2016 Fireworks Annual Report

Fireworks-Related Deaths and Emergency Department-Treated Injuries During 2016

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This analysis was prepared by CPSC staff. It has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

Executive Summary

This report provides the results of U.S. Consumer Product Safety Commission (CPSC) staff's analysis of data on nonoccupational, fireworks-related deaths and injuries during calendar year 2016

Staff obtained information on fireworks-related deaths from news clippings and other sources in the CPSC's Injury and Potential Injury Incident file (IPII) and the CPSC's Death Certificate File. Staff estimated fireworks-related injuries treated in hospital emergency departments from CPSC's National Electronic Injury Surveillance System (NEISS). CPSC staff conducted a special study of nonoccupational fireworks-related injuries occurring between June 18, 2016 and July 18, 2016. The special study included collection and analysis of more detailed incident information, such as the type of injury, the fireworks involved, and the characteristics of the victim and the incident scenario. About 68 percent of the estimated annual fireworks-related, emergency department-treated injuries for 2016 occurred during that period.

Highlights of the report:

Deaths and Injuries

- CPSC staff received reports of four nonoccupational fireworks-related deaths during 2016. Three of the four fatalities in 2016 were related to reloadable aerial devices, and one was associated with manufacturing homemade devices. All four victims died from direct impacts of fireworks. Reporting of fireworks-related deaths for 2016 is not complete, and the number of deaths in 2016 should be considered a minimum.

- CPSC staff received an average of 7.1 reports of fireworks-related deaths per year between 2001 and 2016.

- Fireworks were involved in an estimated 11,100 injuries treated in U.S. hospital emergency departments during calendar year 2016 (95 percent confidence interval 8,400–13,900). The estimated rate of emergency department-treated injuries is 3.4 per 100,000 individuals in the United States.

- There is not a statistically significant trend in estimated emergency department-treated, fireworks-related injuries from 2001 to 2016.

- An estimated 7,600 fireworks-related injuries (or 68 percent of the total estimated fireworks-related injuries in 2016) were treated in U.S. hospital emergency departments during the 1-month special study period between June 18, 2016 and July 18, 2016 (95 percent confidence interval 5,300–9,900).

Results from the 2016 Special Study[1]

- Of the fireworks-related injuries sustained, 61 percent were to males, and 39 percent were to females.

- Children younger than 15 years of age accounted for 31 percent of the estimated 2016 injuries. Thirty-nine percent of the estimated emergency department-treated, fireworks-related injuries were to individuals younger than 20 years of age.

- Young adults 20 to 24 years of age had the highest estimated rate of emergency department-treated, fireworks-related injuries (4.9 injuries per 100,000 people). Children younger than 5 years of age had the second highest estimated rate (4.4 injuries per 100,000 people).

- There were an estimated 900 emergency department-treated injuries associated with sparklers and 400 with bottle rockets.

- There were an estimated 1,300 emergency department-treated injuries associated with firecrackers. Of these, an estimated 47 percent were associated with small firecrackers, an estimated 4 percent with illegal firecrackers, and an estimated 49 percent with firecrackers for which there was no specific information.

- The parts of the body most often injured were hands and fingers (an estimated 33 percent); head, face, and ears (an estimated 20 percent); legs (an estimated 18 percent); eyes (an estimated 9 percent); and arms (an estimated 8 percent).

- Sixty-nine percent of the emergency department-treated injuries were burns. Burns were the most common injury to all parts of the body, except the eyes, where contusions, lacerations, and foreign bodies in the eyes occurred more frequently.

- Approximately 92 percent of the victims were treated at the hospital emergency department and then released. An estimated 7 percent of patients were treated and transferred to another hospital or admitted to the hospital.

CPSC staff conducted telephone follow-up investigations of fireworks-related injuries that were reported at NEISS hospital emergency departments during the 2016 special study period and that met certain criteria. Many of these cases were selected for follow-up interviews because they involved potentially serious injuries and/or hospital admissions. Cases were also selected to clarify information in the hospital record about the incident scenario or fireworks type. Twenty-seven telephone interviews were completed.

[1] The percentages are calculated from the actual injury estimates.

A review of data from the 27 completed telephone follow-up investigations showed that most injuries were associated with misuse or malfunctions of fireworks. Misuse included: setting off fireworks improperly; mischief; placing and lighting fireworks inside one's body part; and lighting fireworks in one's hand. Typical malfunctions included: tip-over incidents; errant flight paths; short fuses; blowouts; and fragments. In addition, debris from fireworks was involved in some of the injuries. According to the injury investigation reports, most victims recovered from their injuries or were expected to recover completely. However, several victims reported that their injuries might be long term.

1. Introduction

This report describes injuries and deaths during calendar year 2016, associated with fireworks devices, as well as kits and components used to manufacture illegal fireworks. Reports for earlier years in this series can be found at: https://www.cpsc.gov/Research--Statistics/Fuel-Lighters-and-Fireworks1.

This report is organized into six sections. Section 1 contains a description of the data and statistical methods used in this analysis. Section 2 summarizes the 2016 fireworks-related incidents that resulted in deaths. Section 3 provides an annual estimate of fireworks-related, emergency department-treated injuries in the United States for 2016, and the report compares that estimate with the estimated injuries for previous years. Section 4 analyzes emergency department-treated, fireworks-related injuries occurring during the month around July 4, 2016. Section 5 summarizes the telephone in-depth investigations of a subsample of the injuries during that period. The report concludes with a summary of the findings in Section 6. Appendix A presents a table on the relationship between fireworks-related injuries and fireworks imports between 2001 and 2016. Appendix B contains more detail on the completed telephone investigations.

Sources of Information

Information on nonoccupational fireworks-related deaths occurring during 2016 was obtained from the CPSC's Injury and Potential Injury Incidents (IPII) file and the CPSC's Death Certificate File. Entries in IPII come from a variety of sources, such as newspaper articles, consumer complaints, lawyer referrals, medical examiners, and other government agencies. CPSC staff from the Office of Compliance and Field Operations conducted in-depth investigations of the deaths to determine the types of fireworks involved in the incidents and the circumstances that led to the fatal injuries.

Because the data in IPII are based on voluntary reports, and because it can take more than 2 years to receive all death certificates from the various states to complete the Death Certificate File, neither data source can be considered complete for the number of 2015 or 2016 fireworks-related deaths at the time this report was prepared. Consequently, the number of deaths should be considered a minimum. Staff updates the number of deaths for previous years when new reports are received. Total deaths for prior years may not coincide with the numbers in reports for earlier years because of these updates.

The source of information on nonoccupational, emergency department-treated fireworks-related injuries is NEISS. NEISS is a probability sample of U.S. hospitals with emergency departments.[2] Injury information is taken from the emergency department record. This information includes the victim's age and sex, the place where the injury

[2] For a description of NEISS, including the revised sampling frame, see Schroeder and Ault (2001). Procedures used for variance and confidence interval calculations and adjustments for the sampling frame change that occurred in 1997 are found in Marker, Lo, Brick, and Davis (1999). SAS® statistical software for trend and confidence interval estimation is documented in Schroeder (2000). SAS® is a product of the SAS Institute, Inc., Cary, NC.

occurred, the emergency department diagnosis, the body part injured, and the consumer product(s) associated with the injury. The information is supplemented by a 160-character narrative that often contains a brief description of how the injury occurred.

To supplement the information available in the NEISS record, every year, during the month around July 4, CPSC staff conducts a special study of fireworks-related injuries. Staff focuses its efforts on fireworks incidents during this period because in most years, about two-thirds to three-quarters of the annual injuries occur then. During this period, hospital emergency department staffs show patients pictures of different types of fireworks to help them identify the type of fireworks device associated with their injuries. The type of fireworks involved in the incident is written into the NEISS narrative. In 2016, the special study period lasted from June 18 to July 18.

After reading the incident case records, including the narrative description of the fireworks device and the incident scenario, CPSC staff may assign a case for telephone investigation. Cases are usually selected because they involve the most serious injuries and/or hospital admissions. Serious injuries include: eye injuries, finger and hand amputations, and head injuries. Cases also may be assigned to obtain more information about the incident than what is reported in the NEISS narrative. In most years, phone interviewers are able to collect information for one-third to one-half of the cases assigned. Information on the final status of the telephone interviews conducted during the 2016 special study is found in Section 5 and Appendix B of this report.

In the telephone investigations, information is requested directly from the victim (or the victim's parent, if the victim is a minor) about the type of fireworks involved, where the fireworks were obtained, how the injury occurred, and the medical treatment and prognosis. When the fireworks device reported in the telephone investigation is different from what is reported in the NEISS emergency department record, the device reported in the telephone investigation is used in the data for this report.

As a result of this investigative process, three different levels of information may be available about a fireworks-related injury case. For the cases that occur before or after the July 4 special study period, the NEISS record is almost always the only source of information. Many NEISS records collected outside the special study period do not specify the type of fireworks involved in the incident. During the special study period, more information is available for analysis because the NEISS record collected by the emergency department usually contains the type of fireworks and additional details on the incident scenario. Finally, the most information is available for the subset of the special study cases where staff conducted telephone investigations. These different levels of information about injuries correspond to different analyses in the report, as follows:

- Estimated national number of fireworks-related, emergency department-treated injuries. This estimate is made using NEISS cases for the entire year, from records where fireworks were specified as one of the consumer products involved. For cases outside the special study period, as noted above, there is usually no information on the fireworks type, and limited information is available on the

incident scenario. Consequently, there is not enough information to determine the role played by the fireworks in the incident. This means that the annual injury estimate may include a small number of cases in which the fireworks device was not lit or no attempt was made to light the device. Calculating the annual estimates without removing these cases makes the estimates comparable to previous years.[3]

- Detailed analyses of injury patterns. The tables in this report, which describe fireworks type, body part injured, diagnosis, age and sex of injured people, and other such information, are based on the special study period only. Fireworks-type information is taken from the telephone investigation or the NEISS comment field when there was no telephone investigation. When computing estimates for the special study period, staff does not include cases in which the fireworks device was not lit or no attempt was made to light the device.

