



2011 Fireworks Annual Report

Fireworks-Related Deaths, Emergency Department-Treated Injuries, and Enforcement Activities During 2011

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Yongling Tu
Division of Hazard Analysis
Directorate for Epidemiology
U.S. Consumer Product Safety Commission

Demar V. Granados
Office of Compliance and Field Operations
U.S. Consumer Product Safety Commission

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Executive Summary

This report provides the results of the U.S. Consumer Product Safety Commission (CPSC) staff's analysis of data on nonoccupational, fireworks-related deaths and injuries during calendar year 2011. The report also includes a summary of CPSC staff enforcement activities during 2011.

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 the CPSC's National Electronic Injury Surveillance System (NEISS). CPSC staff conducted a special study of nonoccupational fireworks-related injuries occurring between June 17, 2011 and July 17, 2011. The special study included a more detailed analysis on the type of injury, the fireworks involved, and the characteristics of the victim. About 65 percent of the estimated annual fireworks-related emergency department-treated injuries for 2011 occurred during that period.

Highlights of the report are as follows:

Deaths and Injuries

- CPSC staff received reports of four fireworks-related deaths during 2011. In the first incident, a 31-year-old male died of substantial head and chest trauma caused by an illegal 1.3G aerial firework device.¹ In the second incident, a 47-year-old male perished when a 1.3G illegal 3-inch display firework device exploded in his face. In the third incident, a 41-year-old male was decapitated by an illegal firework device. A 51-year-old male died of severe head and face injuries caused by a homemade firework device in the fourth incident. CPSC staff has reports of four fireworks-related deaths in 2010. Reporting is not complete for either year, and the number of deaths for each year should be considered a minimum.
- Fireworks were involved in an estimated 9,600 injuries treated in U.S. hospital emergency departments during calendar year 2011 (95 percent confidence interval 7,600–11,600). CPSC staff estimated that there were 8,600 fireworks-related injuries during 2010. The difference is not statistically significant.
- There is not a statistically significant trend in estimated emergency department-treated injuries from 1996, when estimated injuries were the second lowest (7,300), to 2011.
- An estimated 6,200 fireworks-related injuries (or 65 percent of the total fireworks-related injuries in 2011) were treated in U.S. hospital emergency departments during the 1-month special study period between June 17, 2011 and

¹ A 1.3G aerial firework device is a professional display firework device that requires a license from the Bureau of Alcohol, Tobacco, Firearms and Explosives.

July 17, 2011 (95 percent confidence interval 4,500–7,900). CPSC staff estimated that there were 6,300 fireworks-related injuries during the 2010 special study period.

Results from the 2011 special study include the following:

- Of the fireworks-related injuries sustained, 68 percent were to males, and 32 percent were to females.
- Children younger than 15 years of age accounted for approximately 26 percent of the estimated 2011 injuries. Thirty-six percent of the estimated emergency department-treated, fireworks-related injuries were individuals younger than 20 years of age.
- There were an estimated 800 emergency department-treated injuries associated with firecrackers. Of these, an estimated 20 percent were associated with small firecrackers, 10 percent with illegal firecrackers, and 69 percent with firecrackers for which there was no specific information.
- There were an estimated 1,100 emergency department-treated injuries associated with sparklers and 300 with bottle rockets.
- The parts of the body most often injured were hands and fingers (an estimated 46 percent); eyes (an estimated 17 percent); head, face, and ears (an estimated 17 percent); and legs (an estimated 11 percent).
- More than half 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.
- Most patients were treated at the emergency department and then released. An estimated 12 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 reported at NEISS hospital emergency departments during the 2011 special study period that met certain criteria. Many of these cases were selected for follow-up 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. Forty-six telephone interviews were completed. After review, six of these incidents were determined to be out of scope because they were work-related, or the victims were injured from incidental falls or by hot punk, and the fireworks were not lit.

A review of data from telephone follow-up investigations of the 40 in scope incidents showed that most injuries were associated with malfunctioning or misused fireworks. Typical malfunctions included: fireworks exploding earlier or later than

expected, errant flight paths, and the launching tubes of aerial shells tipping over. Misuse included: dismantling fireworks, setting fireworks improperly, lighting fireworks too close to other fireworks or persons, and holding fireworks in one's hand. 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.

Enforcement Activities

During 2011, the CPSC's Office of Compliance and Field Operations continued to work closely with other federal agencies to conduct surveillance on imported fireworks and to enforce the provisions of the Federal Hazardous Substances Act (FHSA). Examples of these activities are as follows:

- CPSC staff worked with the U.S. Department of Justice on cases involving companies and/or individuals involved in the sale of chemicals and components used to make illegal fireworks. In 2011, CPSC Compliance staff issued a letter to importers, distributors, and retailers of consumer fireworks, addressing how a new product marketed as an "adult snapper" should be classified under the CPSC fireworks requirements. Staff continues to take an active role with the industry to ensure adequate understanding of the regulations and to maintain an open dialogue, if any issues should arise.
- CPSC staff, in cooperation with U.S. Customs and Border Protection (CBP), continues to conduct surveillance on imported shipments of consumer fireworks. With assistance from CBP, CPSC staff selectively sampled and tested shipments of imported fireworks in fiscal year 2011 for compliance with the FHSA. Approximately 37 percent of the selected and tested shipments were found to contain fireworks that were noncompliant. The majority of violations involved overloaded report composition in aerial fireworks devices, exceeding the limit of two grains of pyrotechnic composition. CPSC staff requested corrective action on these noncompliant fireworks, and in most cases, firms destroyed the noncompliant fireworks voluntarily. Through CPSC's port surveillance program, fewer violative and dangerous imports are reaching retail stores and roadside stands.

According to 2011 statistics from the U.S. International Trade Commission, China manufactures more than 98 percent of all fireworks imported into the United States. Recognizing the global economy, CPSC staff continues to work with our counterpart in China, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). We actively take part in scheduled video conferences with AQSIQ technical staff to discuss consumer fireworks activities. In October 2011, CPSC staff participated in a fireworks working group meeting with AQSIQ staff during the United States-China Consumer Product Safety Summit.

1. Introduction

This report describes injuries and deaths associated with fireworks during calendar year 2011. The report also describes CPSC staff's enforcement activities for 2011. Reports for earlier years in this series can be found at: www.cpsc.gov/library/data.html, under the heading "Fireworks."

This report is organized into seven sections. Section 1 contains a description of the data and statistical methods used in this analysis. Section 2 summarizes fireworks incidents resulting in deaths. Section 3 provides an annual estimate of fireworks-related, emergency department-treated injuries for the United States in 2011, and it 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. Section 5 summarizes the telephonic in-depth investigations of a subsample of the injuries during that period. Section 6 describes enforcement activities of the CPSC's Office of Compliance and Field Operations during 2011. The report concludes with a summary of the findings in Section 7. Appendix A presents a table on the relationship between fireworks-related injuries and fireworks imports between 1996 and 2011. Appendix B contains more detail on the completed telephone investigations.

Sources of Information

Information on nonwork-related fireworks deaths occurring during 2011 was obtained from the CPSC's Injury and Potential Injury Incident file (IPII) 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. The purpose of these investigations was to determine the types of fireworks involved and the circumstances that led to the fatal injuries.

Because the data in IPII is based on voluntary reports, and because it can take more than two 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 2010 or 2011 fireworks-related deaths at the time this report was prepared. As a result, the number of deaths should be considered a minimum. Staff updates the number of deaths for previous years when reports are received. Total deaths for previous 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 the National Electronic Injury Surveillance System (NEISS). NEISS is a probability sample of U.S. hospitals with emergency departments.² Injury

² For a description of NEISS, including the revised sampling frame, see Kessler and Schroeder (1998). 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.

information is taken from the emergency department record. This information includes the victim's age and sex, the place where the injury 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 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 2011, the special study period spanned from June 17 to July 17.

After reading the incident case records, including the narrative description of the firework 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 2011 special study is found in Section 5 and Appendix B.

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 process, there are three different levels of information that 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 usually contains the type of fireworks and additional details on the incident scenario. 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 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 includes a small number of cases where 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 that 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 types are 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 where 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 where 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 be representative of 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. As a result, interpretation and comparison of these estimates with each other or with estimates from prior years should be made with

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 the nightclub fire in West Warwick, RI, that also caused 100 deaths. For details see Greene and Joholske (2004).

