2012 Fireworks Annual Report

Fireworks-Related Deaths, Emergency Department-Treated Injuries, and Enforcement Activities During 2012

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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 2012. The report also includes a summary of CPSC staff enforcement activities during 2012.

Staff obtained information on fireworks-related deaths from news clippings and other sources in the CPSC's Injury and Potential Injury Incident file (IPII) and the CPSC's Death Certificate File. Staff estimated fireworks-related injuries treated in hospital emergency departments from CPSC's National Electronic Injury Surveillance System (NEISS). CPSC staff conducted a special study of nonoccupational fireworks-related injuries occurring between June 22, 2012 and July 22, 2012. The special study included a more detailed analysis on the type of injury, the fireworks involved, and the characteristics of the victim and the incident scenario. About 60 percent of the estimated annual fireworks-related emergency department-treated injuries for 2012 occurred during that period.

Highlights of the report follow:

Deaths and Injuries

- CPSC staff received reports of six nonoccupational fireworks-related deaths during 2012. In the first incident, a 17-year-old male died of injuries sustained when a sparkler bomb that he and his friend made exploded. In the second incident, a 30-year-old male died of severe facial injuries six days after a mortar-type of firework ignited in his face. In the third incident, a 26-year-old male perished when an illegal 1.3G aerial firework device[1] exploded. In the fourth incident, a 60-year-old male died of blunt force trauma when a homemade firework detonated unexpectedly. In the fifth incident, a 30-year-old male suffered severe injuries when explosions destroyed his house while he was making illegal fireworks, and he succumbed five days later. In the sixth incident, a 61-year-old male died at the scene when he ignited a professional-grade firework device while holding its fuse. Reporting of fireworks-related deaths for 2012 is not complete, and the number of deaths in 2012 should be considered a minimum.

- Fireworks were involved in an estimated 8,700 injuries treated in U.S. hospital emergency departments during calendar year 2012 (95 percent confidence interval 6,900–10,400).

- There is not a statistically significant trend in estimated emergency department-treated injuries from 1997 to 2012.

[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.

- An estimated 5,200 fireworks-related injuries (or 60 percent of the total estimated fireworks-related injuries in 2012) were treated in U.S. hospital emergency departments during the one-month special study period between June 22, 2012 and July 22, 2012 (95 percent confidence interval 3,600–6,800).

Results from the 2012 special study

- Of the fireworks-related injuries sustained, 74 percent were to males, and 26 percent were to females.

- Children younger than 15 years of age accounted for approximately 30 percent of the estimated 2012 injuries. Forty-six percent of the estimated emergency department-treated, fireworks-related injuries were to individuals younger than 20 years of age.

- There were an estimated 1,200 emergency department-treated injuries associated with firecrackers. Of these, an estimated 31 percent were associated with small firecrackers, an estimated 19 percent with illegal firecrackers, and an estimated 50 percent with firecrackers for which there was no specific information.

- There were an estimated 600 emergency department-treated injuries associated with sparklers and 400 with bottle rockets.

- The parts of the body most often injured were hands and fingers (an estimated 41 percent); head, face, and ears (an estimated 19 percent); legs (an estimated 13 percent); and eyes (an estimated 12 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 15 percent of patients were treated and transferred to another hospital or admitted to the hospital.

CPSC staff conducted telephone follow-up investigations of fireworks-related injuries that were reported at NEISS hospital emergency departments during the 2012 special study period and 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. Thirty-eight telephone interviews were completed. After review, four of these incidents were determined to be out of scope because one incident was work-related, and the victims in the other three incidents were treated for injuries or illnesses that were not related to fireworks.

A review of data from telephone follow-up investigations of the 34 in-scope incidents showed that most injuries were associated with misuse or malfunctions. Misuse included: igniting fireworks too close to someone; lighting fireworks improperly; lighting fireworks in one's hand; playing with lit or used fireworks; and setting off fireworks improperly. Typical malfunctions included errant flight paths and debris. 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 2012, 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 follow:

- CPSC staff worked with the U.S. Department of Justice on cases involving companies and/or individuals that sold chemicals and components used to make illegal fireworks. It remains a priority for CPSC staff to investigate the sale of kits and components to make illegal and dangerous firecracker-type explosives, such as M-80s and Quarter Sticks. In 2012, CPSC Compliance staff worked with fireworks importers and trade organizations to discuss violations that were found and test methods. CPSC staff continues to take an active role with the industry to facilitate adequate understanding of the regulations and to maintain an open dialogue, if any issues should arise.