- Information from telephone investigations. Individual case injury descriptions and medical prognosis information from the telephone investigations are listed in Appendix B. These listings also exclude cases in which the fireworks device was not lit or no attempt was made to light the device. These cases represent a sample of some of the most serious fireworks-related injuries and may not represent the typical emergency department-treated, fireworks-related injuries.

Statistical Methods

Injuries reported by hospitals in the NEISS sample were weighted by the NEISS probability-based sampling weights to develop an estimate of total U.S. emergency department-treated, fireworks-related injuries for the year and for the special study month around July 4. Confidence intervals were estimated, and other statistics were calculated using computer programs that were written to take into account the sampling design.[4] Estimated injuries are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are shown with an asterisk (*). Percentages are calculated from the actual estimates. Percentages may not add to subtotals or to the total in the tables or figures, due to rounding.

This report also contains a number of detailed tables about fireworks-related injuries during the special study period. National estimates in these tables were also made using the sampling weights. To avoid cluttering the tables, confidence intervals are not included. Because the estimates are based on subsets of the data, they have larger relative sampling errors (*i.e.*, larger coefficients of variation) than the annual injury estimate or the special study injury estimate. Therefore, interpretation and comparison of these estimates with each other or with estimates from prior years should be made with caution.

[3] The only exception to the practice of including all of the cases occurred in 2003, when nine cases representing an estimated 150 emergency department-treated injuries were excluded from the annual injury estimates. These cases resulted from a nightclub fire in West Warwick, RI, which also caused 100 deaths. For details see Greene and Joholske (2004).

[4] See Schroeder (2000).

For example, when comparing subsets of the data—such as between injuries associated with two different types of fireworks, or between two different age groups—it is difficult to determine how much of the difference between estimates is associated with sampling variability and how much is attributed to real differences in national injury totals.

2. Fireworks-Related Deaths for 2016

CPSC has reports of four nonoccupational, fireworks-related deaths that occurred during 2016. Reporting of fireworks-related deaths for 2016 is not complete, and the number of deaths in 2016 should be considered a minimum. Brief descriptions of the incidents, using wording taken from the incident reports, follow:

- On May 15, 2016, a 38-year-old male from Arizona was fatally injured in the garage of his single family home while apparently attempting to manufacture fireworks. Neighbors heard a loud explosion from the victim's residence, and the responding officers found the victim lying on the driveway outside the garage obviously deceased. The victim reportedly had a history of constructing homemade fireworks. In the victim's home, investigators found a large quantity of fireworks and firework manufacturing components, which had been purchased on-line from an out-of-state supplier.

- On July 4, 2016, a 42-year-old male from Florida suffered fatal injuries when the fireworks device he was lighting malfunctioned. According to the county deputies, the victim was trying to set off large mortar-type fireworks in a PVC pipe that was anchored to the ground. The fireworks malfunctioned—exploding through the side of the pipe—and caused traumatic injuries to the victim's face and chest. The victim was airlifted to a hospital where he died. This incident remains under investigation.

- A 27-year-old male from Georgia died shortly after the new year of 2016 from a fatal fireworks accident. According to the witnesses at the scene, the victim accidentally placed a firework in a tube upside-down and then lifted the tube above his head. The firework exploded from the bottom and struck the victim in the neck. The victim suffered a large laceration to his neck. The victim was taken to a local medical center where he died from his injuries later.

- On July 5, 2016, a 26-year-old male from Kansas fell off the roof of his home after a mortar type of fireworks device exploded in his hand near his chest area. The victim was transported to a hospital where he was pronounced deceased. A mortar shell casing was collected from his chest during the surgery. According to the witnesses, the victim was on his roof shooting firearms. The witnesses also stated that they saw the victim holding some type of mortar fireworks device in his hand near his chest area just prior to the explosion incident. They told the police officials that the explosion knocked the victim backwards off the roof. A used mortar tube was found on the roof by the police officials.

Including the four deaths described above, CPSC staff has reports of 114 fireworks-related deaths between 2001 and 2016, for an average of 7.1 deaths per year.[5]

[5] See previous reports in this series (*e.g.*, the report for 2015: Tu (2015)). In the most recent 3 years, the number of deaths included eight deaths in 2013, 13 deaths in 2014, and 11 deaths in 2015.

3. National Injury Estimates for 2016

Table 1 and Figure 1 present the estimated number of nonoccupational, fireworks-related injuries treated in U.S. hospital emergency departments between 2001 and 2016.

Table 1
Estimated Fireworks-Related Injuries: 2001–2016

Year	Estimated Injuries	Injuries per 100,000 People
2016	11,100	3.4
2015	11,900	3.7
2014	10,500	3.3
2013	11,400	3.6
2012	8,700	2.8
2011	9,600	3.1
2010	8,600	2.8
2009	8,800	2.9
2008	7,000	2.3
2007	9,800	3.3
2006	9,200	3.1
2005	10,800	3.7
2004	9,600	3.3
2003	9,300	3.2
2002	8,800	3.1
2001	9,500	3.3

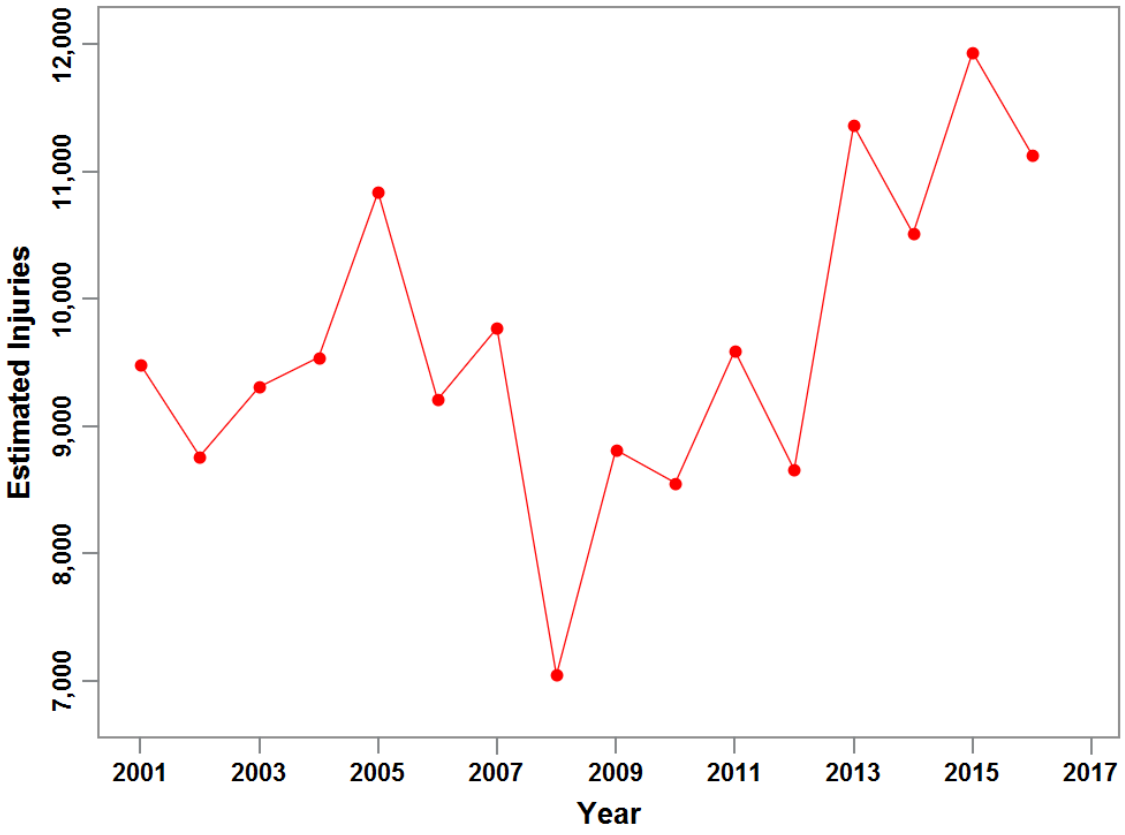
Source: NEISS, U.S. Consumer Product Safety Commission. The estimate for 2003 excludes an estimated 150 emergency department-treated injuries following the nightclub fire in West Warwick, RI. Population estimates for 2010 to 2016 are from Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2016 (NST-EST2016-01), U.S. Census Bureau, Population Division. Release Date: December 2016. Population estimates for 2000 to 2009 are from Table 1. Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2009 (NST-EST2009-01). Population Division, U.S. Census Bureau.

In calendar year 2016, there were an estimated 11,100 fireworks-related, emergency department-treated injuries (95 percent confidence interval 8,400–13,900). There were an estimated 11,900 injuries in 2015. The difference between the injury estimates for 2016 and 2015 is not statistically significant.