⁴ See Schroeder (2000).

caution. 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 2011

The CPSC has reports of four nonoccupational, fireworks-related deaths that occurred during 2011. Brief descriptions of the incidents are as follows:

- A 31-year-old male from Illinois shot off a large, illegal 1.3G aerial firework device in the front yard of his house. The blast caused substantial trauma to his head and chest. The victim was pronounced dead at the scene. There were no witnesses to the incident—people were inside the house having a party for the New Year.
- A 47-year-old male from Illinois and his brother-in-law drank several beers at the victim's residence and then transported a few illegal 1.3G 3-inch display fireworks to the parking lot of an industrial park. The victim apparently placed a 1.3G display firework on a homemade mortar launcher, which consisted of a 5-gallon bucket filled with cement and a 3- to 4-inch PVC pipe sunk into the concrete. The end of the PVC pipe rose several inches out of the bucket. The victim ignited the fuse, but the firework device did not go off. The victim looked over the end of the mortar tube, and the firework detonated and exploded in his face. The brother-in-law was several feet away from the launching site and was knocked to the ground. When the brother-in-law got up from the ground, he saw that the victim was dismembered. The victim died at the scene on May 30, 2011.
- A 41-year-old male from North Dakota was decapitated in a Fourth of July fireworks accident. The victim ignited either a homemade firework or a professional display artillery shell, and it produced a cloud of smoke and a bang. The firework explosion resulted in the victim's death. The police department did not release any information concerning this case due to an ongoing criminal investigation.
- A 51-year-old male from Pennsylvania lit an illegal homemade fireworks device, which consisted of a 3.5" mortar placed inside a metal bucket that was filled with rocks in the evening of July 4, 2011. When the fireworks did not go off, the victim looked inside the PVC piping. The device suddenly exploded, threw the victim about 6 feet back, and caused severe head and face injuries to him. The victim was pronounced dead upon arrival at the hospital.

CPSC staff has reports of 79 fireworks-related deaths between 2000 and 2011, for an average of 6.6 deaths per year.⁵

3. National Injury Estimates for 2011

Table 1 and Figure 1 present the estimated number of nonoccupational, fireworks-related injuries that were treated in U.S. hospital emergency departments between 1996 and 2011.

Table 1
Estimated Fireworks-Related Injuries: 1996–2011

Year	Estimated Injuries	Injuries per 100,000 People
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
2000	11,000	3.9
1999	8,500	3.1
1998	8,500	3.1
1997	8,300	3.0
1996	7,300	2.7

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. The estimate for 2003 excludes an estimated 150 emergency department-treated injuries following the nightclub fire in West Warwick, RI. Estimate for 1996 was revised to adjust for the changed sampling frame and does not match the value published previously. Population estimates for 2010 and 2011 are from Table 1. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2011 (NST-EST2011-01), and 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. Estimates from earlier years are available at: <http://www.census.gov/popest/data/national/totals/1990s/tables/nat-agesex.txt>.

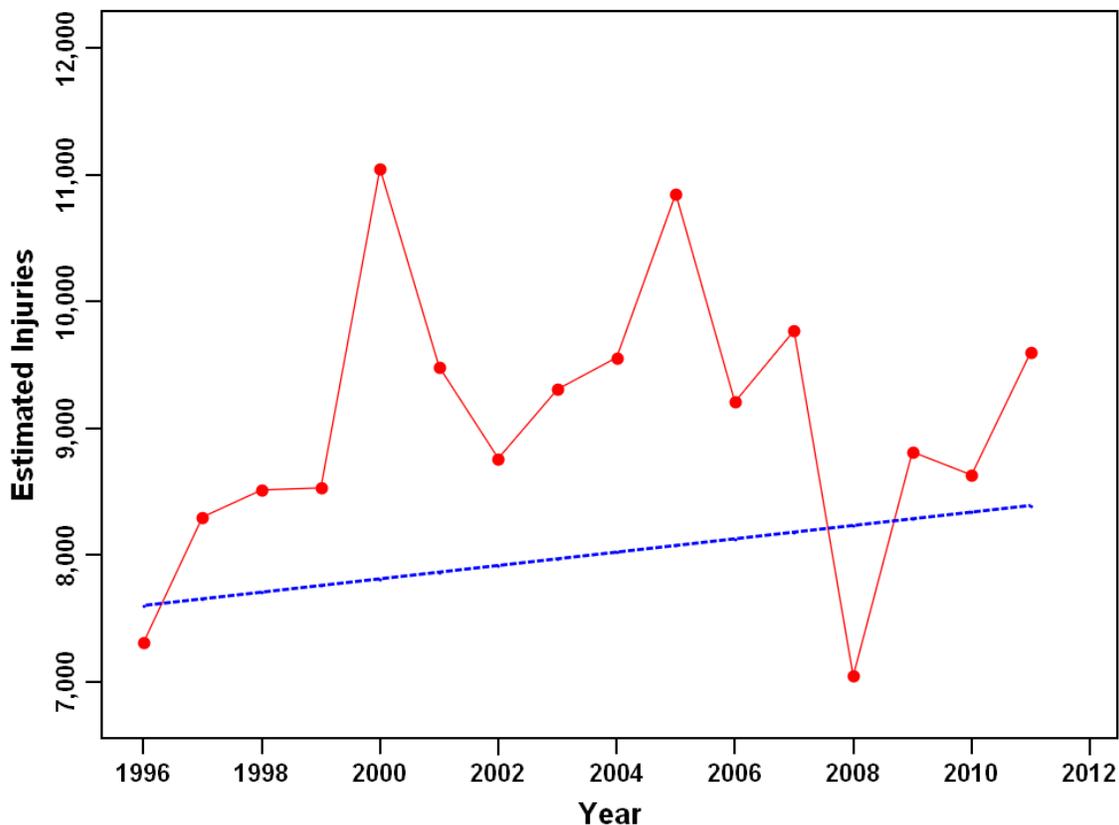
In calendar year 2011, there were an estimated 9,600 fireworks-related, emergency department-treated injuries (95 percent confidence interval 7,600–11,600).

⁵ See previous reports in this series (*e.g.*, the report for 2010: Tu and Granados (2011)). The number of deaths ranged from seven deaths in 2008, to two deaths in 2009, and four deaths in 2010.

There were an estimated 8,600 injuries in 2010. The difference between the injury estimates for 2011 and 2010 is not statistically significant.

Figure 1 shows that the highest estimated number of annual fireworks-related injuries were 11,000 in the millennium year (2000), followed by 10,800 estimated injuries in 2005. For the other years, the estimated number of injuries fluctuated between 7,000 and 9,800. In 1996, the estimated fireworks-related injuries were 7,300, which were the second lowest but they were very close to the lowest (an estimated 7,000 injuries in 2008) between 1996 and 2011. The regression equation from 1996 to 2011 suggests an upward trend; however, the slope is not statistically significant.⁶ The dashed line in Figure 1 (below) is the regression line estimated from the data between 1996 and 2011.

Figure 1
Estimated Fireworks-Related, Emergency Department-Treated Injuries
1996–2011



⁶ For 1996 to 2011, the estimated regression slope was 52.64 injuries per year (standard error 51.84, $t=1.02$ at 14 df, $p=0.164$ one tail). For details on the regression method that incorporates the sampling design, see Schroeder (2000) and Marker et al (1999).

Appendix A contains a table showing estimated fireworks-related injuries and fireworks imports between 1996 and 2011.

4. Injury Estimates for the 2011 Special Study

The injury analysis in this section presents the results of the 2011 special study of fireworks-related injuries that were treated in hospital emergency departments between June 17, 2011 and July 17, 2011. During this period, there were an estimated 6,200 fireworks-related injuries (95 percent confidence interval 4,500–7,900), accounting for 65 percent of the total estimated fireworks-related injuries for the year.

The remainder of this section contains estimates for fireworks-related injuries from this period, broken down by different categories.

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 17, 2011 to July 17, 2011.

Table 2
 Estimated Fireworks-Related Injuries
 By Type of Fireworks Device
 June 17–July 17, 2011

Fireworks Device Type	Estimated Injuries	Percent
Total	6,200	100
All Firecrackers	800	13
Small	200	3
Illegal	100	1
Unspecified	600	9
All Rockets	400	6
Bottle Rockets	300	6
Other Rockets	*	*
All Other Devices	2,900	47
Sparklers	1,100	17
Fountains	100	1
Novelties	300	6
Multiple Tube	100	2
Reloadable Shells	900	14
Roman Candles	400	7
Helicopters	*	*
Homemade/Altered	*	*
Public Display	200	3
Unspecified	1,800	29

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Based on 172 NEISS emergency department-reported injuries between June 17, 2011 and July 17, 2011, and supplemented by 40 completed In-Depth Investigations (IDI). Fireworks types are obtained from the IDI, when available; otherwise, fireworks types are identified from information in victims' reports to emergency department staff that was 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 (16 CFR § 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. Percentages are calculated from the actual estimates, and they may not add to subtotals or the total due to rounding. Estimates of less than 50 injuries are denoted with an asterisk (*).