- The Compliance and Field Operations staff, in cooperation with the 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 2012, for compliance with the FHSA. Approximately 30 percent of the selected and tested shipments were found to contain fireworks that were noncompliant. The majority of violations centered on overloaded report composition in aerial fireworks devices. CPSC staff also found an increase in violations for the fuse burn time requirement under 16 CFR §1507.3(a)(2). CPSC staff requested corrective action on these noncompliant fireworks, and in most cases, firms voluntarily destroyed the noncompliant fireworks. Through CPSC's port surveillance program, fewer violative and dangerous imports are reaching retail stores and roadside stands.

According to 2012 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).

1. Introduction

This report describes injuries and deaths associated with fireworks during calendar year 2012. The report also describes CPSC staff's enforcement activities for 2012. Reports for earlier years in this series can be found at: http://www.cpsc.gov/en/Research--Statistics/Fuel-Lighters-and-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 2012, 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 telephone in-depth investigations of a subsample of the injuries during that period. Section 6 describes enforcement activities of CPSC's Office of Compliance and Field Operations during 2012. 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 1997 and 2012. Appendix B contains more detail on the completed telephone investigations.

Sources of Information

Information on nonwork-related fireworks deaths occurring during 2012 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 2011 or 2012 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 2012, the special study period spanned June 22 to July 22.

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 2012 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 2012

CPSC has reports of six nonoccupational, fireworks-related deaths that occurred during 2012. Brief descriptions of the incidents follow:

- A 17-year-old male victim from Arkansas and his friend, another 17-year-old male, built a sparkler bomb with approximately 300 sparklers and electrical tape. In the evening of July 4, 2012, the victim and his friend lit the fuse of the bomb and then tried to put a bucket over it. The sparkler bomb exploded before they could get away. They were both taken to a hospital where the victim was pronounced dead.

- A 30-year-old male from Illinois tried to light a mortar-type of firework on July 4, 2012, per a bystander who witnessed the incident. When the firework failed to go off as intended, the victim went to investigate at which time the firework exploded, causing extensive damage to the victim's face. The victim suffered brain injuries and was pronounced dead at a medical center six days later.

- In the evening of July 4, 2012, a 26-year-old male from Indiana planted two PVC pipes in the ground in his backyard to be used as mortars for the 3" 1.3G artillery shells (display fireworks) that he bought earlier. Per the witness, the victim used a punk device to light the fuse of the first artillery shell, and it went off without incident. The victim then put another shell into the tube within a minute of firing the first shell. As soon as the victim put the second shell into the tube, it ignited, and the shell impacted the victim in the head as he was looking down at the tube. The witness believed that the tube had smoldering material in it, which caused the shell to explode before the victim attempted to light it. The victim died during the airlift transfer.

- A 60-year-old male from Mississippi set off fireworks at his residence on Christmas day 2012. According to the investigating officer from the sheriff's department, at least one of the devices was homemade, with a larger-than-normal payload. The investigator believed that the victim constructed the device from legally purchased Class C fireworks. A device exploded unexpectedly while the victim was shooting off fireworks. The victim died of blunt force trauma from injuries received in the incident.

- A 30-year-old male from Nebraska suffered severe injuries to his entire body on March 7, 2012, when the pyrotechnic chemicals, which he was using to

manufacture illegal fireworks, spontaneously produced multiple explosions that destroyed his home. The victim died five days later at a hospital. Law enforcement officers and investigators recovered various pyrotechnic devices and materials used to make fireworks, as well as a hand-written notebook containing various pyrotechnic recipes at the blast scene.

