

Live-Fire Training Fatalities and the Degree of Adherence to National Fire Protection Association Standards (NFPA 1403)

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ABSTRACT

A review of literature revealed a gap in research on the relationship between firefighter fatalities that take place during live fire training and adherence to the guidelines outlined in a national standard published by the National Fire Protection Association (NFPA). In this mixed-methods study, quantitative data were collected from fire department training officers through an electronic survey. Qualitative data were collected through document review and interviews with leaders in fire service training and were coded to reveal emerging themes. Findings indicated a relationship between the disregard of NFPA 1403 and the fatalities, with the improper use of fuel found to be a factor in each fatality case. Findings also indicated that NFPA 1403 makes live fire training safer when applied properly, but, when not applied, can lead to fatal consequences.

PROBLEM

Live fire training is important for practicing necessary skills (Stiles, 2010), but it does not need to be inherently hazardous (Colletti & Davis, 2004; Linstrom, 2007). NFPA 1403, Standard on Live Fire Training Evolutions, is a national standard that outlines how to conduct live fire training in as safe a manner as possible. Despite this standard, firefighter fatalities continue to occur during live fire training. Fire departments not following the standard may be one possible cause of this problem. A mixed-methods study using key informant interviews, a survey, and document research was conducted to clarify the relationship between live fire training fatalities and the degree of adherence to elements of NFPA 1403, Standard on Live Fire Training Evolutions.

PURPOSE

The purpose of this study was to determine the relationship between live fire training fatalities and the degree of adherence to the guidelines outlined in NFPA 1403.

RELEVANT LITERATURE

Individual case studies have been written about firefighter fatality incidents (Fahy, LeBlanc, & Molis, 2007; National Institute of Occupational Safety and Health, 2008; Paradise, 2003), however, these researchers studied single incidents and have not looked at the trend of live fire fatalities and the relationship between those fatalities and the degree of adherence to the guidelines outlined in NFPA 1403. In addition, there is a discrepancy in statistical reporting in the reports related to live fire training. Irregularities in the collection and reporting of firefighter fatality data made it difficult to determine without further research exactly how many fatalities fall into the category of 'live fire training' and which incidents took place during other types of training.



These live fire training exercises were not NFPA 1403 compliant. The item burning in the window on the left is a sofa. A stuffed chair is starting to burn in the room on the right. These are unapproved fuels under the standard due to the unpredictable burning characteristics of the materials used to make the furniture.

RESEARCH QUESTIONS

RQ1: What is the relationship between live fire training fatalities and the degree of adherence to elements of NFPA 1403, Standard on Live Fire Training Evolutions?

Sub-questions that examined two specific elements outlined in NFPA 1403 included:

- How do the qualifications of instructors affect adherence to the standard?
- How has the use of inappropriate fuels outlined in NFPA 1403 (diesel fuel, gasoline, mattresses, sofas) contributed to deaths and injuries when used during live fire training?

PROCEDURES

Exploratory sequential mixed methods design

Qualitative sequence:

- Document review
Investigations and reports regarding live fire training fatalities, NIOSH, NFPA reports
- Key informant interviews
NFPA, NIOSH, leaders in fire service training

Quantitative sequence:

- Survey training officers of career fire departments in US cities with populations of 100,000 or more.
Pilot survey
 $n=30$ (28 responded)
Main survey
 $n=246$ (168 responded)

DATA ANALYSIS

- Qualitative data from semi-structured interviews with participants were analyzed both inductively and through coded outlines to look for patterns regarding attitudes about the importance of live fire training and adherence to NFPA 1403.
- Qualitative data were coded using NVivo, quantitative data were analyzed using SPSS.
- Integration of qualitative and quantitative data.

LIMITATIONS

Limitations included time, open and honest responses from participants, and completion of surveys.