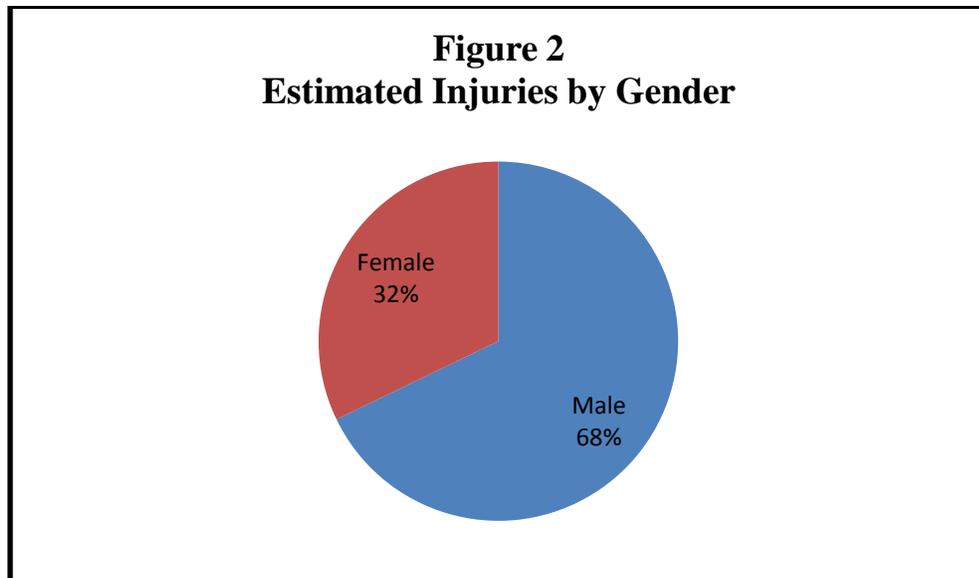
As shown in Table 2, firecrackers accounted for an estimated 800 emergency department-treated injuries, which represents 13 percent of the total fireworks-related injuries during the special study period. Small firecrackers were involved in 200 injuries. The estimate for illegal firecracker-related injuries was 100; however, some of the estimated 600 unspecified firecracker-related injuries and some of the estimated 1,800

unspecified fireworks-related injuries also may have involved illegal firecrackers. Also, sparklers accounted for an estimated 1,100 injuries, 17 percent of the total. Reloadable shells were associated with 900 estimated injuries, 14 percent of the total. Bottle rockets accounted for an estimated 300 injuries, 6 percent of the total.

Novelty fireworks, Roman Candles, fountains, multiple tube devices, helicopters, public display fireworks, and homemade or altered devices each accounted for less than 10 percent of the injuries. This is in keeping with previous years. While public display, homemade, or altered devices are not associated with a large number of injuries, the larger load in these devices makes them involved disproportionately in serious injuries and deaths.

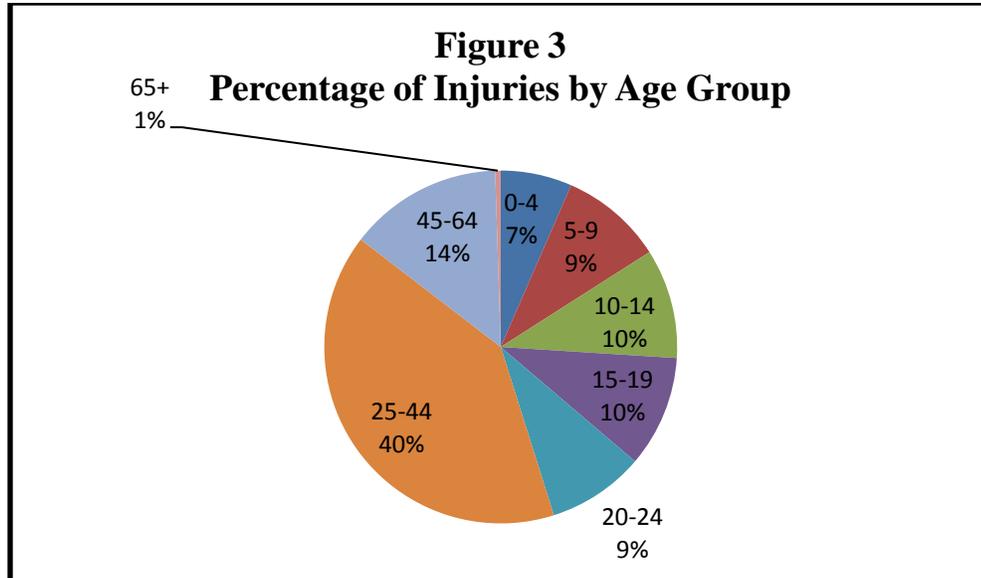
Gender and Age of Injured Persons

Four thousand two hundred of the estimated fireworks-related injuries were to males, representing 68 percent of the total injuries. Males experienced an estimated 2.8 fireworks-related, emergency department-treated injuries per 100,000 individuals during the special study period. Females, with an estimated 2,000 emergency department-treated injuries, had 1.3 injuries per 100,000 people. The concentration of injuries among males and people under 25 has been typical of fireworks-related injuries for many years. Figure 2 shows the distribution of estimated fireworks-related injuries by gender.



Children under 5 years old experienced an estimated 400 injuries (7 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 1,200 injuries (19 percent of all fireworks-related injuries). Breaking down that age group further, children 5 to 9 years old had an estimated 600 injuries, and children 10 to 14 years old

had 600 injuries as well. In the aggregate, children under 15 years old accounted for 26 percent of the estimated fireworks-related injuries. Children and young adults under age 20 constituted 36 percent of the fireworks-related injuries.



The detailed breakdown by age and gender is shown in Table 3.

Table 3
 Estimated Fireworks-Related Injuries
 By Age and Gender
 June 17–July 17, 2011

Age Group	Total	Per 100,000 People	Male	Female
Total	6,200	2.0	4,200	2,000
0–4	400	2.0	300	100
5–14	1,200	2.9	800	400
5–9	600	2.9	300	300
10–14	600	3.0	500	100
15–24	1,200	2.7	800	300
15–19	600	2.9	600	100
20–24	600	2.5	300	300
25–44	2,500	3.0	1,900	600
45–64	900	1.1	300	600
65 +	*	*	*	*

Sources: NEISS, U.S. Consumer Product Safety Commission/EPHA. U.S. population from Table 1. Annual Estimates of the Resident Population by Sex and Five-Year Age Group for the United States: April 1, 2010 to July 1, 2011 (NC-EST2011-01), U.S. Census Bureau, Population Division, May 2012. The oldest victim was 75 years old. Estimates are rounded to the nearest 100 injuries. Age subcategory estimates may not sum to the category total due to rounding. Estimates of fewer than 50 injuries and per capita injury rates based on such estimates are denoted with an asterisk (*).

When considering per capita injury rates, children 10 to 14 years old and people 25 to 44 years old had the highest estimated per capita injury rate at 3.0 injuries per 100,000 population. These were followed by children 5 to 9 years old and 15 to 19 years old at 2.9 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 old, sparklers accounted for the largest number of estimated injuries, which was 36 percent of the total injuries in that age group.⁷

⁷ The percentage is calculated from the actual injury estimate associated with sparklers.

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 and multiple tube and reloadable devices) that 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 17–July 17, 2011

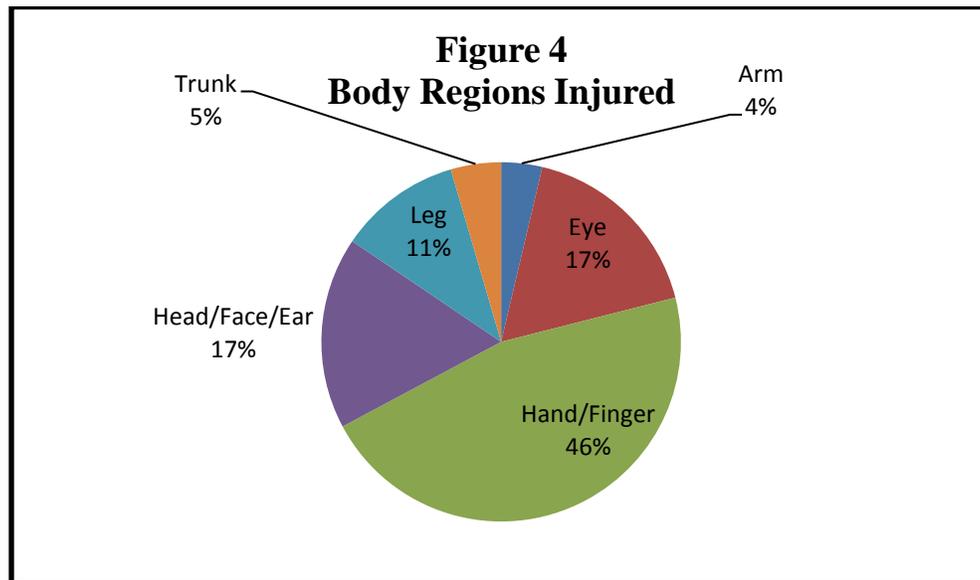
Fireworks Type	Total	Age Group					
		0–4	5–14	15–24	25–44	45–64	65+
Total	6,200	400	1,200	1,200	2,500	900	*
All Firecrackers	800	100	200	300	100	100	*
Small	200	*	100	*	*	100	*
Illegal	100	100	*	*	*	*	*
Unspecified	600	*	100	300	100	100	*
All Rockets	400	*	100	*	200	*	*
Bottle Rockets	300	*	100	*	200	*	*
Other Rockets	*	*	*	*	*	*	*
Other Devices	2,900	200	600	400	1,400	300	*
Sparklers	1,100	100	100	100	700	100	*
Fountains	100	*	*	100	*	*	*
Novelties	300	*	200	100	100	*	*
Multiple Tube	100	*	100	*	*	*	*
Reloadable	900	*	100	200	400	200	*
Roman Candles	400	*	100	*	200	*	*
Helicopters	*	*	*	*	*	*	*
Homemade/Altered	*	*	*	*	*	*	*
Public Display	200	*	*	*	100	100	*
Unspecified	1,800	100	300	400	700	300	*

