



2010 Fireworks Annual Report

Fireworks-Related Deaths, Emergency Department-Treated Injuries, And Enforcement Activities During 2010

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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 analysis of data on nonoccupational, fireworks-related deaths and injuries during 2010. The report also includes a summary of CPSC staff enforcement activities during 2010.

Staff obtained information on fireworks-related deaths from news clippings and other sources in the CPSC's Injury and Potential Injury Incident (IPII) database and the CPSC's Death Certificate File. Staff estimated fireworks-related injuries from the CPSC's National Electronic Injury Surveillance System (NEISS). More detailed analyses of injuries, including the type of injury, the fireworks involved, and the characteristics of the victim were based on a special study conducted by CPSC staff between June 18, 2010 and July 18, 2010. About 73 percent of the annual fireworks-related injuries for 2010 occurred during that period.

Highlights of the report are as follows:

- CPSC staff received reports of three fireworks-related deaths during 2010. In the first incident, a 22-year-old male died after he fell from a cliff when he detonated unspecified fireworks. In the second incident, a 49-year-old male perished when the fireworks he made illegally in his garage exploded. In the third incident, a 55-year-old male died in a house explosion caused by teenagers' mischievous use of Roman candles. CPSC staff has reports of two fireworks-related deaths in 2009. Reporting is not complete for either year, and the actual number of deaths may be higher.
- Fireworks were involved in an estimated 8,600 injuries treated in U.S. hospital emergency departments during calendar year 2010 (95 percent confidence interval 6,600–10,700). CPSC staff estimated that there were 8,800 fireworks-related injuries during 2009. 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 lowest (7,300), to 2010.
- An estimated 6,300 fireworks-related injuries (or 73 percent of the total fireworks-related injuries) were treated in U.S. hospital emergency departments during the 1-month special study period between June 18, 2010 and July 18, 2010 (95 percent confidence interval 4,500–8,100). CPSC staff estimated that there were 5,900 fireworks-related injuries during the 2009 special study period.

Results from the special study include the following:

- Of the fireworks-related injuries sustained, 65 percent were to males, and 35 percent were to females.

- Injuries to children were a major component of total fireworks-related injuries, with children under 15 years of age accounting for approximately 40 percent of the estimated injuries. Fifty-three percent of the estimated emergency department-treated, fireworks-related injuries were individuals younger than 20 years of age.
- There were an estimated 900 injuries associated with firecrackers. Of these, an estimated 30 percent were associated with small firecrackers, 17 percent with illegal firecrackers, and 53 percent with unspecified firecrackers.
- There were an estimated 1,200 injuries associated with sparklers and 400 with bottle rockets.
- The parts of the body most often injured were hands and fingers (estimated 30 percent); legs (estimated 22 percent); eyes (estimated 21 percent); and head, face, and ears (estimated 16 percent).
- More than half of the 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 7 percent of patients were treated and transferred to another hospital or admitted to the hospital.

CPSC staff conducted telephone follow-up investigations of some fireworks-related injuries reported at NEISS hospital emergency departments during the special study period. 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. Thirty-five telephone interviews were completed. After review, one of these incidents was determined to be out of scope because fireworks were not involved.

A review of data from telephone follow-up investigations of the 34 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 fireworks set improperly or lit too close to other fireworks, and mischief. According to the investigations, most victims recovered from their injuries or were expected to recover completely; however, several victims reported that their injuries might be long term.

During 2010, CPSC's Office of Compliance and Field Operations continued to work closely with other federal agencies to conduct surveillance on imported fireworks

and enforce the provisions of the Federal Hazardous Substances Act (FHSA). Examples of these activities are as follows:

- CPSC established permanent staffing at the Import Safety Commercial Targeting and Analysis Center (CTAC) in Washington, D.C., and is working in cooperation with the Bureau of Customs and Border Protection (CBP) to implement new enforcement measures. In 2010, CPSC staff began implementing new procedures for identifying and selecting fireworks entries for examination and sampling and, with assistance from CBP, selectively sampled and tested numerous shipments of fireworks to determine if they were in compliance with the FHSA. From the pool of shipments targeted, approximately 43 percent contained noncompliant fireworks. CPSC staff requested corrective action on these noncompliant fireworks, and in most cases, firms destroyed the noncompliant fireworks voluntarily. Also, in June 2010, CPSC announced the recall of a violative fireworks device that had been sold to consumers.
- CPSC staff worked with other federal agencies, including the Bureau of Alcohol, Tobacco, Firearms and Explosives, the Department of Justice's Office of Consumer Litigation, as well as state and local law enforcement agencies. Staff provided legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers.

Recognizing the global economy, CPSC staff continues to work with our counterpart in China, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ). AQSIQ and CPSC established four working groups on consumer products, one of which focuses on fireworks. According to 2010 statistics from the U.S. International Trade Commission, China manufactures more than 98 percent of all fireworks imported into the United States.

1. Introduction

This report describes injuries and deaths associated with fireworks during 2010. The report also describes CPSC staff enforcement activities for 2010. Reports for earlier years in this series can be found on the Internet at www.cpsc.gov/library/data.html

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 2010, and compares that estimate with those for previous years. Section 4 analyzes emergency department-treated, fireworks-related injuries occurring during the month around the 4th of July. Section 5 summarizes the in-depth telephone 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 2010. The main body of 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 2010. Appendix B contains more detail on the completed telephone investigations.

Sources of Information

Information on nonwork-related fireworks deaths occurring during 2010 was obtained from the CPSC Injury and Potential Injury Incident file (IPII) and the CPSC's Death Certificate File. Entries in IPII come from 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 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 2009 or 2010 fireworks-related deaths at the time this report was prepared. As a result, the number of deaths might be greater than the number reported here. 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 such updates.

The source of information on 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.¹ Injury 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 the 4th of July, CPSC staff conducts a special study of fireworks-related injuries. In 2010, the special study period spanned June 18, 2010 to July 18, 2010. 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 staff shows 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 in the NEISS narrative.

¹ 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 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.

After reading the case records, including the narrative description of the fireworks device and the incident scenario, CPSC staff may assign cases for telephone investigations. 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 2010 special study is found in Section 5.

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 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 4th of July 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 a subset of the special study cases with telephone investigations. These different levels of information about injuries correspond to different analyses in the report as follows:

- Estimated national annual fireworks-related 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.²
- Detailed analyses of injury patterns. The tables in the 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

² The only exception to the practice of including all of the cases occurred in 2003, where 9 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).

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 NEISS sample hospitals 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 the 4th of July. Confidence intervals were estimated, and other statistics were calculated using computer programs that were written to take into account the sampling design.³ 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 rounded estimates. Percentages may not add to subtotals or to the total in the tables due to rounding.

The 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 month injury estimate. As a result, interpretation and comparison of these estimates with each other or with estimates from prior years should be made with 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 2010

The CPSC has reports of three nonoccupational, fireworks-related deaths that occurred during 2010. Brief descriptions of the incidents are as follows:

³ See Schroeder (2000).

- A 22-year-old man from Colorado died when he fell approximately 100 feet off a cliff after he detonated unspecified fireworks. The victim stood near the edge of a cliff, lit a firework while he had another in his hand. The one in his hand ignited and he threw the firework. That was when he went missing. His body was later spotted and recovered.
- A 49-year-old male from Nebraska was fatally injured in an explosion when he illegally manufactured homemade fireworks in his garage. Materials and tools used in the illegal production of fireworks or explosives were recovered by the authorities at the scene.
- A 55-year-old male from Louisiana died in a house explosion caused by teenage mischief. The teenage boys were shooting roman candles at the victim's home, and one of the Roman candles ignited a curtain in the house. The fire caused an explosion in the house, leaving the victim unable to escape.

