RESEARCH

Patterns of Firefighter Fireground Injuries

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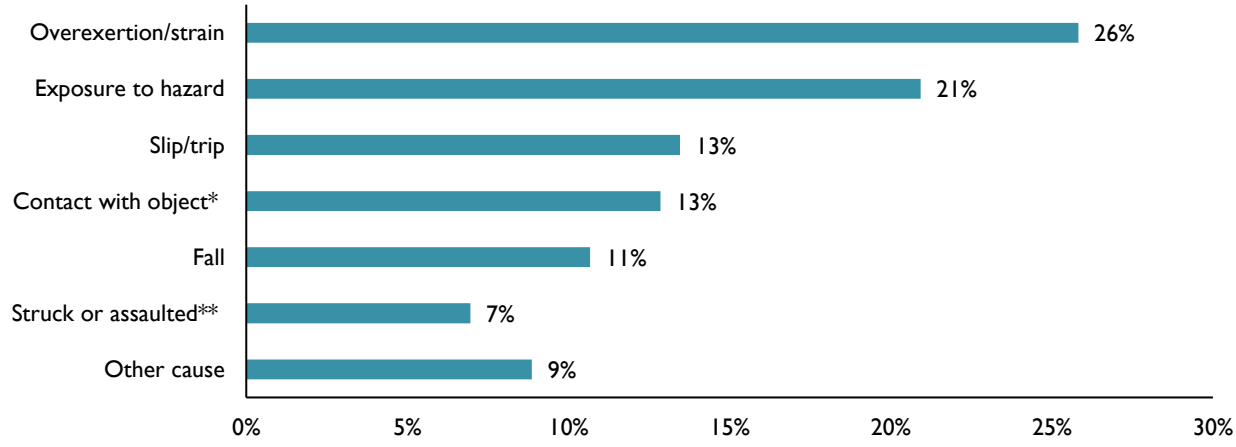
Patterns of Firefighter Fireground Injuries Fact Sheet

NFPA estimates that there were an estimated average of 30,290 fireground injuries per year from 2010 to 2014. An estimated 27,020 fireground injuries in 2014 represents the lowest fireground injury count in the 10 years since 2005.

The leading cause of firefighter fireground injuries was overexertion/strain, accounting for 26% of the total, followed by exposure to hazard, with 21 percent of the injury total. Other leading causes of injury included slip or trip (13%), contact with object (13%), fall (11%), and being struck or assaulted by person, animal, or object (7%).

Firefighter Fireground Injuries by Cause of Injury, 2010-2014 Annual Averages



*Contact with object (firefighter moved into, onto)
**Struck or assaulted by person, animal, object

Other Findings:

- The vast majority of injuries occurred while fighting structure fires (89%).
- Fires at residential properties were associated with the largest share of firefighter injuries, with nearly three-quarters of the total (73%).
- One-third of firefighter injuries resulted in lost work time and were classified as either moderately severe (30%) or severe (2%) injuries.
- The majority of firefighter injuries were sustained by career firefighters (79% of the total), with volunteer firefighters experiencing 21% of injuries.

Abstract

In 2010-2014, there were an estimated average of 30,290 fireground injuries experienced each year by U.S. firefighters. One-third of the injuries resulted in lost work time and were classified as either moderately severe (30%) or severe (2%) injuries. The majority of the injuries (68%) were classified as minor, meaning that they were report only, first aid only, or treated by a physician with no lost work time. The vast majority of injuries occurred while fighting structure fires (89%). Fires at residential properties were associated with the largest share of firefighter injuries, with nearly three-quarters of the total (73%).

The primary symptom in more than one-quarter of fireground injuries were strain or sprain, with 28% of the total. Other leading primary symptoms included pain only (13%), thermal burn (13%), cut or laceration (7%), and exhaustion/fatigue (6%). The leading cause of injury was overexertion/strain, accounting for 26% of injuries, followed by exposure to hazard (21%). Other leading causes of injury were slip/trip (13%), contact with object (13%), fall (11%), and struck or assaulted by person, animal, or object (7%).

Keywords: firefighter injuries, fireground injuries, occupational injury, workplace hazards, firefighter safety.

Acknowledgements

The National Fire Protection Association thanks all the fire departments and state fire authorities who participate in the National Fire Incident Reporting System (NFIRS) and the annual NFPA fire experience survey. These firefighters are the original sources of the detailed data that make this analysis possible. Their contributions allow us to estimate the size of the fire problem.
We are also grateful to the U.S. Fire Administration for its work in developing, coordinating, and maintaining NFIRS.

For more information about the National Fire Protection Association, visit www.nfpa.org or call 617-770-3000. To learn more about the One-Stop Data Shop go to www.nfpa.org/osds or call 617-984-7451.

Copies of this analysis are available from:

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Overview of U.S. Firefighter Fireground Injuries, 2010-2014

- From 2010 to 2014, NFPA estimates that there were an average of 30,290 fireground injuries experienced each year by U.S. firefighters
- The majority of firefighter injuries were sustained by career firefighters (79% of the total), with volunteer firefighters experiencing 21 percent of injuries.
- One-third of firefighter injuries resulted in lost work time and were classified as either moderately severe (30%) or severe (2%) injuries.
- Most fireground injuries (68%) were classified as minor, meaning that they were report only, first aid only, or treated by a physician with no lost work time.
- Overexertion/strain was the leading injury cause, accounting for 26% of injuries, followed by exposure to hazard (21%).
- Other leading causes of injury were slips or trips (13%), contact with object (13%), fall (11%), and struck or assaulted by person, animal or object (7%).
- The vast majority of injuries occurred while fighting structure fires (87%).
- Fires at residential properties were associated with the largest share of firefighter injuries, with nearly three-quarters of the total (73%).

Introduction

Firefighters are routinely exposed to a complex array of job hazards in the course of their work, whether at the scene of a fire, in transit, or even in the firehouse environment. In addition to working in the presence of fire or explosive materials, firefighters must contend with weather-related temperature extremes, physical demands involving awkward postures or heavy loads, work environments that include slippery surfaces or the presence of sharp objects, exposure to chemical and biological agents, potential lack of adequate oxygen, fall hazards and falling objects, and any number of additional health and safety threats. Information about firefighter injuries – how and where they occur, work activity at the time of injury, and other key factors -- is critical for identifying trends, developing prevention programs, and guiding resource decisions, as well as other areas of intervention.

This report presents national estimates of fireground injuries experienced by U.S. firefighters working for the five-year period from 2010 through 2014. The data are limited to non-fatal injuries and do not include work-related illnesses, fatal injuries, or injuries that occurred off the fireground, such as those occurring during travel to or from fire incidents. Accordingly, some of the major components of the firefighter injury experience, such as most vehicular incidents, are not covered in this report. The Research Division of the National Fire Protection Association annually publishes two additional reports that examine aspects of the firefighter injury problem not covered here: *Firefighter Fatalities in the United States*[1] and *U.S. Firefighter Injuries*.[2] The latter provides the latest estimates of all firefighter injuries experienced by local firefighters and includes injuries occurring off the fireground, as well as documented exposures to infectious disease.

The national estimates of firefighter injuries for the categories in this report are based on data derived from the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) in conjunction with the Annual Fire Experience Survey administered by the National Fire Protection Association. The use of NFIRS data allows a more detailed examination of factors relating to injury incidents than data produced by the NFPA survey alone in the U.S. Firefighter Injuries report. The data in this report are estimates of fires and firefighter injuries reported to U.S. municipal fire departments and so exclude fires and firefighter injuries reported only to federal or state agencies or industrial fire brigades. In the tables and figures, fires and fireground injuries are rounded to the nearest ten. Totals may not equal sums due to rounding.

[1] See *Firefighter Fatalities in the United States-2015* by Rita F. Fahy, Paul R. Leblanc, and Joseph L. Molis.

[2] See *U.S. Firefighter Injuries-2015* by Hylton J.G. Haynes and Joseph L. Molis.

More detailed notes on the methodology used in producing the injury estimates are found in Appendix A.

Patterns of Firefighter Injuries on the Fireground

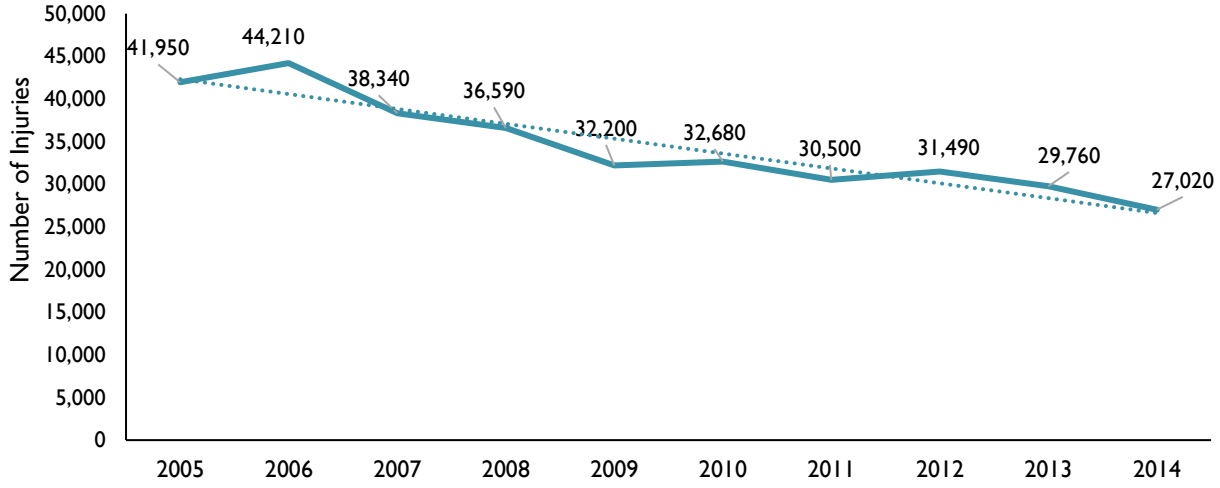
From 2010 to 2014, NFPA estimates that there were an average of 30,290 fireground injuries experienced each year by U.S. firefighters. One-third of firefighter injuries resulted in lost work time and were classified as either moderately severe (30%) or severe (2%) injuries, as shown in Table A below. Most of the firefighter injuries (68%) were classified as minor, meaning that they were report only, first aid only, or treated by a physician with no lost work time.