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

As mentioned previously, males accounted for 68 percent of the estimated fireworks-related injuries, and females accounted for 32 percent. Males accounted for most of the estimated injuries from firecrackers, sparklers, bottle rockets, novelty devices, Roman Candles, and reloadable shells. Females experienced more injuries than males in incidents at public fireworks displays.

Body Region Injured and Injury Diagnosis

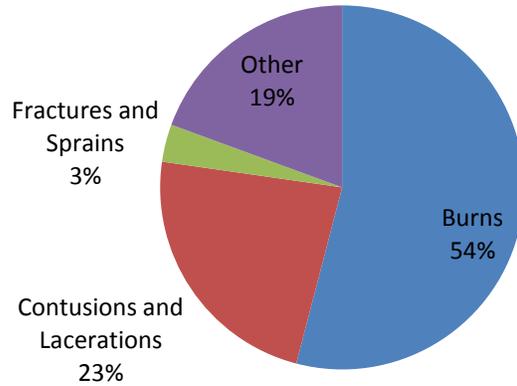
Figure 4 presents the distribution of estimated emergency department-treated injuries by specific parts of the body to which the injury occurred. Hands and fingers, with an estimated 2,900 injuries, accounted for 46 percent of the total injuries. These were followed by an estimated 1,100 eye injuries, accounting for 17 percent; 1,100 injuries to the head/face/ear region, accounting for 17 percent; and 700 leg injuries (11 percent). The remaining 8 percent of the injuries were to the trunk or arm.



Percentages may not sum to subtotal or total due to rounding.

Figure 5 shows the types of injuries associated with fireworks devices. Burns, with 3,400 estimated injuries (54 percent), was the most frequent injury diagnosis. Contusions and lacerations were associated with 1,400 injuries (23 percent), and fractures and sprains were involved in 200 injuries (3 percent). The remaining 1,200 estimated injuries (19 percent) were attributed to other diagnoses.

Figure 5
Type of Injuries



Percentages may not add to 100 due to rounding.

The most frequent injuries to hands, fingers, legs, and arms were burns. Also, burns accounted for a plurality of the estimated injuries to the head and face. Most eye injuries were contusions, lacerations, and other diagnoses that included foreign bodies in the eye. This detail is shown in Table 5.

Table 5
 Estimated Fireworks-Related Injuries
 By Body Region and Diagnosis
 June 17–July 17, 2011

Body Region	Total	Burns	Diagnosis		
			Contusions Lacerations	Fractures Sprains	Other Diagnoses
Total	6,200	3,400	1,400	200	1,200
Arm	200	200	*	100	*
Eye	1,100	200	500	*	400
Hand/Finger	2,900	2,100	400	*	300
Head/Face/Ear	1,100	400	300	*	400
Leg	700	500	100	*	*
Trunk/Other	300	100	100	100	100

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Fractures and sprains also include dislocations. Other diagnoses include all other injury categories. Arm and shoulder regions include 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. Estimated injuries may not sum to subtotals or totals due to rounding. Estimates of fewer than 50 injuries are denoted with an asterisk (*).

Type of Fireworks Device and Body Region Injured

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

Table 6
 Estimated Fireworks-Related Injuries
 By Type of Fireworks Device and Body Region
 June 17–July 17, 2011

Fireworks Type	Total	Region of the Body					
		Arm	Eye	Head/Face	Hands/Fingers	Leg	Trunk/Other
Total	6,200	200	1,100	1,100	2,900	700	300
All Firecrackers	800	*	*	200	400	*	100
Small	200	*	*	100	100	*	*
Illegal	100	*	*	*	100	*	*
Unspecified	600	*	*	100	300	*	100
All Rockets	400	*	*	100	100	*	100
Bottle Rockets	300	*	*	100	100	*	100
Other Rockets	*	*	*	*	*	*	*
Other Devices	2,900	200	400	500	1,400	300	100
Sparklers	1,100	*	100	*	800	100	*
Fountains	100	*	*	*	*	*	*
Novelties	300	*	100	*	100	*	100
Multiple Tube	100	*	*	*	100	*	*
Reloadable	900	200	100	300	300	100	*
Roman Candles	400	*	100	100	100	100	*
Helicopters	*	*	*	*	*	*	*
Homemade/Altered	*	*	*	*	*	*	*
Public Display	200	*	200	*	*	*	*
Unspecified	1,800	*	400	300	900	300	*

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

About 78 percent of the estimated sparkler injuries involved the hands and fingers. Fireworks devices that fly or emit sparks were primarily associated with eye, head, and face injuries. These included fountains, novelties, public display fireworks, and sparklers.

Hospital Treatment

An estimated 85 percent of the victims of fireworks-related injuries were treated at the emergency department and then released; about 6 percent of victims were treated and transferred to another hospital; approximately 6 percent were admitted to the hospital; and the remaining 3 percent of victims left without being seen. The treat-and-release percentage was lower compared to that for all consumer products in 2011 because the percentage of the treated and transferred was higher for the fireworks-related injuries.⁸

5. Telephone Investigations of Fireworks-Related Injuries

CPSC staff conducted telephone investigations of some fireworks injuries that occurred during the 1-month special study period surrounding the July 4th holiday (June 17, 2011 to July 17, 2011). 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, 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, these telephone investigation cases cannot be considered typical of fireworks-related injuries.

From the 200 emergency department-treated, fireworks-related injuries during the special study period, staff selected 95 cases for telephone investigations, of which 40 were completed and determined to be in scope, and 6 were completed and found to be out of scope. Table 7 shows the final status of these investigations.

⁸For all injuries in 2011, 92 percent of patients were treated and released; 1 percent were transferred to other hospitals; 6 percent were admitted to the hospital; and slightly more than 1 percent had other dispositions, including left hospital without being seen, held for observation, or dead on arrival.

Table 7
Final Status of Telephone Investigations

Final Case Status	Number of Cases	Percent
Total Assigned	95	100
Completed Investigation	46	48
In Scope	40	42
Out of Scope	6	6
Incomplete Investigations	49	52
Failed to Reach Patient	24	25
Victim Name Not Provided by Hospital	18	19
Victim Refused to Cooperate	7	7

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

Six cases were found to be out of scope after receiving information in the telephone investigation. Of these six out of scope incidents, one case involved a hot punk, two cases were work-related, and the victims in the other three cases were injured from incidental falls and the fireworks were not lit. Short descriptions of the remaining 40 completed cases are found in Appendix B. The cases are organized in order of emergency department dispositions, with Admitted (to the hospital) first, followed by Treated and Released. Within dispositions, cases are in order of increasing age of the victim.

Summary Statistics⁹

Of the 40 completed cases that were in scope, 29 (73 percent) involved males, and 11 (28 percent) involved females. There were 2 victims (5 percent) younger than 5; 7 victims (18 percent) ages 5 to 14 years old; 12 victims (30 percent) ages 15 to 24 years old; 14 victims (35 percent) ages 25 to 44 years old; 4 victims (10 percent) ages 45 to 64 years old; and the remaining victim (3 percent) was 75 years old. With respect to emergency department dispositions, 10 victims (25 percent) were admitted to the hospital, and 30 (75 percent) were treated and released.

The most frequently used fireworks devices in these incidents were aerial shells,¹⁰ which were associated with 21 incidents (53 percent). Firecrackers were involved in 5 (13 percent) incidents, 1 was related to small firecrackers, and the other 4 were related to firecrackers of unspecified size. Unspecified devices accounted for 4 incidents (10

⁹ Percentages may not add to 100 due to rounding.

¹⁰ The category “aerial shells” includes multiple tube, reloadable mortars and rockets, but excludes bottle rockets.

percent). Roman Candles and public displays each accounted for 3 incidents (8 percent), followed by fountains with 2 incidents (5 percent). Sparklers and homemade devices were associated with a single incident each (3 percent).