Figure 1 shows that the highest estimated number of annual fireworks-related injuries was 11,900 in 2015, followed by 11,400 estimated injuries in 2013, 11,100 estimated injuries in 2016, 10,800 estimated injuries in 2005, and 10,500 estimated injuries in 2014. For the other years, the estimated number of injuries fluctuated between 7,000 and 9,800. In 2008, the estimated number of fireworks-related injuries was 7,000,

which was the lowest between 2001 and 2016. There is not a statistically significant trend detected in the fireworks-related injury estimates from 2001 to 2016.[6]

Figure 1
Estimated Fireworks-Related, Emergency Department-Treated Injuries
2001–2016



Source: NEISS, U.S. Consumer Product Safety Commission.

Appendix A contains a table showing estimated fireworks-related injuries and fireworks imports between 2001 and 2016.

[6] For details on the method to test a trend that incorporates the sampling design, see Schroeder (2000) and Marker et al. (1999).

4. Injury Estimates for the 2016 Special Study: Detailed Analysis of Injury Patterns

The injury analysis in this section presents the results of the 2016 special study of fireworks-related injuries treated in hospital emergency departments between June 18, 2016 and July 18, 2016. During this period, there were an estimated 7,600 fireworks-related injuries (95 percent confidence interval 5,300–9,900), accounting for 68 percent of the total estimated fireworks-related injuries for the year, which is not statistically different from the estimated 8,000 fireworks-related injuries in the 2015 special study period.

The remainder of this section provides the estimated fireworks-related injuries from this period, broken down by fireworks device type, victims' demographics, injury diagnosis, and body parts injured.

Fireworks Device Types and Estimated Injuries

Table 2 shows the estimated number and percent of emergency department-treated injuries by type of fireworks device during the special study period of June 18, 2016 to July 18, 2016.

Table 2
Estimated Fireworks-Related Injuries
By Type of Fireworks Device
June 18–July 18, 2016

Fireworks Device Type	Estimated Injuries	Percent
Total	7,600	100
All Firecrackers	1,300	17
Small	600	8
Illegal	100	1
Unspecified	600	8
All Rockets	700	9
Bottle Rockets	400	5
Other Rockets	300	4
All Other Devices	3,200	42
Sparklers	900	12
Fountains	100	1
Novelties	300	4
Multiple Tube	300	4
Reloadable Shells	1,100	14
Roman Candles	500	7
Public Display	300	4
Unspecified	2,100	28

Source: NEISS, U.S. Consumer Product Safety Commission. Based on 175 NEISS emergency department-reported injuries between June 18, 2016 and July 18, 2016, and supplemented by 27 completed In-Depth Investigations (IDIs). Fireworks types are obtained from the IDI, when available; otherwise, fireworks types are identified from information in victims' reports to emergency department staff that were contained in the NEISS narrative. Illegal firecrackers include M-80s, M-1000s, Quarter Sticks, and other firecrackers that are banned under the Federal Hazardous Substances Act (FHSA) (16 C.F.R. § 1500.17)**.** Fireworks that may be illegal under state and local regulations are not listed as illegal, unless they violate the FHSA. Subtotal estimates are presented below the estimates for firework type. Estimates are rounded to the nearest 100 injuries. Estimates may not sum to subtotal or total due to rounding. Percentages are calculated from the actual estimates, and they may not add to subtotals or the total due to rounding.

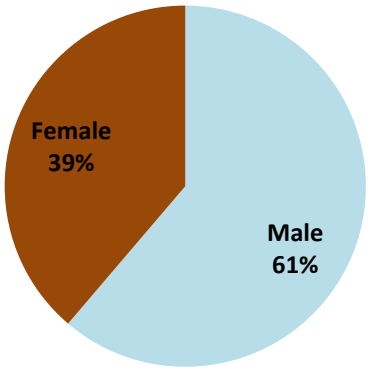
As shown in Table 2, firecrackers accounted for an estimated 1,300 emergency department-treated injuries, which represents 17 percent of the total fireworks-related injuries during the special study period. Small firecrackers were involved in 600 injuries. The estimate for illegal firecracker-related injuries was 100. However, some of the estimated 600 unspecified firecracker-related injuries, and some of the estimated 2,100 unspecified fireworks-related injuries also may have involved illegal firecrackers. Reloadable shells were associated with 1,100 estimated injuries, 14 percent of the total fireworks-related injuries. Sparklers were involved in an estimated 900 emergency department-treated injuries, which represents 12 percent of the total injuries during the special study period. Rockets were associated with 700 estimated injuries, 9 percent of

the total estimated injuries, of which 400 injuries were involved in bottle rockets. Roman candles accounted for 500 estimated injuries, 7 percent of the total. Multiple tube devices, novelty devices, and public display of fireworks each were related to 300 estimated injuries, 4 percent of the total. Although public display fireworks are not associated with a large number of injuries, the larger load in these devices makes them involved disproportionately in serious injuries. Fountains were involved in 1 percent of the estimated fireworks-related injuries during the 2016 special study period.

Gender and Age of Injured Persons

Some 4,600 of the estimated fireworks-related injuries were to males, representing 61 percent of the total injuries. Males experienced an estimated 2.9 fireworks-related, emergency department-treated injuries per 100,000 individuals during the special study period. Females, with an estimated 3,000 emergency department-treated injuries, had 1.8 injuries per 100,000 people. Figure 2 shows the distribution of estimated fireworks-related injuries by gender.

Figure 2
Estimated Injuries by Gender

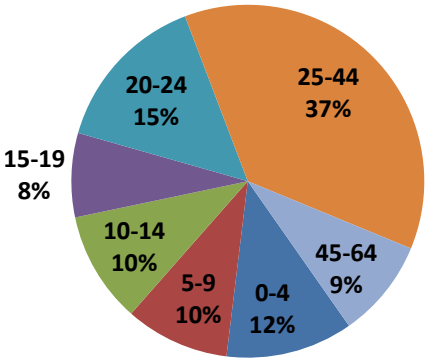


Source: NEISS, U.S. Consumer Product Safety Commission.

Children and young adults under age 20 constituted 39 percent of the fireworks-related injuries. Children under 5 years of age experienced an estimated 900 injuries (12 percent of all fireworks-related injuries during the special study period), as shown in Figure 3 and Table 3. Children in the 5- to 14-year-old age group experienced an estimated 1,500 injuries (20 percent of all fireworks-related injuries). Breaking down that age group further, children 5 to 9 years of age had an estimated 700 injuries and children

10 to 14 years of age accounted for 800 injuries. In the aggregate, children under 15 years of age accounted for 31 percent of the estimated fireworks-related injuries. [7]

Figure 3
Percentage of Injuries by Age Group



Source: NEISS, U.S. Consumer Product Safety Commission. Percentages may not sum to 100 due to rounding.

The detailed breakdown by age and gender is shown in Table 3. The concentration of injuries among males and people under 25 has been typical of fireworks-related injuries for many years.

[7] The percentages are calculated from actual injury estimates, and age subcategory percentages may not sum to the category percentage due to rounding.

Table 3
Estimated Fireworks-Related Injuries
By Age and Gender
June 18–July 18, 2016

Age Group	Total	Per 100,000 People	Male	Female
Total	7,600	2.4	4,600	3,000
0–4	900	4.4	300	600
5–14	1,500	3.7	900	600
5–9	700	3.5	500	200
10–14	800	3.8	400	400
15–24	1,700	3.9	1,300	400
15–19	600	2.8	300	300
20–24	1,100	4.9	1,000	100
25–44	2,800	3.3	1,700	1,100
45–64	700	0.8	400	300

Sources: NEISS, U.S. Consumer Product Safety Commission. NC-EST2015-AGESEX-RES: Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States: April 1, 2010 to July 1, 2015. File: 7/1/2015 National Population Estimates. Source: U.S. Census Bureau, Population Division. Release Date: April 2016. The two oldest victims were 59 years of age. Estimates are rounded to the nearest 100 injuries. Age subcategory estimates may not sum to the category total due to rounding.

When considering per capita injury rates, children and young adults had higher estimated rates of injury than the other age groups during the 2016 special study period. Young adults 20 to 24 years of age had the highest estimated per capita injury rate at 4.9 injuries per 100,000 population. This was followed by children younger than 5 years of age at 4.4 injuries per 100,000 people.

Age and Gender of the Injured Persons by Type of Fireworks Device

Table 4 shows the ages of those injured by the type of fireworks device associated with the injury. For children under 5 years of age, sparklers accounted for half of the total estimated injuries for that specific age group.[8]

[8] The percentages are calculated from the actual injury estimates.

No clear relationship between age and fireworks type is suggested by the data in Table 4. It is worth noting that the number of estimated injuries does not completely represent the usage pattern because victims are often injured by fireworks used by other people. This is especially true for rockets and aerial shells (*e.g.*, fountains, multiple tube, and reloadable devices), which can injure people located some distance away from where the fireworks are launched.

Table 4
Estimated Fireworks-Related Injuries
By Device Type and Age Group
June 18–July 18, 2016

		Age Group				
Fireworks Type	Total	0–4	5–14	15–24	25–44	45–64
Total	7,600	900	1,500	1,700	2,800	700
All Firecrackers	1,300	*	500	500	200	100
Small	600	*	200	400	100	*
Illegal	100	*	*	100	*	*
Unspecified	600	*	300	*	100	100
All Rockets	700	200	100	100	300	*
Bottle Rockets	400	100	*	100	100	*
Other Rockets	300	100	100	*	100	*
Other Devices	3,200	600	400	600	1,100	500
Sparklers	900	400	*	100	300	*
Fountains	100	*	*	100	*	*
Novelties	300	100	200	*	*	*
Multiple Tube	300	*	*	100	*	100
Reloadable	1,100	*	100	100	600	200
Roman Candles	500	*	100	200	200	100
Public Display	300	*	*	*	300	*
Unspecified	2,100	100	500	500	900	100

Source: NEISS, U.S. Consumer Product Safety Commission. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimated injuries may not sum to subtotals or totals due to rounding.