- A 61-year-old male from Washington purchased some professional-grade firework devices from an Indian Reservation. In the evening of July 4, 2012, the victim set up two PVC pipes to launch the fireworks. The victim's wife, who witnessed the incident, stated that the victim failed to launch a 3" mortar because the tube was too tall and the fuse was not extending out of the tube. The wife put her arm in the tube and pulled the firework out by its fuse. The victim then lowered the firework down the pipe slowly while holding onto the fuse and suspended the firework in the pipe by holding the fuse from outside of the pipe. The victim lit a match and the mortar exploded. The victim sustained injuries to his head and chest and was pronounced dead at the scene.

CPSC staff has reports of 86 fireworks-related deaths between 2000 and 2012, for an average of 6.6 deaths per year.[5]

[5] See previous reports in this series (*e.g.*, the report for 2011: Tu and Granados (2012)). In the most recent three years, the number of deaths ranged from two deaths in 2009, to four deaths in 2010, and five deaths in 2011.

3. National Injury Estimates for 2012

Table 1 and Figure 1 present the estimated number of non-occupational, fireworks-related injuries that were treated in U.S. hospital emergency departments between 1997 and 2012.

Table 1
Estimated Fireworks-Related Injuries: 1997–2012

Year	Estimated Injuries	Injuries per 100,000 People
2012	8,700	2.8
2011	9,600	3.1
2010	8,600	2.8
2009	8,800	2.9
2008	7,000	2.3
2007	9,800	3.3
2006	9,200	3.1
2005	10,800	3.7
2004	9,600	3.3
2003	9,300	3.2
2002	8,800	3.1
2001	9,500	3.3
2000	11,000	3.9
1999	8,500	3.1
1998	8,500	3.1
1997	8,300	3.0

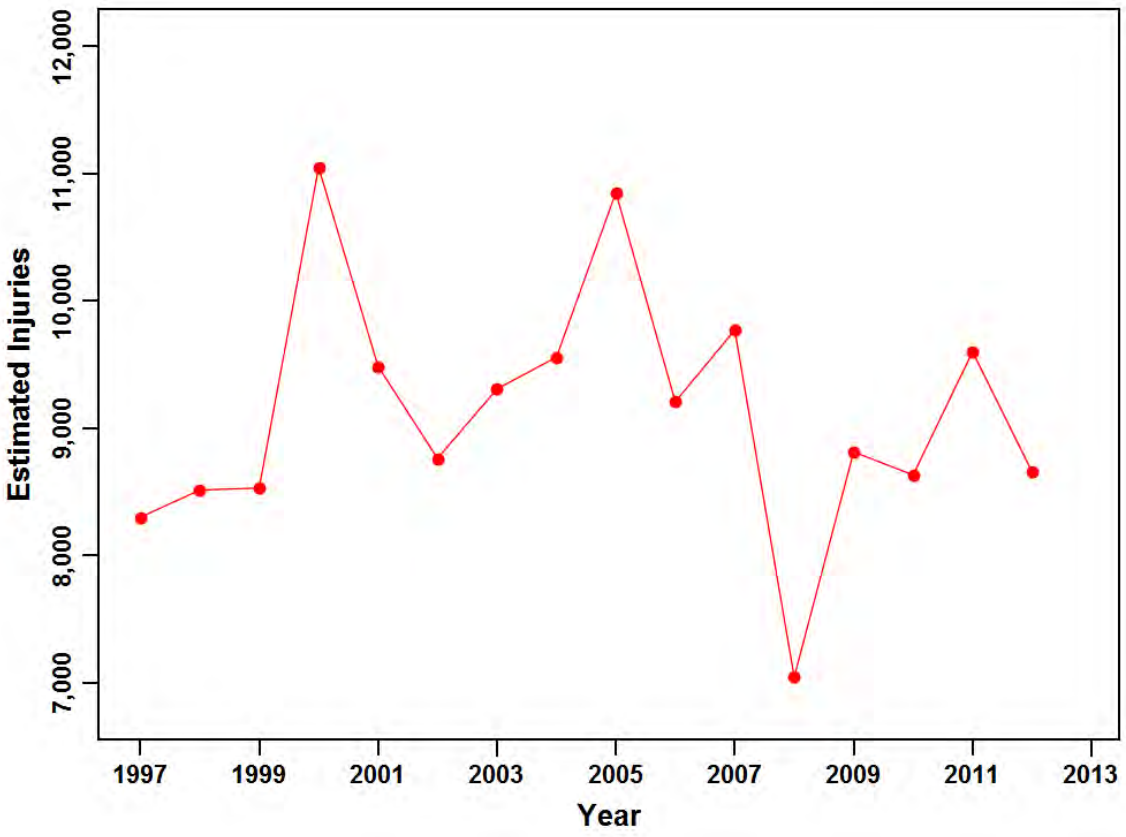
Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. The estimate for 2003 excludes an estimated 150 emergency department-treated injuries following the nightclub fire in West Warwick, RI. Population estimates for 2010, 2011 and 2012 are from Table 1. Annual Estimates of the Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2012 (NST-EST2012-01), 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 2012, there were an estimated 8,700 fireworks-related, emergency department-treated injuries (95 percent confidence interval 6,900–10,400). There were an estimated 9,600 injuries in 2011. The difference between the injury estimates for 2012 and 2011 is not statistically significant.