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 about half 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.

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

Hazard Pattern	Number of Cases	Percent
All	40	100
Misuse	16	40
Holding Fireworks in Hand	7	18
Dismantling Fireworks	2	5
Playing with Lit Fireworks	2	5
Igniting Fireworks Too Close to Someone	2	5
Setting Fireworks Improperly	1	3
Stacking Fireworks on Top of Each Other	1	3
Other	1	3
Malfunction	24	60
Debris	7	18
Early or Late Ignition	5	13
Errant Flight Path	4	10
Tipover	4	10
Blowout	2	5
Other	2	5

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

Misuse (16 victims injured, 40 percent)

Sixteen victims were injured when fireworks were used in ways that depart from proper usage.

Holding Fireworks in Hand.

- In Case 2, a 19-year-old male held an aerial shell in his hand and lit it. The firework went off in his hand before he thought it would. He lost his right pinky down to the first knuckle and the tips of the rest of his fingers.
- In Case 10, a 44-year-old male ignited a mortar on his boat. The firework misfired as it exploded in his hand instead of going up. As a result, the victim lost his right index finger, top of his right thumb, and his left index finger.
- In Case 18, a 14-year-old female had a Roman Candle in her hand. When she ignited it, some of the debris went into her eye, causing a corneal abrasion.
- In Case 19, a 15-year-old male held an unspecified firework in his hand and thought he could throw it once it was ignited. The firework exploded in his hand, causing second-degree burns to his hand and fingers.
- In Case 24, a 20-year-old male ignited a firecracker in a car. The firecracker exploded in his hand before he could throw it out the car window. He sustained a cut to the thumb on his left hand.
- In Case 28, a 26-year-old male held an aerial shell in his hand and was about to put it on the platform/ground. The aerial shell was ignited by a spark from a firework lit by his friend, and it exploded in his hand. The victim suffered two finger amputations of his left hand and open wounds on his chest and wrist.
- In Case 37, a 48-year-old male victim was setting off aerial shells in his backyard. He felt something was wrong when he lit one of the mortars. He grabbed the mortar and it exploded in his hands. He suffered second-degree burns to the fingers and palms of both his hands.

Dismantling Fireworks.

- In Case 7, a 30-year-old male opened a mortar and sifted through the flash powder. Someone lit a cigarette 10 feet away from him when he was repacking the mortar. The victim stated that the powder dust in his hand caught fire from the fumes of the lit cigarette. The victim sustained second-degree burns to his head, neck, lips, and hands.
- In Case 35, a 34-year-old male dismantled the cake device (mortar) and set off the tubes one by one. One of the tubes went off more quickly than he expected and exploded in his face. As a result, the victim suffered broken bones between his nose and eye socket, causing vision loss.

Playing with Lit Fireworks.

- In Case 11, a 4-year-old girl and her friends were lighting firecrackers. She saw one on the ground and picked it up. The firecracker had been lit, but she didn't know. It exploded in her hand, and she got cuts to her left hand.
- In Case 13, a 5-year-old male was playing with a firecracker. He didn't realize that the firecracker had been lit by someone and was about to go off. When the

firecracker exploded, it reportedly went up his short pants and burned his pubic area.

Igniting Fireworks Too Close to Someone.

- In Case 26, a 22-year-old male was at his friend's house. His friend lit a Roman Candle in the yard, and one of the sparks went into the victim's eye due to the wind. The victim suffered a corneal abrasion.
- In Case 27, a 23-year-old female bent down to light fireworks in an open field. A person lit a fountain type of firework 10 feet away from her, and it hit her in the left ear. As a result, the victim suffered first-degree burns to her left ear and loss of hearing.

Setting Fireworks Improperly.

- In Case 5, a 25-year-old male detonated mortars at a beach late at night. It was very dark, and he could hardly see. He thought that he put the mortar in upside down, but he was not sure about this. The mortar went off sooner than he expected, went backward, and cut his hand. The victim sustained a 2" laceration to his left hand.

Stacking Fireworks on Top of Each Other.

- In Case 20, a 16-year-old male's brother stacked multiple-tube devices on top of each other and ignited them. The cubes fell over and started shooting in all directions. To protect others, the victim grabbed one of the cubes, which he thought was inactive. The firework exploded and went into his right eye. As a result, the victim suffered a corneal abrasion and hyphema.

Other.

- In Case 9, it was reported to CPSC that when the victim's stepson stuck a lit Roman Candle into the ground to attempt to extinguish it, the 40-year-old male victim grabbed the firework to prevent it from exploding in his stepson's hand. While doing that, he stepped on one of the balls from the Roman Candle, and it exploded. As a result, the victim's left foot was fractured.

Malfunction (24 victims injured, 60 percent)

Twenty-four victims were injured when fireworks reportedly malfunctioned. These injuries resulted from debris with 7 injuries; early or late ignitions with 5 injuries; tipovers with 4 injuries; errant flight paths with 4 injuries; blowout with 2 injuries; and other malfunctions with 2 injuries. Note that some of the errant flight path injuries may have involved tipovers, but victims may have been unable to observe the tipover if they were far from the fireworks.

Debris.

- In Case 1, a 3-year-old girl was walking with her mother across a street when she was hit in the face by a firework ball. She suffered second-degree burns to her right cheek, ear, shoulder, and chest.
- In Case 16, a 9-year-old male was on a boat with his parents to watch the city's public fireworks display. A small piece of ash went into his eye, causing an irritation/scratch.
- In Case 30, a 31-year-old female was watching a public display of fireworks at a university. Due to a breeze, a piece of debris (metal) got into her right eye.
- In Case 33, a 33-year-old male ignited an aerial type of firework in front of his house. The firework went up about 6 feet and exploded. A burning ember came down and hit the victim in the right eye. He sustained a burn to his right eye.
- In Case 36, a 45-year-old male was watching fireworks set off by his friend. Some debris went into his eye, causing a corneal abrasion.
- In Case 39, a 54-year-old female was in a public park watching a city's fireworks display across a river. The ashes/debris from the fireworks went into her eye. Her eye was irritated, and she got a hematoma in the eye.
- In Case 40, a 75-year-old male was watching a fireworks display on a street. Some of the ashes landed in his left eye, and his eye was scratched.

Early or Late Ignition.

- In Case 3, a 19-year-old male was setting off mortar-type fireworks. The last firework went off faster than he expected and exploded about 2 feet from his face. The victim sustained burns to his face and an eye abrasion.
- In Case 6, a 26-year-old male was testing the fireworks made by a friend. One firework was fast-fused and went off much sooner than he thought it should. The firework exploded in his hand. As a result, the victim lost part of his right hand.
- In Case 23, a 20-year-old male was trying to relight a mortar-type firework that did not go off the first time. The device exploded almost immediately upon being relit. The victim suffered a second-degree burn on a finger of his right hand.
- In Case 31, a 31-year-old male lit a firecracker, and it went off more quickly than he expected. The firecracker exploded and hit the victim in his left eye. The victim sustained a contusion to his left eyeball.
- In Case 34, a 33-year-old male was setting off fountains in his backyard. The third fountain went off much faster than the first two. The victim did not have time to get away, and the sparks from the fountain hit him in his left eye. He suffered a corneal abrasion to that eye.

Errant Flight Path.

- In Case 14, a 6-year-old boy sat on a porch to watch fireworks being set off on a street. A missile-type firework went off horizontally instead of vertically. The victim and many others were hit. The victim sustained second-degree burns to his face (chin area) and the right side of his neck.
- In Case 21, a 19-year-old male ignited a mortar in a cylinder on the ground. The firework went a short distance up into the air, and then it came down. The sparks

from the mortar hit the victim in his hand, chest, and arm, and they cut his right thumb as well. He suffered minor burns.

- In Case 22, a 20-year-old female was watching her neighbor setting off aerial shells. One of the fireworks exploded, and the shells went horizontally. A fireball hit the victim in the eye, causing her to fall. She sustained a hyphema in the eye.
- In Case 25, a 21-year-old female was at a friend's house to watch fireworks being set off in the front yard. One of the unspecified fireworks misfired and went sideways. The cardboard hit the victim in the eye and face and caused contusions.

Tipover.

- In Case 12, a 5-year-old girl and her family were watching the neighbor setting off multiple-tube devices at what was reported to be considered a safe distance. The fireworks were propped on a stand. One firework fell over, went off, and shot toward the victim. She sustained second-degree burns on her right thumb.
- In Case 15, a 9-year-old female was watching aerial shells detonated by adults in the backyard. One firework fell, went the wrong way, and hit the victim. She sustained burns to her face and a toe on her right foot.
- In Case 29, a 28-year-old male was watching fireworks at a lake. Someone lit a mortar about 20 feet away from him. The mortar fell over, went sideways, and hit him in the arm. The victim's lower arm was fractured.
- In Case 38, a 52-year-old female and her grandchildren were watching fireworks set off by her son. A multiple-tube device that shot shells vertically was ignited. The cylinder fell over, and one of the shells went up the leg of the victim's jeans. The victim sustained third-degree burns on her lower leg.

