, or cancer-related death, is a familiar event in the fire service these days. These emotional events can spur leaders to implement new departmental changes geared toward preventing further diagnoses and deaths.

Fire department leadership can also bring about the following organizational changes to influence the implementation process:

- *Develop a reward and recognition system:* Leaders should recognize their firefighters for complying with best practices, both publicly and privately. Privately, this could be as simple as a saying "nice job" after a firefighter performs a best practice, or by offering best-performing firefighters a promotion or special assignment. Publicly, leaders can encourage their local newsletters, local media, and community leaders to recognize firefighters that are complying with best practices.

- *Stop rewarding heroic acts that violate safety guidelines:* To develop a safety culture, unsafe and risky behavior should be discouraged.

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[392] Boyd.

[393] Laughlin, 32.

Rewarding this type of behavior communicates to firefighters that such actions are acceptable.[394]

- *Employ strategic scheduling and staffing*: By cutting long shifts and rotating supervisors, fire department leaders can prevent groupthink within the firehouse.

3. The Benefits of a Workgroup

The final theme discovered, particularly prominent in the case studies, was the benefit that a workgroup can provide for a fire department that is attempting to overcome barriers preventing them from implementing best practices. When creating workgroups, fire department leaders should carefully consider how to staff the group. Ideally it should be composed of both formal and informal leaders from different sections of the department, as well as union leaders. This wide diversification will help the group gather support and obtain different viewpoints, and will legitimize the group's recommendations for other members of the department. Camaraderie between workgroup members should be promoted and fostered to increase motivation. To improve the workgroup's decision-making ability and prevent groupthink, leaders should encourage the members to play devil's advocate. Workgroups should also call in outside experts and consultants to provide new information and perspectives.

Once formed, a workgroup can develop methods for overcoming their barriers and implementing best practices. Some possible tasks include:

- *Examine past and existing fire department initiatives:* To begin, the workgroup can analyze its department's past initiatives and current practices, looking for any gaps or areas for potential improvement.

- *Create or adapt an educational and training program:* The workgroup can create a new or modify an existing one to suit the department's needs.

[394] U.S. Fire Administration, National Safety Culture Change Initiative, 13.

There is a wide assortment of educational and training resources and programs online.

- *Evaluate existing fire department training staff:* Bad habits demonstrated by a training instructor can easily be passed onto an impressionable firefighter. "The attitudes, beliefs and behaviors of the instructor may be more influential than the program content itself."[395] Workgroup representatives should determine if training instructors are themselves wearing clean gear and using their SCBA when mandated.

- *Optimize existing fire service personnel and resources:* Workgroups should look for low-cost, high-impact solutions until funding can be procured for high-cost items (e.g., annual physicals, two sets of turnout gear, extractors, direct-source diesel capture systems, health and wellness programs, etc.).

- *Examine and update department policies and procedures:* Workgroups can determine if their fire department has written policies and procedures in place. If they do exist, the workgroup can determine if the documents need to be updated to reflect current scientific research.

- *Create and rebalance enforcement mechanisms:* To encourage firefighter compliance of best practices workgroups can be tasked with making sure enforcement mechanisms exist and that they aren't too strict that they would be unenforceable.

- *Modify the recruitment and promotional processes:* The workgroup should recommend changes to both the recruitment and promotional processes to ensure the department is targeting and hiring new firefighters, and

[395] U.S. Fire Administration, 17.

promoting current officers, who share the values and behaviors they desire.

- *Develop beneficial partnerships:* A partnership with a college or university will provide a department with valuable policies, procedures, videos, and other resources that can be used as a foundation from which to build an educational and training program.

- *Conduct research and development:* To improve firefighter PPE compliance, a workgroup can be tasked with researching comfortable PPE and on-scene air monitoring options.

- *Identify cultural values:* A workgroup can be tasked with analyzing the department's formal, written values, as well as and the informal values that are actually practiced.[396] This values audit may reveal some desired, detrimental, contradictory, or even missing values.[397]

Upon completion of any of these tasks, the workgroup should provide the department's leadership with recommendations. With the support of its leadership, a workgroup can take the necessary steps to implement change.