Table A. Fireground Injuries by Injury Severity, 2010-2014 Annual Averages

Severity of Injury	Fireground Injuries	
Minor	**20,580**	**68%**
Report only, including exposure	9,120	30%
First aid only	4,770	16%
Treated by physician, not a lost-time injury	6,690	22%
Moderate	**9,090**	**30%**
Lost time injury, moderate severity	9090	30%
Severe	**620**	**2%**
Lost time injury, severe	520	2%
Lost time injury, life threatening	100	0%
Total	**30,290**	**100%**

In total, there were an estimated 151,440 fireground injuries in the five years from 2010 to 2014. While substantial, this figure nonetheless represents a 22% decrease from the total of 193,300 injuries experienced over the previous five years, from 2005 to 2009. As shown in Figure 1 below, the annual total of firefighter fireground injuries fell in seven of the ten years from 2005 to 2010. Increases were recorded in 2006, 2010, and 2012 over the previous year. The 27,020 fireground injuries recorded in 2014 represents the lowest fireground injury count in the ten-year period dating to 2005.

Figure 1. Firefighter Fireground Injuries, 2005-2014



Firefighter Injuries by Affiliation

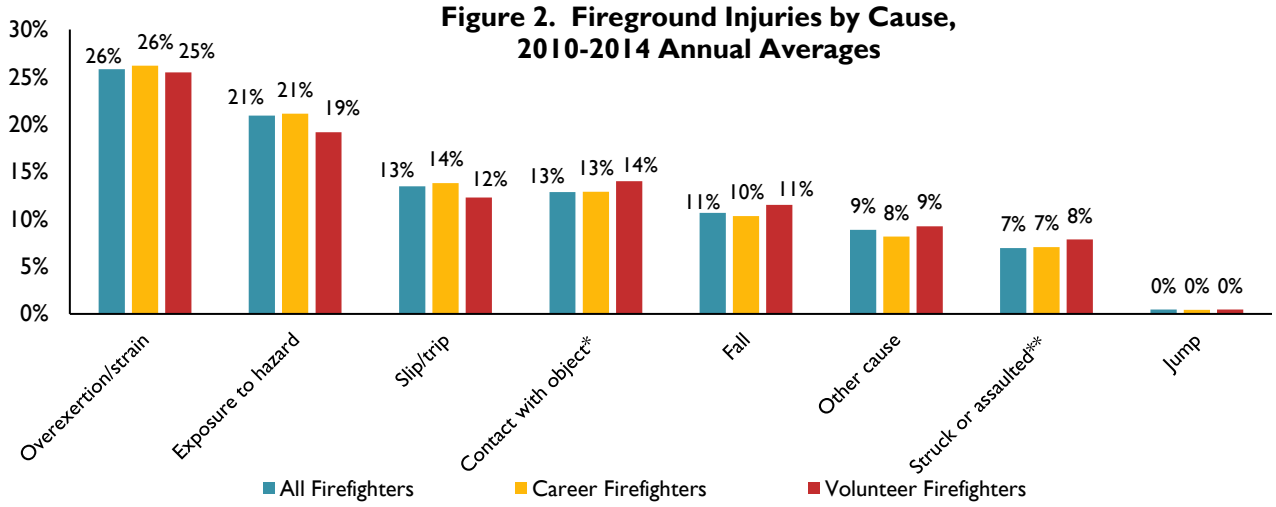
The majority of firefighter injuries experienced in 2010-2014 were sustained by career firefighters (79% of the total), with volunteer firefighters experiencing 21% of injuries.

Table B. Fireground Injuries by Affiliation, 2010-2014 Annual Averages

Career	Fireground Injuries	
Career	23,870	79%
Volunteer	6,420	21%
Total	30,290	100%

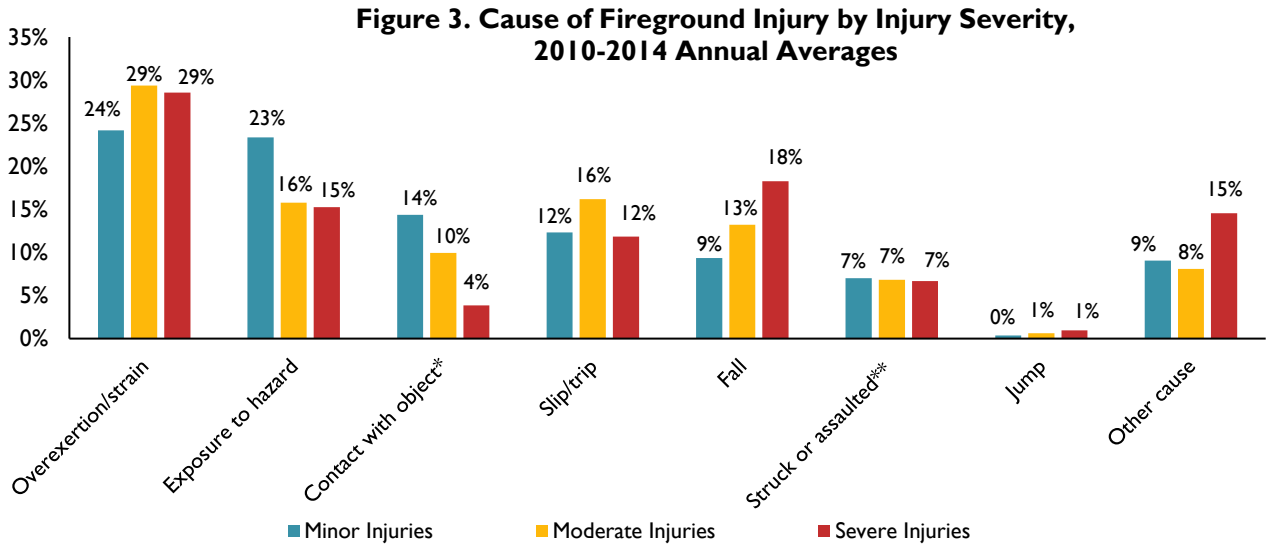
Causes of Fireground Injury

Figure 2 shows firefighter injuries by the cause of injury for all firefighters and separately includes causal information for career and volunteer firefighters. As the figure shows, there is generally little differentiation in the causes of injury between career and volunteer firefighters. Overexertion or strain represented the leading injury cause, accounting for approximately one-quarter of injuries (26% for career and 25% for volunteer), followed by exposure to hazard (21% career, 19% volunteer). Career firefighter injuries were slightly more likely to be caused by a slip or trip (14%) than those of volunteers (12%). Other causes of injury were contact with object (13% career, 14% volunteer), fall (10% career, 11% volunteer), and struck or assaulted by person, animal, object (7% career, 8% volunteer).



*Contact with object (firefighter moved into, onto)
**Struck or assaulted by person, animal, object

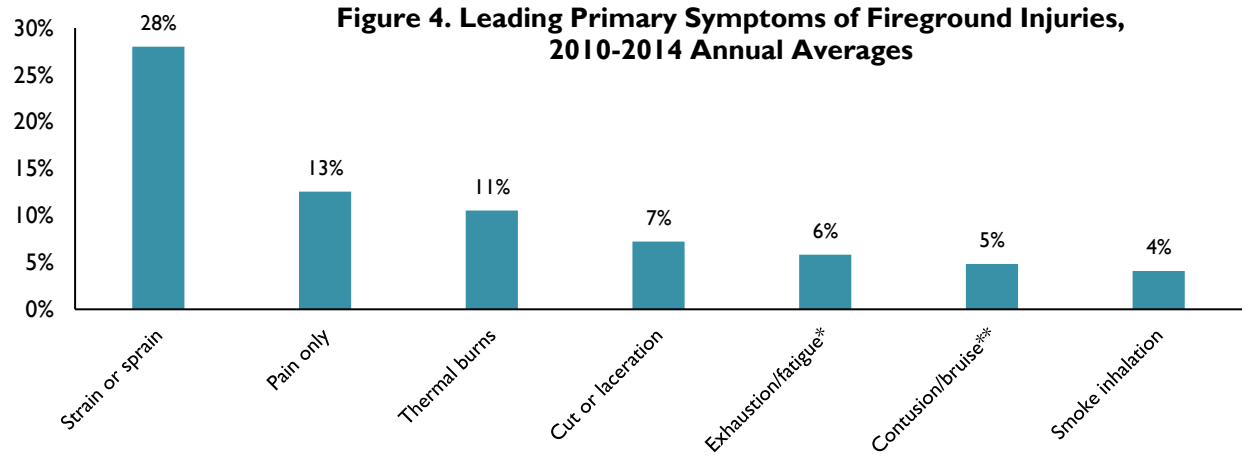
In Figure 3, causal information for minor, moderate, and severe injuries provides a more detailed look at cause and injury outcome. As the figure indicates, overexertion or strain is still the dominant cause of injury, but plays a greater role in moderate (29%) and severe injuries (29%) than those of a minor nature (24%). The table also shows that a greater share of the minor injuries are caused by exposure to hazard (23%) and contact with objects (14%) than is the case with either moderate injuries (16% of which by are caused by exposure to hazard and by 10% contact with objects) or severe injuries (15% caused by exposure to hazard and 4% by contact with objects). Slips and trips cause a greater share of moderate injuries (16%) than minor (12%) or severe (12%) injuries, while falls are the second leading cause of severe injuries (18%), but less significant in minor (9%) or moderate (13%) injuries.



*Contact with object (firefighter moved into, onto)
**Struck or assaulted by person, animal, object

Primary Symptoms

Figure 4 shows the leading primary symptoms of firefighter injuries (those with 4% or more of the total) for 2010 to 2014. The primary symptom most often associated with firefighter injuries was sprain or strain, which accounted for 28% of injuries, while another 13% of injuries involved pain only as the primary symptom. Thermal burns were the primary symptom in 11% of injuries, followed by cuts or lacerations (7%), exhaustion or fatigue, including heat exhaustion (6%), contusions or bruises (5%), and smoke inhalation (4%).