Blowout.

- In Case 8, a 31-year-old male set off aerial shells at a beach. He placed a mortar into a tube and buried the tube a few inches in sand. When he lit the mortar, the tube blew apart and caused the mortar to go sideways. The firework hit the victim in his right eye. The victim suffered bleeding in his right eye, and the iris was torn apart.
- In Case 32, a 31-year-old male put a mortar into a launching tube and lit it. The mortar blew up in the tube. The victim sustained a second-degree burn to his left shoulder.

Other.

- In Case 4, a 20-year-old male lit a sparkler, which was left by his sister's friend. The victim stated that the sparkler exploded and injured his hand. The victim suffered partial amputation to his index finger, and his thumb and middle fingers were also badly injured.
- In Case 17, a 12-year-old male was setting off fireworks similar to firecrackers, which his parent believed were meant for use by small children. One of them backfired. It got stuck in his pants and burned his shirt. As a result, the victim sustained burns between his right hip and buttocks.

Long-Term Consequences of Fireworks-Related Injuries

Victims were asked if there were any long-term consequences of their injuries. Most (29 of 40, or 73 percent) expected complete recoveries with no long-term effects. Some of the victims reported that they might experience long-term effects of the injuries as follows:

- In Case 2, the victim lost his right pinky down to the first knuckle and tips of the rest of his fingers after an aerial shell exploded in his hand. He is not expected to regain full function of his right hand.
- In Case 4, the victim suffered partial amputation to the index finger, and his thumb and middle fingers were badly injured, as well, after a sparkler exploded in his hand. He might not regain full function in that hand.
- In Case 5, the victim sustained a 2" laceration to his left hand when a mortar went backward and cut his hand. He wasn't sure if there would be any long-term effect from his injury.
- In Case 6, the victim lost part of his right hand when a homemade device exploded in his hand. He might not regain full function of his right hand.
- In Case 9, the victim's left foot was fractured when he stepped on a fireball from a lit Roman Candle and it exploded. He didn't know if there would be any long-term effect as a result of his injury.
- In Case 10, the victim lost his right index finger, top of his right thumb, and his left index finger when a mortar misfired and exploded in his hands. He didn't expect to regain full function of his hands.
- In Case 20, the firework exploded and went into the victim's right eye. The victim sustained a corneal abrasion and hyphema as a result. His parent was not sure if there would be any long-term effect but thought his vision might be slightly impaired.
- In Case 27, a fountain-type firework hit the victim in the left ear. The victim suffered first-degree burns to her left ear and hearing loss. She was not sure whether the hearing loss would be permanent.
- In Case 28, an aerial shell exploded in the victim's left hand. As a result, the victim suffered two finger amputations of his left hand, and he suffered open wounds on his chest and wrist. He did not expect to regain full function of his left hand.
- In Case 33, a burning ember from an aerial shell hit the victim's right eye. The victim sustained a burn to that eye. He was not sure if there would be any long-term effects from his injury.
- In Case 35, a mortar exploded in the victim's face. As a result, the victim suffered broken bones between his nose and eye socket and vision loss. Consequently, he has to wear eyeglasses for his right eye.

Where Fireworks Were Obtained

Of the 40 telephone survey respondents, 26 (65 percent) knew where the fireworks were obtained. Thirteen respondents reported that the fireworks had been obtained from a stand; 9 stated that the fireworks were acquired from a relative; and 4 indicated the fireworks were obtained from a store.

Thirteen victims (33 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.

The remaining respondent stated that he was injured by the fireworks made by his friend.

6. Enforcement Activities

The Office of Compliance and Field Operations oversees enforcement activities for all applicable regulations for consumer fireworks under the Federal Hazardous Substances Act (FHSA), 15 U.S.C. §1261–1278. In 2011, Compliance staff continued enforcement of the fireworks regulations through surveillance of imported products and conducting routine inspections of fireworks retailers, which included collecting samples for analysis and testing and commencing any necessary corrective actions regarding the products. CPSC staff's enforcement activities are focused on reducing the number of fireworks-related deaths and injuries.

In 2011, CPSC staff continued to work closely with other federal partners, including the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), the Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA), and U.S. Customs and Border Protection (CBP). CPSC staff has worked with the U.S. Department of Justice on cases involving companies and/or individuals involved in the sale of chemicals and components used to make illegal fireworks. CPSC staff continues to make it a priority to investigate the sale of kits and components to make illegal and dangerous firecracker-type explosives, such as M-80s and Quarter Sticks. In 2011, Commission staff reviewed the regulatory history and prior regulatory guidance given to the industry on snappers and similar products, and Compliance staff issued a letter to importers, distributors, and retailers of consumer fireworks, addressing how a new product marketed as an “adult snapper” should be classified under the CPSC fireworks requirements. Staff continues to take an active role with industry to ensure adequate understanding of the regulations and to maintain an open dialogue if any issues should arise.

CPSC staff, in cooperation with CBP, continues to conduct surveillance on imported shipments of consumer fireworks. When a shipment is selected for examination, CPSC staff notifies the importer and broker that the shipment has been selected for further examination. Follow-up correspondence is sent, indicating which items, if any,

will be sampled and tested. Fireworks are selected for testing, either at random, or based on the violation history for the type of device, whether the item had been previously sampled, and other factors. With assistance from CBP, staff from CPSC selectively sampled and tested shipments of imported fireworks in fiscal year 2011 for compliance with the FHSA. Approximately 37 percent of the selected shipments were found to contain fireworks that were noncompliant. The majority of violations centered on overloaded report composition in aerial fireworks devices, exceeding the limit of 2 grains of pyrotechnic composition (16 C.F.R. §1500.17(3)). CPSC staff requested corrective action on these noncompliant fireworks, and in most cases, firms destroyed the noncompliant fireworks voluntarily.

Most fireworks are manufactured outside the United States, and China (98 percent) and Hong Kong (1 percent) are the sources of most imported fireworks.¹¹ CPSC staff continues to work closely with its counterpart Chinese agency, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). We participate actively in scheduled video conferences with AQSIQ technical staff to discuss consumer fireworks activities. In addition, CPSC staff participated in a fireworks working group meeting with AQSIQ staff during the United States-China Consumer Product Safety Summit in October 2011.

7. Summary

In 2011, there were four reported fireworks-related deaths, the same as reported in 2010. However, reporting for 2010 and 2011 may not be complete at this time. Emergency department-treated injuries, estimated at 9,600 for 2011, increased from the estimated 8,600 injuries in 2010. However, the difference between the injury estimates for 2010 and 2011 is not statistically significant.

During the 1-month special study period from June 17, 2011 to July 17, 2011, there were an estimated 6,200 emergency department-treated injuries, close to the 6,300 estimated injuries in 2010. In 2011, children under 15 years old experienced about 26 percent of the estimated injuries, and males of all ages experienced 68 percent of the injuries.

Also similar to previous years, more than half the estimated injuries during the special study period in 2011 involved burns. Burns were the most frequent injury to all parts of the body, except the eyes, where contusions, lacerations, and other diagnoses (mainly foreign bodies in the eye) occurred more frequently. The parts of the body most often injured were hands and fingers (estimated 46 percent of the injuries), followed by eyes (17 percent), the head, face, and ears (17 percent), and legs (11 percent). Most of the estimated injuries (85 percent) involved treat-and-release dispositions. An estimated

¹¹ These data are from 2011 statistics from the U.S. International Trade Commission. There were 227.9 million pounds of fireworks imported, with 223.4 million pounds from China (98 percent), and 2.3 million pounds from Hong Kong (1 percent). Staff believes that most fireworks imported from Hong Kong were actually manufactured in China. The next largest exporter was Thailand, with 1.4 million pounds.

12 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, sparklers were associated with 17 percent of the injuries. Firecrackers were involved in 13 percent of the estimated injuries, and bottle rockets were associated with 6 percent of the injuries.

A review of data from telephone follow-up investigations showed that the typical causes of injuries were as follows: (1) misuse of fireworks; (2) debris and smoke associated with eye irritations; (3) ignition and explosion of fireworks earlier/later than expected; (4) errant flight paths; and (5) aerial shell, multiple tube device, or mortar tipovers. At the time of the telephone investigation, typically 1 to 2 months after the injury, most victims had recovered from their injuries. A small number of victims reported that the injuries were likely to have long-term effects.