B. CONCLUSION

The fire service is standing on its own burning platform. Firefighter cancer rates and line of duty deaths as a result of cancer are at all-time highs and continue to climb. We must decide if we are going to stay on the burning platform, muttering, "It's the way we have always done it," or if we will trust the overwhelming scientific data and change our behavior. The fire service needs to make this jump to honor the firefighters that have already died from this disease, for those that are currently battling it, and for the firefighters yet to join our brother and sisterhood.

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[396] Stein and Berardinelli, "Improving Your Organization."

[397] Drumm, "Identifying Core Values," 233.

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APPENDIX. PROVIDING A FRAMEWORK

This appendix seeks to accomplish two objectives: first, to provide the reader with visual references of material mentioned during the FDNY case study in Chapter III; second, to help fire departments create their own framework to overcome the barriers that are preventing them from implementing best practices.

A. FDNY CONTAMINATION REDUCTION WORKGROUP'S TIMELINE

This timeline covers the major events of the workgroup, from its founding on July 3, 2017, to the cut-off date for this thesis research, June 28, 2018.

2017

July 3	Leadership of Contamination Reduction Workgroup meets.
July 10	Entire Contamination Reduction Workgroup meets.
Aug 7	Contamination Reduction Workgroup meets and finalizes recommendations to chief of department and fire commissioner.
Aug 11	Letterhead report sent to chief of safety.
Nov 21	Contamination Reduction Workgroup chair presents recommendation to chief of department and fire commissioner for approval and support. Both are immediately granted.

2018

Jan 18	Workgroup leadership presents recommendations to staff chiefs.
Feb 1	Department buckslip released to membership.
Feb 15	Workgroup meeting and walkthrough at Decontamination Support Unit (FDNY's in-house laundering facility).
Feb 16	Uniformed Firefighters Association (UFA) safety message released.
Feb 27	Workgroup meeting and visit at Minerva (FDNY's independent service provider to professionally clean and inspect gear).
March 3	Workgroup chair meeting with Fleet Services.
April 9	Workgroup chair delivers presentation to probationary firefighters at Fire Academy.
May 17	Members of workgroup deliver presentation to Uniformed Firefighter Officer Association delegates
June 12–26	FDNY's Annual Safety Week and Health Week takes place, with theme "Reduce Your Risk: Reducing Exposure to Fire-ground Contaminants."
June 28	Release of "Reduce Your Risk" booklet to membership.

B. DEPARTMENT BUCKSLIP

To address the underutilization of the Decontamination Support Units cleaning facility, the workgroup recommended a buckslip, and FDNY leadership published a buckslip, shown below, on February 1, 2018. As previously mentioned, a buckslip is an official notification used to reinforce an existing FDNY procedure, pending an official release of a training or procedural manner. This buckslip reminded readers that the cleaning facility can clean contaminated bunker gear, and highlighted the procedure for doing so.

New York City Fire Department
Bureau of Operations

When responding refer to Buckslip No.: **OPS-18-02-02**

Ref. No:

Buckslip Date: 2/1/2018

Date Logged: 2/1/2018

To: All Borough Commands: Manh., Brx, Qns, Bklyn, S.I.
SOC-Special Operations Command

Subject: Equipment Decontamination Report (EDR-1)

Action: FOR IMMEDIATE ACTION
PLEASE NOTIFY ALL CONCERNED

Remarks Please Follow The Directions Outlined In The Memo.

cc's:

Due Date:

JOHN SUDNIK
Chief of Operations

Filed: OPERATIONS
JS/JH/jb

FDNY

www.nyc.gov/fdny

JOHN SUDNIK
Chief of Operations
Bureau of Operations

TO: All Borough Commands
Special Operations Command

FROM: John Sudnik Chief of Operations

DATE: February 1, 2018

SUBJECT: Equipment Decontamination Report (EDR-1)

As part of the FDNY's continuing commitment to the protection of the members' health and safety, the Department staffs a unit capable of cleaning and decontaminating FIRE and EMS PPE. The Haz-Mat Decontamination Support Unit (DSU) provides the department with an in-house capability to meet the day to day decontamination needs of the department; **including decontamination from fireground contaminants.**

To have FIRE or EMS PPE cleaned complete the Equipment Decontamination Report form (EDR-1) and follow the included instructions – both the form and instructions are accessed via the FDNY Intranet under Forms/Fire Admin Forms.