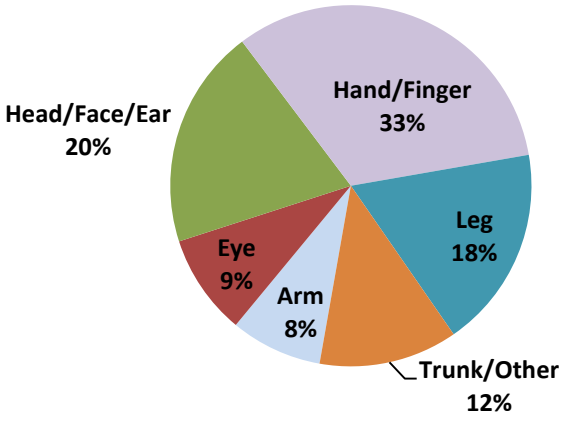
As shown previously in Figure 2, males accounted for 61 percent of the estimated fireworks-related injuries, and females comprised 39 percent. Males accounted for a majority of the estimated injuries from firecrackers; bottle rockets; multiple tube devices;

reloadable devices; Roman candles; and public display of fireworks. In addition, males were associated with all the estimated injuries from fountains. Females were involved in more estimated injuries from other rockets; sparklers; novelties; and unspecified devices.

Body Region Injured and Injury Diagnosis

Figure 4 presents the distribution of estimated emergency department-treated injuries by the specific parts of the body to which the injury occurred. Hands and fingers, with an estimated 2,500 injuries, accounted for 33 percent of the total injuries. These were followed by an estimated 1,500 injuries to the head/face/ear region (20 percent); 1,400 leg injuries (18 percent); 900 injuries to trunk/other category (12 percent); 700 eye injuries (9 percent); and 600 arm injuries (8 percent).

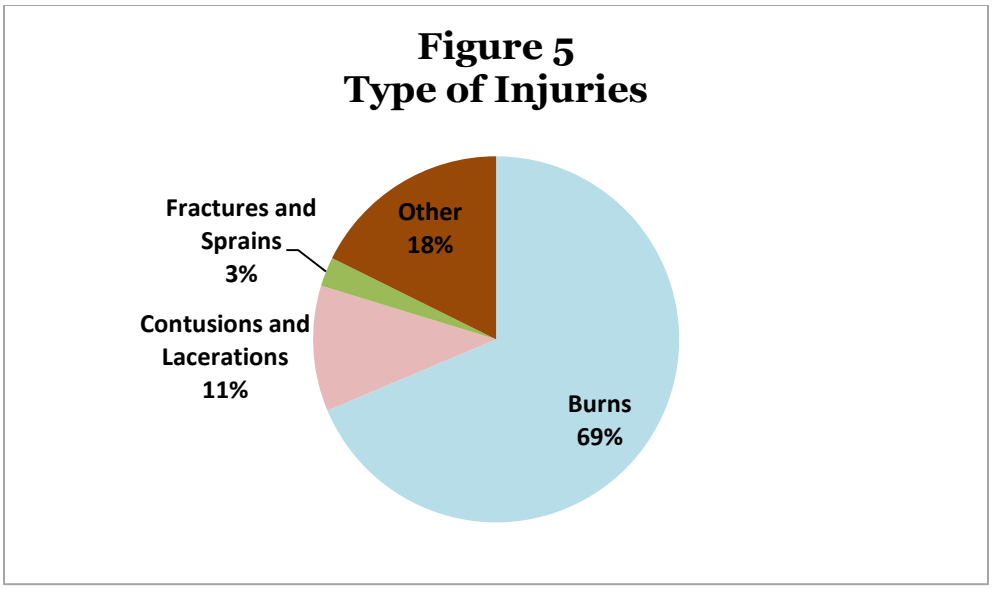
Figure 4
Body Regions Injured



Source: NEISS, U.S. Consumer Product Safety Commission.

Figure 5 shows the diagnoses of the estimated injuries associated with fireworks devices. Burns, with 5,200 estimated injuries (69 percent), were the most frequent injury diagnosis. Contusions and lacerations were associated with 800 estimated injuries (11 percent), and fractures and sprains were associated with 200 estimated injuries (3 percent). The remaining 1,300 estimated injuries (18 percent) were attributed to other diagnoses.[9]

[9] Percentages are calculated from the actual injury estimates and do not sum to 100 due to rounding.



Source: NEISS, U.S. Consumer Product Safety Commission. Percentages may not sum to 100 due to rounding.

As shown in Table 5, burns were the most frequent injuries to all body parts except for eye injuries, which were other diagnoses that included foreign bodies in the eye.

Table 5
Estimated Fireworks-Related Injuries
By Body Region and Diagnosis
June 18–July 18, 2016

Body Region	Total	Diagnosis			
		Burns	Contusions Lacerations	Fractures Sprains	Other Diagnoses
Total	7,600	5,200	800	200	1,300
Arm	600	600	*	*	*
Eye	700	200	200	*	300
Head/Face/Ear	1,500	600	300	*	600
Hand/Finger	2,500	1,800	300	200	200
Leg	1,400	1,200	100	*	100
Trunk/Other	900	800	*	*	200

Source: NEISS, U.S. Consumer Product Safety Commission. Fractures and sprains also include dislocations. Other diagnoses include all other injury categories. Arm includes NEISS codes for upper arm, elbow, lower arm, shoulder, and wrist. Head/Face/Ear regions include eyelid, eye area, nose, neck, and mouth but not the eyeball. Leg includes upper leg, knee, lower leg, ankle, foot, and toe. Trunk/other regions include chest, abdomen, pubic region, "all parts of body", internal, and "25–50 percent of body". Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimated injuries may not sum to subtotals or totals due to rounding.

Type of Fireworks Device and Body Region Injured

Table 6 presents estimated injuries by the type of fireworks device and body region injured.

Table 6
Estimated Fireworks-Related Injuries
By Type of Fireworks Device and Body Region Injured
June 18–July 18, 2016

Fireworks Type	Total	Region of the Body Injured					
		Arm	Eye	Head/Face/Ear	Hand/Finger	Leg	Trunk/Other
Total	7,600	600	700	1,500	2,500	1,400	900
All Firecrackers	1,300	*	100	300	700	100	200
Small	600	*	100	200	300	*	100
Illegal	100	*	*	*	100	*	*
Unspecified	600	*	*	100	300	100	100
All Rockets	700	100	100	100	*	300	100
Bottle Rockets	400	*	100	*	*	200	*
Other Rockets	300	100	*	*	*	100	100
Other Devices	3,200	200	300	800	1,300	400	300
Sparklers	900	*	*	100	700	200	*
Fountains	100	*	100	*	*	*	*
Novelties	300	*	*	100	200	*	*
Multiple Tube	300	*	*	*	100	100	100
Reloadable	1,100	200	100	300	200	100	200
Roman Candles	500	*	100	300	100	*	100
Public Display	300	200	*	*	*	*	100
Unspecified	2,100	200	200	300	500	600	300

Source: NEISS, U.S. Consumer Product Safety Commission. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimated injuries may not sum to subtotals or totals due to rounding.

Seventy percent of the estimated sparkler injuries and 65 percent of the estimated novelty injuries involved the hands and fingers. All of the estimated injuries from fountains involved the eyes. A majority of the estimated injuries associated with Roman candles affected the heads, faces and ears.

Hospital Treatment

An estimated 92 percent of the victims of fireworks-related injuries were treated at the emergency department and then released; about 4 percent were admitted to the hospital; approximately 3 percent of the victims were treated and transferred to another hospital; and 1 percent of the victims had other dispositions (i.e. left hospital without being seen and held for observation). The treat-and-release percentage was slightly higher compared to that for all consumer products in 2016, and the percentages of the treated and transferred and the admitted were a bit lower for the fireworks-related injuries in the special study period than those for all consumer products.[10]

[10]For all injuries in 2016, 90 percent of patients were treated and released; 7 percent were admitted to the hospital; 1 percent of patients were transferred to other hospitals; and 2 percent had other dispositions, including left hospital without being seen, held for observation, or dead on arrival.

5. Telephone Investigations of Fireworks-Related Injuries

CPSC staff conducted telephone in-depth investigations of some fireworks incidents that occurred during the 1-month special study period surrounding the 4th of July holiday (June 18, 2016 to July 18, 2016). Completed telephone investigations provided more detail about incidents and injuries than the emergency department information summarized in the narrative in the NEISS record. During the telephone interview, respondents were asked how the injury occurred (hazard pattern); what medical care they received following the emergency-department treatment; and what long-term effects, if any, resulted from their injury. Respondents were also asked detailed questions about the fireworks involved in the incident, including their type, markings, and where they were obtained.

Cases were selected for telephone investigations based on the information provided in the NEISS narrative and coded information in the NEISS records. The selection criteria included: (1) unusual hazard patterns, (2) severity of the injury, and (3) lack of clear information in the narrative about the type of fireworks associated with the injury. For these reasons, and because many victims did not respond, the telephone investigation cases cannot be considered typical of fireworks-related injuries.