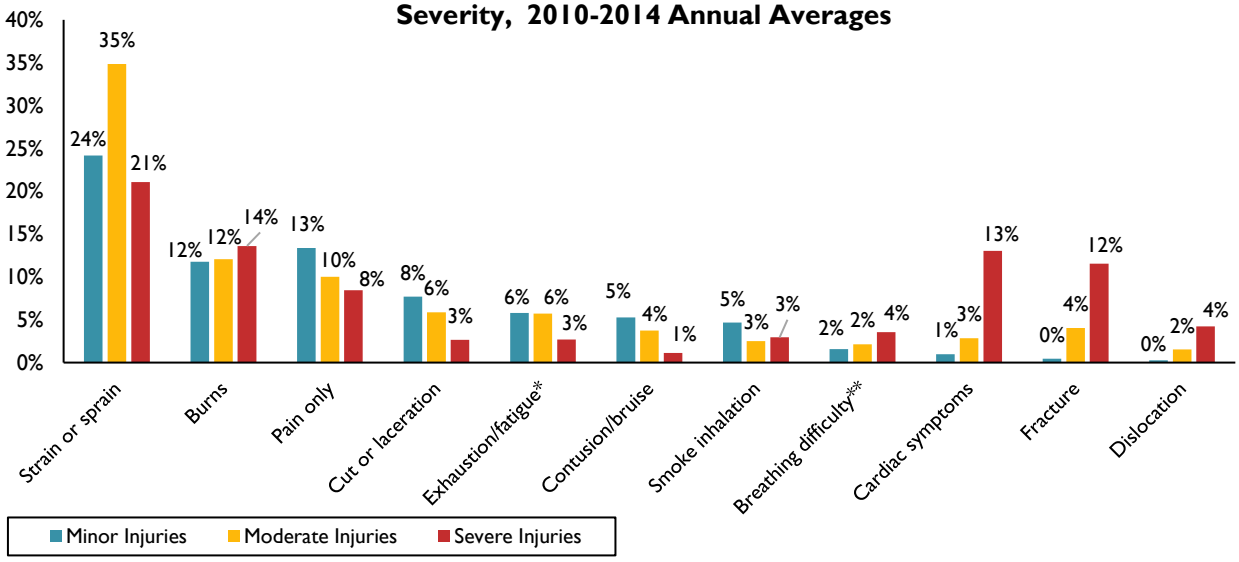


*including heat trauma
**minor trauma

Figure 5 below provides a more detailed look at the primary symptoms of fireground injuries by examining them in relation to injury severity. For ease of presentation, the data presented in the figure are restricted to the leading primary symptoms, which in this case includes those with symptoms having a share of four percent or more of an injury severity category (minor, moderate, or severe). More detailed information on primary symptom by injury severity is available in Table 5.

As Figure 5 indicates, strain or sprain is the leading symptom for all categories of injury severity, but are particularly dominant in the case of moderate injuries, accounting for over one-third (35%) of the moderate injury total. Burns (comprised of all burn categories) are the second leading primary symptom for moderate (12% of injuries) and severe injuries (14%), while pain only injuries are the second leading primary symptom for minor injuries (13% of minor injuries), followed closely by burns (12%). However, in the severe injury category, cardiac symptoms (13% of severe injuries) and fractures (12%) are much more common symptoms than they are in either minor or moderate injuries.

Figure 5. Leading Primary Symptom of Fireground Injuries by Injury Severity, 2010-2014 Annual Averages



*Exhaustion/fatigue, including heat exhaustion
**Breathing difficulty or shortness of breath

Type of Incident Where Firefighter Injuries Occurred

The vast majority of injuries occurred while fighting structure fires (89%). See Table C below. Another 2% of injuries involved mobile properties used as structures. Other leading injury incidents included natural vegetation fires and vehicle fires, each of which accounted for 4% of injuries. Just 2% of injuries occurred in incidents involving other outside fires.

Table C. Fireground Injuries by Incident Type, 2010-2014 Annual Averages

Incident Type	Fireground Injuries	
Structure Fire	26,890	89%
Fire in mobile property used as fixed structure	490	2%
Natural vegetation fire	1,290	4%
Brush, or brush and grass mixture fire	660	2%
Mobile property (vehicle) fire	1,100	4%
Passenger vehicle fire	710	2%
Outside rubbish fire	390	1%
Special outside fire	230	1%
Cultivated vegetation or crop fire	60	0%
Unclassified fire	330	1%
Total	30,290	100%

Injuries by Occupancy

Fires at residential properties were associated with the largest share of firefighter injuries, with nearly three-quarters of the total (73%), as shown in Table D. Most of these residential properties were one- or two-family homes (56% of injuries), with another 15% of injuries in apartment or multi-family housing properties. Outside or special properties accounted for the second highest share of firefighter injuries, with eight percent, followed by storage properties (6%), mercantile, business properties (5%), and assembly properties (2%).

Table D. Fireground Injuries by Type of Occupancy, 2010-2014 Annual Averages

Occupancies	Fireground Injuries	
Residential	22,140	73%
One-or-two-family dwelling	16,850	56%
Apartment or multi-family dwelling	4,650	15%
Outside or special property	2,380	8%
Open land, beach, or campsite	1,010	3%
Highway, street, or parking area	880	3%
Storage	1,670	6%
Vehicle storage, garage or fire station	610	2%
Mercantile, business	1,650	5%
Manufacturing, processing	910	3%
Public assembly	670	2%
Industrial, utility, defense, agriculture or mining	370	1%
Educational	160	1%
Health care, detention or correction	110	0%
Unclassified or unknown property use	220	1%
Total	**30,290**	**100%**

It is also possible to examine fireground injuries in relation to occupancy by looking at injuries per fire by type of occupancy. This is an important measure because it provides a sense of the relative hazardousness of fires by occupancy type, rather than just reflecting the sheer number of fires by occupancy. To do this, we restricted the analysis to fireground injuries occurring at structure fires only, permitting a calculation of structure fire injury rates per 100 structure fires, as shown in Table E. When differences in injury per occupancy are taken into account, a very different picture emerges. While residential occupancies account for the greatest shares of structure fires and structure fire injures, the fireground injury rates are highest in manufacturing and processing properties (17.5 injuries per 100 fires), mercantile and business properties (9.1 injuries per 100 fires), storage properties (6.9 injuries per 100 fires). The overall injury rate for residential properties is 5.7 injuries per 100 fires, but is higher in one- and two-family homes (6.6 injuries per 100 fires) than apartments (4.2 injuries per 100 fires).

Table E. Structure Fireground Injuries, Structure Fires, and Structure Fire Injury Rates, 2010-2014 Annual Averages*					
Occupancy	Fireground Injuries in Structure Fires		Structure Fires		Injuries per 100 Fires
Residential	21,760	81%	384,900	79%	5.7
Homes	21,130	79%	358,310	74%	5.9
One- and two-family homes	16,560	62%	250,550	52%	6.6
Apartments	4,570	17%	107,760	22%	4.2
Outside or special property	220	1%	22,480	5%	1.0
Storage	1,450	5%	21,130	4%	6.9
Mercantile, business	1,540	6%	16,980	3%	9.1
Assembly	620	2%	14,040	3%	4.4
Health care, detention and correction	100	0%	6,390	1%	1.6
Educational	140	1%	4,990	1%	2.8
Manufacturing, processing	850	3%	4,850	1%	17.5
Industrial, utility, defense**	170	1%	2,620	1%	6.5
Unclassified	50	0%	7,310	2%	0.7
Total	26,890	100%	485,700	100%	5.5

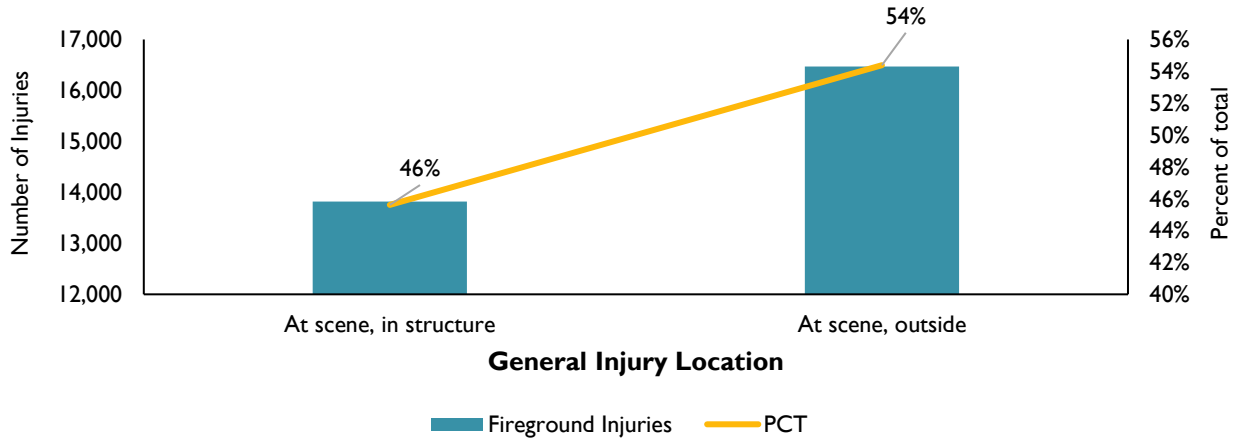
*Data in this table are restricted to injuries in structure fires only

**Industrial, utility, defense, agriculture, mining

General Injury Location

Over half of the fireground injuries occurred at the scene of a fire and outside (54%, 16,470 injuries), while 46% (13,820 injuries) occurred at the scene of a fire and inside a structure, as shown in Figure 6.

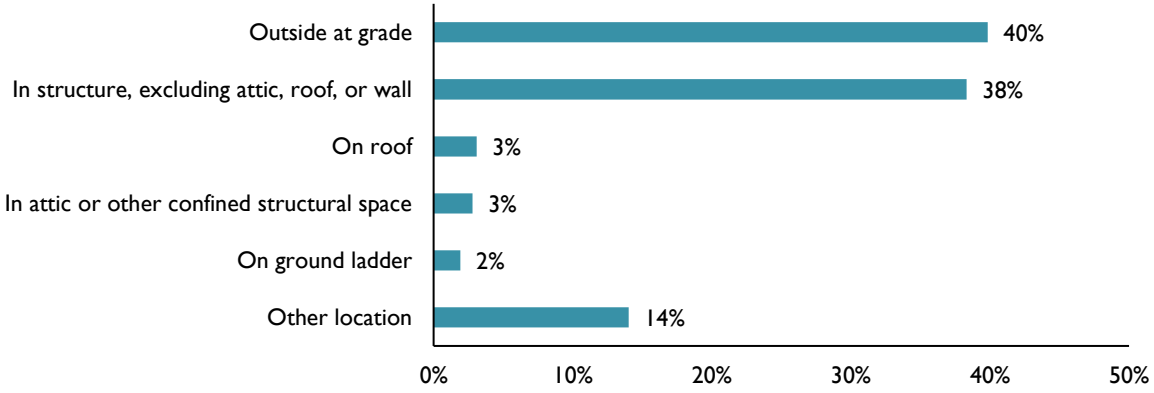
Figure 6. Fireground Injuries by General Location When Injured, 2010-2014 AnnualAverages



Specific Injury Location

Information is also available on the specific location at the incident scene where firefighters were injured. Figure 7 shows that the vast majority of injuries occurred in two locations -- outside at grade (40% of injuries), and in the structure, but excluding attic, roof, or wall (38% of injuries). The other leading injury locations were: on roof (3%), in attic or other confined structural space (3%), and on a ground ladder (2%). See Table 6 in the Tables section for more information.