Figure 1 shows that the highest estimated number of annual fireworks-related injuries were 11,000 in 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 2008, the estimated number of fireworks-related injuries was 7,000, which was the lowest

between 1997 and 2012. There is not a statistically significant trend detected in the fireworks-related injury estimates from 1997 to 2012.[6]

Figure 1
Estimated Fireworks-Related, Emergency Department-Treated Injuries
1997–2012



Appendix A contains a table showing estimated fireworks-related injuries and fireworks imports between 1997 and 2012.

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

4. Injury Estimates for the 2012 Special Study

The injury analysis in this section presents the results of the 2012 special study of fireworks-related injuries that were treated in hospital emergency departments between June 22, 2012 and July 22, 2012. During this period, there were an estimated 5,200 fireworks-related injuries (95 percent confidence interval 3,600–6,800), accounting for 60 percent of the total estimated fireworks-related injuries for the year, which is not statistically different from the estimated 6,200 fireworks-related injuries in the 2011 special study period.

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

Fireworks Device Types and Estimated Injuries

Table 2 shows the estimated number and percent of emergency department-treated injuries by type of fireworks device during the special study period of June 22, 2012 to July 22, 2012.

Table 2
Estimated Fireworks-Related Injuries
By Type of Fireworks Device
June 22–July 22, 2012

Fireworks Device Type	Estimated Injuries	Percent
Total	5,200	100
All Firecrackers	1,200	23
Small	400	7
Illegal	200	4
Unspecified	600	11
All Rockets	600	12
Bottle Rockets	400	8
Other Rockets	200	4
All Other Devices	1,800	36
Sparklers	600	12
Fountains	100	2
Novelties	300	5
Multiple Tube	100	3
Reloadable Shells	500	9
Roman Candles	200	4
Helicopters	100	1
Homemade/Altered	*	*
Public Display	100	2
Pest Control Devices	100	2
Unspecified	1,300	25

Source: NEISS, U.S. Consumer Product Safety Commission/EPHA. Based on 157 NEISS emergency department-reported injuries between June 22, 2012 and July 22, 2012, and supplemented by 34 completed In-Depth Investigations (IDIs). Fireworks types are obtained from the IDI, when available; otherwise, fireworks types are identified from information in victims' reports to emergency department staff that were contained in the NEISS narrative. Illegal firecrackers include M-80s, M-1000s, Quarter Sticks, and other firecrackers that are banned under the Federal Hazardous Substances Act (FHSA) (16 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 fewer than 50 injuries are denoted with an asterisk (*).

