



Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Executive Summary

On April 15, 2016, a 37-year-old male career fire fighter/paramedic was killed and a 19-year-old male volunteer fire fighter was seriously wounded when they were shot after a combination fire department was dispatched for a check on the welfare of a citizen. The fire fighters were on the front porch attempting to gain entry into the single family dwelling when they were shot by the resident. At approximately 1930 hours, the county 911 center received a call from a civilian who reported that he was outside of his brother's house and his brother was not answering his phone calls or knocks on the front door. The caller reported that he had spoken with his brother earlier in the day and that his brother's vehicle was parked in the driveway in front of his house. He further stated that his brother had known medical issues. He requested assistance in gaining entry into his brother's house. Rescue Engine 827 with six volunteer fire fighters and Paramedic Ambulance 823 with two career fire fighter/paramedics were dispatched at 19:35 hours. After arriving on scene, the fire fighters met the homeowner's brother in the driveway and observed that all visible windows were covered. The fire fighters knocked on the front door, announced their presence several times and checked for an open door, however they did not perform a 360-degree walk around. After again announcing their presence, the fire fighters began to force open the front doors. Forcing both doors took 5-8 minutes with multiple strikes from three fire fighters using a halogen tool, axe and a sledge. The fire fighters forced the metal outer door but had trouble forcing the inner wooden door and ended up knocking a lower panel out of the wooden door and reaching through the hole to open the door from the inside. Four fire fighters, two medics and the homeowner's brother were standing on the small front porch and the steps in front of the door. As the door was opened the homeowner's brother entered. The homeowner fired a pistol multiple times through the open doorway striking his brother, the fire fighter/paramedic and a volunteer fire fighter.



Two Fire Fighters and a civilian were shot and two other fire fighters injured when trying to perform a welfare check at this single-family residence.

(Photo source Local Police Department Homicide Unit)

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

The fire fighters and the civilian all tried to escape from the front porch area (see cover photo) and ran to take cover behind the apparatus in the street. The career fire fighter/paramedic who was shot, ran to Paramedic Ambulance 823 and collapsed at the unit. He was transported in Paramedic Ambulance 823 to a local hospital where he was later pronounced dead. The volunteer fire fighter who was shot ran to Rescue Engine 827 where he was driven to a safe area, transferred to a medic unit, and then transported by air ambulance to a local trauma center. The homeowner's brother was taken by police to the off-site command post and later transported by ambulance to a local hospital. Two other volunteer fire fighters suffered minor injuries (not gunshot-related) during their escape from the porch and were treated and released.

Contributing Factors

- *Police were not on scene at time door was forced open*
- *Fire Fighter Identification (lack of standardized station uniform) and time of evening*
- *Lack of communication of important information to responders (presence of firearms in residence)*
- *Resident did not acknowledge multiple attempts by fire department to contact him verbally and by knocking on front door*
- *Fire fighters/paramedics not wearing ballistic vests or personal protective equipment.*

Key Recommendations

- *Fire, EMS, police departments, and dispatch agencies should ensure that police are the primary agency initially assigned to “check on the welfare” of occupants and that information regarding weapons in a residence are communicated to all of the responding agencies*
- *Fire and EMS departments should implement standard operating procedures requiring fire fighters and EMS providers to present themselves in uniforms that readily identify them to be emergency responders*
- *Fire, EMS, police departments and dispatch agencies should ensure important responder safety information is requested during the call taking process and that information is transferred into the dispatch system and provided to first responders.*

The National Institute for Occupational Safety and Health (NIOSH), an institute within the Centers for Disease Control and Prevention (CDC), is the federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. In 1998, Congress appropriated funds to NIOSH to conduct a fire fighter initiative that resulted in the NIOSH Fire Fighter Fatality Investigation and Prevention Program, which examines line-of-duty deaths or on-duty deaths of fire fighters to assist fire departments, fire fighters, the fire service, and others to prevent similar fire fighter deaths in the future. The agency does not enforce compliance with state or federal occupational safety and health standards and does not determine fault or assign blame. Participation of fire departments and individuals in NIOSH investigations is voluntary. Under its program, NIOSH investigators interview persons with knowledge of the incident who agree to be interviewed and review available records to develop a description of the conditions and circumstances leading to the death(s). Interviewees are not asked to sign sworn statements and interviews are not recorded. The agency's reports do not name the victim, the fire department, or those interviewed. The NIOSH report's summary of the conditions and circumstances surrounding the fatality is intended to provide context to the agency's recommendations and is not intended to be definitive for purposes of determining any claim or benefit.

For further information, visit the [program website](http://www.cdc.gov/niosh/fire) at www.cdc.gov/niosh/fire or call toll free 1-800-CDC-INFO (1-800-232-4636).



Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Introduction

On April 15, 2016, a 37-year-old male career fire fighter/paramedic was killed and a 19-year-old male volunteer fire fighter was seriously wounded when they were shot after a combination fire department was dispatched for a check on the welfare of a citizen. A civilian (the homeowner's brother) was also shot and seriously injured. Two other volunteer fire fighters suffered minor injuries (not gunshot-related) while trying to escape off the front porch. On April 18, 2016, the U.S. Fire Administration notified the National Institute for Occupational Safety and Health (NIOSH) of this incident. On April 25, 2016, the Fire Department contacted the NIOSH Fire Fighter Fatality Investigation and Prevention Program and requested assistance with an independent investigation of the incident. Over the next few weeks, a number of phone conversations were held to exchange information and arrange the on-site investigation. In early June, 2016, the Fire Chief requested that NIOSH place its investigation on hold due to the complexity of the incident and the on-going criminal investigation. In December 2016, the Fire Department again contacted the NIOSH Fire Fighter Fatality Investigation and Prevention Program and requested that NIOSH re-open its investigation. Additional phone calls were held over the next few weeks. On February 21, 2017, a Safety and Occupational Health Specialist, a Safety Engineer with the NIOSH Fire Fighter Fatality Investigation and Prevention Program and a Research Epidemiologist from the NIOSH Division of Safety Research traveled to Maryland to investigate this incident. The NIOSH investigators met with senior staff officers and representatives of the fire department, the International Association of Fire Fighters (IAFF) local 1619 and the volunteer fire fighters association. The NIOSH investigators met with and interviewed the career fire fighters and officers involved in the incident. The NIOSH investigators obtained and reviewed fire department training records, standard-operating procedures, incident scene photographs and drawings, and training records and medical records. On May 4, 2017, the NIOSH Occupational Safety and Health Specialist and the Safety Engineer returned to Maryland to conduct additional interviews with current and subsequently retired members of the career department. The volunteer fire fighters who responded on Rescue Engine 827 along with chief officers from the volunteer fire department were not available to be interviewed by NIOSH.

Fire Department

The fire department involved in this incident is a combination career and volunteer department consisting of 860 career and 1072 volunteer uniformed members that provide fire suppression and emergency medical service (EMS) protection. The fire department employs a total of 908 paid staff.