CPSC staff has reports of 74 fireworks-related deaths between 2000 and 2010, for an average of 6.7 deaths per year.⁴ According to the Centers for Disease Control and Prevention (CDC), there were 58 fireworks-related deaths (an average of 6.4 deaths annually) between 1999 and 2007.⁵ Unlike the statistics presented by CPSC staff, the CDC statistics include both work-related and nonwork-related fireworks deaths.

3. National Injury Estimates for 2010

Table 1 and Figure 1 present the estimated number of nonoccupational, fireworks-related injuries that were treated in U.S. hospital emergency departments between 1991 and 2010.

⁴ See previous reports in this series (*e.g.*, the report for 2009: Greene, Tu and Granados (2010)). The number of deaths ranged from 11 deaths in 2007, to 7 deaths in 2008, and 2 deaths in 2009.

⁵ Data from CDC for ICD 10 code W39 (1999–2007). See <http://wonder.cdc.gov/cmfi10.html>.

Table 1
Estimated Fireworks-Related Injuries 1991–2010

Year	Estimated Injuries	Injuries per 100,000 People
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
1995	10,900	4.1
1994	12,500	4.8
1993	12,100	4.6
1992	12,500	4.9
1991	10,900	4.3

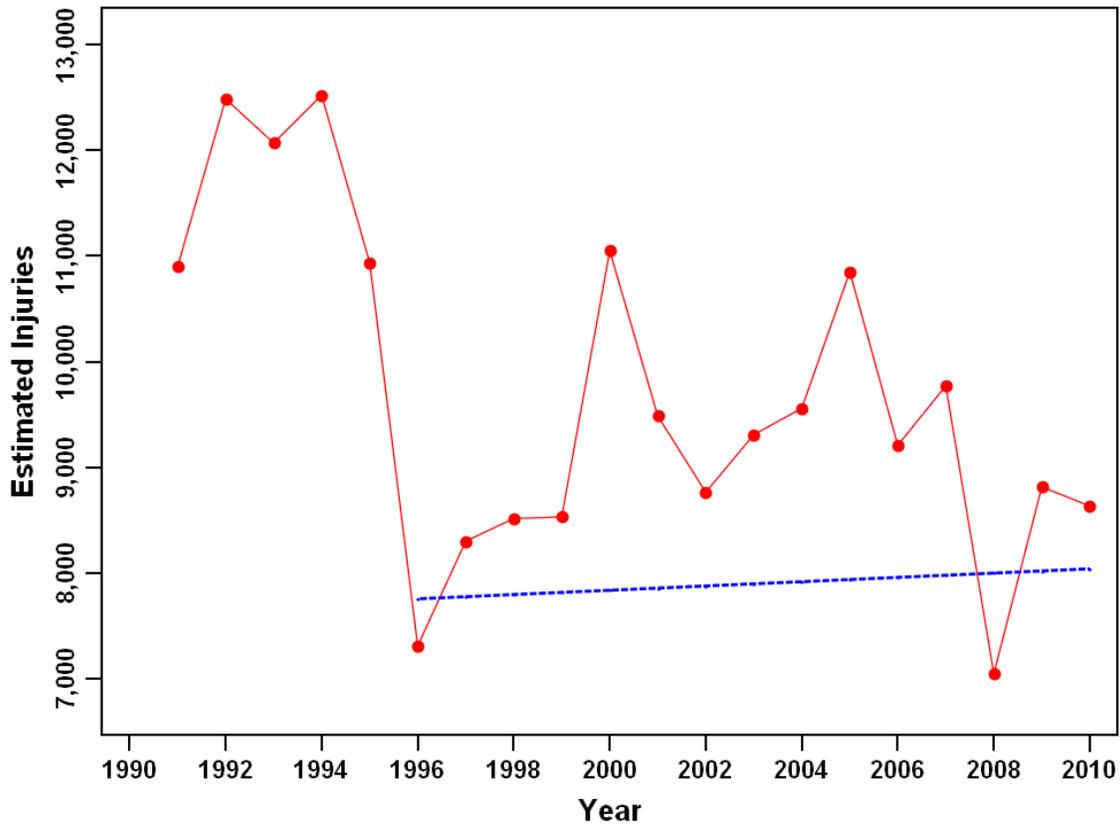
Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. The estimate for 2003 excludes an estimated 150 emergency department-treated injuries following the nightclub fire in West Warwick, RI. Estimates for 1991–1996 were revised to adjust for the changed sampling frame and do not match values published during that period. Population estimates for 2000 to 2010 from Table 1. Annual Estimates of the Resident Population by Sex and Five-Year Age Groups for the United States: April 1, 2000 to July 1, 2009 (NC-EST2009-01). Population Division, U.S. Census Bureau.
<http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>. Estimates from earlier years at <http://www.census.gov/popest/archives/1990s/nat-total.txt>.

In calendar year 2010, there were an estimated 8,600 fireworks-related, emergency department-treated injuries (95 percent confidence interval 6,600–10,700). There were an estimated 8,800 injuries in 2009. The difference between the injury estimates for 2010 and 2009 was not statistically significant.

Figure 1 shows that the highest estimated numbers of annual injuries were between the years 1991 and 1995, followed by lower estimates between 1996 and 1999. Injuries rose to 11,000 in the millennium year (2000) and then decreased to 9,500 in 2001. Between 2002 and 2007, injuries fluctuated between 8,800 and 10,800. From the second lowest annual estimate of 7,300 in 1996, to the estimate of 9,800 in 2007, there

was a statistically significant upward trend. The regression equation from 1996 to 2010 also suggests an upward trend, but 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 2010.

Figure 1
Estimated Fireworks-Related, Emergency Department-Treated Injuries
1991–2010



Appendix A contains a table showing estimated fireworks-related injuries and fireworks imports between 1996 and 2010.

⁶ For 1996 to 2010, the estimated regression slope was 20.32 injuries per year (standard error 61.85, $t=0.33$ at 13 df, $p=0.374$ one tail). For details on the regression method that incorporates the sampling design, see Schroeder (2000) and Marker et al (1999).

4. Injury Estimates for the 2010 Special Study

The injury analysis in this section presents the results of the 2010 special study of fireworks-related injuries that were treated in hospital emergency departments between June 18, 2010 and July 18, 2010. During this period, there were an estimated 6,300 fireworks-related injuries (95 percent confidence interval 4,500–8,100), accounting for 73 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 18, 2010 to July 18, 2010.

Table 2
 Estimated Fireworks-Related Injuries
 By Type of Fireworks Device
 June 18–July 18, 2010

Fireworks Device Type	Estimated Injuries	Percent
Total	6,300	100
All Firecrackers	900	14
Small	300	4
Illegal	200	2
Unspecified	500	7
All Rockets	400	6
Bottle Rockets	400	6
Other Rockets	100	1
All Other Devices	2,700	43
Sparklers	1,200	19
Fountains	200	3
Novelties	500	8
Multiple Tube	100	2
Reloadable Shells	500	8
Roman Candles	200	3
Homemade/Altered	*	*
Public Display	400	6
Unspecified	1,800	29

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Based on 176 NEISS emergency department-reported injuries between June 18, 2010 and July 18, 2010, and supplemented by 34 completed In-Depth Investigations (IDI). Fireworks types are obtained from the IDI, when available; otherwise, fireworks types are identified from victim's reports to emergency department staff that was contained in the NEISS narrative. Illegal firecrackers include M-80s, M-500s, 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 firework type estimates. Estimates are rounded to nearest 100 injuries, and percents are computed from the rounded estimates. Percentages may not add to subtotals or the total due to rounding. Estimates of less than 50 injuries are denoted with an asterisk (*).