From the 199 emergency department-treated, fireworks-related injuries during the special study period, staff selected 127 cases for telephone investigations, of which 27 were completed and determined to be in scope, and 100 were incomplete. Table 7 shows the final status of these investigations, including the reasons why some investigations were incomplete.

Table 7
Final Status of Telephone Investigations

Final Case Status	Number of Cases	Percent
Total Assigned	127	100
Completed Investigation	27	21
In Scope	27	21
Incomplete Investigations	100	79
Failed to Reach Patient	48	38
Victim Name Not Provided by Hospital	27	21
Victim Refused to Cooperate	21	17
Other[§]	4	3

[§]Three of the investigations were purged because two members of the same household injured in the same incident and were both selected as part of the sample to be interviewed. By rule (within the interviewing protocol), only one interview was conducted. Both cases appear in the denominator of the response rate, however only one is counted as a completed interview. One investigation was purged due to administrative errors. The disposition assigned for these four cases is not interviewed—other.

Short descriptions of the 27 completed cases are found in Appendix B. The cases are organized in order of emergency department disposition, with Admitted (to the hospital) first, followed by Treated and Transferred, and Treated and Released. Within dispositions, cases are in order of increasing age of the victim.

Summary Statistics[11]

Of the 27 completed in scope cases, 19 (70 percent) involved males, and 8 (30 percent) involved females. There were three victims (11 percent) younger than 5 years of age; six victims (22 percent) ages 5 to 14 years of age; five victims (19 percent) ages 15 to 24 years of age; nine victims (33 percent) ages 25 to 44 years of age; and four victims (15 percent) ages 45 to 64 years of age. As for emergency department dispositions, six victims (22 percent) were admitted to the hospital; two victims (7 percent) were treated at the emergency department and transferred to another hospital; 19 victims (70 percent) were treated and released.

The most frequently used fireworks devices in these incidents were aerial shells,[12] which were associated with 18 incidents (67 percent). Roman candles and public display of fireworks each accounted for three incidents (11 percent). One incident (4 percent) was

[11] Percentages may not add to 100 due to rounding.
[12] The category "aerial shells" includes multiple tube, reloadable mortars and rockets, but excludes bottle rockets.

involved in large illegal firecrackers. A bottle rocket and an unspecified device each were related to one incident (4 percent) as well.

Note that the distribution of the types of fireworks and the emergency department dispositions differ from the special study data in Section 4. These differences reflect the focus in the telephone investigation on more serious injuries and incompletely specified NEISS records. Note also that only 21 percent of the victims selected for the telephone investigations responded.

Hazard Patterns

The hazard patterns described below are based on the incident descriptions obtained during the telephone investigations and summarized in Appendix B. When an incident has two or more hazard patterns, the hazard pattern most likely to have caused the injury was selected. Hazard patterns are presented in Table 8, below, and a detailed description of the incidents follows Table 8. Case numbers refer to the case numbers shown in Appendix B.

Table 8
Hazard Patterns, as Described in Telephone Investigations of Fireworks-Related Injuries

Hazard Pattern	Number of Cases	Percent
All	27	100
Misuse	8	30
Setting Fireworks Improperly	4	15
Mischief	2	7
Holding Fireworks in Hand	1	4
Placing and Lighting Fireworks inside Body Part	1	4
Malfunction	18	67
Tip-over	6	22
Errant Flight Path	4	15
Short Fuse	4	15
Blowout	3	11
Fragment	1	4
Other	1	4
Debris	1	4

Note: Percentages may not add to subtotals or the total due to rounding.

Misuse (8 victims injured, 30 percent).

Eight victims were injured when fireworks were used in ways that departed from proper usage.

Setting Fireworks Improperly.

- In Case 4, a 39-year-old female was at a friend's house watching fireworks being set off in the middle of the street. The victim sat far back in the yard. The person who shot fireworks was told not to stack the fireworks, but he stacked them anyway. When this person lit the multiple tube device it fell over and a mortar shot at the victim. The victim suffered second-degree burns on the right side of her chest, ribs, stomach, as well as the underside of her arm and wrist.
- In Case 9, a 7-month-old baby boy and his family were at a public display of fireworks set up by the town. After the public display, the victim's grandfather lit a cake type of firework on a bumpy stand at the beach. The cake firework fell over and the embers fell on the victim's face and chest. The victim's outfit was ignited in several places on the chest area. The victim suffered first-degree burns on his chest. In addition, part of the victim's eyebrow was burned off.
- In Case 10, a 4-year-old boy was in the backyard with his mother and a relative. This relative ignited a bottle rocket in his hand and dropped it on concrete. The firework bounced off and landed on the victim's right foot. The victim sustained a third-degree burn on the middle of his right foot.
- In Case 20, a 29-year-old male and his family were outside lighting fireworks. The family across the street was doing the same thing as well. The neighbor family set up a mortar not on a flat level of plain but on a hill. The mortar fell over and shot across the street into the victim's yard, right next to one of the victim's young cousins. The victim picked his cousin up to shield her and the mortar went off. The victim suffered burns on the left side of his face and neck. Moreover, some of the embers from the firework got into the victim's left eye and caused blurred vision.

Mischief.

- In Case 14, an 11-year-old boy and his sister were outside in their backyard. Someone from a passing car threw a lit Roman candle out the car window into the yard. One of the fireballs from the Roman candle hit the victim's eye. The victim suffered a corneal abrasion.
- In Case 15, it was reported that a 14-year-old boy and his friends were at a private beach. The victim sat on sand, and someone threw an unspecified firework toward the victim's back and it landed between his legs. The firework flew up in between the victim's shirt and his lower back and caught his clothing on fire. The victim sustained second- and third-degree burns on his lower back, as well as blisters on both of his hands.

Holding Fireworks in Hand.

- In Case 1, a 17-year-old male and his brother bought reloadable aerial shell-type fireworks. They loaded six shells into a launching tube, and the victim's brother ignited the shell while the victim was holding the tube in his right hand. The fireworks exploded in the victim's hand, and the victim sustained amputations of three fingers and burns to his right hand.

Placing and Lighting Fireworks inside Body Part.

- In Case 22, a 34-year-old male drank alcohol and deliberately misused a Roman candle firework that caused injuries. The victim suffered a head abrasion, concussion, and other undisclosed injuries.[13]

Malfunction (18 victims injured, 67 percent).

Eighteen victims were injured when fireworks reportedly malfunctioned. These injuries resulted from tip-overs, errant flight paths, short fuses, blowouts, and fragments. Note that some of the errant flight path injuries may have involved tip-overs, but victims may have been unable to observe the tip-over if they were far from the fireworks.

Tip-Over Incidents.

- In Case 3, the victim was a 28-year-old female. Her friend ignited a multiple-tube firework device. The shell in the first tube went upward, but the tube fell over, causing the remaining five tubes to fall over and the shells to shoot sideways. One shell hit the victim in the middle of her chest. The victim sustained first-, second- and third-degree burns on her chest over an area approxiately12" x 6".
- In Case 7, a 4-year-old boy was watching fireworks set off by his family. He sat between his mother's legs on a blanket. They were about 30 feet away from where the fireworks were set off. As the victim's mother went to fold the blanket over the victim and herself, she saw the blanket was on fire. The victim's mother stated during the telephone interview that she believed the cake fireworks tipped over and shells shot towards them, which set the blanket on fire. The victim suffered second-degree burns on both of his legs and feet.
- In Case 13, victim was a 10-year-old female. According to her mother, the victim and her family were outside igniting fireworks. The victim's father lit a missile-type of firework that had legs on it. The firework tipped over, instead of shooting up. It hit a barrier wall and ricocheted towards the victim's face. The victim saw it coming and put up her arm to shield her face. The firework hit the victim's arm and landed on her chest. It burned through the victim's clothing and caused first-degree burns on her arm and second-degree burns on her chest.

[13] Injuries are undisclosed to ensure anonymity in the data.

- In Case 17, a 16-year-old male and his friends bought some fireworks. The victim put a mortar into a cylinder that was on the ground and ignited. The cylinder fell over and the shell shot into the victim's face. The victim's front teeth were knocked from their sockets but not broken due to the braces he wore. In addition, the victim's lip was split by the firework.
- In Case 23, a 34-year-old female was at a racetrack watching a public display of fireworks. She sat in the bleachers approximately 125 feet away from where the fireworks were set off. The box tipped sideways and shot shells into the stands. One shell exploded beside the victim and another one went off behind her. The victim suffered deafness in her left ear for 4 days and a burn about the size of a nickel on her left shoulder.
- In Case 24, a 35-year-old male and his family were at a racetrack watching a public display of fireworks. The victim sat about 50 to 75 yards away from where the fireworks were ignited. The person who set off the fireworks went to the last or the second to the last box of fireworks and ignited. The first shell went up. The victim did not know if the person who lit fireworks accidentally kicked the box or the box fell over, and the shells started shooting up into the bleachers. One hit the victim's back, exploded and put a ½-inch hole in his back. The victim sustained second-degree burns on his back and hearing loss in his left ear from nerve damage. A few other spectators were also injured.

Errant Flight Path.