There are 45 fire stations located strategically throughout the county that serve a population of approximately 909,535 in a geographic area of approximately 482 square miles. The department responded to approximately 148,506 incidents in 2016. Some station houses are staffed by career fire

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

fighters, some station houses are staffed entirely by volunteer fire fighters and some station houses are staffed by both career and volunteer fire fighters. These 45 stations house 163 apparatus, including 49 engines (including 5 paramedic units), 23 ladder trucks, 9 rescue trucks, five rescue engines, 43 basic life support (BLS) and 18 advanced life support (ALS) ambulances, and 16 specialty units. Five battalion chiefs are on duty per shift. The battalion chiefs and career fire fighters are assigned to one of four shifts that work 24 hours on and 72 hours off duty. The fire department does not utilize chief's aides or incident command technicians. The station that the fatally injured fire fighter/paramedic's ambulance responded from is a career station that responded to 7697 emergency calls in 2016. The station that the injured fire fighters responded from is a volunteer station that responded to 7172 emergency calls in 2016.

During calendar year 2016, the department responded to a total of 5959 "check on the welfare" incidents resulting in 7654 individual unit responses. This equates to approximately 16 per 24-hour shift. The department dispatched an engine with the EMS unit to assist in these incidents (force entry) 28 percent of the time.

The fire department estimated that less than 20 percent of all "check on the welfare" calls result in the fire department providing patient care. It was also reported that 28 percent of these calls required forceable entry.

The fire department was dispatched on tactical channel 8 per department standard operating procedures. The response area is divided by a major east-west highway. Once dispatched, responding units would switch to channel 8 alpha, bravo, or charlie depending on the incident location. Channel 8 alpha is used for incidents on the north side of the highway, Channel 8 bravo is used for high volume/high speed roadways and vehicle entrapment incidents and Channel 8 charlie is used for incidents south of the highway.

The communication center operates 24 hours per day with call takers working 12-hour shifts from 06:30 to 18:30 hours and 18:30 hours to 06:30 hours. The communication center is staffed according to the expected call volume and time of day. The communication center may have anywhere from 7 or 8 call takers and up to 24 persons at dedicated work stations at any time. The hours of 14:30 to 22:30 hours generally experience the most call volume and require the highest number of dispatchers.

Note: The fire department administrative office requested that NIOSH conduct an independent investigation of this incident. The volunteer department number 27 did not participate in this investigation. The volunteer department did not provide standard operating procedures, training records or related information. The volunteer fire fighters involved in this incident were not made available for the NIOSH interview process.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Training and Experience

The state of Maryland requires training for volunteer fire fighters that meets or exceeds the requirements of *National Fire Protection Association (NFPA) 1001, Standard for Fire Fighter Professional Qualifications*, [NFPA 2013] for the topic areas of Fire Fighter I, Hazardous Materials Awareness, Hazardous Materials Operations, and First Responder. The process requires annual recertification.

The career fire department involved in this incident has a recruit school which is 18 weeks in length and consists of NFPA 1001, Standard on Fire Fighter Professional Qualifications, Fire Fighter I, Fire Fighter II, Hazardous Materials Awareness, Hazardous Materials Operations, and Emergency Medical Technician (EMT).

In the state of Maryland, training requirements are as follows:

- Firefighter I is 108 hours
- Firefighter II is 60 hours
- EMT is 380 hours
- Hazardous Materials Operations is 24 hours
- Hazardous Materials Awareness is 12 hours.

The career fire fighter/paramedic fatally shot in this incident had 13 years of fire service experience. Fire department training records indicated he had received training and certification in Fire Fighter I Equivalency, Fire Fighter II Equivalency, Hazardous Materials Operations Equivalency, Emergency Vehicle Operator, Pump Operator, Aerial Apparatus Operator, Truck Company Operations, National Fire Academy Responding to Terrorism Basic Concepts, Emergency Medical Technician (EMT) training and certification, and Paramedic training and certification. The career fire fighter/paramedic was working an overtime shift at the time of the incident and was not working at his normal duty station.

Training records for the volunteer fire fighter wounded in this incident were requested by NIOSH but not provided by the volunteer fire department.

Equipment and Personnel

Units that initially responded to the check on the welfare incident:

- Rescue Engine 827 with six volunteer personnel including an officer (lieutenant).
- Paramedic Ambulance 823 with two career fire fighters (fire fighter/EMT driving and fire fighter/paramedic (the shooting victim)).

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Timeline

The following timeline is a summary of events that occurred as the incident evolved. This timeline is not a formal record of events and not all incident events are included in this timeline. The times are approximate and were obtained by studying the dispatch records, audio recordings, witness statements, and information courtesy of the local police department and other available information. All times are approximate and rounded to the closest minute.

Incident Conditions	Time	Response
Civilian repeatedly called his brother's cell phone and landline, feared a medical event may have occurred	1430-1915 hours	No answer on either line
Civilian then went over to check on his brother at incident location	1915 hours	Couldn't get his brother to answer his door and then knocked on windows with no success
Civilian called 911 for assistance	1930	Dispatcher took information from the civilian (brother of the occupant)
	1933	Call was entered for "Check on the Welfare"
Call was dispatched to Fire/Rescue Department	1935	Rescue Engine 827 and Paramedic Ambulance 823 assigned and responded
Rescue Engine 827 arrived on scene	1946	Volunteers from Rescue Engine 827 met with the civilian (brother) and walked up and started to force door
Paramedic Ambulance 823 arrived on scene	1948	The 2 career fire department EMT's from Paramedic Ambulance walked up the yard to the front door while the rescue engine was attempting to force the front door

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Incident Conditions	Time	Response
PD unit 3K9 and 3K6 dispatched to assist FD	1949	Rescue Engine 827 and Paramedic Ambulance 823 personnel were at the front door (on the porch and steps) with tools attempting to force the door
PD unit 3K10 replaced 3K9 on the incident and responded	1950	No PD units were on scene, just Rescue Engine 827 and Paramedic Ambulance 823 and the civilian The fire fighters broke out a panel of the lower portion of the wooden front door and a fire fighter reached in and unlocked and opened the door and yelled fire department
A responder on the radio advised “shots fired” (an additional shot could be heard in the background of the dispatch tape during this transmission)	1950-1951	Fire crews and civilian had just entered the front door, then the home owner fired a total of 5 shots at the responders and his brother
Radio transmission “police step up”	1951	Fire fighters ran off the porch (civilian ran too but did yell to his brother to identify himself)
Radio transmission “One fire fighter down by the house, cannot get to him”	1953	Shooting suspect was still in the house
PD timeline noted 1954 hours “Paramedic Ambulance 823, one shot to chest, not conscious”	1951-1954	Fatally injured career fire fighter from Paramedic Ambulance 823 ran to Paramedic Ambulance 823 in street and told members he was shot, then collapsed

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Incident Conditions	Time	Response
	1951-1954	Volunteer fire fighter from Rescue Engine 827 was shot 3 times and tried to get down the sidewalk by crawling, then rolled down driveway to Rescue Engine 827
PD arrived on scene	1957	
	2009	Shooting suspect walked out of the house and surrendered to PD
	2038	Career fire fighter medic off of Paramedic Ambulance 823 was pronounced dead at local hospital from gunshot wound to the chest
Rescue Engine 827 transported injured volunteer fire fighter to meet ambulance 825. Staff from ambulance 825 provided care on the tailboard of Rescue Engine 827 until ambulance 829 arrived and took over care. Transport to medic helicopter was initiated in ambulance 825. Ambulance 829 took the homeowner's injured brother (gunshot wound) to trauma hospital.		Unit ambulance 825 gave care to Rescue Engine 827 fire fighter on the tailboard of Rescue Engine 827 then transferred care to ambulance 829. 829 then transported 2 volunteer fire fighters with minor injuries (non-gunshot related) to hospital.