Figure 7. Fireground Injuries by Leading Specific Location, 2010-2014 Annual Averages



Structure Status

The great majority of firefighter injuries – 82% of the total – occurred in structures that were occupied and operating, as indicated in Table F. Vacant and unsecured premises were the site of seven percent of injuries, while vacant and secured premises accounted for six percent of injuries. No other structure status accounted for more than one percent of injuries.

Table F. Fireground Injuries by Structure Status, 2010-2014 Annual Averages*

Structure Status	Fireground Injuries	
Occupied and operating	22,100	82%
Vacant and unsecured	1,810	7%
Vacant and secured	1,750	6%
Under construction	240	1%
Idle, not routinely used	380	1%
Under major renovation	340	1%
Being demolished	90	0%
Other	180	1%
Total	26,890	100%

*Data in this table are restricted to injuries in structure fires only.

Firefighter Activities When Injured

Just over one-half of injuries (51%) occurred while firefighters were extinguishing a fire or involved in neutralizing incidents, including 24% while handling charged hose lines, with another six percent while using hand tools in extinguishment activity, as indicated below in Table G. One quarter of injuries (25%) occurred while firefighters were engaged in suppression support activities, primarily involving overhaul (10%); 3% occurred during ventilation with hand tools. Other leading activities associated with firefighter injuries included access or egress activities (4%), emergency medical service (EMS) or rescue activities (3%), operating fire department apparatus (2%), picking up tools, equipment or hose on scene (2%), moving tools or equipment around the scene (2%), and laying hose (2%).

More detailed information on firefighter activities by activity at the time of injury is available in Table 7. Generally speaking, when injury data are separated into minor, moderate, and severe injury categories, there is little differentiation on the basis of activity when injured, as indicated in Table 8. The greatest observed difference is that overhaul activities are responsible for 10% of minor injuries, a somewhat larger share than moderate (8%) and severe (6%) injuries.

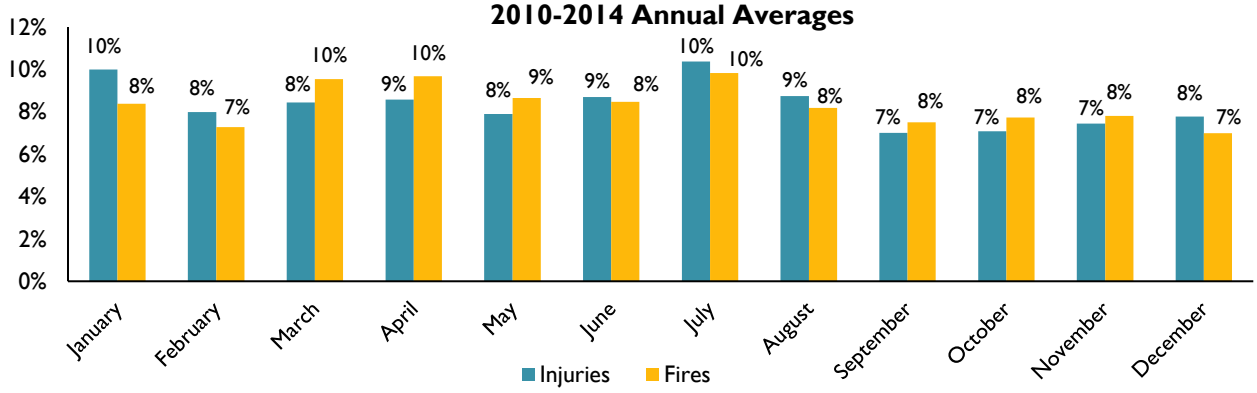
Table G. Fireground Injuries by Activity When Injured, 2010-2014 Annual Averages

Activity When Injured	Fireground Injuries	
Extinguishing fire or neutralizing incident	15,480	51%
Handling charged hose lines	7,180	24%
Unspecified extinguishing fire/neutralizing incident	6,030	20%
Using hand tools in extinguishment activity	1,930	6%
Suppression support	7,460	25%
Overhaul	2,890	10%
Ventilation with hand tools	770	3%
Forcible entry	620	2%
Ventilation with power tools	540	2%
Suppression support, other	2,340	8%
Other incident scene activity	2,840	9%
Picking up tools, equipment, or hose on scene	660	2%
Moving tools or equipment around scene	640	2%
Laying hose	530	2%
Access or egress	1,080	4%
Operating fire department apparatus	920	3%
Operating engine or pumper	700	2%
EMS or rescue	1,040	3%
Searching for victim	540	2%
Driving or riding vehicle	610	2%
Other activity	860	3%
Total	30,290	100%

Firefighter Injuries by Month

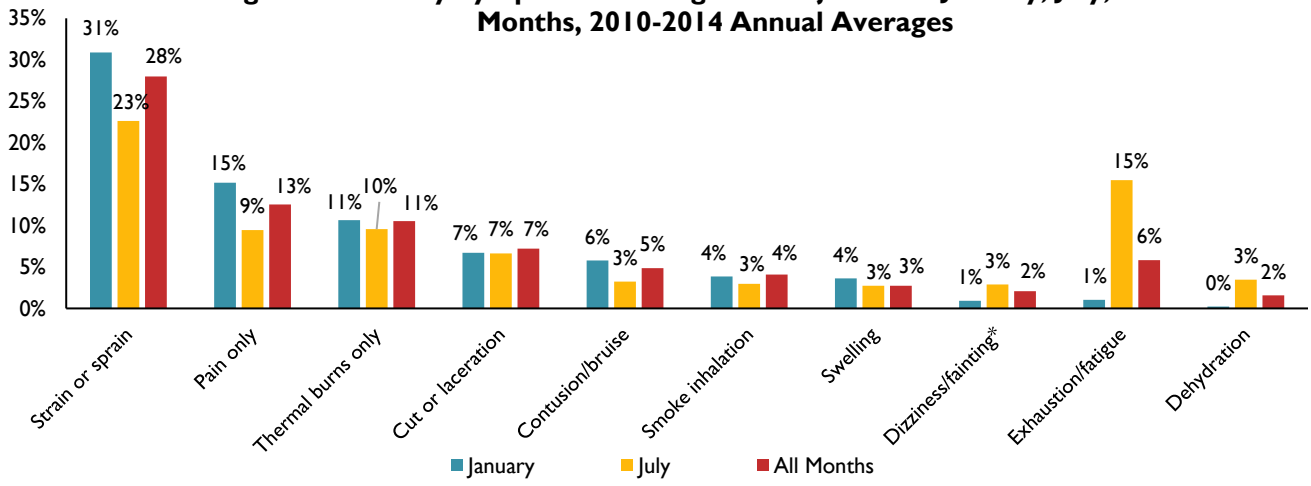
For the 2010 to 2014 period, the fewest injuries were recorded in September (2,120 injuries) and October (2,150 injuries), while the highest number of injuries occurred in July (3,140 injuries) and January (3,028 injuries). In general, the distribution of firefighter injuries per month follows a pattern similar to the distribution of fires per month, as shown in Figure 8 and Table 8.

Figure 8. Fireground Injuries and Total Fires, by Month
2010-2014 Annual Averages



As might be anticipated, there are some notable differences that distinguish the firefighter injuries experienced in the peak injury months of January and July, most likely reflecting seasonal factors that influence hazards in the fireground work environment. The primary symptoms for January and July are shown in Figure 9, along with the primary symptoms for all months shown in Figure 4. The primary symptoms for January injuries closely mirror those for all months, with the exceptions of a higher share of strain or strain symptoms (31% vs. 28%) and lower share of exhaustion/fatigue symptoms (1% vs. 6%). July injuries, on the other hand, have a lower share of strain or sprain symptoms (23%), but much higher share of symptoms involving exhaustion/fatigue (15%) than either January (1%) or all months (6%). The share of exhaustion/fatigue symptoms in July can likely be explained by the hotter ambient temperatures that influence working conditions. An additional likely indicator of temperature effects is seen when combining the symptoms of dehydration and dizziness/fainting/weakness, accounting for a much higher share of symptoms in July (6%) than in January (1%), while also higher than the share for all months (4%). Additional data for primary symptoms in January and July are available in Table 10.

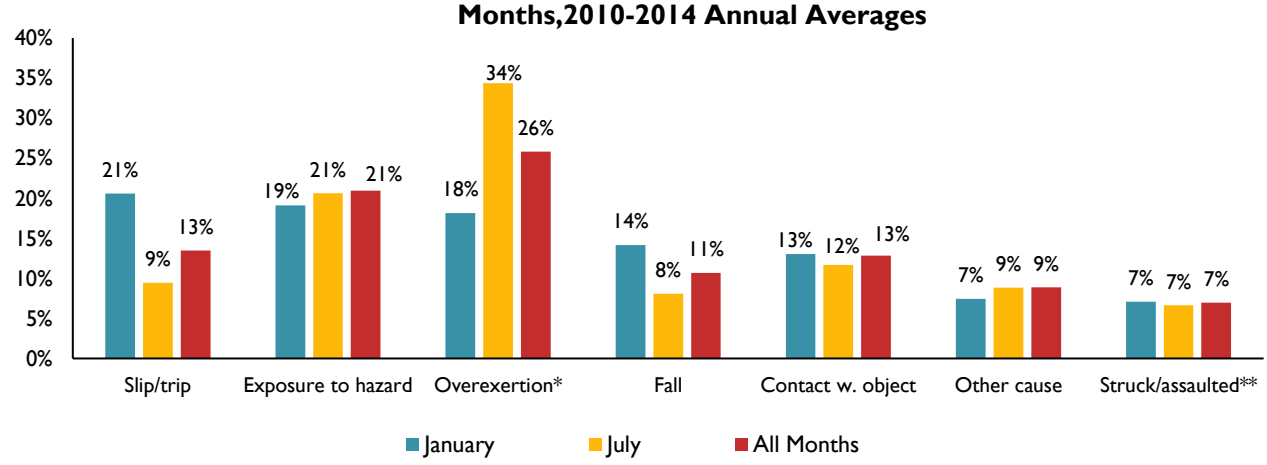
Figure 9. Primary Symptoms of Fireground Injuries for January, July, and All Months, 2010-2014 Annual Averages



*Dizziness, fainting, weakness

Seasonal influences on firefighter work environments may also be a factor in distinguishing the injury cause profiles for the peak injury months of January and July and the all-months average. Notably, as shown in Figure 10, the share of January injuries caused by slips and trips (21%) is substantially higher than July (9%) or the all-months average) 13%), with falls also higher in January (14%) than July (8%) or all-months (11%). In July, on the other hand, one-third of injuries (34%) are caused by overexertion/strain, compared to 18% in January and 26% in the all-months average, again likely reflecting warm weather working conditions. Additional information on cause of injury for January and July is available in Table 11 in the Tables section of the report.