Finally, in 2011, CPSC staff's enforcement activities remained at a high level. CPSC staff worked with Customs to sample imported fireworks and to seize illegal shipments. Staff also continued working with the Chinese government's AQSIQ. In addition, CPSC staff participated in a fireworks working group meeting with AQSIQ staff during the United States-China Consumer Product Safety Summit in October 2011. China is the world's largest exporter of fireworks, and most fireworks imported into the United States come from China. Fireworks are among one of four product areas targeted by the CPSC and AQSIQ for exchange of information on standards, increased inspection of high-risk products, and tighter quality controls on components from parts suppliers.

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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 1997–2008, peaking in 2005 at 275.1 million pounds, and then declining to 199.3 million pounds in 2009. Fireworks imports in 2011 increased 14 percent to 227.9 million pounds from 199.6 million pounds imported in 2010. The number of estimated emergency department-treated injuries has fluctuated between 7,000 and 11,000, with the largest number of injuries occurring in the millennium year of 2000. During this period, as shown in Table A-1 below, the number of injuries per 100,000 pounds of fireworks has declined from 8.0 injuries per 100,000 pounds in 1997, to 3.4 injuries per 100,000 pounds in 2006 and 2008.

Estimated injuries per 100,000 pounds were 4.2 in 2011, which decreased slightly from the previous year.

Table A-1
Estimated Fireworks-Related Injuries and
Estimated Fireworks Imported into the U.S. 1996–2011

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)	Injuries Per 100,000 Pounds
2011	9,600	227.9	4.2
2010	8,600	199.6	4.3
2009	8,800	199.3	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
2000	11,000	146.2	7.5
1999	8,500	146.7	5.8
1998	8,500	123.8	6.9
1997	8,300	103.5	8.0
1996	7,300	108.6	6.7

Source: Injuries from NEISS, U.S. Consumer Product Safety Commission/EPHA. See Table 1 for further details. Estimated fireworks imports from the U.S. International Trade Commission, 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 6.7 percent of the total imports in 2011. 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, which is not available from the International Trade Commission and not shown in this table.

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.