- In Case 21, a 33-year-old female was at a parking lot where fireworks were being set off. A launching tube was loaded with aerial shells and ignited. One of the shells went sideways instead of going up, and it hit the victim on the neck. The victim suffered a third-degree burn on her neck.
- In Case 25, a 47-year-old female was in her backyard watching her husband and a neighbor setting off multiple-tube type fireworks. One of the shells misfired and went sideways. It hit the victim in the chest and went through her fleece jacket and T-shirt. The victim suffered a second-degree burn on her chest, as well as lacerations on her face from shrapnel.
- In Case 26, a 50-year-old male victim sat in a lawn chair watching fireworks in a cul-de-sac. The victim was about 120 feet away from where the fireworks were ignited. A mortar went sideways, and it struck the victim on his left thigh and burned through his shorts. The victim sustained a second-degree burn from the left thigh extending around to his left buttock.
- In Case 27, a 53-year-old male sat in a chair in his neighbor's yard. His neighbor lit a multiple-tube type fireworks device that consisted of 16 tubes. After ignition, the first 15 shots went up, but the 16th shot went sideways. The shell went under the victim's chair and hit his right leg. The victim sustained a puncture wound on his leg.

Short Fuse.

- In Case 2, a 23-year-old male took a mortar firework from his friend and went to the street in front of his house. He tried to put the mortar into a launching tube, but the fuse was short, so he lit the mortar first. As the victim put the mortar into the tube, it fell out. The victim was going to throw the mortar, but there was a child coming towards him when he looked down the street. The victim then tried to put the mortar back into the tube. As soon as he let it go, the mortar went off in his hand and ricocheted off his hand to his face. The victim suffered minor scrapes and burns on his face. In addition, he sustained several lacerations on his right hand.
- In Case 8, the victim was a 14-year-old male. It was reported that the victim and his friends set off fireworks in an open field. The victim lit a mortar that had a short fuse. As the victim dropped the mortar into a tube, the fuse split in half and blew up before the victim could get out of the way. The victim suffered burns on the left side of his face, as well as retinal swelling, internal bleeding, and scratches on the left cornea.
- In Case 18, a 24-year-old male found a very old, large firecracker from his grandfather's house, and it had a short fuse. The victim lit the firecracker on the ground and it exploded really quickly. The victim's hand was about 3 feet away from the firecracker when it exploded. The victim suffered first-degree burns on his right hand.
- In Case 19, a 27-year-old male set off fireworks in a public field. He put a mortar into a tube that was on the ground. The victim stated that the mortar had a short fuse and exploded right away once it was ignited. The mortar hit the victim in the lower back and right foot. The victim sustained a tissue avulsion on his lower back and a laceration on his right foot.

Blowout.

- In Case 5, a 40-year-old male lit a 2-inch reloadable mortar, but the shell failed to launch and blew up in the tube in front of him. The victim sustained amputations of the thumb, ring, and middle fingers on his left hand. In addition, he suffered ear drum ruptures in both ears and shrapnel damage on both legs.
- In Case 11, an 8-year-old boy and his grandfather set off mortar-type fireworks devices. His grandfather lit a mortar and dropped it into a tube and they ran away. The mortar had a longer delay in going off than the previous mortars. After a few minutes, the victim thought the mortar was a dud and turned around towards the firework. As the victim turned, the mortar exploded in the tube on the ground. The victim was burned by shrapnel from the firework. The victim sustained burns on his eyes and forehead. He also suffered corneal abrasion.
- In Case 12, a 9-year-old boy was injured by fireworks. It was reported that the victim was with his father shooting off fireworks. A Roman candle type of fireworks device malfunctioned. The flaming balls landed on the back of the victim's right ear, the back of his head and the shoulder of his shirt. The victim suffered a second-degree burn on the back side of his ear near the hairline.

Fragment.

- In Case 6, a 59-year-old female was at a friend's barbecue. Her friend put a mortar into a tube on the ground and ignited it. The victim was 30 feet away from the tube. The mortar did not shoot upward as expected, and shrapnel from the mortar hit the victim under the arm and on the side of the chest area. The victim did not have detailed information about what went wrong with the firework.

Other (one victim injured, 4 percent).

There was one victim whose injury was related to fireworks, based on the NEISS incident narrative and telephone IDI. However, the telephone IDI did not yield enough information to pinpoint definitively the hazard associated with the incident.

Debris.

- In Case 16, a 15-year-old female and her father were at a public display of fireworks. They were sitting about 1,000 yards away. As the fireworks show was taking place, the wind changed and embers from fireworks were flying around. An ember went into the victim's eye and caused a scratch on her cornea.

Long-Term Consequences of Fireworks-Related Injuries

Victims were asked whether there were any long-term consequences of their injuries. Most victims (22 of 27, or 81 percent) have experienced or expected complete recoveries with no long-term effects. Information was not collected for one victim, due to a glitch in the telephone survey instrument. Four victims reported that they have experienced or might suffer long-term effects of the injuries, as follows:

- In Case 1, reloadable aerial shells exploded while the victim was holding the launching tube in his right hand. The victim sustained amputations of three fingers on his hand. The victim might not regain full function of his right hand.
- In Case 5, a reloadable mortar failed to launch and blew up in front of the victim. The victim suffered amputations of thumb, ring, and middle fingers on his left hand. The victim may not recover full function of his left hand.
- In Case 11, the victim sustained burns to his eyes when a mortar exploded in the tube. The victim's guardian, who participated in the telephone interview, stated that the victim could have a higher risk for glaucoma because of the eye injuries.
- In Case 24, the victim was injured by a public display of fireworks. The victim suffered hearing loss in his left ear due to nerve damage.

Where Fireworks Were Obtained

Of the 27 telephone survey respondents, 16 (59 percent) knew where the fireworks were obtained. Nine respondents reported that the fireworks were purchased from a stand; five stated that fireworks were acquired from a friend or a relative; and two reported that the fireworks were obtained from an Indian reservation.

Six victims (22 percent) reported that they did not know the source of the fireworks. This is typically the situation when the victim did not purchase or light the fireworks device that caused the injury. Three victims (13 percent) declared that they were injured at a public display of fireworks. One victim refused to tell how the fireworks were obtained. In the remaining case, administrative errors prevented information collection for the question.

6. Summary

In 2016, there were four reported fireworks-related deaths. However, reporting for 2016 may not be complete at this time. Emergency department-treated injuries are estimated at 11,100 for 2016.

During the 1-month special study period from June 18, 2016 to July 18, 2016, there were an estimated 7,600 emergency department-treated fireworks-related injuries. Children under 15 years of age experienced about 31 percent of the estimated injuries, and males of all ages experienced 61 percent of the estimated injuries.

Additionally, similar to previous years, 69 percent of the estimated injuries during the special study period in 2016 involved burns. Burns were the most frequent injury to all parts of the body, except the eyes, where other diagnoses (mainly foreign bodies in the eye) occurred more frequently. The parts of the body most often injured were hands and fingers (an estimated 33 percent of the injuries); followed by the head, face, and ears (20 percent); legs (18 percent); trunk (12 percent); eyes (9 percent); and arms (8 percent). Most of the estimated injuries (92 percent) involved treat-and-release dispositions. An estimated 7 percent were treated and transferred to another hospital or admitted to the hospital where the emergency department was located.

Among the different types of fireworks, firecrackers accounted for 17 percent of the estimated injuries; reloadable shells were involved in 14 percent of the estimated injuries; and sparklers were associated with 12 percent of the estimated injuries. Roman candles accounted for 7 percent of the estimated injuries, and bottle rockets were related to 5 percent of the injuries. Multiple-tube devices, novelty devices, other rockets, and public display of fireworks each were associated with 4 percent of the estimated injuries. Fountains were involved in 1 percent of the injuries.

A review of data from telephone follow-up investigations showed that the typical causes of injuries were as follows: misuse of fireworks; tip-overs; errant flight paths; short fuses; blowouts; fragments; and debris associated with eye irritations. At the time of the telephone investigation, which was conducted typically 1 to 2 months after the injury, most victims had recovered from their injuries. Four of the 27 victims interviewed reported that the effect of their injuries might be long term.

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Appendix A
Fireworks-Related Injuries and Fireworks Imported

Table A-1 shows that fireworks imports have generally risen over the period 2001–2007, peaking in 2005 at 275.1 million pounds. From 2008 to 2014, fireworks imports have been relatively steady with modest changes for some years. In 2015, the fireworks imports soared to 279.5 millions of pounds, which was the highest since 2001. In 2016, it decreased a little, to 262.3 millions of pounds. As for the number of estimated emergency department-treated fireworks-related injuries, year 2015 with 11,900 estimated injuries was also the highest since 2001. The other three highest estimated fireworks-related injuries were 11,400 in 2013, 11,100 in 2016, and 10,800 in 2005. As shown in Table A-1 below, the highest number of injuries per 100,000 pounds of fireworks was 6.3 injuries per 100,000 pounds in 2013, and the lowest number of injuries per 100 pounds of fireworks was 3.4 injuries in 2006 and 2008. From 2009 to 2016, the number of injuries per 100,000 pounds of fireworks was noticeably stable at about 4.3 injuries per 100,000 pounds except for 2013 and 2014. In 2013, the estimated injuries per 100,000 pounds of fireworks imported were 6.3, and in 2014 that number was 4.8.