Weather

At approximately 1951 hours, the weather in the immediate area was reported to be approximately 54 degrees Fahrenheit, a dew point of 31.6 degrees F., and the relative humidity was 43%. Wind conditions were 6.9 miles per hour from the southeast and clear with visibility of 10 miles [Weather Underground 2017].

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Incident Location

This incident occurred at a one-story, 1,600-square foot, residential single-family dwelling located within city limits. The structure included an in-basement garage and contained 4 bedrooms and 2 baths. The structure faced a two-lane city street (See Photo 1 and Diagram 1).

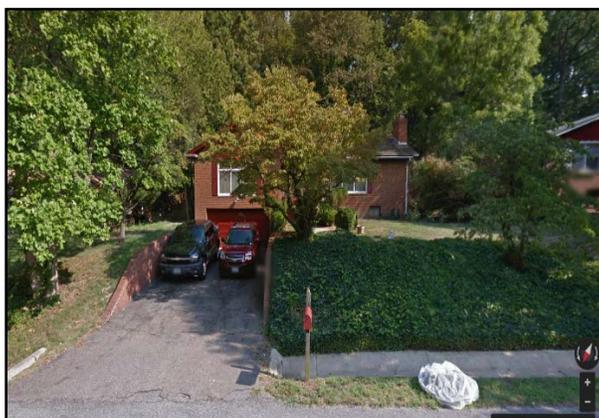


Photo 1. Incident Scene.

(Photo source Local Police Department Homicide Unit)

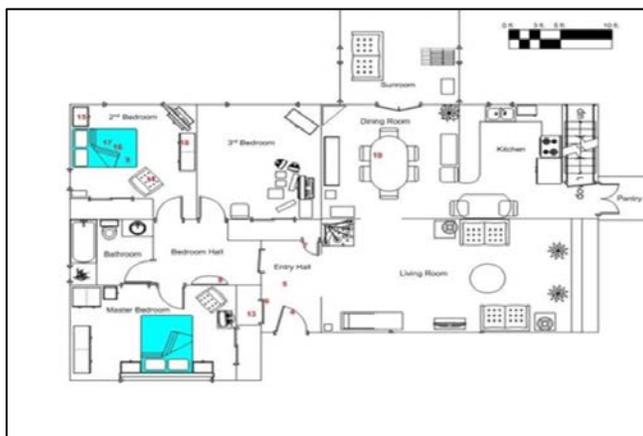


Diagram 1, first floor layout.

(Diagram derived from floorplan provided by the fire department.)

Investigation

At approximately 1930 hours on April 15, 2016, the county 911 center received a call from a civilian who reported that he was outside of his brother's house and his brother was not answering his phone

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

calls or knocks on the front door. The caller reported that he had spoken with his brother earlier in the day and that his brother's vehicle was parked in the driveway in front of his house. He also stated that his brother had known medical issues and had "blacked-out" at work the previous day. The caller also reported the possibility of firearms inside the house, and requested assistance in gaining entry into his brother's house. Dispatch recorded the information and entered the call as a "Check on the welfare" call.

At 1935 hours, Rescue Engine 827 and Paramedic Ambulance 823 were dispatched for the assignment. Rescue Engine 827 responded from Station 27 with six volunteer fire fighters onboard, including one officer. Paramedic Ambulance 823 responded at 1935 hours with two career fire fighters (fire fighter/EMT driving and fire fighter/paramedic) onboard. Rescue Engine 827 arrived on scene at 1946 hours and met with the resident's brother in the driveway in front of the house, and proceeded to the front door. Paramedic Ambulance 823 arrived on scene at 1948 hours and joined the Rescue Engine 827 fire fighters at the front porch (see Photo 2). The resident's brother joined the fire department members on the front porch and urged them to force open the door so that they could gain entrance and check on the status of the resident.

Fire fighters knocked on the front door and loudly announced that they were with the fire department and checked the front door, however they did not perform a 360-degree walk around. It was reported that they did not hear any response from inside the house. All the visible windows were covered over from the inside so the fire fighters could not see inside the house. It was also reported that the resident's brother made several more calls from his cell phone in an attempt to reach the resident who was assumed to be inside. After again announcing their presence, the fire fighters began to force open the front doors.

At 1949 hours, two police department patrol units were added to the dispatch assignment and went enroute. The Rescue Engine 827 crew members began to force open the front door using hand tools. The fire fighters encountered some difficulties in forcing open the outer metal door and the main wooden door. At approximately 1950 hours, one of the fire fighters used a sledge hammer and broke out the bottom left panel of the four-panel wooden door (see Photo 3). The fire fighters again loudly announced they were with the fire department. One of the fire fighters reached through the opening in the door and unlocked the door from the inside.

The fire fighters opened the door and prepared to step inside. Six of the eight fire fighters on-scene were standing on the front porch (approximately 6 feet by 6 feet) with one fire fighter standing on the sidewalk and the driver of Rescue Engine 827 remained in the driver's seat of the engine. One volunteer fire fighter (wounded) and the resident's brother (also wounded) were standing side-by-side just outside the threshold when the door was swung open. Another volunteer fire fighter and the fatally-wounded career fire fighter/paramedic (carrying a medical bag) were located right behind them.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

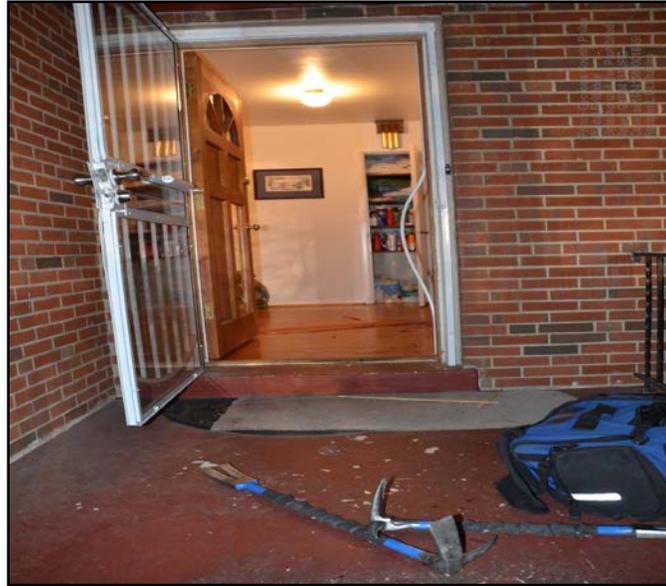


Photo 2. Incident Scene. Photo shows the 6 foot by 6 foot front porch area where fire fighters and the resident's brother were located just prior to the shooting. Medical bag and tools were dropped as the fire fighters exited the area.