As shown in Table 2, firecrackers accounted for an estimated 1,200 emergency department-treated injuries, which represents 23 percent of the total fireworks-related injuries during the special study period. Small firecrackers were involved in 400 injuries. The estimate for illegal firecracker-related injuries was 200; however, some of the estimated 600 unspecified firecracker-related injuries and some of the estimated 1,300 unspecified fireworks-related injuries also may have involved illegal firecrackers. Also,

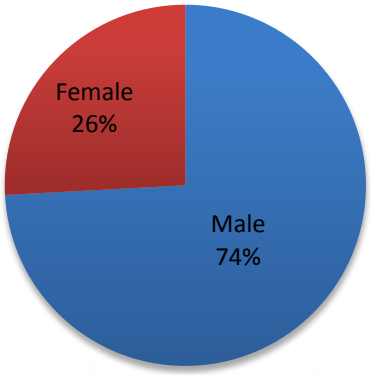
sparklers accounted for an estimated 600 injuries, 12 percent of the total. Reloadable shells were associated with 500 estimated injuries, 9 percent of the total. Bottle rockets accounted for an estimated 400 injuries, 8 percent of the total.

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

Three thousand eight hundred of the estimated fireworks-related injuries were to males, representing 74 percent of the total injuries. Males experienced an estimated 2.5 fireworks-related, emergency department-treated injuries per 100,000 individuals during the special study period. Females, with an estimated 1,300 emergency department-treated injuries, had 0.8 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.

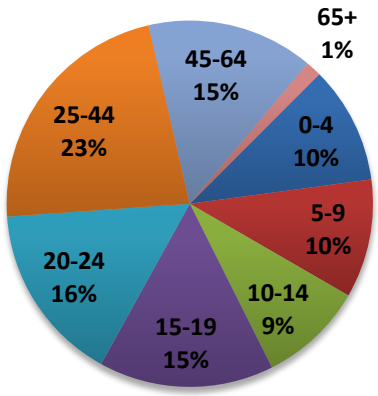
Figure 2
Estimated Injuries by Gender



Children under five years old experienced an estimated 500 injuries (10 percent of all fireworks-related injuries during the special study period) as shown in Figure 3 and Table 3. Children in the five- to 14-year-old age group experienced an estimated 1,000 injuries (20 percent of all fireworks-related injuries). Breaking down that age group further, children five to nine years old had an estimated 500 injuries, and children 10 to 14 years old had 500 injuries as well. In the aggregate, children under 15 years old

accounted for 30 percent of the estimated fireworks-related injuries. Children and young adults under age 20 constituted 46 percent of the fireworks-related injuries.[7]

Figure 3
Percentage of Estimated Injuries by Age Group



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

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

[7] Percentages do not sum to subtotal or total due to rounding.

Table 3
Estimated Fireworks-Related Injuries
By Age and Gender
June 22–July 22, 2012

Age Group	Total	Per 100,000 People	Male	Female
Total	5,200	1.7	3,800	1,300
0–4	500	2.7	500	*
5–14	1,000	2.5	800	200
5–9	500	2.7	500	*
10–14	500	2.3	400	100
15–24	1,600	3.7	1,200	400
15–19	800	3.7	600	200
20–24	800	3.7	600	300
25–44	1,200	1.4	800	400
45–64	800	0.9	500	300
65 +	100	0.2	100	*

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 71 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, the age group of 15 to 24 years old had the highest estimated per capita injury rate at 3.7 injuries per 100,000 population. These were followed by children under five and five to nine years old at 2.7 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 five years old, firecrackers (30 percent) and sparklers (22 percent) accounted for more than half of the estimated injuries for that age group.[8]

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

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

usage pattern because victims are often injured by fireworks used by other people. This is especially true for rockets and aerial shells (*e.g.*, fountains, multiple tube, and reloadable devices) 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 22–July 22, 2012

		Age Group					
Fireworks Type	Total	0–4	5–14	15–24	25–44	45–64	65+
Total	5,200	500	1,000	1,600	1,200	800	100
All Firecrackers	1,200	200	200	400	300	200	*
Small	400	*	100	*	200	100	*
Illegal	200	*	*	200	*	*	*
Unspecified	600	100	100	200	100	100	*
All Rockets	600	*	300	300	*	100	*
Bottle Rockets	400	*	200	200	*	*	*
Other Rockets	200	*	100	100	*	100	*
Other Devices	1,800	200	500	500	500	200	*
Sparklers	600	100	200	100	100	100	*
Fountains	100	*	*	100	*	*	*
Novelties	300	100	100	100	*	*	*
Multiple Tube	100	*	*	100	100	*	*
Reloadable	500	*	*	100	200	100	*
Roman Candles	200	*	100	100	*	*	*
Helicopters	100	*	100	*	*	*	*
Homemade/Altered	*	*	*	*	*	*	*
Public Display	100	*	*	*	*	*	100
Pest Control Devices	100	*	*	*	*	100	*
Unspecified	1,300	200	100	400	400	200	*

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 (*).