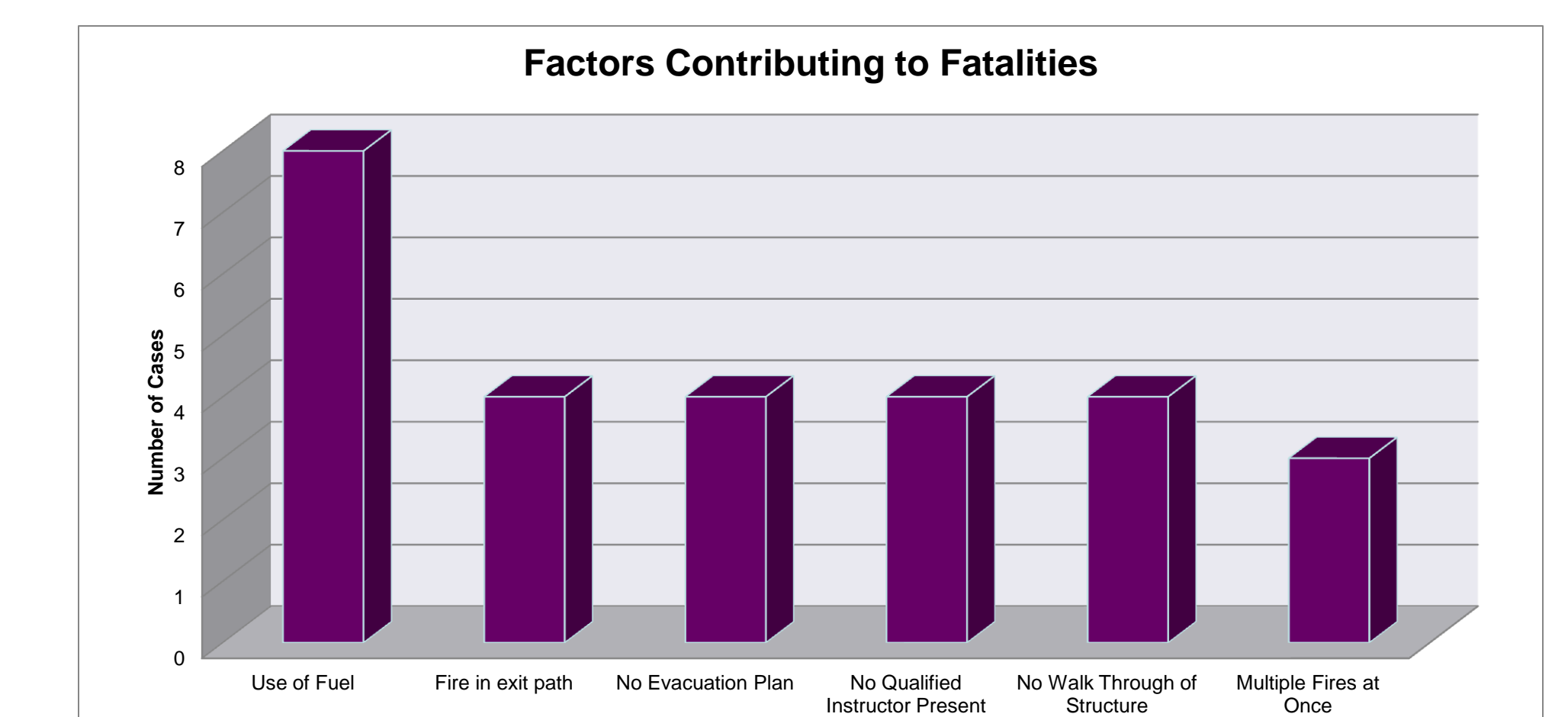
The implications of this study may not be generalizable to the entire fire service, but rather to career fire departments in cities with a population of 100,000 or higher.

The small qualitative sample may not be representative of all training facilities. The small sample size became less of a limitation through the use of triangulation and the combination of both qualitative and quantitative data.

FINDINGS

The study identified several common factors that contributed to fatalities. The use of fuel is the one factor that played a role in each fatal incident.

- 94% of respondents hold at least one live fire training event per year.
- 85% said it is mandatory for their fire department to adhere to NFPA 1403, but only 56% reported their program always complies with all elements of the standard.
- 46% use flammable or combustible liquids, and 36% use fuels such as furnishings, mattresses, or sofas.



CONCLUSIONS

There are inherent dangers in the firefighting profession. Training is the most controllable environment in which fire personnel operate. This study provided an insight as to how career fire departments in U.S. cities with populations of 100,000 people or more are applying NFPA 1403 in their jurisdictions. Through the document review, survey, and key informant interviews it has been demonstrated that NFPA 1403 works well and reduces known risks when applied properly. When not applied properly, unnecessary risks and uncontrolled hazards are introduced in exchange for safety.

SOCIAL CHANGE IMPLICATIONS

This study provides an understanding of how firefighter injuries and fatalities occur during live fire training and identifies contributing factors to injuries and fatalities.

Identifying the contributing factors gives training facilities and fire departments an opportunity to put training and safety measures in place to make live fire training safer for the nation's 1.3 million firefighters and possibly prevent future fatalities.