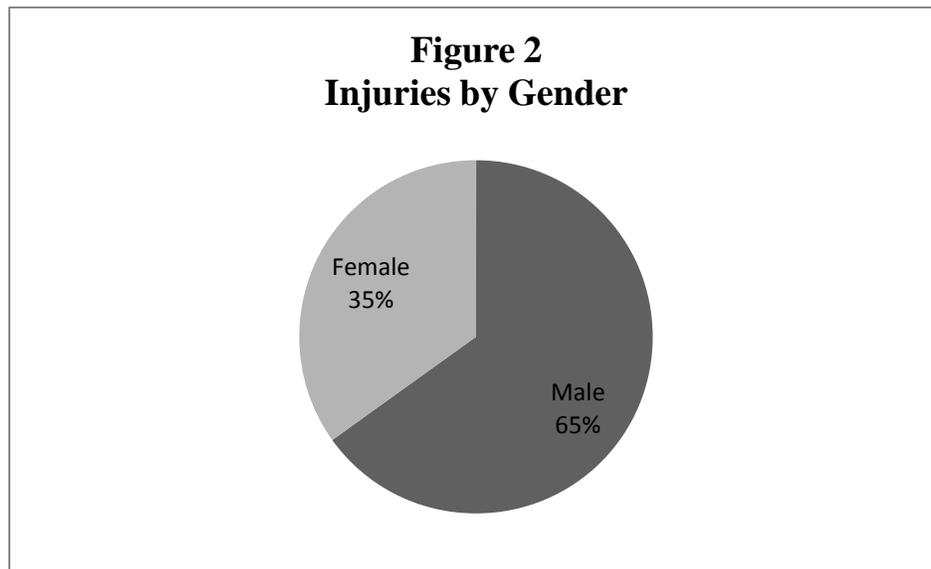
As shown in Table 2, firecrackers accounted for an estimated 900 emergency department-treated injuries, which was 14 percent of the total fireworks-related injuries during the special study period. Small firecrackers were involved in 300 injuries. The estimate for illegal firecracker-related injuries was 200; however, some of the estimated 500 unspecified firecracker-related injuries and some of the estimated 1,800 unspecified

fireworks-related injuries may have also involved illegal firecrackers. Also, sparklers accounted for an estimated 1,200 injuries, 19 percent of the total. Bottle rockets accounted for an estimated 400 injuries, 6 percent of the total.

Reloadable shells, novelty fireworks, fountains, multiple tube devices, public display fireworks, Roman candles, and homemade or altered devices each accounted for less than 10 percent of the injuries. This is in keeping with previous years. While these 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

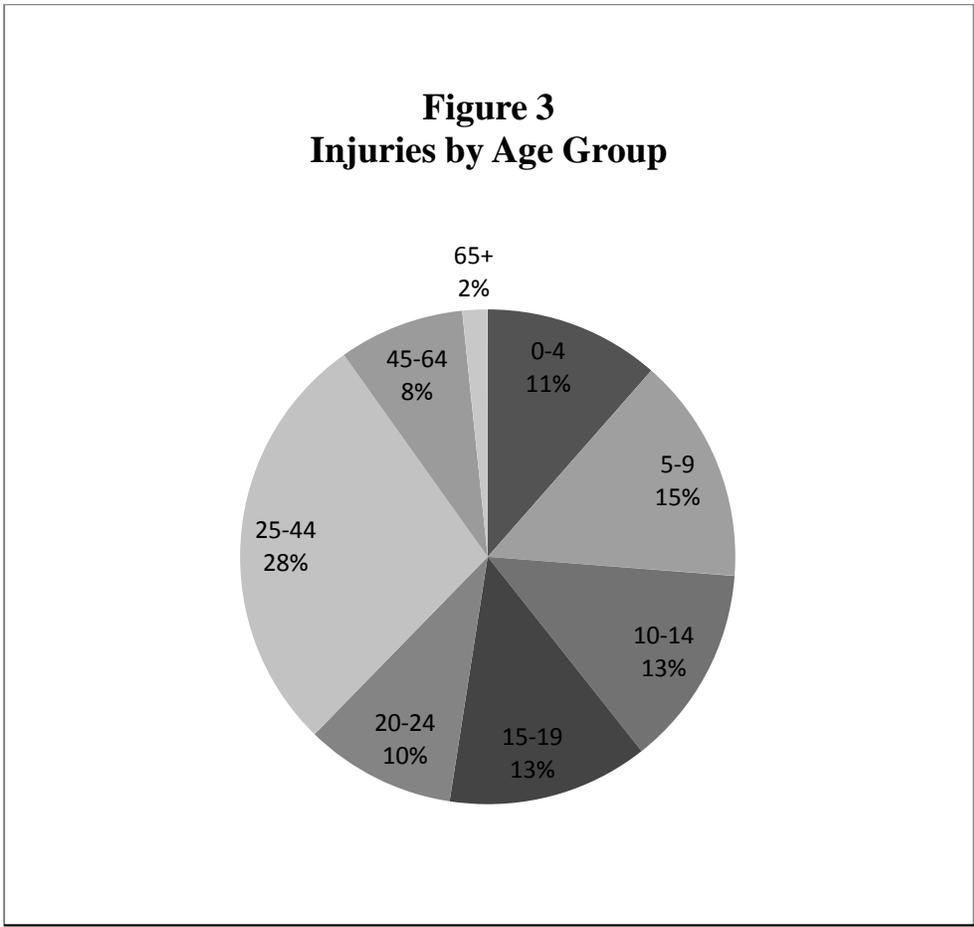
Males had 4,100 fireworks-related injuries, representing 65 percent of the total injuries. Males experienced 2.7 fireworks-related, emergency department-treated injuries per 100,000 individuals during the special study period. Females, with 2,200 emergency department-treated injuries, had 1.4 injuries 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 fireworks-related injuries by gender.



Note: Percentages are computed from rounded estimates.

Children under 5 years old experienced an estimated 700 injuries (11 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 age group experienced an estimated 1,800 injuries (29 percent of all fireworks-related injuries). Breaking that age group down further, children 5 to 9 years old had 900 injuries, and children 10 to 14 years old had 800 injuries. In the aggregate, children under 15 years old accounted for approximately 40 percent of

the fireworks-related injuries. Children and young adults under age 20 constituted 54 percent of the fireworks-related injuries.



Note: Percentages are computed from rounded estimates.

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

Table 3
 Estimated Fireworks-Related Injuries
 By Age and Sex
 June 18–July 18, 2010

Age Group	Total	Per 100,000 People	Male	Female
Total	6,300	2.1	4,100	2,200
0–4	700	3.3	400	300
5–14	1,800	4.4	1,100	700
5–9	900	4.4	600	300
10–14	800	4.0	500	300
15–24	1,400	3.2	1,100	300
15–19	800	3.7	600	200
20–24	600	2.8	500	100
25–44	1,700	2.0	1,100	600
45–64	600	0.8	300	300
65 +	100	0.3	100	*

Sources: NEISS, U.S. Consumer Product Safety Commission/EPHA, U.S. population from <http://www.census.gov/popest/national/asrh/NC-EST2009-sa.html>. The oldest victim was 65 years old. Estimates are rounded to nearest 100 injuries, and percentages are computed from the rounded estimates. Percentages may not add to subtotals or the total due to rounding. Estimates of less than 50 injuries are denoted with an asterisk (*).