Figure 10. Fireground Injuries by Cause of Injury in January, July, and All Months,2010-2014 Annual Averages



*Overexertion/strain
**Struck assaulted by person, animal, object

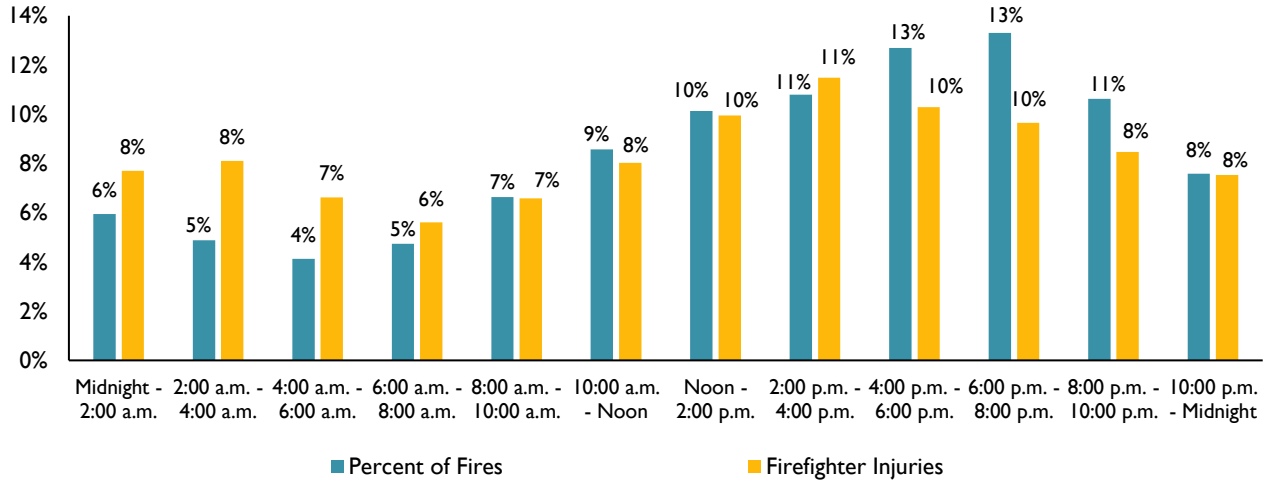
Fireground Injuries by Time of Day and Day of Week

There was little variation in the distribution of firefighter injuries by day of week, with all days of the week recording 14% to 15% of injuries. The days of the week with 15% of injuries were

Saturday, Sunday, and Monday, with all other days of the week having a 14% share of injuries. See Table 12 for data on day of the week.

Figure 11 shows that there were some notable differences in injury occurrence by time of day. The smallest share of firefighter injuries occurred between 4 a.m. and 10 a.m., with the 6 a.m. to 8 a.m. period having the fewest (6% of total). The largest share of injuries occurred between noon and 8 p.m., with the 2 p.m. to 4 p.m. time frame recorded the most injuries (11% of total). However, when the share of injuries per time of day is compared to the share of fires for the corresponding period, it is clear that there are fewer injuries per fire in the peak afternoon and evening period, and considerably more injuries per fire in the midnight to 6 a.m. period. Additional information is available in Table 13.

Figure 11. Fires and Fireground Injuries in Structures by Time of Day, 2010-2014 Annual Averages



Firefighter Injuries by Gender and Age

The vast majority of injuries on the fireground are experienced by males (96%), as shown in Table H. Table H also indicates that a greater share of volunteer firefighter injuries are experienced by females (7%) than is the case among career firefighters, where three percent of injuries are experienced by females.

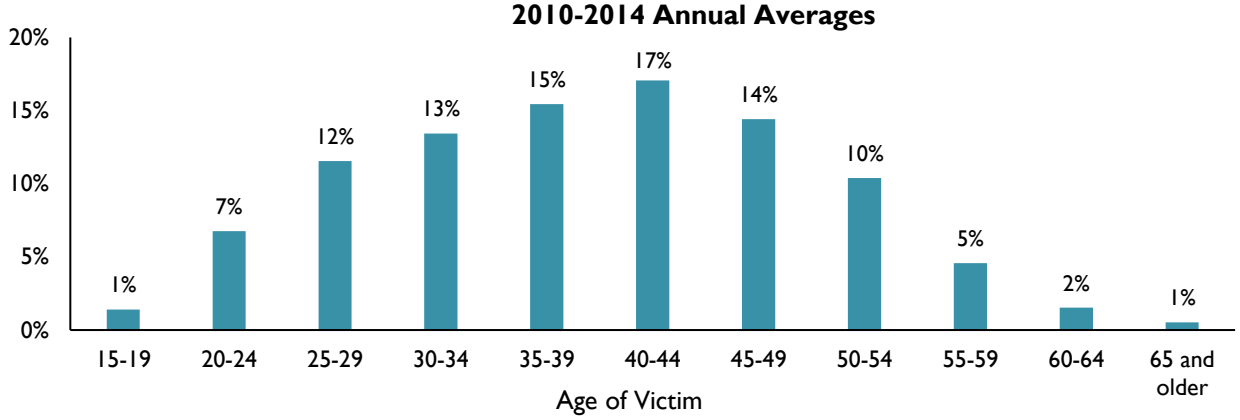
Table H. Fireground Injuries by Gender, 2010-2014 Annual Averages

Gender of Victim	Overall	Career	Volunteer
Male	96%	97%	93%
Female	4%	3%	7%

Figure 12 below shows that the largest share of firefighter injuries was experienced by firefighters in the 40- to 44 year-old age group (17% of total), followed by firefighters 35 to 39 years of age (15%), then those 45 to 49 years of age (14%), 30 to 34 years of age (13%), 25 to 29 years of age (12%), and 50 to 54 years of age (10%). Firefighters aged 15 to 19 and those 65

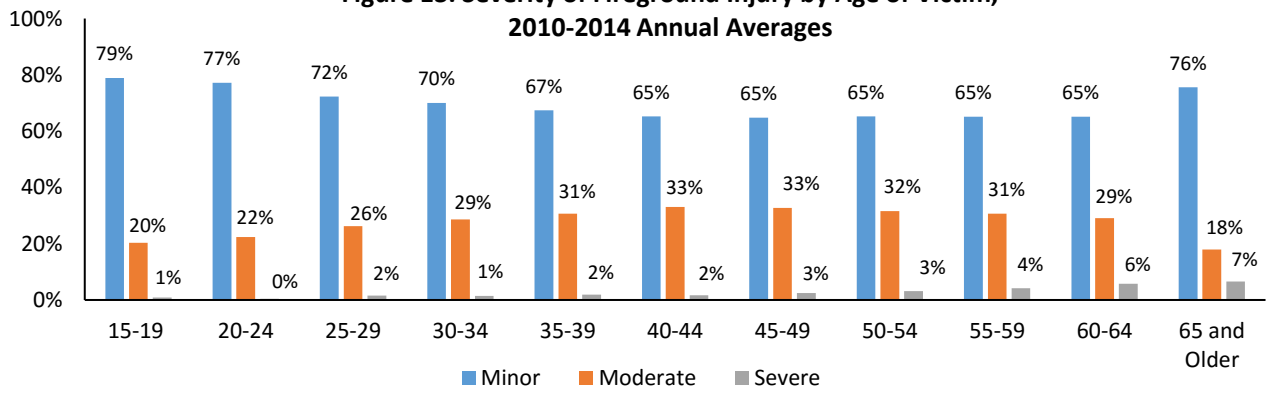
years and older had the smallest share of injuries, each with one percent of the total, while those 60 to 64 years of age accounted for two percent of injuries and 55 to 59 year-olds for five percent. Firefighters in the 20 to 24 year age group experienced seven percent of injuries. Additional information is available in Table 14.

Figure 12. Fireground Injuries by Age of Victim, 2010-2014 Annual Averages



While firefighters in the older age groups experienced a smaller share of injuries overall, a greater portion of their injuries were severe, relative to younger age groups. As shown in Figure 13, seven percent of the injuries among firefighters 65 years of age and older were severe, while six percent of injuries among 60- to 64-years olds were severe, followed by four percent of 55- to 59-year olds, and three percent of injuries among 50- to 54-year olds and 45- to 49-year olds. Two percent or fewer of the injuries among the younger age groups were classified as severe. It is interesting to note that the highest share of injuries that were classified as minor was also in the 65 and older age group (76%), as well as the youngest age groups – 79% among 15-19 years, 77% among 20-24 years, 72% among 25-29 years, and 70% among 30-34 years. Workers in age groups between 40 and 49 years had the highest shares of moderate injuries (33%), followed by those 50-54 years (32%) and those 35-39 years and 55-59 years, each with 31% of injuries classified as moderate. More information is available in Table 15.

Figure 13. Severity of Fireground Injury by Age of Victim, 2010-2014 Annual Averages



Physical Condition at Time of Injury

Data indicate that the majority of firefighters are rested at the time of injury, with little differentiation between career and volunteer firefighters. As shown in Table I, 86% of firefighter injuries occurred at the time the injury victims were rested -- 86% for career firefighters and 85% for volunteers. Eleven percent of firefighter injuries occurred while firefighters were fatigued (10% for career, 11% for volunteer), and three percent occurred while firefighters were ill, as was the case for career and volunteer affiliations.