Enter **"fireground contamination"** in the contaminant section of the EDR-1.

Fax the form as directed in the instructions

Members are reminded of the importance of maintaining clean, contamination free PPE.

Fire Department, City of New York
9 MetroTech Center, Brooklyn New York 11201-3857

C. UNIFORMED FIREFIGHTERS ASSOCIATION (UFA) SAFETY MESSAGE

Similar to the department buckslip, the below UFA safety message was released on February 16, 2018, to its membership.

An Official Communication from the UFA
Safety Message · February 16, 2018

The 'Bravest'
NYC Firefighters
IAFF Local 94
AFL-CIO

UFA Safety Message

DECON SUPPORT UNIT (DSU)

You Do Not Need To Wait For Your Scheduled Cleaning

If you find that your gear is beginning to smell like a dirty diaper, it's time to do something about it. Gear cleaning is not only for carcinogen removal but is useful after a heatwave, train operations, or any suspected contamination. Clean gear, while being less offensive is safer; allowing the gear to function as it was designed to do while reducing your risk of cancer and communicable diseases.

Members are reminded to utilize the "SOC laundry" as needed. The service is not only for emergency decon cleaning but can be utilized by members as needed. HazMat Operations runs a laundry facility in Corona, Queens. If you need them to clean your gear for any reason, have the officer fill out and fax an EDR-1. The gear will be picked up and usually returned in 48 hrs. Include your hood and gloves. Any questions give them a call (718) 478-3150.

Ensuring the health and safety of the membership is our priority.
Remember to continue to make it yours!

Fraternally,

Michael Schreiber
Sergeant-at-Arms
Health & Safety Officer
212-545-6965
HealthandSafety@ufanyc.org

Robert C. Eustace
Recording Secretary

Gerard Fitzgerald
President

Follow us on **Twitter @ufanyc** · **Facebook @ufanyc** · **Instagram @ufa94nyc**

D. FUTURE GOALS

The Contamination Reduction Workgroup will continue long after this thesis is published. The ever-evolving fire ground will require the FDNY and the workgroup to continually examine departmental policies and procedures to remain focused on the health and wellbeing of its members. Future initiatives for the workgroup currently include:

- *Creating a generic department sign for placement in firehouses*: These signs will read "No Bunker Gear Beyond this Point" and will be placed at the entrance to living areas of the firehouse, such as kitchens, sitting rooms, television rooms, house watch areas, offices, bunkrooms, gyms, and other areas where firefighting protective ensembles are not routinely stored or worn. It is hoped that this will help prevent cross-contamination within the firehouse.

- *Implementing a firefighter hood and glove cleaning program*: To reduce the risk of contamination, the workgroup is creating a new policy and procedure that will allow firefighters at the scene of a fire to turn in their contaminated hood and gloves for cleaning, and have the equipment returned to them shortly thereafter.

- *Providing wipes*: With proper funding, the workgroup aims to provide field units with wipes to be used after a fire to clean a member's skin of fireground contaminates.

- *Creating educational videos and material*: Educational videos and material will be made available for multiple departmental trainings.

- *Using enhanced medical on-scene monitoring*: The workgroup is developing a policy and procedure to allow firefighters at post-fire operations to have their blood gases measured. If units do not comply with the policy, they will be called back to scene for measurements.

- *Creating a mandatory rest and relaxation (R&R) policy after a fire*: This mandatory time of one hour will allow firefighters to change out of contaminated uniforms and bunker gear and take a shower.
- *Continually examining and revising FDNY manuals*: As science evolves, new policies and procedures will need to be created and added to the FDNY manuals.

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