When considering per capita injury rates, children 5 to 9 years old had the highest per capita injury rate at 4.4 injuries per 100,000 population. This was followed by children ages 10 to 14 years old at 4.0 per 100,000, and children ages 15 to 19 years old at 3.7 injuries per 100,000 people.

Age and Gender of the Injured Person 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 at 300 injuries, which was 43 percent of the total injuries in that age group. Children 5 to 14 years old had an estimated 400 injuries from sparklers.

No clear relationship between age and fireworks type is suggested in Table 4. It is worth noting that the number of injuries does not completely represent usage patterns 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 18–July 18, 2010

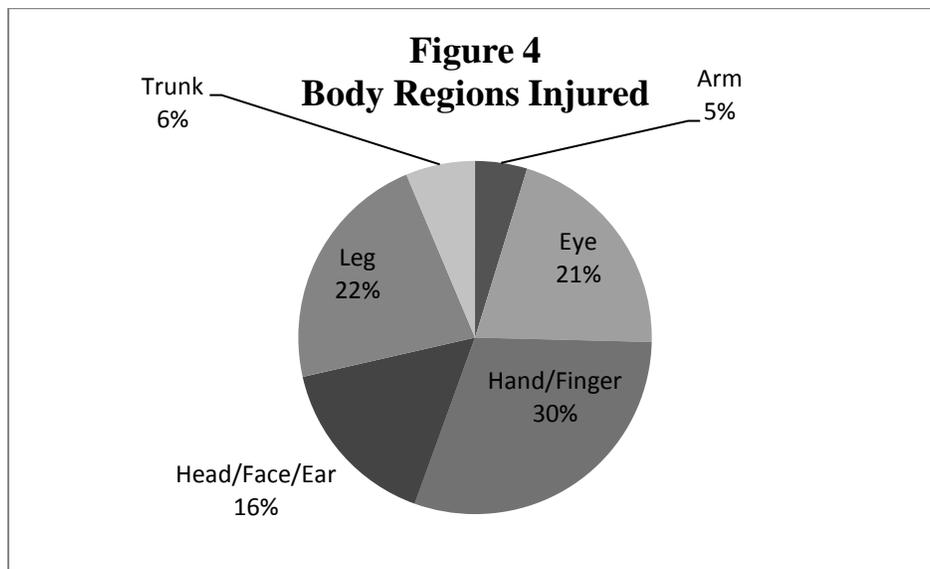
Fireworks Type	Total	Age Group					
		0–4	5–14	15–24	25–44	45–64	65+
Total	6,300	700	1,800	1,400	1,700	600	100
All Firecrackers	900	*	100	200	400	*	*
Small	300	*	100	100	100	*	*
Illegal	200	*	*	*	100	*	*
Unspecified	500	*	*	200	200	*	*
All Rockets	400	100	100	200	*	100	*
Bottle Rockets	400	100	*	200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

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Estimates are rounded to nearest 100 injuries, and percents are computed from the rounded estimates. Percentages may not add to subtotals or the total due to rounding. Estimates of less than 50 injuries are denoted with an asterisk (*).

As mentioned previously, males experienced 65 percent of the fireworks-related injuries, and females accounted for 35 percent. Males were associated with all the estimated injuries from fountains and most of the estimated injuries from bottle rockets, novelty devices, and reloadable shells. Females experienced more injuries than males in incidents at public fireworks displays.

Body Region Injured and Injury Diagnosis

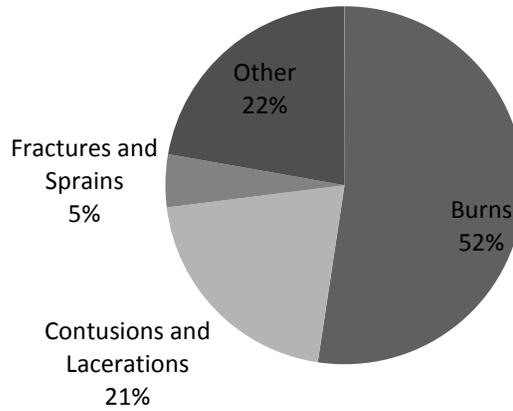
Figure 4 presents the distribution of estimated emergency department-treated injuries by specific parts of the body where the injury occurred. Hands and fingers, with an estimated 1,900 injuries, accounted for 30 percent of the total injuries. These were followed by an estimated 1,400 leg injuries, accounting for 22 percent; 1,300 eye injuries, accounting for 21 percent; and 1,000 injuries to the head/face/ear region (16 percent). The remaining 11 percent of the injuries were to the arm or trunk.



Note: Percentages are computed from rounded estimates.

Figure 5 shows the types of injuries. Burns, with 3,300 estimated injuries (52 percent) was the most frequent injury diagnosis. Contusions and lacerations were associated with 1,300 injuries (21 percent), and fractures and sprains were involved in 300 injuries (5 percent). The remaining 1,400 estimated injuries (22 percent) were attributed to other diagnoses.

Figure 5
Type of Injuries



Note: Percentages are computed from rounded estimates.

The most frequent injuries to hands, fingers, legs, and arms were burns. Also, nearly half of the injuries to the head and face were burns. 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 18–July 18, 2010

Body Region	Total	Burns	Diagnosis		
			Contusions Lacerations	Fractures Sprains	Other Diagnoses
Total	6,300	3,300	1,300	300	1,400
Arm	300	300	*	*	*
Eye	1,300	300	500	*	600
Hand/Finger	1,900	1,300	300	*	100
Head/Face/Ear	1,000	500	400	*	200
Leg	1,400	800	100	300	300
Trunk/Other	400	100	*	*	200

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 region 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 region includes chest, abdomen, pubic region, all parts of body, internal, and 25–50 percent of body. Estimates are rounded to nearest 100 injuries, and percents are computed from the rounded estimates. Percentages may not add to subtotals or the total due to rounding. Estimates of less 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 18–July 18, 2010

Fireworks Type	Total	Region of the Body					
		Arm	Eye	Head/Face	Hands/Fingers	Leg	Trunk/Other
Total	6,300	300	1,300	1,000	1,900	1,400	400
All Firecrackers	900	100	100	200	300	200	*
Small	300	*	*	100	100	100	*
Illegal	200	*	*	*	100	100	*
Unspecified	500	100	100	100	100	100	*
All Rockets	400	*	200	*	200	*	*
Bottle Rockets	400	*	200	*	200	*	*
Other Rockets	100	*	*	*	*	*	*
Other Devices	2,700	100	400	300	1,200	600	100
Sparklers	1,200	*	200	100	500	300	100
Fountains	200	100	100	100	*	*	
Novelties	500	*	*	*	300	200	*
Multiple Tube	100	*	*	*	100	*	*
Reloadable	500	*	*	*	300	100	*
Roman Candles	200	*	100	100	*	*	*
Homemade/Altered	*	*	*	*	*	*	*
Public Display	400	100	200	*	*	100	100
Unspecified	1,800	*	500	500	200	400	100

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. See notes for Table 2 and Table 5.