Table A-1
Estimated Fireworks-Related Injuries and
Estimated Fireworks Imported into the U.S. 2001–2016

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)[¥]	Injuries Per 100,000 Pounds
2016	11,100	262.3	4.2
2015	11,900	279.5	4.3
2014	10,500	219.6	4.8
2013	11,400	180.2	6.3
2012	8,700	201.0	4.3
2011	9,600	228.1	4.2
2010	8,600	199.6	4.3
2009	8,800	200.2	4.4
2008	7,000	208.3	3.4
2007	9,800	260.1	3.8
2006	9,200	272.1	3.4
2005	10,800	275.1	3.9
2004	9,600	230.0	4.2
2003	9,300	214.6	4.3
2002	8,800	175.3	5.0
2001	9,500	155.3	6.1

Source: Injuries from NEISS, U.S. Consumer Product Safety Commission. See Table 1 for further details. Estimated fireworks imports data from the U.S. International Trade Commission (ITC), using Harmonized Tariff Schedule (HTS code 3604.10). Imports include consumer fireworks (1.4G HTS code 3604.10.90.10 and 3604.10.90.50) and display fireworks (1.3G HTS code 3604.10.10.00). Display fireworks were about 6.6 percent of the total imports in 2016. In addition to imported fireworks used in the United States, there is also a small amount of fireworks manufactured in the United States for domestic consumption; the data for these fireworks is not available from the International Trade Commission and is not shown in this table. Fireworks imports data were downloaded from ITC website in April 2016.
[¥]Fireworks imports data subject to change by ITC. These changes have typically been minor.

Although the table suggests a relationship between weight and the number of injuries, it should be interpreted with caution. First, the logical unit of exposure is the number of fireworks devices used, instead of the collective weight of the devices because a person is exposed to injury when a device is consumed (*i.e.*, lit). Injuries per 100,000 fireworks devices imported might be more meaningful, but the number of devices imported is not available. Moreover, using weight overrepresents heavy devices and underrepresents light devices. There is no reason to assume that a heavy device is inherently more dangerous than a light device because the weight of the device includes things other than just the amount of explosive material.

In addition, international trade statistics do not provide weight by fireworks device types. Thus, it is not possible to associate injuries with the weight of different types of fireworks imported. As shown in Table 2 earlier in this report, different fireworks devices have different numbers of injuries. Thus, the decrease in injuries per 100,000 pounds between 2001 and 2008 may be due to different mixtures of types of fireworks imported over time, or an overall decrease in injuries among all types of fireworks. Similarly, the increase in injuries per 100,000 pounds in 2013 may have resulted from different fireworks mixtures, a decrease in importation of fireworks, or just statistical variation. The data do not provide enough information to determine the relative contribution of these factors.

Appendix B
Completed Telephone Investigations

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
1	17	Male	Amputation	Finger	Admit	Aerial Shell	Victim and his brother bought reloadable aerial shell type of fireworks. They loaded six shells into a launching tube, and the victim's brother ignited the shell while the victim was holding the tube in his right hand. The fireworks exploded in the victim's hand. The victim sustained amputations of three fingers and burns to his right hand.	The victim was airlifted to a hospital and was admitted for a week. The victim had additional medical visits after he was discharged from the hospital to see if his hand healing properly. The victim was still recovering from his injuries at the time of the telephone interview. His brother who answered the telephone survey stated that the victim may need an additional surgery.
2	23	Male	Laceration	Hand	Admit	Aerial Shell	The victim took a mortar firework from his friend and went to the street in front of his house. He tried to put the mortar into a launching tube but the fuse was short, so he lit the mortar first. As the victim put the mortar into the tube, it fell out. The victim was going to throw the mortar but there was a child coming towards him when he looked down the street. The victim then tried to put the mortar back into the tube. As soon as he let it go, the mortar went off in his hand and ricocheted off his hand to his face. The victim suffered minor scrapes and burns on his face. In addition, he sustained several lacerations on his right hand, and some of them were so deep to touch the tendon.	The victim was hospitalized for 3 days. He was still recovering and was getting therapy for his injured hand at the time of the telephone interview. The victim was expected to recover fully in 2 months.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
3	28	Female	Thermal Burns	Upper Trunk	Admit	Multiple Tube Device	A victim's friend brought some multiple tube device type of fireworks to the victim's home. The firework had six tubes. This friend ignited a multiple tube device and the shell in the first tube went upward, but the tube fell over causing the remaining five tubes to fall over and the shells to shoot sideways. One shell hit the victim in the middle of her chest. The victim sustained first-, second- and third-degree burns on her chest about 12" by 6" in dimensions.	The victim was taken to the emergency department (ED) and was admitted for overnight. After discharge from the hospital, the victim sought additional medical treatments to change the bandage/addressing for her wounds and to see if the burns healing properly. The victim was still recovering when she was interviewed for this report, and she stated that it would take a year for her to recover fully.
4	39	Female	Thermal Burns	Upper Trunk	Admit	Multiple Tube Device	Victim was at a friend's house watching fireworks being set in the middle of the street. The victim sat far back in the yard. The person who shot fireworks was told not to stack the fireworks, but he stacked them anyway (possibly under the influence of alcohol). When this person lit the firework, it fell over and a mortar shot at the victim. The victim's shirt caught fire and burned out. The victim suffered second-degree burns on right downside of her chest, ribs, and stomach, as well as underside of her arm and wrist.	The victim was taken by an ambulance to ED and was admitted to the hospital. After discharge from the hospital, the victim had 3 to 4 follow-up visits with the burn unit of the hospital to change the bandage or dressing for her wounds. At the time of the telephone interview, the victim was still in recovery and her injury was 90 percent healed. The victim was not sure how long it would take for her to recover fully.
5	40	Male	Amputation	Finger	Admit	Aerial Shell	Victim stated that he lit a 2" reloadable mortar, but the shell failed to launch and blew up in the tube in front of him. The victim sustained amputations of the thumb, ring and middle fingers on his left hand. He also suffered ear drum-rupture in both ears and shrapnel damages to both legs.	The victim was hospitalized for 3 days. After discharge from the hospital, the victim had additional visits to have a surgery, as well as to change bandage/addressing for his wounds. The victim was still recuperating at the time of the telephone interview and expected to recover fully in 1 year.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
6	59	Female	Internal Injury	Upper Trunk	Admit	Aerial Shell	Victim was at a friend's barbecue. Her friend put a mortar in a tube on the ground and ignited it. The victim stated that the mortar did not shoot upward as supposed and shrapnel from the mortar hit her under the arm and on the side of the chest area. The victim did not have any details of what went wrong with the firework, but she stated that she was 30 feet away.	The victim was taken to the hospital and admitted. She had an exploratory surgery and shrapnel was found and removed. The victim stayed at the hospital for 2 days. After discharge from the hospital, the victim had a follow-up visit to remove stitches. The victim had not recovered at the time of the telephone interview, but she expected a full recovery in 3 months.
7	4	Male	Thermal Burns	Foot	Treat and Transfer	Multiple Tube Device	Victim's family set off fireworks for the 4th of July celebration. The victim sat between his mother's legs on a blanket. They were about 30 feet away from where the fireworks were being set off. As the victim's mother went to fold the blanket over the victim and herself, she saw the blanket was on fire. Someone came over and started stomping on the blanket to put out the embers. The victim's mother stated during the telephone interview that she believed the cake fireworks tipped over and the shots fired towards them, which set the blanket on fire. The victim sustained second-degree burns on both his legs and feet.	The victim and his mother went to the ED and were transferred to another hospital with a burn unit for treatment. The victim had a follow-up visit to check the healing progress. The victim recovered fully in about 2 months.
8	14	Male	Thermal Burns	Face	Treat and Transfer	Aerial Shell	The telephone survey respondent did not witness the incident and was told about what happened by the victim and the police officer. It was reported that the victim and his friends set off fireworks in an open field. The victim lit a mortar that had a short fuse. As the victim dropped the mortar into the tube, the fuse split in half and blew up before the victim could get out of the way. The victim suffered burns on the left side of his face, as well as retinal swelling, internal bleeding and scratches on the left cornea.	The victim was taken to the ED and then transferred to another hospital for treatment. The victim had four follow-up visits with an ophthalmologist to monitor his eye and get medications for the eye. The victim had recovered fully in 3 weeks.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
9	7 months	Male	Thermal Burns	Face	Treat and Release	Multiple Tube Device	Victim and his family were at a firework display set up by the town. Once the public display ended, the victim grandfather ignited a cake type firework on a bumpy stand at the beach. The cake fell over and the embers fell on the victim's face and chest. The victim's outfit was ignited in several places on the chest area. The victim suffered first-degree burns on his chest. In addition, part of the victim's eyebrow was burned off.	The victim was taken to the ED, and he was treated and released. The telephone interview did not yield information about the victim's recovery status.
10	4	Male	Thermal Burns	Foot	Treat and Release	Bottle Rocket	It was stated that the victim was in the backyard with his mother and a relative. The relative ignited a bottle rocket in his hand and dropped it on concrete. The firework bounced off and landed on the victim's right foot. The victim suffered a third-degree burn on the middle of his right foot.	After the treatment at the ED, the victim was taken to a burn unit and had a surgery on his foot 3 days later. At the time of the telephone survey, the victim was still healing from his injury and was expected to recover fully in about 2 months.
11	8	Male	Contusions Abrasions	Eye	Treat and Release	Aerial Shell	Victim was with his grandfather shooting off mortar type fireworks. The victim's grandfather lit a mortar and dropped it into a tube and they ran away. The mortar had a longer delay in going off than the previous mortars. After a few minutes, the victim thought the mortar was a dud and turned around towards the firework. As the victim did it, the mortar exploded in the tube on the ground. The victim was burned by shrapnel from the firework. The victim sustained burns on his eyes and forehead. He also suffered corneal abrasion.	After being treated at the hospital, the victim saw an optometrist to make sure that his vision was returning to normal. The victim had recovered fully in 3 to 4 weeks.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
12	9	Male	Thermal Burns	Ear	Treat and Release	Roman Candle	The telephone survey respondent did not witness the incident and was told what happened by the victim's father. It was reported that the victim was with his father shooting fireworks. A Roman candle type firework malfunctioned. The flaming balls landed on the back of the victim's right ear, the back of his head and the shoulder of his shirt. The victim suffered a second-degree burn on the back side of his ear near the hairline. The victim was taken to the ED the next day.	After the treatment at the ED, the victim made two follow-up visits to the wound center for observation. The victim had fully recovered in 3 weeks.
13	10	Female	Thermal Burns	Upper Trunk	Treat and Release	Missile	Victim and her family were outside in the yard igniting fireworks. Based on the description given by the victim's mother, the last firework was a missile type and had legs on it. The victim's father ignited the firework and it fell over instead of shooting up. The firework hit a barrier wall and ricocheted towards the victim's face. The victim saw it coming and put up her arm to shield her face. The firework hit her arm and landed on her chest, and it burned through her clothing. The victim sustained first-degree burns on her arm and second-degree burns on her chest.	After the treatment at the ED, the victim had a follow-up visit with a pediatric surgeon. The victim had fully recovered in about 3 weeks.
14	11	Male	Contusions Abrasions	Eye	Treat and Release	Roman Candle	Victim and his sister were outside in their backyard. Someone from a passing car threw a lit Roman candle firework out the car window into the yard. One of the fire balls from the Roman candle hit the victim's eye. The victim suffered a corneal abrasion.	After the treatment at the ED, the victim went to a doctor to ensure that his eye was healing properly. The victim had recovered fully in 1 week.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
15	14	Male	Thermal Burns	Lower Trunk	Treat and Release	Unspecified	The telephone survey respondent did not witness the incident and was told about what happened. It was stated that the victim and his friends were at a private beach. The victim sat on the sand, and someone threw an unspecified firework towards his back and it landed between his legs. The firework flew up in between the victim's shirt and his lower back and caught his clothing on fire. The victim sustained second- and third-degree burns on his lower back as well as blisters on both of his hands.	At the time of the telephone interview, the victim was still recovering from his injuries. It would take about 6 weeks for him to recuperate fully according to his guardian who responded to the telephone survey.
16	15	Female	Contusions Abrasions	Eye	Treat and Release	Public Display	Victim and her father were at a public display of fireworks set up by the city. They were sitting about 1000 yards away. As the fireworks show was taking place, the wind changed and embers from the fireworks were flying around. An ember got into the victim's eye. The victim suffered a scratch on her cornea. The victim's father washed the victim's eye with water, and the victim was taken to the ED by EMS.	After the treatment at the ED, the victim had follow-up visits with an eye doctor to check the status of her eye. At the time of the telephone interview, the victim was still recovering from her injury and she would recover fully in 2 months according to the guardian who answered the survey.
17	16	Male	Dental Injury	Mouth	Treat and Release	Aerial Shell	The telephone survey respondent did not witness the incident and was told what happened by the Victim. It was stated that the victim and his friends bought some fireworks. The victim put a mortar into a cylinder that was on the ground and ignited. The cylinder fell over and the shell shot to the victim's face. The victim's front teeth were knocked from their sockets but not broken due to the braces he wore. In addition, the victim's lip was split by the firework.	The victim's guardian who answered the telephone survey stated that the victim had follow-up visits with a dentist in order to save his teeth after being treated at the ED. The dentist put a bracket on the victim's teeth with hope that his teeth will reattach. It would not be known for several months whether the teeth reattach all alone. If they do not reattach, additional dental work would be required. The guardian stated that the victim had not recovered at the time of the telephone interview, and it would take 3 months for him to recuperate fully.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
18	24	Male	Thermal Burns	Hand	Treat and Release	Large Firecracker	Victim found a 20 years old large firecracker from his grandfather's house, and it had a short fuse. The victim stated that he ignited the firecracker on the ground and it exploded very quickly. The victim's hand was about 3 feet away from the firecracker when it exploded. The victim suffered first-degree burns on his right hand.	The victim fully recovered in 14 days.
19	27	Male	Avulsion	Lower Trunk	Treat and Release	Aerial Shell	Victim was with his friends and family setting off fireworks in a public field. The victim put a mortar into a tube that was on the ground. The victim stated that the mortar had a short fuse and exploded right away once it was ignited. The mortar hit the victim in the lower back and right foot. The victim sustained a tissue avulsion on the lower back and a laceration on his right foot.	The victim was taken to the ED for treatment, and he had internal and external stitches for the wound on his back. The victim saw a wound specialist every Tuesday to check the healing of his wound after the ED visit. The wound on his back did not heal properly internally and the stitches had to be removed to let it heal. At the time of the telephone interview, the victim was still recovering. The victim expected to recover fully in 2 months.
20	29	Male	Thermal Burns	Face	Treat and Release	Aerial Shell	Victim and his family were out lighting fireworks, and there was a family across the street that was also setting off fireworks. The family across the street set up a mortar not on a flat level plain but on a hill. The mortar fell over and shot across the street into the victim's yard, right next to one of the 5-year-old cousins of the victim. The victim picked up his cousin to shield her and the firework went off. The victim suffered burns on the left side of his face and neck. Additionally, some of the embers got into the victim's left eye and caused blurred vision.	The victim had a further eye examination after the treatment at the ED. The victim recuperated fully in a few weeks.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
21	33	Female	Thermal Burns	Neck	Treat and Release	Aerial Shell	Victim was at a parking lot where fireworks were being set off. A launching tube was loaded with aerial shells and ignited. One of the shells went sideways instead of going up, and it hit the victim on the neck. The victim suffered a third-degree burn on her neck.	After being treated at the ED, the victim had a follow-up visit to see how the burn was healing. The victim recovered fully in 7 days.
22	34	Male	Concussion	Head	Treat and Release	Roman Candle	Victim drank alcohol and deliberately misused a Roman candle firework that caused injuries. The victim suffered a head abrasion, concussion, and other undisclosed injuries.[14]	The victim recovered fully in 3 days.
23	34	Female	Thermal Burns	Shoulder	Treat and Release	Public Display	Victim was at a racetrack watching a public display of fireworks. She sat in the bleachers approximately 125 feet away from where the fireworks were set off. The box tipped sideways and shot shells into the stands. One shell exploded beside the victim and another one went off behind her. The victim suffered deafness in her left ear for 4 days and a burn about the size of a nickel on her left shoulder.	The victim had recovered fully in about 2 weeks.