(Photo source Local Police Department Homicide Unit)

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

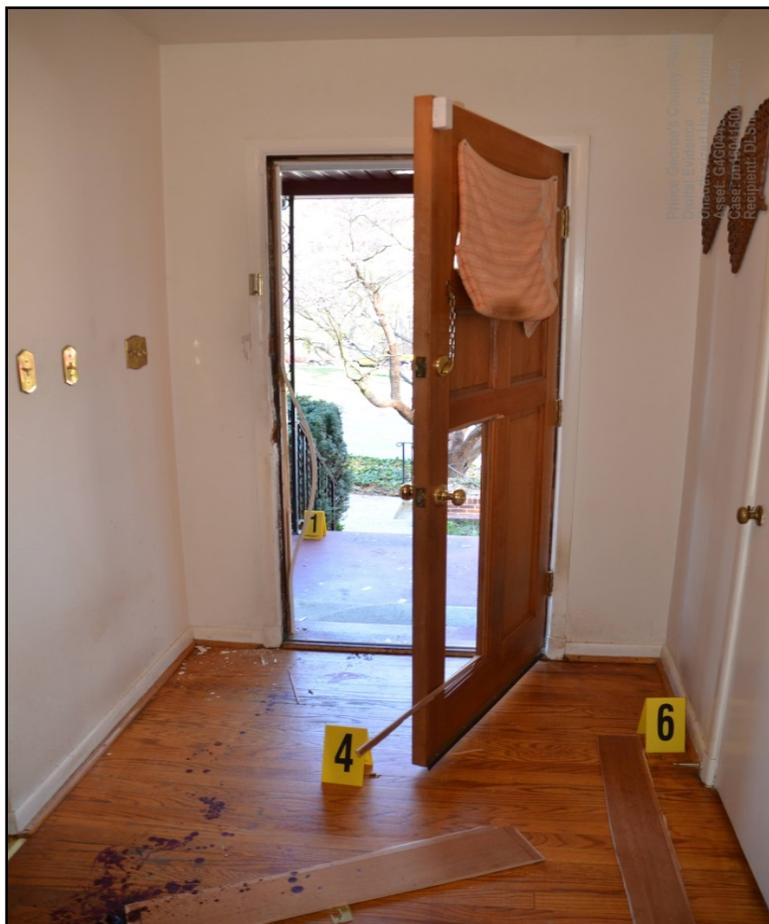


Photo 3. Incident Scene. Photo taken from inside the residence facing the front entrance shows the front door which was forced open by the responding fire fighters. Numbered markers were placed by the local police department.

(Photo source Local Police Department Homicide Unit)

Unknown to the fire fighters, the resident was located approximately 10 feet from the front door at the hallway leading to the bedroom area (see Diagram 1). As the door was swung open, the resident began firing a handgun, striking the fire fighter/paramedic, one of the volunteer fire fighters, and his brother. None of the fire fighters were believed to have entered the house when the shooting occurred.

The fire fighter/paramedic from Paramedic Ambulance 823 was struck in the upper chest by a single bullet. The volunteer fire fighter from Rescue Engine 827 was struck three times in the arm, abdomen and upper leg. The resident's brother was struck by a single bullet in the chin. The resident's brother reportedly called out to his brother and identified himself by name after the shooting. *Note: It was reported during NIOSH interviews and police photographs confirmed that some of the Station 27*

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

volunteer fire fighters (on Rescue Engine 827) were not wearing fire department uniforms. The Station 27 volunteers did not participate in the NIOSH interviews or information requests. Police photographs showed athletic-type shorts, tee-shirts and athletic shoes being worn at the time of the incident. It was also reported that the volunteer fire department did not have a uniform requirement.

All of the fire fighters immediately ran for cover. Two of the volunteer fire fighters suffered minor injuries diving off the porch. The fire fighters ran toward the street to take cover behind the engine and ambulance. The career fire fighter/EMT and the volunteer officer both dove behind Paramedic Ambulance 823 at the same time. The volunteer officer got into the right front seat and radioed dispatch that fire fighters had been shot. The career fire fighter/EMT got into the driver's seat as another Rescue Engine 827 volunteer fire fighter dove behind Ambulance 823 for cover. The wounded fire fighter/paramedic (victim) reached the ambulance and walked around to the right side of the ambulance. He reportedly said "I think I'm shot" and then collapsed as he was opening the side door. The career fire fighter/EMT jumped out of the driver's seat to assist his partner. The volunteer fire fighter helped to pull the wounded fire fighter/paramedic into the ambulance through the side door. The wounded fire fighter/paramedic was placed on the cot facing rearward. The career fire fighter/EMT and the volunteer fire fighter began checking the fire fighter/paramedic for wounds as the volunteer officer began driving away from the scene while radioing dispatch that Paramedic Ambulance 823 was transporting the wounded fire fighter/paramedic to the hospital. The career fire fighter/EMT hooked up a heart monitor and began to monitor the wounded fire fighter/paramedic's vital signs.

As Paramedic Ambulance 823 drove away from the scene, dispatch advised that a medic unit was being dispatched to meet them. Paramedic Ambulance 823 briefly stopped, the three fire fighters discussed the situation and then they decided to proceed immediately to the closest county hospital. After arriving at the hospital, the wounded fire fighter/paramedic was immediately taken into the emergency room for treatment. Unfortunately, the fire fighter/paramedic did not survive his wounds and was pronounced dead at the hospital.

Rescue Engine 827 drove away from the residence with the wounded volunteer fire fighter and the remaining three crew members onboard. Ambulance 825 was dispatched to meet Rescue Engine 827 at a local middle school. Ambulance 825 was staffed with two fire fighter/paramedics but was operating as a basic-life-support (BLS) ambulance at the time of the incident. The fire fighter/paramedics on Ambulance 825 treated the Rescue Engine 827 volunteer fire fighter's gunshot wounds and prepared him for transport. Medic 829 arrived and assisted with medical treatment. The wounded fire fighter was placed in the police helicopter (Trooper 2) and transported to the shock trauma hospital in Baltimore MD. One of the Rescue Engine 827 volunteer fire fighters rode in the helicopter with the wounded fire fighter. The Ambulance 825 crew then treated the remaining injured Rescue Engine 827 fire fighters and transported them to the local county hospital. One of the volunteer fire fighters suffered a broken jaw and the other volunteer fire fighter suffered an ankle injury diving off the porch during the shooting. The driver of Rescue Engine 827 suffered a knee injury when he exited the driver's seat of the engine. Ambulance 829 transported the resident's brother from the off-

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

site command post (where police had transported him) to the local trauma hospital to be treated for the gunshot wound he sustained during the incident.