About 42 percent of the estimated sparkler injuries involved the hands and fingers. Fireworks devices that fly or emit sparks were associated with eye, head, and face injuries. These included fountains, novelties, public display fireworks, and sparklers.

Hospital Treatment

An estimated 92 percent of the victims of fireworks-related injuries were treated at the emergency department and then released; about 3 percent of victims were treated and transferred to another hospital; approximately 4 percent were admitted to the

hospital; and the remaining 1 percent of victims left without being seen. The treat and release percentage was about the same for all consumer products in 2010.⁷

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 18, 2010 to July 18, 2010). 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), their medical care following the emergency department treatment, and the long-term effects, if any, from their injury. Respondents were also asked detailed questions about the fireworks, including its type, markings, and where it was 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 177 emergency department-treated, fireworks-related injuries during the special study period, staff selected 69 cases for telephone investigations, of which 34 were completed and determined to be in scope, and one was completed and found to be out of scope. Table 7 shows the final status of these investigations.

⁷For all injuries in 2010, 92 percent of patients were treated and released; 1 percent was transferred to other hospitals; 5 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	69	100
Completed Investigation	35	51
In-scope	34	49
Out-of-scope	1	1
Incomplete Investigations	34	49
Failed to Reach Patient	15	22
Victim Name Not Provided by Hospital	14	20
Victim Refused to Cooperate	5	7

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

One case was found to be out of scope after receiving information in the telephone investigation that indicated that fireworks were not involved in the incident. Short descriptions of the remaining 34 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 Statistics

Of the 34 completed cases, 27 (79 percent) involved males, and seven (21 percent) involved females. There were 5 victims (15 percent) age 0 to 4 years old; 10 victims (29 percent) age 5 to 14 years old; 7 victims (21 percent) age 15 to 24 years old; 9 victims (26 percent) age 25 to 44 years old; and 3 victims (9 percent) age 45 to 64 years old. With respect to emergency department dispositions, 9 victims (26 percent) were admitted to the hospital, and 25 (74 percent) were treated and released.

The most frequently used fireworks devices in these incidents were aerial shells⁸ and unspecified devices, each accounted for 7 incidents (21 percent); followed by sparklers with 6 incidents (18 percent). Four cases (12 percent) were associated with rockets (3 with bottle rockets and 1 with unspecified rocket). Also, firecrackers were involved in 4 incidents (12 percent), one was related to large firecrackers, and the other 3 were related to firecrackers with unspecified size. Novelty devices (*e.g.*, smoke bombs)

⁸ The category “aerial shells” includes multiple tube, reloadable mortars and rockets, but excludes bottle rockets.

were associated with 3 incidents (9 percent). Fountains were involved in 2 incidents (6 percent) and homemade devices were associated with 1 incident (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 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	34	100
Misuse	10	29
Holding Fireworks in Hand	3	9
Mischief	2	6
Fireworks Not Set Properly	2	6
Lighting Fireworks Near Explosive	1	3
Fireworks Wrapped Together	1	3
Other Misuse	1	3
Malfunction	21	62
Debris, Smoke	9	26
Errant Flight Path	5	15
Early or Late Ignition	4	12
Tipover	3	9
Other	3	9

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

Misuse (10 victims injured, 29 percent)

Ten victims were injured when fireworks were used in ways that depart from typical usage.

Holding Fireworks in Hand. In Case 1, an 11-year-old male found an unused golf ball-shaped firework on the beach. He held the firework in his right hand and lit it. The firework exploded in his hand, and he was injured. In Case 9, a 42-year-old male set off smoke bombs to get rid of bugs, and one of the smoke bombs blew up in his hand. He was injured seriously. In Case 13, the victim's older brother lit an unspecified firework, and the 3-year-old male victim grabbed the firework and held it in his hand before his brother could throw it away. The firework exploded in the victim's hand and injured him.

Mischief. Two victims were injured as a result of mischievous acts by others. In Case 21, when a 12-year-old female and her family were getting out of their car on the driveway, her neighbor deliberately threw a string of fireworks at them. The popping sound frightened the victim, and she hit her head against the car door when she jumped backwards. In Case 23, a 16-year-old male was injured when another child threw a firework under his chair at school. The victim was scared by the loud noise from the firework and hit his head against the wall.

Fireworks Not Being Set Properly. In Case 15, a 6-year-old female and her stepsister placed a bottle rocket in a cone improperly. When they lit it, the rocket shot into the victim's lip and hurt her. In Case 22, a 12-year-old male did not fully unwrap the fuse of a fountain firework. As a result, the fuse was too short, and the firework exploded near his face and injured his eye.

Lighting Fireworks Near Explosive. In Case 8, a 41-year-old male lit sparklers just a few feet away from an open cooler, which contained flash powder. A sparkler landed in the cooler and caught the flash powder on fire. The victim's leg was on the cooler, and he sustained burns from his right foot up to his forearm.

Fireworks Wrapped Together. In Case 5, a 26-year-old male made a sparkler bomb by wrapping a number of sparklers with duct tape. He lit the sparkler bomb, and it exploded before he could move away. He was injured in several places.

Other Misuse. In Case 19, a 7-year-old boy was running around with a sparkler in his hand and waving it. The sparkler slipped into his hand and burned his palm.

Malfunction (21 victims injured, 62 percent)

Twenty-one victims were injured when fireworks reportedly malfunctioned. These injuries included debris and smoke with 9 injuries, errant flight paths with 5 injuries, early or late ignitions with 4 injuries, and tipovers with 3 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 and Smoke. In Case 2, a 14-year-old male and his friends were lighting fireworks in the street. He was injured when a rocket, ignited by someone else, went sideways, and a spark from it lit his pants, and they caught on fire. In Case 3, a 19-year-old male was injured by debris from a smoke bomb set off by his father. He was standing next to his father, and the debris lodged in his leg. In Case 10, a 2-month-old baby girl was carried by her mom to their car in a car seat. Some debris or sparks from fireworks landed on her car seat, and the material of the car seat burned. The victim was injured on her lower leg. In Case 11, a 5-month-old baby girl was held by her aunt on a porch. A boy came down the street throwing some fireworks. The victim started crying, and her aunt felt that she may have been hit in the eye by one of the sparks. In Case 12, a 3-year-old boy was given a used sparkler that was still hot. He attempted to throw the sparkler, but it went down his shirt. He suffered burns to his chest. In Case 14, a 4-year-old boy's father lit some smoke bombs that shot off colored smoke. The victim ran into the smoke and leaned over to a smoke bomb on the ground. The tar that held the wick was still "sizzling," and a small piece of tar shot into his eye and injured him. In Case 16, someone lit a firecracker, leaving sparks on the ground. A 6-year-old female did not see the sparks and stepped on them; the bottom of her right foot was burned. In Case 18, a 7-year-old boy was watching his neighbor set off fireworks. His neighbor held an aerial fountain in his hand and lit it. The firework ignited so fast that the neighbor dropped it; the firework went sideways, and the sparks hit the victim and injured him. In Case 24, a 17-year-old male and his friends were standing by an open car door to block the wind so they could light sparklers. A spark flew into the back seat of the car and ignited a blanket. The victim grabbed the blanket and got thermal burns to his right hand.