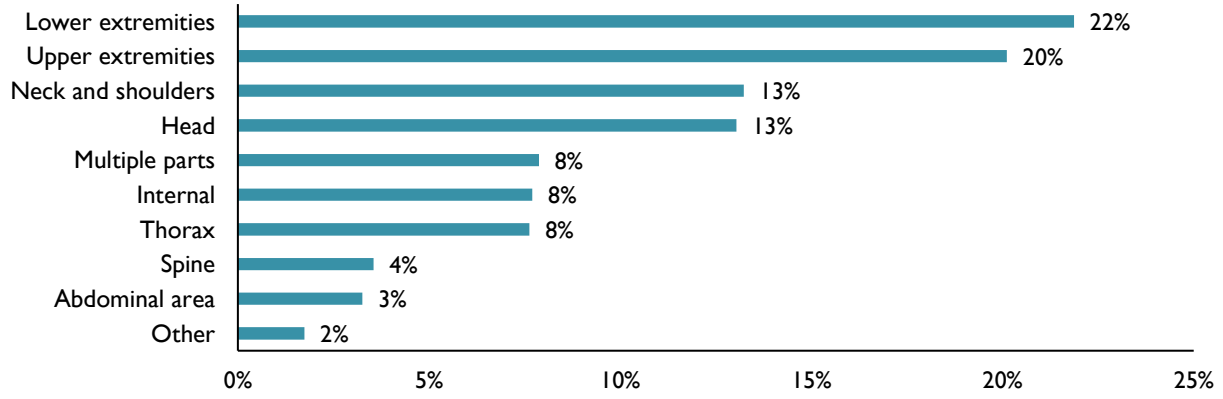
Table I. Fireground Injuries by Physical Condition, 2010-2014 Annual Averages

Physical Condition	All Firefighters		Career fire-fighters		Volunteer fire-fighters	
Rested	25,990	86%	20,520	86%	5,470	85%
Fatigued	3,140	10%	2,430	10%	700	11%
Ill or injured	320	1%	250	1%	60	1%
Other condition	840	3%	660	3%	180	3%
Total	30,290	100%	23,870	100%	6,420	100%

Primary Body Part Injured

Firefighter injuries most often involve injuries to lower extremities (22% of injuries) and upper extremities (20%), as shown in Figure 14, followed by injuries to the neck and shoulders (13%) and head (13%). Injuries to multiple body parts (8%), internal injuries (8%), and injuries to the thorax (8%), spine (4%), and abdominal area (3%) are other leading locations of firefighter injury. More detailed information on body parts available in Table 15 shows that lower extremity injuries primarily involve the knee (10%) and ankle (6%) and that upper extremity injuries most often occur to the hand and fingers (12%), with neck and shoulder injuries primarily affecting the shoulders (8%). Injuries to the head most often involve the ear (3%) and eye (3%), and internal injuries involve the trachea and lungs (5%). Injuries to the thorax most often involve the back (5%).

Figure 14. Fireground Injuries by Leading Primary Body Part Injured, 2010-2014 Annual Averages



Injury Factor

A variety of factors may influence whether an injury occurs and type of injury sustained by firefighters on the fireground. The leading factor in firefighter injuries in the 2010-2014 period was fire development, accounting for 25% of injuries, with 18% of these due to fire progress, including smoky conditions. See Table J below. Slippery or uneven surfaces were a factor in another 21% of injuries, followed by collapses or falling objects (11%) and holes (3%). Being lost, caught, trapped, or confined was a factor in two percent of injuries, and vehicles or apparatuses were also a factor in two percent of injuries.

Table J. Fireground Injuries by Injury Factor, 2010-2014 Annual Averages

Injury Factor	Fireground Injuries	
Fire development	7,430	25%
Fire progress, including smoky conditions	5,420	18%
Unclassified fire development	1,500	5%
Slippery or uneven surfaces	6,290	21%
Uneven surface, included are holes in the ground	1,890	6%
Icy surface	1,390	5%
Loose material on surface	710	2%
Unclassified slippery or uneven surfaces	1,560	5%
Collapse or falling object	3,450	11%
Falling objects	1,180	4%
Ceiling collapse	810	3%
Unclassified collapse or falling object	520	2%
Holes	940	3%
Lost, caught, trapped, confined	630	2%
Vehicle or apparatus	470	2%
Other unclassified factor	4,280	14%
Other specified factor	110	0%
None	6,670	22%
Total	30,290	100%

Object Involved in Injury

Information is also available on the types of objects involved in firefighter injuries. As the entries in Table K indicate, a diffuse array of objects is involved in firefighter injuries, with no single dominant object. The leading object involved in injury, charged hose, was involved in 12% of injuries, followed by tools or equipment (9%), floor or ceiling (8%), and heat or flame (5%). Several objects were each involved in four percent of injuries: fumes, gases, or smoke; unclassified structural components; hoses (not charged); stairs; and dirt, stones, or debris. As the table shows, there are a number of other objects which each account for two to three percent of firefighter injuries in 2010-2014.

Table K. Fireground Injuries by Object Involved in Injury, 2010-2014 Annual Averages

Object Involved in Injury	Fireground Injuries	
Charged hose	3,630	12%
Tools/equipment	2,650	9%
Floor or ceiling	2,350	8%
Heat or flame	1,520	5%
Fumes, gases, or smoke	1,330	4%
Unclassified structural component	1,270	4%
Hose, not charged	1,260	4%
Stairs	1,200	4%
Dirt, stones, or debris	1,060	4%
Ground ladder	1,040	3%
Property and structure contents	910	3%
Glass	890	3%
Fire department vehicle/apparatus	780	3%
Window	680	2%
Roof	620	2%
Embers	600	2%
Nails	590	2%
Wall or other vertical surfaces	510	2%
Door in building	510	2%
Asbestos	470	2%
Coupling	470	2%
Steam	460	2%
Other specified object	3,750	12%
Other unclassified object	1740	6%
Total	30,290	100%

Improving Firefighter Safety

As the statistics in this report and previous reports attest, firefighting presents great risks of personal injury to firefighters. Moreover, because of the kind of work performed and the hazards of the incident scene environment, it is unlikely that all firefighter injuries can be eliminated. A risk management system and the application of existing technology, however, can offer options to reduce present injury levels and bring about corresponding reductions that are recommended by NFPA that could be taken at the local level.

- Commitment on the part of top fire service management to reducing injuries NFPA 1500,Standard on Fire Department Occupational Safety and Health Program, *Section 4.3)*
- Establishment of a safety committee headed by a safety officer to recommend a safety policy and the means of implementing it NFPA 1500, *Section 4.5).*
- Develop and implement an investigation procedure that includes all accidents, near misses, injuries, fatalities, occupational illnesses, and exposures involving members. NFPA 1500, *4.4.4 and 4.4.5)*
- Provision of appropriate protective equipment and a mandate to use it. NFPA 1500, *Section 7.1 through 7.8)*
- Development and enforcement of a program on the use and maintenance of SCBA NFPA 1500, *Section 7.9 through 7.14*
- Development and enforcement of policies on safe practices for drivers and passengers of fire apparatus NFPA 1500, *Section 6.2 and 6.3)*
- Development of procedures to ensure response of sufficient personnel for both fire fighting and overhaul duties. NFPA 1500, *4.1.2; NFPA 1710 Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments;* and *NFPA 1720, Standard for the Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Volunteer Fire Department)*
- Implementation of regular medical examinations and a physical fitness program NFPA 1500, *Section 10.1 through 10.3; NFPA1582, Standard on Comprehensive Occupational Medical Program for Fire Departments; NFPA1583, Standard on Health-Related Fitness Programs for Firefighters-)*
- Adoption and implementation of an incident management system. NFPA 1500,Standard on Fire Department Occupational Safety and Health Program, *Section 8.1; and NFPA 1561, Standard on Emergency Services Incident Management System*

- Training and education for all members related to emergency operations NFPA 1500,,, *Chapter 5)*
- Implementation of programs for the installation of private fire protection systems, so that fires are discovered at an earlier stage, exposing the firefighter to a less hostile environment *NFPA 1 Uniform Fire Code* *NFPA 101 Life Safety Code,®; NFPA 5000 Building Construction and Safety Code*
- Increased efforts in the area of fire safety education programs, so that citizens are made aware of measures to prevent fires and of correct reactions to the fire situation *NFPA 1201, Standard for Providing Emergency Services to the Public,* Chapter 6 Other NFPA standards that may help in reducing firefighter injuries include:
- NFPA 1584, Standard on the Rehabilitation Process for members During Emergency Operations and Training Exercises, 2008 Edition, Chapter 4 Preparedness and Chapter 6 Incident Scene and Training Rehabilitation
- NFPA 1002, Standard for Fire Apparatus Driver/Operator Professional Qualification Risk Management, 2010 Edition, Section 4.8 The Risk Management process
- NFPA 1620, Standard for Pre-Incident Planning, 2010 Edition, Chapter 4 Pre-Incident Planning Process, Chapter 5 Physical & Site Considerations, Chapter 7 Water supplies & Fire Protection Systems, Chapter 8 Special Hazards

Continued efforts are needed to implement programs and procedures that can reduce the risk of firefighter injury. By addressing recognized priority areas, fire service organizations can make significant strides towards reducing the number and impact of such injuries.