Occupation Related Violence

The Centers for Disease Control and Prevention estimates that 2,600 EMS workers received hospital treatment in 2014 for injuries resulting from work-related violence out of a total of 21,300 EMS medical treatment incidents for all types of work-related injuries [CDC 2014].

A survey conducted by the National Association of Emergency Medical Technicians (NAEMT) found that 80 percent of emergency medical services (EMS) workers have experienced some form of injury on the job [NAEMT 2005]. Further, the majority (52 percent) reported that they were injured from an assault [NAEMT 2005]. In 2012, the overall private industry rate of injury requiring days away from work for violence and other injuries by persons or animals was 4.0 per 10,000 full time employees [BLS 2014]. The rate for EMTs and paramedics was over eight times greater (32.5) [BLS 2014].

Compared to 2012 numbers, the number of EMS workers seeking treatment for all work-related injuries in 2014 decreased by 2,900, while the number seeking treatment for work-related assault injuries increased by 200 [CDC, 2012]. Although, not all assault-related injuries can be prevented, the risk can be reduced by implementing recommendations included in this report.

Contributing Factors

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. NIOSH investigators identified the following items as key contributing factors in this incident that ultimately led to the fatality:

- Police were not on scene at time door was forced open
- Fire Fighter identification (lack of standardized station uniform) and time of evening
- Lack of communication of important information to responders (presence of firearms in residence)
- Resident did not acknowledge multiple attempts by fire department to contact him verbally and by knocking on front door.
- Fire fighters not wearing ballistic vests or personal protective equipment.

Cause of Death

According to the medical examiner report, the victim died from a gunshot wound to the chest.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Recommendations

Recommendation #1: *Fire, EMS, police department’s and dispatch agencies should ensure that police are the primary agency initially assigned to “check on the welfare” of occupants and that information regarding weapons in a residence are communicated to the responding agencies.*

Discussion: In 2004, NIOSH released EMS specific recommendations on methods to best mitigate violence following the investigation into the death of a female firefighter who responded to the scene of a civilian shooting [NIOSH 2005]. Table 3 summarizes the recommendations from the 2005 NIOSH report.

Table 3. NIOSH recommendations from Report F2004-11 [NIOSH 2005].
Fire departments should:
<ul style="list-style-type: none"> • Develop standard operating procedures for responding to potentially violent situations. These should include, at a minimum, simultaneous dispatch of police and EMS.
<ul style="list-style-type: none"> • Develop integrated emergency communication systems that include the ability to directly relay real-time information between the caller, dispatch, and all responding emergency personnel.
<ul style="list-style-type: none"> • Make it standard operating procedure that any time weapons are mentioned during the dispatch, EMS personnel stage a safe distance from the scene until police declare the scene safe.
<ul style="list-style-type: none"> • Provide body armor or bullet-resistant personal protective equipment; train on, and consistently enforce its use when responding to potentially violent situations (including all check on the welfare calls).
<ul style="list-style-type: none"> • Ensure all emergency response personnel have the capability for continuous radio contact, and consider providing portable communication equipment that has integrated hands-free capabilities.
<ul style="list-style-type: none"> • Consider requiring emergency dispatch centers to incorporate the ability to archive location, or individual, historical data, and provide pertinent information to responding fire and emergency medical services personnel.
<ul style="list-style-type: none"> • Develop coordinated response guidelines for violent situations, and hold joint training sessions with law enforcement, mutual-aid and emergency response departments.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

NIOSH recommends that employers train workers on recognizing and preventing workplace violence, investigate all reports of violence, work with police to identify dangerous neighborhoods where special precautions need to be taken, and provide that information to employees.

From the employee's standpoint, NIOSH recommends the following in response to violent workplace incidents: employees should participate in violence prevention training and report all incidents of violence, no matter how minor [NIOSH Fast Facts, 2012]. Other recommendations include concurrent dispatching of police in all high-risk situations associated with violence or the potential for violence (e.g., suicide, homicide, domestic violence, intoxication, and psychiatric illness) [Corbett et al., 1998; Mechem et al., 2002, USFA 2017b].

During this incident, the fire department members arrived on Rescue Engine 827 and Paramedic Ambulance 823 before the police department arrived. Due to the urgency expressed by the resident's brother, the fire department members did not wait for the police department to arrive before beginning to force open the front door.

Recommendation #2: Fire and EMS departments should implement standard operating procedures requiring fire fighters and EMS providers to present themselves in uniforms that readily identify them to be emergency responders

Discussion: The ability of the public to identify a fire fighter or EMS provider as someone who does not pose a physical threat to them is vital for the safety of emergency responders and the public. Fire fighters and all emergency responders should be easily identifiable and highly visible for both practical and safety purposes. The National Fire Protection Association (NFPA) 1975 *Standard on Emergency Services Work Clothing Elements* establishes requirements for fire fighter and emergency responder work apparel and clothing be worn while performing their official duties. [NFPA 2014a]. This standard does not apply to clothing that is intended to protect the wearer with primary protection from given hazard exposures.

The uniform should make the fire fighter easily and readily identifiable as a member of the fire department. The U.S. Fire Administration final report *Mitigation of Occupational Violence to Firefighters and EMS Responders* provides emergency medical services best practices to avoid violence to EMS and emergency responders based upon first-hand experience. One important recommendation from this report states "Make sure 'EMS' is clearly stated in your appearance, so that there is no confusion of your intentions" [USFA 2017b]. The uniform should make the fire fighter easily and readily identifiable as members of the fire department. NFPA 1500 Standard on Fire Department Occupational Safety and Health Program, Paragraph 7.1.4 states "Where station/work uniforms are worn by members, such station/work uniforms shall meet the requirements of NFPA 1975, Standard on Station/Work Uniforms for Emergency Services [NFPA 2013b]. Annex A, Chapter 7.1.4 of NFPA 1500 states "Because it is impossible to ensure that every member, whether a volunteer, call, or off-duty career member, will respond to an incident in a station/work uniform or will change into station/work uniform clothing before donning protective garments, it is very important that

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

members understand the hazards of some fabrics that more easily melt, drip, burn, shrink, or transmit heat rapidly and cause burns to the wearer. Clothing made from 100 percent natural fibers or blends that are principally natural fibers should be selected over other fabrics that have poor thermal stability or that ignite easily. The very fact that members are fire fighters indicates that all clothing they wear should be flame resistant to give a degree of safety if unanticipated happenings occur that expose the clothing to flame, flash, sparks, or hot substances [NFPA 2013b].”

In this incident, it was reported that some members of the volunteer engine company who responded on the initial dispatch were wearing athletic apparel (shorts) and tennis shoes. This could have contributed to the resident failing to identify them as members of the responding fire department and perceiving them as a threat. The resident did not call or request the fire department to respond so it is possible the resident heard the sound of the fire department forcing open the front door and thought his home was being burglarized. Easily identifiable fire service uniforms may have made the individuals more easily recognizable as fire department members.