Errant Flight Path. In Case 4, a 22-year-old male was about 12 feet away from where a bottle rocket was ignited. His friend held the rocket in his hand and then dropped it on the ground. The rocket skipped across the lawn and went into the victim's eye and injured him. In Case 7, a 40-year-old female was 7 or 8 feet away from where aerial shells were setting off. One of the fireworks fell out the tube, went sideways, and hit her in the chest. In Case 26, a 20-year-old male was in his backyard when a neighbor ignited aerial shells about 25 feet away from him. The last shell went sideways through a cardboard box and injured him. In Case 31, a 40-year-old male was in his backyard. One firecracker (size unspecified) set off by his neighbor ran sideways, and a piece of metal from the firework stuck in his ankle. In Case 34, a 63-year-old male was 50 feet away from where fireworks were set off by a neighbor. His neighbor ignited a mortar, which set off 9 other mortars individually. One mortar ran sideways and stuck the victim's leg.

Early or Late Ignition. In Case 25, a 19-year-old male lit a large firecracker and as he was about to throw it up in the air, the firecracker exploded quicker than he expected and fractured his finger. In Case 29, a 35-year-old male was setting off mortars. One of the mortars did not go off, so he went over to light it again after a few minutes. He was looking down when he relit it. The mortar exploded in his face and injured him within a second. In Case 30, a 38-year-old male was drinking while lighting a sparkler, which was

more than 1-year-old. The sparkler blew up very quickly and gave off a big spark that burned his thumb. In Case 32, a 50-year-old male made some firecrackers on July 4. When he held one and lit it, the firecracker blew up in his hand before he expected.

Tipover. In Case 6, a 31-year-old male lit a cannon-type firework and as the firework started to fall over, he grabbed it and set it back up. The firework exploded in his hand before he could get out of the way. In Case 27, a 20-year-old male was setting off aerial shells. One of the tubes fell over on the ground as he was lighting it. He grabbed the tube at the top and got burned in his left hand. In Case 33, a 51-year-old male was watching someone else setting off multiple tube devices. The container that held fireworks sat on a table. The first two fireworks went off okay. However, the container fell off the table and caused the third firework to go sideways and hit the victim in the left knee.

Other (3 victims injured, 9 percent)

In Case 17, a 6-year-old female did not see the bottle rocket shot off by her neighbor and was hit in the eye. In Case 20, a 9-year-old male was injured when he tried to light a firecracker (size unspecified) and instead, set his shirt on fire. In Case 28, a 33-year-old male was injured by an unspecified fireworks device lit by someone next to him in the street.

Long-Term Consequences of Fireworks-Related Injuries

Victims were asked if there were any long-term consequences of their injuries. Most (25 of 34, or 74 percent) expected complete recoveries with no long-term effects. Some of the victims who reported that they might experience long-term effects of the injuries were as follows:

- In Case 1, the victim lost his right index and middle fingers and thumb after a golf ball-shaped firework exploded in his right hand. He is not expected to gain full function of his right hand.
- In Case 2, the victim sustained third degree burns on his upper left leg when a spark from someone else's firework hit his pants, which caught fire. He still has lingering sensitivity in his left leg.
- In Case 4, the victim was hit in the right eye by a rocket and suffered acute vision loss and a large hyphema. After hospitalization and additional visits to an eye specialist, his vision is still blurry, and he is unsure if his vision will return.
- In Case 6, the victim burned his entire left hand when he grabbed a tipped over cannon-type firework to set it upright; the firework exploded in his hand. He was unsure if there would be any long-term nerve damage.
- In Case 8, the victim lit sparklers near an open cooler with flash powder in it. One sparkler landed in the cooler and ignited flash powder. The victim suffered second and third degree burns on his right foot to forearm (about 25 percent of his body). He has nerve damage and cannot lift his arm above his head.

- In Case 9, the victim lit a smoke bomb, and it blew up in his hand. He lost fingers and the palm of his hand. He does not expect to gain full function of his hand.
- In Case 17, the victim did not see the bottle rocket set off by her neighbor and was hit in the right eye. She suffered eye trauma, and her parent reported that she could get glaucoma because of the injury.
- In Case 23, the victim suffered a head injury at school when someone threw an unspecified firework under his chair. The victim, scared by the loud noise from the firework, hit his head against a wall and passed out. His parents were unsure if there would be any long-term effects from his injury.
- In Case 31, a 40-year-old male was hit by a piece metal from a firecracker set off by his neighbor. After additional medical treatment for the injury, he was unsure whether there would be any long-term effects.

Where Fireworks Were Obtained

Of the 34 telephone survey respondents, 18 (53 percent) knew where the fireworks were obtained. Twelve respondents reported that the fireworks had been obtained from a stand; 3 indicated the fireworks were obtained from a store; and 3 stated that the fireworks were acquired from a relative.

Fourteen victims (41 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.

One of the two remaining respondents stated that he made the firecrackers himself on July 4, 2010, and the other respondent refused to tell where the fireworks that injured him were obtained.

6. Enforcement Activities

The CPSC, through 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. CPSC staff's enforcement activities are focused on reducing the number of fireworks-related deaths and injuries. A variety of enforcement techniques and national, as well as international initiatives were used in 2010 to keep unsafe fireworks from consumers.

CPSC staff continues to work closely with U.S. Customs and Border Protection (Customs) to conduct surveillance on imported shipments of consumer fireworks. CPSC established permanent staffing at the Import Safety Commercial Targeting and Analysis Center (CTAC) in Washington, D.C., and is working in cooperation with Customs to implement new enforcement measures. In 2010, staff began implementing new procedures for identifying and selecting fireworks entries for examination and sampling. CPSC staff no longer requests all importers to fax consumer fireworks entry packets to the CPSC in

advance (as had been the practice for many years). Staff now notifies importers and brokers if their shipment has been identified for further examination. Follow-up correspondence is sent, indicating which items, if any, will be sampled and tested. Fireworks were selected for testing either at random or based on the past violation history of the type of device, whether the item had been sampled previously, and other factors. With assistance from Customs, CPSC staff selectively sampled and tested numerous shipments of imported fireworks in fiscal year 2010 for compliance with the FHSA. Approximately 43 percent of the shipments targeted by CPSC staff contained noncompliant fireworks. CPSC staff requested corrective action on these noncompliant fireworks, and in most cases, the firms voluntarily destroyed the noncompliant fireworks. Also, in June 2010, CPSC announced the recall of a violative fireworks device that had been sold to consumers.

Another enforcement activity that continues to remain a priority for CPSC staff is the investigation of firms and individuals that offer kits and components to make illegal and dangerous firecracker-type explosives, such as M-80s and Quarter Sticks. Since 2006, CPSC staff has worked with the U.S. Department of Justice on cases involving companies and/or individuals involved in selling the chemicals and components used to make illegal fireworks.

Also, CPSC staff continues to maintain close relations with the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), the Justice Department's Office of Consumer Litigation, as well as state and local law enforcement agencies. CPSC staff has provided training on consumer fireworks regulations to ATF's Industry Operations Investigators, as well as legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers.

Most fireworks are manufactured outside the United States and China (98 percent) and Hong Kong (1 percent) are the sources of most imported fireworks.⁹ In light of this, CPSC staff visited consumer fireworks factories in China to gain a better understanding of the manufacturing process. CPSC's agreement and subsequent Work Plans with its counterpart Chinese agency, the AQSIQ, provide for extensive information exchange and cooperation. CPSC staff participates in digital video conferences with AQSIQ technical staff to discuss consumer fireworks activities.