Table 1.
Fireground Injuries by Year, 2005-2014

Year	Number of Injuries
2005	41,950
2006	44,210
2007	38,340
2008	36,590
2009	32,200
2010	32,680
2011	30,500
2012	31,490
2013	29,760
2014	27,020

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 2.
Fireground Injuries by Cause of Injury, 2010-2014 Annual Averages

Cause of Injury	All Firefighters	
Overexertion or strain	7,820	26%
Exposure to hazard	6,340	21%
Slip/trip	4,080	13%
Contact with object (firefighter moved into/onto)	3,890	13%
Fall	3,230	11%
Other cause	2,680	9%
Struck or assaulted by person, animal or object	2,110	7%
Jump	140	0%
Total	30,290	100%
Career Firefighters		
Overexertion or strain	6,250	26%
Exposure to hazard	5,040	21%
Slip/trip	3,290	14%
Contact with object (firefighter moved into/onto)	3,080	13%
Fall	2,470	10%
Other cause	1,680	7%
Struck or assaulted by person, animal or object	100	0%
Jump	1,950	8%
Career firefighter total	23,870	100%
Volunteer Firefighters		
Overexertion or strain	1,640	25%
Exposure to hazard	1,230	19%
Slip/trip	900	14%
Contact with object (firefighter moved into/onto)	790	12%
Fall	740	11%
Other cause	590	9%
Struck or assaulted by person, animal or object	500	8%
Jump	30	0%
Volunteer firefighter total	6,420	100%

Note: These are national estimates of fires and firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 3.
Cause of Fireground Injury by Injury Severity, 2010-2014 Annual Averages

Cause of Injury	Fireground Injuries	
Minor Injuries		
Overexertion or strain	4,980	24%
Exposure to hazard	4,800	23%
Contact with object (firefighter moved into/onto)	2,960	14%
Slip/trip	2,530	12%
Fall	1,920	9%
Struck or assaulted by person, animal or object	1,440	7%
Jump	70	0%
Other cause	1,860	9%
Total minor injuries	20,570	100%
Moderate Injuries		
Overexertion or strain	2,670	29%
Slip/trip	1,470	16%
Exposure to hazard	1,430	16%
Fall	1,200	13%
Contact with object (firefighter moved into/onto)	900	10%
Struck or assaulted by person, animal or object	620	7%
Jump	60	1%
Other cause	740	8%
Total moderate injuries	9,090	100%
Severe Injuries		
Overexertion or strain	180	29%
Fall	110	18%
Exposure to hazard	90	15%
Slip/trip	70	12%
Struck or assaulted by person, animal or object	40	7%
Contact with object (firefighter moved into/onto)	20	4%
Jump	10	1%
Other cause	90	15%
Total severe injuries	620	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA survey.

Table 4.
Fireground Injuries by Primary Symptom of Injury, 2010-2014 Annual Averages

Primary Symptom of Injury	Fireground Injuries	
Strain or sprain	8,480	28%
Pain only	3,800	13%
Thermal burns	3,200	11%
Cut or laceration	2,190	7%
Exhaustion or fatigue, including heat exhaustion	1,770	6%
Contusion/bruise	1,470	5%
Smoke inhalation	1,230	4%
Swelling	830	3%
Hazardous fumes inhalation	580	2%
Stab wound or puncture wound	560	2%
Breathing difficulty or shortness of breath	550	2%
Cardiac symptoms	550	2%
Fracture	540	2%
Dehydration	470	2%
Other known primary symptom	2,880	10%
Unclassified symptom	570	2%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 5.
Primary Symptom of Injury by Injury Severity, 2010-2014 Annual Averages

Primary Symptom of Injury	Minor Injuries		Primary Symptom of Injury	Moderate Injuries		Primary Symptom of Injury	Severe Injuries	
Strain or sprain	4,970	24%	Strain or sprain	3,170	35%	Strain or sprain	130	21%
Burn	2,420	12%	Burn	1,100	12%	Burn	80	14%
Thermal burn	2,090	10%	Thermal burn	970	11%	Burn and smoke inhalation	20	2%
Pain only	2,750	13%	Pain only	910	10%	Thermal burn	60	10%
Cut or laceration	1,590	8%	Cut or laceration	530	6%	Cardiac symptoms	80	13%
Exhaustion/fatigue, inc. heat exhaustion	1,190	6%	Exhaustion/fatigue, inc. heat exhaustion	520	6%	Fracture	70	12%
Contusion or bruise	1,080	5%	Fracture	370	4%	Pain only	50	8%
Smoke inhalation	960	5%	Contusion or bruise	340	4%	Dislocation	30	4%
Swelling	550	3%	Cardiac symptoms	260	3%	Breathing difficulty or shortness of breath	20	4%
Hazardous fumes inhalation	520	3%	Swelling	250	3%	Smoke inhalation	20	3%
Stab wound/puncture wound	480	2%	Smoke inhalation	230	3%	Exhaustion/fatigue, inc. heat exhaustion	20	3%
Dizziness/fainting/weakness	400	2%	Dizziness, fainting, or weakness	200	2%	Cut or laceration	20	3%
Dehydration	330	2%	Breathing difficulty or shortness of breath	190	2%	Cardiac arrest	10	2%
Breathing difficulty or shortness of breath	320	2%	Dislocation	140	2%	Dizziness/fainting/ weakness	10	2%
Abrasion	310	2%	Other known	770	8%	Crushing	10	2%
Unclassified symptom	460	2%	None	10	0%	Other known	60	10%
Other known symptom	1,550	8%				None	--	0%
None	690	3%						
Total minor injuries	20,570	100%	Total moderate injuries	9,090	100%	Total severe injuries	620	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 6.
Fireground Injuries by Specific Location When Injured, 2010-2014 Annual Averages

Specific Location When Injured	Fireground Injuries	
Outside at grade	12,070	40%
In structure, excluding attic, roof, or wall	11,610	38%
On roof	940	3%
In attic or other confined structural space	850	3%
On ground ladder	580	2%
On steep grade	400	1%
On fire escape or outside stairway	380	1%
On aerial ladder or in basket	290	1%
In motor vehicle	220	1%
On vertical surface or ledge	220	1%
Unclassified location	1,820	6%
Other specific location	2,420	8%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 7.
Fireground Injuries by Activity When Injured, 2010-2014 Annual Averages

Activity When Injured	Fireground Injuries	
Extinguishing fire or neutralizing incident	15,480	51%
Unclassified extinguishing fire/neutralizing incident	6,030	20%
Handling charged hose lines	7,180	24%
Using hand tools in extinguishment activity	1,930	6%
Other specified extinguishing or neutralizing activity	340	1%
Suppression support	7,460	25%
Overhaul	2,890	10%
Unclassified suppression support	2,340	8%
Ventilation with hand tools	770	3%
Forcible entry	620	2%
Ventilation with power tools	540	2%
Salvage	310	1%
Other incident scene activity	2,840	9%
Unclassified other incident scene activity	730	2%
Picking up tools, equipment, or hose on scene	660	2%
Moving tools or equipment around scene	640	2%
Laying hose	530	2%
Catching hydrant	230	1%
Other specific scene activity	50	0%
Access or egress	1,080	4%
Unclassified access/egress	460	2%
Climbing ladder	190	1%
Other specified access/egress activity	430	0%
Operating fire department apparatus	920	3%
Operating engine or pumper	700	2%
Other specified apparatus activity	230	1%
EMS or rescue	1,040	3%
Searching for victim	540	2%
Rescuing fire victim	380	1%
Driving or riding vehicle	610	2%
Getting off fire department vehicle	460	2%
Other specified driving or riding activity	150	0%
Other activity	500	2%
Incident investigation during incident	330	1%
Other specified activity	170	1%

Table 7.
Fireground Injuries by Activity When Injured, 2010-2014 Annual Averages
(Continued)

Activity When Injured	Fireground Injuries	
Unclassified activity	350	1%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 8.
Fireground Injuries by Activity When Injured, by Injury Severity, 2010-2014 Annual Averages

Activity When Injured	Minor Injuries		Moderate Injuries		Severe Injuries	
Driving or riding vehicle	390	2%	210	2%	10	1%
Getting off fire department vehicle	290	1%	160	2%	0	1%
Operating fire department apparatus	630	3%	270	3%	20	4%
Operating engine or pumper	470	2%	210	2%	20	3%
Extinguishing fire or neutralizing incident	10,400	51%	4,750	52%	330	53%
Unclassified extinguishing fire/neutralizing incident	4,190	20%	1,720	19%	120	19%
Handling charged hose lines	4,690	23%	2,330	26%	160	26%
Using hand extinguishers	120	1%	20	0%	0	1%
Using hand tools in extinguishment activity	1,260	6%	620	7%	40	7%
Suppression support	5,170	25%	2,160	24%	130	21%
Suppression support, other	1,610	8%	680	7%	50	7%
Forcible entry	420	2%	190	2%	10	2%
Ventilation with power tools	360	2%	160	2%	10	2%
Ventilation with hand tools	470	2%	290	3%	20	3%
Salvage	230	1%	80	1%	0	0%
Overhaul	2,080	10%	770	8%	40	6%
Access or egress	670	3%	380	4%	20	4%
Unclassified access/egress	290	1%	160	2%	10	1%
Raising ground ladder	80	0%	60	1%	0	0%
Climbing ladder	120	1%	70	1%	10	1%
EMS or rescue	660	3%	350	4%	30	5%
Searching for victim	330	2%	180	2%	20	3%
Rescuing fire victim	240	1%	120	1%	10	2%
Other incident scene activity	1,960	10%	830	9%	50	9%
Other incident scene activity, other	530	3%	180	2%	10	2%
Catching hydrant	150	1%	70	1%	10	1%
Laying hose	330	2%	190	2%	10	2%
Moving tools or equipment around scene	440	2%	190	2%	10	2%
Picking up tools, equipment, or hose on scene	460	2%	190	2%	0	1%
Station activity	20	0%	0	0%	0	0%

Table 8.
Fireground Injuries by Activity When Injured, by Injury Severity, 2010-2014 Annual Averages
(Continued)

Activity When Injured	Minor Injuries		Moderate Injuries		Severe Injuries	
Other activity	420	2%	70	1%	10	2%
Incident investigation, during incident	280	1%	40	0%	10	2%
Unclassified activity	260	1%	80	1%	10	2%

	Total minor injuries		Total moderate injuries		Total severe injuries	
	20,570	100%	9,090	100%	620	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 9.
Fireground Injuries by Month, 2010-2014 Annual Averages

Month	Fireground Injuries	
January	3,030	10%
February	2,420	8%
March	2,550	8%
April	2,600	9%
May	2,390	8%
June	2,630	9%
July	3,140	10%
August	2,650	9%
September	2,120	7%
October	2,150	7%
November	2,250	7%
December	2,350	8%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 10.
Fireground Injuries by Primary Symptom of Injury in January and July, 2010-2014 Annual Averages