[14] Injuries are undisclosed to ensure anonymity in the data.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
24	35	Male	Thermal Burns	Upper Trunk	Treat and Release	Public Display	Victim and his family were at a racetrack watching a public display of fireworks. The victim sat about 50 to 75 yards away from where the fireworks were set off. The person who set off the fireworks went to the last or the second to the last box of fireworks and ignited. The first shell went up. The victim did not know if the person who lit fireworks accidentally kicked the box or the box fell over, the shells started shooting up into the bleachers. One hit the victim's back and caused a ½-inch hole in his back. In addition, the victim sustained second-degree burns on his back and hearing loss in his left ear from nerve damage. A few other spectators were also injured.	After the treatment at the ED, the victim had a follow-up visit to ensure that the wound was not infected. At the time of the telephone interview, the victim stated that his back had healed, but his ear still bothered him sometimes.
25	47	Female	Thermal Burns	Upper Trunk	Treat and Release	Multiple Tube Device	Victim was in her backyard watching her husband and a neighbor setting off multiple tube device type of fireworks. One of the shells misfired and went sideways. It hit the victim in the chest and went through her fleece jacket and tee-shirt. The victim suffered a second-burn on her chest. She also sustained lacerations on her face from shrapnel.	After being treated at the ED, the victim had a follow-up visit to ensure that the burn wound was healing properly. The victim was still recovering when she was interviewed for the report, and she expected to recover fully in 3 months.
26	50	Male	Thermal Burns	Lower Trunk	Treat and Release	Aerial Shell	Victim sat in a lawn chair watching fireworks in a cul-de-sac. He was about 120 feet away from where the fireworks were set off. A mortar went sideways instead of shooting up, and it struck the victim on his left thigh and burned through his shorts. The victim suffered a second-degree burn from his left thigh extending around to his left buttock.	The victim had a follow-up visit with his general practitioner after the treatment at ED. During the interview, the victim said that he was about 98 percent recovered. But he stated that he did not know exactly how long it would take for him to fully recover.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
27	53	Male	Puncture	Lower Leg	Treat and Release	Multiple Tube Device	Victim sat in a chair in his neighbor's yard. His neighbor lit a multiple tube device type of fireworks that consisted of 16 tubes. After ignition, the first 15 shots went upwards but the 16th shot went sideways instead. The shell went under the victim's chair and hit his lower right leg. The victim sustained a puncture wound on his leg.	After the treatment at the ED, the victim had seen a wound specialist about 12 times to clean his wound and to make sure that the wound was healing properly. The victim had not recovered when he was interviewed for the report, and he stated that he continued to see the specialist until the wound heals. The victim anticipated to recover fully in 2 months.