Fire departments should consider developing and implementing standard operating procedures or guidelines requiring fire department members to be properly dressed in a professional manner while on duty. *Note: During the NIOSH interview process information was reported and police photographs confirmed that some of the Station 27 volunteer fire fighters (on Rescue Engine 827) were not wearing fire department uniforms. Police photographs showed athletic-type shorts, tee-shirts and athletic shoes being worn at the time of the incident. It was also reported that the volunteer fire department did not have a uniform requirement. The Station 27 volunteers did not participate in the NIOSH interviews or respond to information requests.*

Recommendation #3: Fire, EMS, police departments and dispatch agencies should ensure important responder safety information is requested during the call taking process and that information is transferred into the dispatch system and provided to first responders.

Discussion: Critical information, such as the suspected presence of weapons, that can assist first responders with their safety needs to be obtained and transmitted to all of the responding units to an emergency. This information can help establish the proper response urgency and put the responders in the proper mind-set regarding their own safety. This incident was initiated when a civilian called 911 and expressed concern that his brother was not responding to repeated phone calls and attempts to make contact. The caller reported that he was at his brother’s house and his brother’s vehicle was parked in the drive way. The caller stated that he had knocked on the door but his brother did not respond. The call taker asked the caller if any weapons were in the house and the caller stated that there could be firearms inside the house.

The communications center did not have a process for entering this type of critical information into the computer-aided-dispatch system. The information about the possibility of weapons in the house was not forwarded to the responding units.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Recommendation #4: Fire and EMS departments should ensure that important information regarding an incident (such as weapons in the house) are communicated to individual responding units and provide mobile data terminals (MDT) for reserve units.

Discussion: Fire departments and authorities having jurisdiction should ensure that critical information that could impact responder safety is communicated to all responding units as part of the initial dispatch and all subsequent dispatches to the incident. It is also important to relay this information by radio as well as putting notes in the warning or information section of the MDT. Fire fighters and EMS providers may not be sitting in front of a MDT or be able to scroll through notes and read important cases notes such as this during an emergency response. These important messages should have a priority screen presence with some sort of visual stimuli to ensure it is noticed. This is not only important for the primary units assigned, but also fire department and EMS supervisors for those units.

When sensitive information cannot or should not be transmitted over the radio, the dispatcher should verbally prompt responding units to check case notes and acknowledge to complete the communications loop.

In this incident, the communications center did not have a process for entering this type of critical information (possibility of weapons in the house) into the computer-aided-dispatch system. The information about the possibility of weapons in the house was not forwarded to the responding units. The resident's brother had a conversation with the dispatcher and when the dispatcher asked if there were any weapons in the residence, the brother said yes, but he (resident) wouldn't hurt himself. This information may have led to the information on weapons not being considered a priority and transmitted over the radio.

Fire and EMS departments should train fire fighters to ask if weapons are in the structure before forcing entry. This should be directed to the dispatch and also any civilians on the scene who may know the location. Additionally fire and EMS departments should consider providing MDT's for reserve fire and EMS vehicles.

Recommendation # 5: Fire departments and authorities having jurisdiction should consider issuing ballistic vests to fire fighters and emergency responders that meet, at a minimum, the requirements of the National Institute of Justice, Standard-0101.06, Ballistic Resistance of Body Armor.

Discussion: Protective equipment (which includes ballistic vests, helmets, and eyewear) for both civilian first responders and the military is designed and tested according to anticipated threats, injury patterns, and existing technology. Historically, first responders have been primarily concerned with protective equipment to counter firearm and, to a certain extent, chemical, biological, radiological, and nuclear threats).

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

First Responders

The development of standards and the manufacturing of this protective equipment for first responders have only been available since the 1970s [Montanarelli et. al 1973, NIJ 2001]. The 126 percent increase in police officer fatalities from 1966 to 1971 prompted the Department of Justice (DOJ) to develop and evaluate concealable soft body armor for daily use that would protect against ballistic threats while minimizing blunt trauma. [Hanlon & Gillich 2012, Montanarelli et al.] Handguns have historically been the most common threat to police officers, but National Institute of Justice (NIJ) ballistic vest testing parameters follow trends in threats, and updated testing parameters are added based on new knowledge of vest performance and necessary test conditions [DOJ 2008, OTA 1992].

Currently there are five types of ballistic vests based on NIJ body armor standards. However, statistics from the Bulletproof Vest Partnership/Body Armor Safety Initiative suggest that the majority of vests used by first responders are Type II and IIIA. Descriptions of the body armor standards are listed below, ordered by the level of protection. For instance, Type IIA provides protection against Type II and IIA threats, whereas Type III vests provide protection for Type IIA, Type II, and Type IIIA threats. All of the vests listed, with the exception of Types III and IV, are considered concealable body armor and designed to fit under a normal uniform shirt [NIJ 2001].

NIJ Standard-0101.06 establishes five formal armor classification types [NIJ 2008, DOJ 2010]:

- Type IIA protects against 9 mm; .40 S&W
- Type II protects against 9 mm; .357 Magnum
- Type IIIA protects against .357 SIG; .44 Magnum
- Type III protects against Rifles; 7.62mm FMJ
- Type IV protects against Armor Piercing Rifles; .30 caliber AP

Some manufacturers also produce soft armor vests that accommodate “trauma packs”, which are ballistic inserts added to a vest to provide added protection. These inserts are referred to as “in conjunction” designs and are similar to military ballistic inserts. These “in conjunction” designs must be threat level tested and labeled appropriately [NIJ 2001]. In other words, if a Type III vest provides Type III protection only in conjunction with a trauma pack, then the system’s label must be marked accordingly.

Recommendation #6: Fire and EMS departments should ensure that accountability is maintained on all incidents.

Discussion: Although there is no evidence that the following recommendation would have prevented this fatality, it is being provided as a reminder of best safety practice for the fire service. Fire and EMS departments need to ensure accountability for all responding personnel. Accountability should be maintained at the task, tactical and strategic level.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

An accountability system can be as simple as a team using the buddy system (task level) on a single unit response to a formal command (tactical and strategic level) accountability function established. It not only keeps track of where personnel are but can even be used as a protection element for responders. An example would be sending two members to search a residence when no one answers the door. Two responders can account for each other and perform a quick scan to make sure the mission is complete. Not only are the two members maintaining accountability, they are also ensuring mission integrity and security. Once an incident escalates and multiple units are dispatched, supervisors need to be aware. This may mean supervisors are made aware of or sent to incidents when multiple units are assigned.

A personnel accountability system can help to reduce exposure to hazardous areas and also potentially hazardous areas such as this front porch. A personnel accountability system is a system that readily identifies both the location and function of all members operating at an incident scene [NFPA 2014b]. The accountability system should be inclusive of all sizes and types of emergency incidents.

The philosophy of the personnel accountability system starts with the same principles of an incident management system – company unity and unity of command. Unity can be fulfilled initially and maintained throughout the incident by documenting the situation status and resource status on a tactical worksheet. An integral part of the accountability system is to make sure the fire fighters who are assigned and operating in the hazard zone are accounted for, starting with the initial operations and throughout the entire incident. Also, a system should be in place to periodically check to make sure that all members operating in the hazard zone are accounted for.