7. Summary

In 2010, there were 3 reported fireworks-related deaths, an increase from the 2 deaths reported in 2009. However, reporting for 2009 and 2010 may not be complete at this time. Emergency department-treated injuries, estimated at 8,600 for 2010, decreased

⁹ These data are from 2010 statistics from the U.S. International Trade Commission. There were 199.6 million pounds of fireworks imported, with 195.3 million pounds from China (98 percent), and 2.7 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 1.1 million pounds.

slightly from the estimated 8,800 injuries in 2009. The difference between the injury estimates for 2009 and 2010 is not statistically significant.

During the 1-month special study period from June 18, 2010 to July 18, 2010, there were an estimated 6,300 emergency department-treated injuries, somewhat greater than the 2009 estimate of 5,900 injuries. However, the difference is not statistically significant. Similar to previous years, in 2010, children under 15 years old experienced about 40 percent of the injuries, and males of all ages experienced 65 percent of the injuries.

Also similar to previous years, approximately more than half the injuries in 2010 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 30 percent of the injuries), legs (22 percent), eyes (21 percent), and the head, face, and ears (16 percent). Most 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, sparklers were associated with 19 percent of the injuries. Firecrackers were involved in 14 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, including mischief and improper use; (2) ignition and explosion of fireworks earlier than expected; (3) errant flight paths; (4) aerial shell device tipovers; and (5) debris and smoke associated with eye irritations. At the time of the telephone investigation, typically one to two 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 2010, CPSC staff's enforcement activities remained at a high level. CPSC's Office of Compliance and Field Operations worked with Customs to sample imported fireworks and to seize illegal shipments. Staff provided legal, field, and technical support in cases involving the distribution of illegal explosive devices and the illegal diversion of professional fireworks to consumers. Staff also continued working with the Chinese government's AQSIQ. China is the world's largest exporter of fireworks, and most fireworks imported into the United States come from China. Fireworks is 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 2010, 199.6 million pounds, were a little higher than they were in 2009. 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.

Injuries per 100,000 pounds were slightly lower in 2010, than the previous year at 4.3 injuries per 100,000 pounds.

Table A-1
Estimated Fireworks-Related Injuries and
Estimated Fireworks Imported into the U.S. 1996–2010