Primary Symptom of Injury - January	Fireground Injuries	
Strain or sprain	940	31%
Pain only	460	15%
Thermal burns	320	11%
Cut or laceration	200	7%
Contusion or bruise	180	6%
Smoke inhalation	120	4%
Swelling	110	4%
Fracture	70	2%
Stab or puncture wound	60	2%
Eye trauma, avulsion	50	2%
Dizziness, fainting or weakness	30	1%
Other specified symptoms	400	13%
None	100	3%
January total	3,030	100%
Primary Symptom of Injury - July	**Fireground Injuries**	
Strain or sprain	710	23%
Exhaustion or fatigue, including heat exhaustion	490	15%
Thermal burns	300	10%
Pain only	300	9%
Cut or laceration	210	7%
Dehydration	110	3%
Contusion or bruise	100	3%
Smoke inhalation	90	3%
Dizziness/fainting/weakness	90	3%
Swelling	90	3%
Cardiac symptoms	70	2%
Stab or puncture wound	60	2%
Unclassified symptom	50	2%
Breathing difficulty or shortness of breath	50	1%
Fracture	50	1%
Hazardous fumes inhalation	40	1%
Nausea	40	1%
Scald burn	30	1%
Abrasion	30	1%

Table 10.
Fireground Injuries by Primary Symptom of Injury in January and July, 2010-2014 Annual Averages (Continued)

Primary Symptom of Injury - January	Fireground Injuries	
Dislocation	20	1%
Eye trauma, avulsion	20	1%
Vomiting	20	1%
Heat stroke	20	1%
Numbness or tingling, paresthesia	20	1%
Other specified	100	3%
None	40	1%
July total	3,140	100%

Note: These are national estimates of fires and firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 11.
Fireground Injuries by Cause of Injury in January and July, 2010-2014 Annual Averages

Cause of Injury - January	Fireground Injuries	
Slip/trip	620	21%
Exposure to hazard	580	19%
Overexertion or strain	550	18%
Fall	430	14%
Contact with object (firefighter moved into/onto)	400	13%
Unclassified cause	230	7%
Struck or assaulted by person, animal or object	210	7%
Jump	10	0%
January total	3,030	100%

Cause of Injury - July	Fireground Injuries	
Overexertion or strain	1,080	34%
Exposure to hazard	650	21%
Contact with object (firefighter moved into/onto)	370	12%
Slip/trip	300	9%
Unclassified cause	280	9%
Fall	250	8%
Struck or assaulted by person, animal or object	210	7%
Jump	10	0%
July total	3,140	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude fires and firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 12.
Fireground Injuries by Day of Week, 2010-2014 Annual Averages

Day of Week		Fireground Injuries
Sunday	4,510	15%
Monday	4,450	15%
Tuesday	4,210	14%
Wednesday	4,230	14%
Thursday	4,270	14%
Friday	4,150	14%
Saturday	4,460	15%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude fires and firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 13.
Fireground Injuries by Time of Day, 2010-2014 Annual Averages

Time of Day	Fireground Injuries	
Midnight- 12:59 a.m.	1,170	4%
1:00-1:59 a.m.	1,160	4%
2:00-2:59 a.m.	1,210	4%
3:00-3:59 a.m.	1,250	4%
4:00-4:59 a.m.	1,080	4%
5:00-5:59 a.m.	920	3%
6:00-6:59 a.m.	870	3%
7:00-7:59 a.m.	830	3%
8:00-8:59 a.m.	990	3%
9:00-9:59 a.m.	1,000	3%
10:00-10:59 a.m.	1,140	4%
11:00-11:59 a.m.	1,290	4%
12:00-12:59 p.m.	1,460	5%
1:00-1:59 p.m.	1,550	5%
2:00-2:59 p.m.	1,730	6%
3:00-3:59 p.m.	1,750	6%
4:00-4:59 p.m.	1,560	5%
5:00-5:59 p.m.	1,560	5%
6:00-6:59 p.m.	1,540	5%
7:00-7:59 p.m.	1,380	5%
8:00-8:59 p.m.	1,320	4%
9:00-9:59 p.m.	1,240	4%
10:00-10:59 p.m.	1,230	4%
11:00-11:59 p.m.	1,050	3%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 14.
Fireground Injuries by Age of Victim, 2010-2014 Annual Averages

Age of Victim	Fireground Injuries	
15-19	440	1%
20-24	2,110	7%
25-29	3,600	12%
30-34	4,190	13%
35-39	4,820	15%
40-44	5,320	17%
45-49	4,50	14%
50-54	3,240	10%
55-59	1,420	5%
60-64	480	2%
65 and older	160	1%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Table 15.
Fireground Injuries by Primary Body Part, 2010-2014 Annual Averages

Primary Body Part Injured	Fireground Injuries	
Lower extremities	6,620	22%
Knee	2,990	10%
Ankle	1,770	6%
Leg-lower	740	2%
Foot and toes	720	2%
Upper extremities	6,090	20%
Hand and fingers	3,640	12%
Wrist	770	2%
Elbow	670	2%
Lower arm not including elbow or wrist	560	2%
Neck & Shoulders	4,010	13%
Shoulder	2,480	8%
Neck	1,400	4%
Head	3,950	13%
Unclassified head	1,720	5%
Ear	850	3%
Eye	940	3%
Multiple parts	2,380	8%
Multiple body parts - whole body	1,710	5%
Multiple body parts - upper part of body	560	2%
Internal	2,330	8%
Trachea and lungs	1,590	5%
Thorax	2,310	8%
Back, except spine	1,540	5%
Chest	760	2%
Spine	1,070	4%
Abdominal area	990	3%
Hip, lower back or buttocks	640	2%
Unclassified body part	530	2%
Total	30,290	100%

Note: These are national estimates of firefighter injuries reported to U.S. municipal fire departments and so exclude firefighter injuries reported only to federal or state agencies or industrial fire brigades. National estimates of total fireground injuries are made based on data reported by fire departments to the NFPA in its Annual Fire Experience Survey. Firefighter detailed casualty information is based on data reported by fire departments participating in NFIRS 5.0. Fireground injuries are rounded to the nearest ten.

Totals may not equal sums because of rounding.

Source: NFIRS and NFPA Fire Experience Survey.

Appendix A.
How National Estimates Statistics Are Calculated

The statistics in this analysis are estimates derived from the U.S. Fire Administration's (USFA's) National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's (NFPA's) annual survey of U.S. fire departments. NFIRS is a voluntary system by which participating fire departments report detailed factors about the fires to which they respond. Roughly two-thirds of U.S. fire departments participate, although not all of these departments provide data every year. Fires reported to federal or state fire departments or industrial fire brigades are not included in these estimates.

NFIRS provides the most detailed incident information of any national database not limited to large fires. NFIRS is the only database capable of addressing national patterns for fires of all sizes by specific property use and specific fire cause. NFIRS also captures information on the extent of flame spread, and automatic detection and suppression equipment. For more information about NFIRS visit http://www.nfirs.fema.gov/.

NFIRS has a wide variety of data elements and code choices. The NFIRS database contains coded information. Many code choices describe several conditions. These cannot be broken down further. For example, area of origin code 83 captures fires starting in vehicle engine areas, running gear areas or wheel areas. It is impossible to tell the portion of each from the coded data.

Methodology may change slightly from year to year.
NFPA is continually examining its methodology to provide the best possible answers to specific questions, methodological and definitional changes can occur. *Earlier editions of the same report may have used different methodologies to produce the same analysis, meaning that the estimates are not directly comparable from year to year.*

NFPA's fire department experience survey provides estimates of the big picture.
Each year, NFPA conducts an annual survey of fire departments which enables us to capture a summary of fire department experience on a larger scale. Surveys are sent to all municipal departments protecting populations of 50,000 or more and a random sample, stratified by community size, of the smaller departments. Typically, a total of roughly 3,000 surveys are returned, representing about one of every ten U.S. municipal fire departments and about one third of the U.S. population.

The survey is stratified by size of population protected to reduce the uncertainty of the final estimate. Small rural communities have fewer people protected per department and are less likely to respond to the survey. A larger number must be surveyed to obtain an

adequate sample of those departments. (NFPA also makes follow-up calls to a sample of the smaller fire departments that do not respond, to confirm that those that did respond are truly representative of fire departments their size.) On the other hand, large city departments are so few in number and protect such a large proportion of the total U.S. population that it makes sense to survey all of them. Most respond, resulting in excellent precision for their part of the final estimate.

The survey includes the following information: (1) the total number of fire incidents, civilian deaths, and civilian injuries, and the total estimated property damage (in dollars), for each of the major property use classes defined in NFIRS; (2) the number of on-duty firefighter injuries, by type of duty and nature of illness; 3) the number and nature of non-fire incidents; and (4) information on the type of community protected (e.g., county versus township versus city) and the size of the population protected, which is used in the statistical formula for projecting national totals from sample results. The results of the survey are published in the annual report *Fire Loss in the United States*. To download a free copy of the report, visit http://www.nfpa.org/assets/files/PDF/OS.fireloss.pdf.

Projecting NFIRS to National Estimates

As noted, NFIRS is a voluntary system. Different states and jurisdictions have different reporting requirements and practices. Participation rates in NFIRS are not necessarily uniform across regions and community sizes, both factors correlated with frequency and severity of fires. This means NFIRS may be susceptible to systematic biases. No one at present can quantify the size of these deviations from the ideal, representative sample, so no one can say with confidence that they are or are not serious problems. But there is enough reason for concern so that a second database -- the NFPA survey -- is needed to project NFIRS to national estimates and to project different parts of NFIRS separately. This multiple calibration approach makes use of the annual NFPA survey where its statistical design advantages are strongest.

In this analysis, only data originally collected in NFIRS 5.0 is included in the calculations of the 2010-2014 national estimates for firefighter injuries in structure fires. The portion of fires and firefighter injuries originally collected in NFIRS 5.0 compared to the earlier NFIRS 4.1 version has increased steadily over time. The percent of fires coded in version 5.0 for the 2010 to 2014 period ranged from 97% to 100%.

This update for 2010-14 includes injuries that occurred at all fires (incident type 110-171), at the fireground (where injury occurred codes 5 and 6), and severity of injury (1 to 5). The analysis in this report is based on 24,522 injuries that met these criteria. Except where otherwise noted, all tables are based on fireground injuries that occurred at all fires. The national annual estimates of firefighter injuries were weighted for the

individual years using total fireground injuries from the annual NFPA Fire Experience Survey.

In this report, unknown data was assumed to have the same proportional distribution as the distribution where the data was known. The "Other" category includes cases specifically coded as "other" and cases coded in specific categories but with very low frequency. Note that the number of occurrences for fires has been rounded to the nearest hundred, the number of firefighter fireground injuries has been rounded to the nearest ten, and percentages are rounded to the nearest whole percent. Totals in tables may not equal sums due to rounding.