One of the most important functions of command safety is for the incident commander to initiate a personnel accountability system that includes the functional and geographical assignments at the beginning of operations until the termination of the incident. NFPA 1561, Standard on Emergency Services Incident Management System and Command Safety states in Paragraph 8.12.4, “The incident commander and members who are assigned a supervisory responsibility that involves three or more companies or crews under their command shall have an additional member(s) (e.g., staff aide) assigned to facilitate the tracking and accountability of the assigned companies or crews” [NFPA 2014b].

A functional personnel accountability system requires the following:

- Development and implementation of a departmental accountability SOP
- Necessary components and hardware, such as an accountability board, individual name tags, and company name tags
- Training for all members on the operation of the system
- Strict enforcement during emergency incidents.

Resource accountability should be assigned to personnel who are responsible for maintaining the location and status of all assigned resources at an incident. As the incident escalates, resource status would be placed under the Planning Section. This function is separate from the role of the incident commander. The incident commander is responsible for the overall command and control of the

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

incident. Due to the importance of responder safety, resource status should be assigned to a dedicated member as the size and complexity of the incident dictates.

An important aspect of a personnel accountability system is the personnel accountability report or PAR. A PAR is an organized on-scene roll call in which each supervisor reports the status of their crew when requested by the incident commander or accountability officer [NFPA 2014b]. **The PAR should be conducted every 15-20 minutes or when benchmark activities are met.**

In situations where individual fire department units and EMS units may respond without a fire battalion chief or EMS supervisor; the agencies need to insure appropriate levels of accountability are in place and effective. Individual units should not be left alone or unaccounted for. This can easily happen when single piece responses are dispatched without the battalion chief or EMS supervisor being aware of the initial response. In a recent incident in MD, a fire department safety officer was left in an exposure after a fire and died from smoke inhalation. The safety officer was a single person emergency response vehicle. It was not realized that he was unaccounted for until the following morning when his vehicle was spotted outside of the original fire building [NIOSH 2014].

In situations where there are single piece fire and EMS units on scene and no supervisor responding, departments should ensure that they are checked on even if it is by the dispatcher. This could be considered task or tactical level accountability by the members on the ambulance or engine, and may be the extent of the accountability needed. However, if a single unit is dispatched to a seemingly non-hazardous or insignificant incident and doesn't report in with dispatch or their supervisor a break down in accountability at the strategic level can occur. To prevent this, supervisors such as Battalion Chiefs and EMS supervisors as well as dispatchers should have a system to recognize when a unit never clears the scene.

In this incident, task and tactical level command and control quickly deteriorated after the shooting occurred and the two initial companies left the scene to seek safety. Once it was determined that the shooting had occurred, responding chief officers struggled to determine what had happened, how many fire fighters were wounded and who they were. This confusion continued for some time as conflicting information was reported over the radio. When the volunteer fire fighter who was wounded was airlifted, another member of the volunteer fire department rode in the helicopter, adding additional confusion as chief officers attempted to get a personnel accountability report.

Recommendation #7: Fire and EMS departments should consider using field incident technicians for command officers to help ensure an effective unified command post is established.

Discussion: Although there is no evidence that the following recommendation would have prevented this fatality, it is being provided as a reminder of best safety practice for the fire service. A field incident technician, staff assistant, or a chief's aide is a position designed to assist an incident commander with various operational duties during emergency incidents. The chief's aide can be an essential element for effective incident management. During an emergency incident, the staff assistant

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

can assist with key functions such as: managing the tactical worksheet; maintaining personnel accountability of all members operating at the incident (resource status and deployment location); monitoring radio communications on the dispatch, command, and fireground channels; control information flow by computer, fax, or telephone; and, access reference material and pre-incident plans. The personnel accountability system is a vital component of the fire fighter safety process. The system is designed to account and track personnel as they perform their fireground tasks. In the event of an emergency or “Mayday,” the personnel accountability system must be able to provide the rapid accounting of all responders at the incident. This is one of the chief’s aide’s essential responsibilities. Another important function is the role of a driver in addition to their role as part of the command team. Chief Officers are required to respond quickly to emergency incidents. In their response, they have to be fully aware of heavy traffic conditions, construction detours, traffic signals, and other conditions. The chief officer should also monitor and comprehend radio traffic to assess which companies are responding, develop a strategy for the incident based upon input from first arriving officers, develop and communicate an incident action plan which defines the strategy of the incident. A chief’s aide can assist the battalion chief or chief officer in processing information without distraction and complete the necessary tasks enroute to the scene [Ciarrocca & Harms, 2011].

The fire department involved in this incident does not employ field incident technicians, assistants or aides for chief officers. Thus, Battalion Chiefs and above-ranking officers are responsible for the operation of their vehicles during emergency responses, in addition to collecting and analyzing information about the incident from a number of sources. Departments should consider the aide to be an individual that has the experience and authority to conduct the required tasks. Other potential roles for the chief’s aide include assisting with the initial size-up, completing a 360-degree size-up, coordinating progress reports from sector/division officers and many others. The aide position can be used as a training position to help facilitate officer development. There are non-emergency functions for the chief’s aide that are vital to the daily operations of the department. Some jurisdictions assign an incident command technician or chief’s aide to command officers to perform daily administration functions (such as position staffing and leave management). In this incident, a chief’s aide or staff assistant could have helped the Incident Commander manage a rapidly escalating emergency situation following the shootings.

Recommendation # 8: Fire Departments should consider developing and implementing a workplace violence prevention program with standard operating procedures and guidelines that support the workplace violence prevention program.

Discussion: There have recently been numerous incidents involving violence against emergency responders. Fire and EMS organizations need to ensure training in avoidance and protection for all members.

The U.S. Fire Administration joined with the International Association of Fire Fighters (IAFF) and Drexel University to research best practices for preventing and mitigating violence against firefighters and other first responders. Their study supports the National Fallen Firefighters Foundation's [Fire](#)

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

[Fighter Life Safety Initiative 12 – Violent Incident Response](#) [NFFF 2018]. Violence is a major occupational challenge confronting the field of Emergency Medical Services (EMS). Firefighters and EMS responders are increasingly called upon to meet community demands for this service. As a result, firefighters and EMS responders are often expected to respond to incidents where they can be exposed to violence. Violence against EMS responders has been recognized as an occupational hazard since the early 1970s, and recent incidents are evidence that the problem continues.

Violence is a major occupational challenge confronting the EMS field. A review of the literature from academic and industry trade journals shows an increase in attention to the issue over the years. However, there is limited understanding of risk factors and preventive measures. The literature provides insight into the characteristics of violence perpetrators, EMS responder risk factors, and best practices. However, much of the available information on these factors is contradictory, or not rooted in evidence-based assessment. The U.S. Fire Administration, in cooperation with the International Association of Fire Fighters (IAFF) recently published a report titled *Mitigation of Occupational Violence to Firefighters and EMS Responders*. The purpose of this report, released in June 2017, is to document the causes and risk factors of violence and mitigation opportunities to reduce and prevent violence to EMS responders [USFA 2017b].