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)	Injuries Per 100,000 Pounds
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 7.4 percent of the total imports in 2010. 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 2010 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	11	Male	Amputation	Admit	Finger	Unspecified	Victim found an unused golf ball-shaped firework on beach and lit it. The firework exploded in his right hand. The victim lost right index and middle fingers and thumb.	After discharge, the victim had additional medical treatment for his injuries. He has not recovered yet, and is not expected to regain full function of his right hand.
2	14	Male	Thermal Burns	Admit	Upper Leg	Rocket Unspecified	Victim and his friends were lighting fireworks in the street. A rocket lit by someone else went sideways, and a spark from it hit the victim's pants, and they caught on fire. The victim suffered third degree burns on his upper left leg.	After being admitted to hospital overnight, the victim had additional medical visits and underwent surgery. The victim has not fully recovered, and the sensitivity in his leg is expected to go away within a year.
3	19	Male	Foreign Body	Admit	Upper Leg	Smoke Bomb	The victim's father lit a smoke bomb to fight off bugs as the victim was standing next to him. The smoke bomb blew up in his father's hand, and the debris from the fireworks hit the victim and lodged in his leg.	After emergency department and additional treatment, the victim fully recovered in two weeks.
4	22	Male	Other	Admit	Eye	Bottle Rocket	Victim was about 12 feet away from a lit bottle rocket. His friend held the rocket in his hand and then dropped it on the ground. The rocket skipped across the lawn and hit the victim in his right eye. The victim suffered acute vision loss and a large hyphema.	After hospitalization, the victim saw an eye specialist to check his eye. His vision is still blurry, and he is unsure if his vision will return fully.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
5	26	Male	Internal Injury	Admit	Upper Trunk	Sparkler	Victim made a sparkler bomb by wrapping a number of sparklers with duct tape. He set it on the ground and lit it; the sparkler bomb exploded before he could move away. The victim was hit in several places.	Victim was admitted to the hospital and had surgery to remove his skin and flesh from his right knee, hip, and leg. After discharge, the victim had additional medical visits to check the skin graft. He expects a full recovery in two or more months.
6	31	Male	Thermal Burns	Admit	Hand	Aerial Shell	The victim lit a cannon-type firework, and when it started to fall over, he grabbed it to set it back upright. Before he could get out of the way, the firework exploded in his hand. The victim's left thumb was hanging off, and his entire hand burned.	After discharge, the victim sought additional treatment for his injuries. There could be long-term nerve damage to his hand, but the victim doesn't know that for sure yet.
7	40	Female	Thermal Burns	Admit	Upper Trunk	Aerial Shell	The victim was seven or eight feet away from where aerial shells were setting off. One of the fireworks fell out the tube and went sideways, and the victim was hit in the chest.	The victim sustained burns to her chest and stomach. The victim has since fully recovered.
8	41	Male	Thermal Burns	Admit	25-50% of Body	Sparkler	Victim was lighting sparklers a few feet away from an open cooler containing flash (gun) powder. A sparkler landed in the cooler; the flash powder caught fire. Victim's leg was on the cooler; he sustained second and third degree burns from his right foot to his forearm (about 25% of his body).	The victim was hospitalized for a month. After discharge, he had additional medical visits to treat his injuries. The victim suffered nerve damage and cannot lift his arm above his head.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
9	42	Male	Amputation	Admit	Finger	Smoke Bomb	The victim set off smoke bombs to get rid of bugs, and one of the smoke bombs blew up in his hand. The victim lost his fingers and the palm of his hand, and had injury to his right eye and a 4-inch hole in his stomach.	The victim was still in the hospital as of the date of the telephone interview, and did not expect to gain full function in his hand.
10	2 Months	Female	Thermal Burns	Treated and Released	Lower Leg	Unspecified	The victim was carried by her mom to their car in a car seat. They had been watching fireworks set off by a neighbor a few houses away at her aunt's house. Some debris or sparks from the fireworks landed on the car seat, and the material of the car seat burned. The mother took the victim out of the car seat and noticed a red mark on her lower leg.	The victim suffered slight burn on her lower leg, and has fully recovered in seven days.
11	5 Months	Female	Other	Treated and Released	Eye	Unspecified	The victim was held by her aunt on the porch. A boy came down the street throwing some fireworks. The victim started to cry, and her aunt felt that she may have been hit in the eye by one of the sparks. The victim was taken to the hospital to be checked the next day, and she was fine.	The victim recovered the next day.
12	3	Male	Thermal Burns	Treated and Released	Upper Trunk	Sparkler	Victim was given a used sparkler that was still hot. He attempted to throw the sparkler, but it went down his shirt. He suffered second degree burns to his chest.	The victim has fully recovered after the emergency department treatment.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
13	3	Male	Thermal Burns	Treated and Released	Finger	Unspecified	Victim's older brother lit a firework and before he could throw it away, the victim grabbed the firework and held it in his hand. The firework exploded in the victim's hand.	Victim sustained second degree burns on his fingers. He fully recovered in 10 days.
14	4	Male	Contusions Abrasions	Treated and Released	Eye	Smoke Bomb	Victim's father lit some smoke bombs that shot off colored smoke. The victim ran into the smoke and leaned over to a smoke bomb on the ground. The tar holding wick was still "sizzling," and a small piece of tar shot into the victim's eye.	The victim suffered corneal abrasion. He has fully recovered.
15	6	Female	Thermal Burns	Treated and Released	Mouth	Bottle Rocket	Victim's father was igniting some "whistler" rockets on the school yard. The victim and her step-sister got one of the rockets, put it in a cone, and lit it with a punk stick. They didn't insert the rocket properly into the cone, and as a result, the rocket went into the victim's lip when ignited.	The victim sustained second degree burns to her lip. After additional medical treatment, the victim fully recovered in three weeks.
16	6	Female	Thermal Burns	Treated and Released	Foot	Firecracker Unspecified	Someone lit a firecracker, and sparks were on the ground. Victim didn't see the sparks and stepped on them.	Victim burned the bottom of her right foot. She was treated at emergency department and then sought more treatment. She has fully recovered.
17	6	Female	Foreign Body	Treated and Released	Eye	Bottle Rocket	Victim went outside just as her neighbor shot off a bottle rocket. Victim didn't see the rocket when it went off, and she was hit in the right eye.	Victim suffered eye trauma. She saw an eye doctor after treatment at emergency department. She may develop glaucoma due to the injury.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
18	7	Male	Thermal Burns	Treated and Released	Lower Arm	Fountain	The victim was watching his neighbor setting off fireworks. The neighbor was on the last aerial fountain firework. Instead of putting it on the ground, the neighbor held it in his hand and lit it. The firework ignited so fast that he dropped it and it went sideways. The sparks hit the victim's lower arm and stomach area causing third degree thermal burns.	The victim has fully recovered.
19	7	Male	Thermal Burns	Treated and Released	Hand	Sparkler	The victim was running around with a sparkler in his hand and waving it. The sparkler slipped into his hand and he got a second degree burn to his palm.	After emergency department and additional treatments, the victim has fully recovered in ten days.
20	9	Male	Thermal Burns	Treated and Released	Upper Trunk	Firecracker Unspecified	The victim tried to light a firecracker, and instead he lit his shirt on fire. The victim sustained first and second degree burns to his chest and stomach.	After treatment at emergency department, the victim has fully recovered in two weeks.
21	12	Female	Hematoma	Treated and Released	Head	Unspecified	When the victim and her family were getting out of their car on the driveway, a neighbor deliberately threw a string of fireworks at them. The popping sound frightened the victim, and she hit her head against the car door when she jumped backwards. The victim sustained hematoma to her head.	The victim recovered in two days.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
22	12	Male	Other	Treated and Released	Eye	Fountain	Victim didn't fully un-wrap the fuse of a fountain-type firework that he was lighting. As a result, the fuse was too short and the firework exploded near his face and caused a tiny hole in his retina.	The victim sought additional medical treatment after the emergency room visit, and he has fully recovered in a few days.
23	16	Male	Internal Injury	Treated and Released	Head	Unspecified	The victim was at school when another child threw a firework under his chair. The loud noise from the firework scared the victim, and he hit his head against a wall and passed out. The victim suffered head injury.	The victim had not yet recovered from his injury as of the date of the telephone interview, and his parents didn't know if there would be any long-term effects from the injury.
24	17	Male	Thermal Burns	Treated and Released	Hand	Sparkler	The victim and his friends were standing by an open door of a car to block wind so they could light sparklers. A spark flew into the back seat of the car and ignited a blanket. The victim grabbed the blanket and got thermal burns to the palm of his right hand.	After emergency department treatment, the victim fully recovered in two weeks.
25	19	Male	Fracture	Treated and Released	Finger	Large Firecracker	The victim lit a big firecracker and was about to throw it up in the air. The firecracker exploded quicker than he expected and fractured his index finger.	The victim fully recovered in a week.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
26	20	Male	Thermal Burns	Treated and Released	Upper Leg	Reloadable Aerial Shell	The victim was in his backyard when a neighbor ignited aerial shells about 25 feet away from him. The last shell went sideways through the cardboard box and hit the victim's chest. The victim rolled over and the shell hit his upper thigh and exploded.	The victim sustained third degree burns on right calf and second degree burns on both inner thighs. After treatment at emergency department, he fully recovered in two weeks.
27	20	Male	Laceration	Treated and Released	Hand	Aerial Shell	The victim was setting off reloadable aerial shells at a friend's home. One of the tubes fell over on the ground as he was igniting it. The victim grabbed the tube at the top and got first degree burns on his left hand around thumb.	Following treatment at emergency department, the victim completely recovered in two weeks.
28	33	Male	Contusions Abrasions	Treated and Released	Mouth	Unspecified	The victim was ready to set off fireworks in the street when he heard a loud boom. Someone next to him set off a firework, which hit the victim in face and cut his mouth. The victim didn't realize that the other person had lit the firework until he was hit.	After treatment at emergency room, the victim fully recovered in five days.
29	35	Male	Contusions Abrasions	Treated and Released	Eye	Aerial Shell	The victim was setting off mortar type of fireworks in a parking lot. One of the fireworks he lit didn't go off. After a few minutes the victim went over to light it again. He was looking down when he relit it. The firework exploded in his face within a second.	The victim suffered impact injury in his eyes and was legally blind for a week. After treatment at emergency department, the victim saw an eye specialist to evaluate his injury. He hasn't recovered yet, but expects the swelling in his eyes to go down within three months.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
30	38	Male	Thermal Burns	Treated and Released	Finger	Sparkler	The victim was drinking and lit a year-old sparkler. The sparkler blew up very quickly and gave off a big spark that burned his thumb.	The victim sustained second degree burns to his thumb. After emergency department and additional treatment, he fully recovered in 20 days.
31	40	Male	Foreign Body	Treated and Released	Ankle	Firecracker Unspecified	The victim was in the backyard, and one of the firecrackers set off by his neighbor went sideways and hit him at ankle. The victim did not realize that he was hit until it started to swell 10 or 15 minutes later. He went to the hospital the next day and was told that a piece of metal from the firework was in his ankle.	After treatment at emergency department, the victim had additional visits to doctors for checkups. He had not yet recovered at the time of the telephone interview, and didn't know if there would be any long-term effects from the injury.
32	50	Male	Laceration	Treated and Released	Hand	Homemade	The victim made some firecrackers on July 4. When he held one in his hand and lit it, the firework blew up in his hand before he got a chance to throw it.	The victim sustained lacerations to his right hand. Following emergency department and further treatment, he fully recovered in a week.
33	51	Male	Contusions Abrasions	Treated and Released	Lower Leg	Multiple Tube Device	The victim was watching someone else setting off multiple tube-type fireworks. The container that held fireworks was sitting on a table. The first two fireworks went off okay. However, the container fell off the table and caused the third firework to go sideways and hit the victim in the left knee.	The victim's left knee was bruised and infected. He had additional medical visits to treat infection after treatment at emergency room. The victim has not recovered and expects a full recovery within six weeks.

Case Number	Age	Sex	Diagnosis	Disposition	Body Part	Fireworks Type	Incident Description	Medical Treatment and Prognosis
34	63	Male	Other	Treated and Released	Lower Leg	Aerial Shell	The victim was 50 feet away from where the fireworks were set up by his neighbor. The neighbor ignited a mortar, which set off nine other mortars individually. One mortar went sideways and hit the victim in the leg.	The victim sustained a bad bruise, and his leg got infected. Following treatment at the emergency department, the victim recovered completely within in two weeks.