Also, 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 1996 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 decrease in injuries per 100,000 pounds in 2011 may have resulted from different fireworks mixtures, a decrease in injuries, 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 Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
1	3	Female	Thermal Burns	Admit	Face	Multiple Tube Device	The victim was walking across the street with her mother and was hit by a firework ball. The fireworks were lit by a group of 12-year-olds. The victim suffered second-degree burns to her right cheek, ear, shoulder, and chest.	After discharge, the victim had additional medical treatment for her injuries. She had not recovered at the time of the telephone interview, but she was expected to recover fully in 6 weeks.
2	19	Male	Amputation	Admit	Finger	Aerial Shell	The victim held a firework in his hand and lit it. The firework went off in his hand before he thought it would. He lost his right pinky down to the first knuckle and the tips of the rest of his fingers.	The victim was admitted to the hospital for 7 days. After discharge, he had surgery and other treatment for his injuries. He was still under medical care at the time of the telephone investigation, and he might not regain full function of his right hand.
3	19	Male	Thermal Burns	Admit	Face	Aerial shell	Victim was setting off mortar-type fireworks. The last firework went off faster than he expected and exploded about 2 feet from his face. He sustained burns to his face and an eye abrasion.	After treatment at the emergency department, the victim was transferred to another hospital to be seen by an ophthalmologist. He had additional visits with the eye doctor. He fully recovered in 1 week.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
4	20	Male	Amputation	Admit	Finger	Sparkler	Victim's sister had friends over, and one of the friends left a sparkler. The victim took the sparkler outside and lit it. The victim stated that the sparkler exploded and injured his hand. He suffered partial amputation to the index finger. His thumb and middle fingers were also badly injured and required pins.	The victim was admitted to the hospital overnight. After discharge, he had surgery to treat his injuries. He had not recovered at the time of the telephone interview.
5	25	Male	Laceration	Admit	Hand	Aerial Shell	The victim detonated mortars at the beach late at night. It was very dark, and he could hardly see. He thought that he put the mortar in upside down, but he was not sure about this. The mortar went off sooner than he expected, it went backward, and it cut his hand. He sustained a 2" laceration to his left hand.	The victim was admitted to the hospital for 3 days. After discharge, he had additional medical visits to remove stitches or a cast. He was still under medical care when he was interviewed for this report, and he was not sure if there would be any long-term effect as a result of his injury.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
6	26	Male	Amputation	Admit	Hand	Homemade	Victim was testing the fireworks made by a friend. One firework was fast-fused and went off much sooner than he thought it should. The firework exploded in the victim's hand, and he lost part of his right hand as a result.	The victim was hospitalized for 5 days. After discharge, he had surgery and additional treatment for his injury. He was still under medical care at the time of the interview. He did not know when he would recover and if there would be any long-term effect from his injury.
7	30	Male	Thermal Burns	Admit	Neck	Aerial Shell	Victim opened a mortar and sifted through the flash powder. Someone lit a cigarette 10 feet away from him while he was repacking the mortar. The victim stated that the powder dust in his hand caught fire from the fumes of the lit cigarette. As a result, he sustained second-degree burns to his head, neck, lip, and hand.	The victim was transferred to a burn center and was admitted for 2 days. After discharge, he had follow-up visits to change the bandage/dressing for his injury. He recovered fully in 6 weeks.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
8	31	Male	Other	Admit	Eye	Aerial Shell	The victim set off 2-inch mortars at a beach. He placed a mortar into the tube and buried the tube several inches in the sand. When he lit the mortar, the tube blew apart, which caused the mortar to go sideways. The firework hit the victim in his right eye. The victim suffered bleeding in his right eye, and the iris of his eye was torn apart.	The victim was admitted overnight. After discharge, He had surgery on his injured eye. He had not recovered at the time of the telephone interview, but he expected to recover fully in 2.5 months.
9	40	Male	Fracture	Admit	Foot	Roman Candle	Victim's 16-year-old stepson lit a Roman Candle, and his 19-year-old son told his younger brother to put it out. The 16-year-old stuck the end of the Roman Candle in the ground. When the victim grabbed the firework so that it would not explode in his stepson's hands, he stepped onto one of the fireballs from the Roman Candle on the ground and it exploded. As a result, the victim's left foot was fractured.	The victim was hospitalized overnight. After discharge, he had additional visits with doctors to treat his injury. He was still under medical care at the time of the interview, and he didn't know if there would be any long-term effect from his injury.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
10	44	Male	Amputation	Admit	Finger	Aerial Shell	Victim ignited a mortar on his boat. The firework misfired and exploded in his hands instead of going up. The victim lost his right index finger, top of his right thumb, and his left index finger.	The victim was taken to the emergency department and admitted for 2 days. After discharge, he had additional visits to doctors to treat his injuries. He was still under medical care at the time of the telephone investigation, and he did not expect to regain full function of his hands.
11	4	Female	Laceration	Treat and Release	Hand	Firecracker Unspecified	Victim and her friends were lighting firecrackers. She saw one on the ground and picked it up. The firecracker has been lit, but she didn't know. It exploded in her hand, and she suffered cuts to her left hand.	The victim had fully recovered in 5 days.
12	5	Female	Thermal Burns	Treat and Release	Finger	Multiple Tube Device	The victim and her family were watching her neighbor setting off fireworks at what was reported to be a safe distance. The fireworks were propped on a stand. One firework fell over, went off, and shot toward the victim. She sustained second-degree burns on her right thumb.	After the emergency department treatment, the victim had a follow-up visit with her pediatrician. She had fully recovered in 3 weeks.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
13	5	Male	Thermal Burns	Treat and Release	Public Region	Firecracker Unspecified	Victim was playing with a firecracker at a friend's house. He didn't realize that the firecracker had been lit by someone and was about to explode. When the firecracker went off, it went up the short pants that the victim was wearing and burned his pubic area.	After the treatment at the emergency department, the victim had follow-up visits with the doctor for checkups. He recovered fully in 2 weeks.
14	6	Male	Scald Burn	Treat and Release	Neck	Missile	Victim sat on a porch to watch fireworks being set off in the street. A missile-type firework was ignited and went horizontally instead of vertically. He and many others were hit. The victim sustained second-degree burns to his face (chin area) and the right side of his neck.	The victim recovered fully in 7 days.
15	9	Female	Thermal Burns	Treat and Release	Toe	Aerial Shell	The victim was watching aerial shells being set off by adults in the backyard. One firework fell, went the wrong way, and hit the victim. The victim sustained burns to the toe of her right foot and her face.	The victim recovered fully in a week.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
16	9	Male	Foreign Body	Treat and Release	Eye	Public Display	Victim was on a boat with his parents to watch the city's public fireworks display. A small piece of ash went into his eye, causing an irritation/scratch.	The victim fully recovered in 2 days.
17	12	Male	Thermal Burns	Treat and Release	Lower Trunk	Small Firecracker	The victim was setting off fireworks similar to firecrackers, which his parent believed were meant for use by small children. One of the fireworks backfired. It got stuck in his pants and burned his shirt. As a result, the victim sustained burns between his right hip and buttocks.	The victim recovered fully in 7 days.
18	14	Female	Contusions Abrasions	Treat and Release	Eye	Roman Candle	Victim had a Roman Candle in her hand. When she ignited it, some of the debris went into her eye, causing a corneal abrasion.	After treatment at the emergency department, the victim had additional medical visits to check how her eye was healing. She recovered fully in 7 days.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
19	15	Male	Thermal Burns	Treat and Release	Hand	Unspecified	The victim held a firework in his hand and thought he could throw it once it was ignited. The firework exploded in his hand, causing second-degree burns to his hand and fingers.	The victim had additional medical visits to check for the healing of his injury, to remove dead skin, and to change the bandage. He had not recovered yet at the time of the telephone investigation, but he was expected to recover fully in 4 to 6 weeks.
20	16	Male	Contusions Abrasions	Treat and Release	Eye	Multiple Tube Device	Victim's half brother had a multiple-tube device. His brother stacked the cubes on top of each other and ignited them. The cubes fell over and started shooting in all directions. To protect others, the victim grabbed one of the cubes, which he thought was inactive. The firework exploded and went into the victim's right eye. As a result, the victim suffered corneal abrasion and hyphema.	The victim was still under medical care to treat his injury at the time of the telephone interview. His parent was not sure if there would be any long-term effects from his injury but thought that his vision might be slightly impaired.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
21	19	Male	Laceration	Treat and Release	Finger	Aerial Shell	Victim ignited a mortar-type firework in a cylinder on the ground. Instead of going vertically into the air, the firework went a short distance into the air and then came down. The sparks hit the victim in the hand, arm, and chest, and they cut his right thumb also. He suffered minor burns.	The victim had a follow-up visit to ensure that his wounds healed properly. He recovered fully in a week.
22	20	Female	Other	Treat and Release	Eye	Aerial Shell	The victim was watching her neighbor setting off aerial shells. One of the fireworks exploded, and the shells went horizontally. A fireball hit the victim in the eye, causing her to fall. She sustained hyphema in the eye.	After treatment at the emergency department, the victim saw an eye specialist to check her vision and the healing of the eye. Her vision was still blurry at the time of the telephone interview, but she expected it to return without any long-term effect.
23	20	Male	Thermal Burns	Treat and Release	Finger	Aerial Shell	Victim was trying to relight a mortar-type firework that did not go off the first time. The firework exploded almost immediately upon being relit. The victim suffered a second-degree burn on a finger of his right hand.	The victim recovered fully in 4 weeks.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
24	20	Male	Laceration	Treat and Release	Hand	Firecracker Unspecified	Victim lit a firecracker in a car. The firecracker exploded in his hand before he could throw it out the car window. He sustained a cut to his left hand thumb.	After treatment at the emergency department, the victim had additional medical visits to treat his injuries. He had not recovered yet at the time of the interview, but he expected a full recovery in 2 or more months.
25	21	Female	Contusions Abrasions	Treat and Release	Eye	Unspecified	Victim was at a friend's house to watch fireworks being set off in the front yard. One of the fireworks misfired and went sideways. The cardboard hit the victim in the eye and face. As a result, she suffered minor contusions to her eye and face.	The victim fully recovered in 1 day.
26	22	Male	Contusions Abrasions	Treat and Release	Eye	Roman Candle	Victim was at his friend's house. His friend lit a Roman Candle in the yard. Due to the wind, one of the stars/sparks went into the victim's eye, causing a corneal abrasion.	The victim fully recovered in 3 days.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
27	23	Female	Thermal Burns	Treat and Release	Ear	Fountain	Victim bent down to light fireworks in an open field. A person who was 2 feet from her lit a fountain-type firework, and it hit her in the left ear. The victim suffered first-degree burns to her left ear and a loss of hearing.	The victim sought additional medical treatment for her hearing loss. The burns to her left ear had healed, but she was still under doctor's care for the hearing loss at the time of the telephone interview. She was not sure whether the hearing loss would be permanent.
28	26	Male	Amputation	Treat and Release	Finger	Aerial Shell	Victim held an aerial shell in his hand and was going to put it on the platform/ground. The aerial shell was ignited by a spark from a firework lit by his friend, and it exploded in his hand. The victim got two finger amputations of his left hand and open wounds on his chest and wrist.	After treatment at the emergency department, the victim saw a specialist to check the healing of his fingers. He was still recovering at the time of the telephone investigation, and he did not expect to regain full function of his left hand.
29	28	Male	Fracture	Treat and Release	Lower Arm	Aerial Shell	Victim was watching fireworks at a lake. Someone lit a mortar about 20 feet away from him. The firework fell over, went sideways, and hit the victim in his arm. The victim's lower arm was fractured.	The victim had a follow-up visit to put a cast on his fractured arm. He had not recovered at the time of the telephone interview, but he did not think there would be any long-term effect as a result of the injury.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
30	31	Female	Foreign Body	Treat and Release	Eye	Public Display	The victim was watching a public display of fireworks at a university. Due to a breeze, a piece of debris (metal) went into her right eye. She went to the emergency department and had the metal removed.	The victim recovered fully within a day.
31	31	Male	Contusions Abrasions	Treat and Release	Eye	Firecracker Unspecified	Victim lit a firecracker, and it went off more quickly than he expected. The firecracker exploded and hit the victim in his left eye. The victim sustained a contusion to his left eyeball.	After treatment at the emergency department, the victim had an additional medical visit to make sure that his eye was okay. He fully recovered in a few days.
32	31	Male	Thermal Burns	Treat and Release	Shoulder	Aerial Shell	The victim put a mortar in a launching tube and lit it. The mortar blew up in the tube. He suffered a second-degree burn to his left shoulder.	The victim fully recovered in 2 to 3 weeks.
33	33	Male	Thermal Burns	Treat and Release	Eye	Aerial Shell	The victim lit an aerial shell type of firework in front of his house. The firework went up about 6 feet and exploded. A burning ember came down and hit the victim in the right eye. He sustained a burn to his right eye.	The victim had additional doctor visits to treat his injured eye. He was still under medical care at the time of the telephone investigation, and he was not sure if there would be any long-term effect from the injury.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
34	33	Male	Foreign Body	Treat and Release	Eye	Fountain	Victim was setting off fountain-type fireworks in his backyard. The third fountain went off much faster than the first two. The victim did not have time to get away and the sparks from the fountain hit his left eye. He suffered a corneal abrasion to the eye.	The victim had an appointment with a specialist but had not seen him when the telephone interview was conducted. He did not know if he was fully recovered at the time.
35	34	Male	Fracture	Treat and Release	Face	Multiple Tube Device	The fireworks (multiple tube device) were several years old. The victim dismantled the cake device (mortar) and set them off one by one. One of them went off more quickly than the victim expected and exploded in his face. He suffered broken bones between his nose and eye socket, causing vision loss.	The victim had additional medical treatments for his injuries. He had not recovered at the time of the telephone interview. He has to wear eyeglasses for his right eye as a result of the vision loss.
36	45	Male	Contusions Abrasions	Treat and Release	Eye	Unspecified	The victim was watching fireworks set off by his friend. Some debris went into his eye, causing a corneal abrasion.	After treatment at the emergency department, the victim saw his primary doctor and scheduled an appointment with a specialist to check his eye. He had not recovered at the time of the telephone interview, but he expected to recover fully without any long-term effect.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
37	48	Male	Thermal Burns	Treat and Release	Hand	Aerial Shell	Victim was setting off aerial shells in his backyard. He felt something was wrong when he lit one of the mortars, so he grabbed the firework, and it exploded in his hands. The victim sustained second-degree burns to the fingers and palms of both his hands.	The victim had not recovered at the time of the telephone interview, but he expected a full recovery in 4 to 5 weeks.
38	52	Female	Thermal Burns	Treat and Release	Lower Leg	Aerial Shell	Victim and her grandchildren were watching fireworks that were set off by her son. A multiple-tube device that shot shells vertically was ignited. The cylinder fell over, and one of the shells went up the leg of the victim's jeans. She suffered third-degree burns on her lower leg.	The victim had follow-up visits to see if she would need a skin graft. No skin graft was required. The victim had not recovered at the time of the telephone interview, but she expected a full recovery in 6 weeks.
39	54	Female	Hematoma	Treat and Release	Eye	Public Display	The victim was in a public park watching a city's fireworks across the river. The ashes/debris from the fireworks went into her eye. The victim's eye was irritated, and she got a hematoma in the eye.	The victim fully recovered within a day.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
40	75	Male	Contusions Abrasions	Treat and Release	Eye	Unspecified	Victim was watching fireworks display on a street, and some of the ash landed in his left eye. His left eye was scratched.	The victim saw an eye doctor for his scratched eye after the treatment at the emergency department. He fully recovered in 3 days.