In fire and EMS, there is an obvious need for training and interventions to prevent and mitigate violence. There is limited evidence regarding the availability and effectiveness of such interventions (Gates et al., 2011). Much of the current violence prevention training that exists consists of generic programs that are not tailored to the unique setting of the patient care provider, and primarily focus on self-defense techniques rather than prevention [Gates et al., 2011]. Researchers note the guidelines developed for violence reduction in emergency department (ED) settings do not work well in the EMS industry [Corbett et al., 1998]. It is incumbent on the U.S. fire service to work toward developing standard operating procedures and guidelines that address workplace violence prevention measures. While NIOSH has not developed an EMS specific intervention, several recommendations for fire departments to prevent and mitigate violence at both the organizational and employee levels can be found in the NIOSH Publication [Workplace Violence Prevention Strategies and Research Needs](#) which is available at <https://www.cdc.gov/niosh/docs/2006-144/.pdf> [NIOSH 2006].

The National Fire Protection Association (NFPA) is currently developing a new standard *NFPA 1300 Standard on Community Risk Assessment and Community Risk Reduction Plan Development* that is intended to service as a source of information that communities can use to assess and plan for risks within their own jurisdiction [NFPA 2018].

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Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

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Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

Investigator Information

This incident was investigated by Stephen T. Miles Investigator/Safety and Occupational Health Specialist; and Tim Merinar, Investigator/Safety Engineer; with the Fire Fighter Fatality Investigation and Prevention Program, Surveillance and Field Investigations Branch; and Dan Hartley, Research Epidemiologist, Analysis and Field Evaluation Branch; Division of Safety Research, NIOSH located in Morgantown, West Virginia. This report was authored by Stephen T. Miles. An expert technical review was provided Fire Chief Gary Ludwig. A technical review was also provided by the National Fire Protection Association, Public Fire Protection Division. A technical review was also provided by Lori Moore-Merrell, Dr.PH, MPH, EMT-P and Assistant to the General President of the International Association of Fire Fighters.

Additional Information

International Association of Fire Fighters

[Active Shooter Toolkit](#) includes information on key criteria for local protocols, national organization policies and examples of established and practiced active shooter protocols. Additionally, the site includes a compendium of active shooter incidents.

<http://client.prod.iaff.org/#page=activeshooter>

International Association of Fire Chiefs

The [IAFC Active Shooter Toolkit](#) provides direct access to resources to prepare, respond and recover from active shooter and associated incidents. IAFC members must remember the active shooter threat spans a broad base of events from organized terrorist cells to the lone wolf actor. Developing local response plans, procedures and policies collaboratively with all other local stakeholders is imperative then—exercise, exercise, exercise—with total stakeholder participation.

The Active Shooter Toolkit was developed and the resources vetted by the IAFC Terrorism and Homeland Security Committee. All resources and references provided are for member consideration without qualification or recommendation.

<https://www.iafc.org/topics-and-tools/large-scale-response/active-shooter-toolkit>

Lexipol

This [online webinar learning series focuses on fire service responses to active shooter events](#). In this webinar, chief officers from three departments recount their experiences in responding to an active-shooter situation.

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

<http://info.lexipol.com/fire-active-shooter>

U.S. Department of Justice, Federal Bureau of Investigation

This [FBI report](#), covering active shooter incidents in the United States between 2000 and 2013, examines specific behaviors that may precede an attack and that might be useful in identifying, assessing, and managing those who may be on a pathway to violence.

<https://www.fbi.gov/file-repository/pre-attack-behaviors-of-active-shooters-in-us-2000-2013.pdf/view>

Department of Homeland Security

DHS Report: [*First Responder Guide for Improving Survivability in Improvised Explosive Device and/or Active Shooter Incidents*](#):

Recent improvised explosive device (IED) and active shooter incidents reveal that some traditional practices of first responders need to be realigned and enhanced to improve survivability of victims and the safety of first responders caring for them. This Federal, multi-disciplinary first responder guidance translates evidence-based response strategies from the U.S. military's vast experience in responding to and managing casualties from IED and/or active shooter incidents and from its significant investment in combat casualty care research into the civilian first responder environment. Additionally, civilian best practices and lessons learned from similar incidents, both in the United States and abroad, are incorporated into this guidance. Recommendations developed in this paper fall into three general categories: hemorrhage control, protective equipment (which includes, but is not limited to, ballistic vests, helmets, and eyewear), and response and incident management.

<https://www.dhs.gov/sites/default/files/publications/First%20Responder%20Guidance%20June%202015%20FINAL%202.pdf>

U.S. Fire Administration

US Fire Administration Final report: (Contract: HSFE20-15-Q-0053) [*Mitigation of Occupational Violence to Firefighters and EMS Responders*](#).

In January 2016, Drexel University was subcontracted by the International Association of Fire Fighters under their contract with the Department of Homeland Security/Federal Emergency Management Agency contract number: HSFE20-15-Q-0053 for the final report: *Mitigation of Occupational Violence to Firefighters and EMS Responders*. Violence is a major occupational challenge confronting the field of Emergency Medical Services (EMS). Firefighters and EMS responders are increasingly called upon to meet community demands for service. As a result, firefighters and EMS responders are often expected to respond to incidents where they can be exposed to violence. Violence against EMS

Career Fire Fighter Killed and Volunteer Fire Fighter Seriously Wounded When Shot during a Civilian Welfare Check—Maryland

responders has been recognized as an occupational hazard since the early 1970s, and recent incidents are evidence that the problem continues.

https://www.usfa.fema.gov/downloads/pdf/publications/mitigation_of_occupational_violence.pdf

NIOSH On-line Training: “Workplace Violence Prevention for Nurses”.

This [free, interactive course](#) is designed to help healthcare workers better understand the scope and nature of violence in the workplace. Upon successful completion of the course, healthcare professionals can earn continuing education units (CEUs). Course modules include: Definition, types, and prevalence; WPV consequences; Risk factors for type II and type III violence; Prevention strategies for organizations; Prevention strategies for nurses; and Post-event response.

https://www.cdc.gov/niosh/topics/violence/training_nurses.html

Army Testing of Personal Protective Equipment

Over the last several years, the U.S. Army Test and Evaluation Command (ATEC) has conducted thousands of ballistic tests of protective equipment, including individual pieces of equipment traditionally thought of as “body armor” (softer material vests containing hard armor plates), helmets, bomb suits, eye and face protection, extremity and pelvic protection, and concealable body armor. In a majority of these tests, the threats evaluated include 7.62mm to 9mm bullets, metallic fragments of various sizes and shapes, stab tests using both blade and pick threats, blast tests, and blunt trauma tests. Other types of testing are also conducted, such as durability, reliability, wear ability, and suitability. Permission to review reports must be obtained from the test sponsor, since ATEC was contracted to conduct the assessment and is thus not the owner of the subsequent test data. All reports can be requested through the [ATEC website www.atec.army.mil/foia.html](http://www.atec.army.mil/foia.html) [DHS 2015].

Disclaimer

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