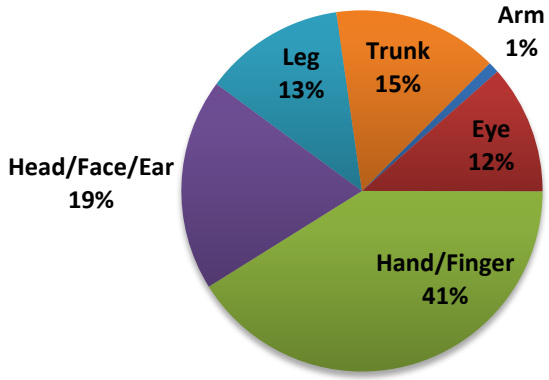
As mentioned previously, males accounted for 74 percent of the estimated fireworks-related injuries, and females comprised 26 percent. Males accounted for most of the estimated injuries from firecrackers, sparklers, all rockets, novelty devices, Roman

Candles, reloadable shells, and homemade devices. Furthermore, males were associated with all injuries from fountains and helicopters.

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 2,100 injuries, accounted for 41 percent of the total injuries. These were followed by an estimated 1,000 injuries to the head/face/ear region (19 percent); 800 injuries to trunk (15 percent); 700 leg injuries (13 percent); 600 eye injuries (12 percent), and 100 arm injuries (1 percent).[9]

Figure 4
Estimated Body Regions Injured

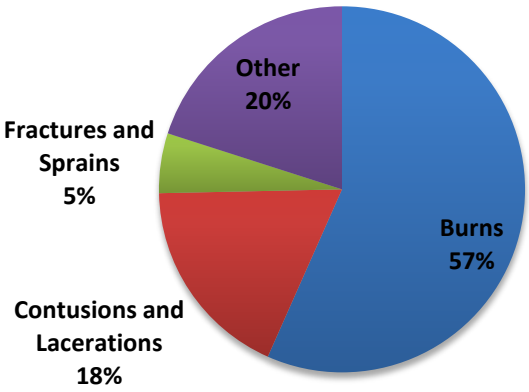


Percentages do not sum to 100 due to rounding.

Figure 5 shows the types of the estimated injuries associated with fireworks devices. Burns, with 2,900 estimated injuries (57 percent), was the most frequent injury diagnosis. Contusions and lacerations were associated with 900 estimated injuries (18 percent), and fractures and sprains were involved in 300 estimated injuries (5 percent). The remaining 1,000 estimated injuries (20 percent) were attributed to other diagnoses.

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

Figure 5
Type of Estimated Injuries



The most frequent injuries to the head, face, hands, fingers, and legs 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 22–July 22, 2012

Body Region	Total	Diagnosis			
		Burns	Contusions Lacerations	Fractures Sprains	Other Diagnoses
Total	5,200	2,900	900	300	1,000
Arm	100	*	*	*	*
Eye	600	*	300	*	300
Hand/Finger	2,100	1,500	300	200	100
Head/Face/Ear	1,000	500	100	*	400
Leg	700	400	100	100	100
Trunk/Other	800	500	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 includes NEISS codes for upper arm, elbow, lower arm, shoulder, and wrist. Head/Face/Ear regions include eyelid, eye area, nose, neck, and mouth but not the eyeball. Leg includes upper leg, knee, lower leg, ankle, foot, and toe. Trunk/other regions include chest, abdomen, pubic region, all parts of body, internal, and 25–50 percent of body. Estimates are rounded to the nearest 100 injuries. 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 injured.

Table 6
Estimated Fireworks-Related Injuries
By Type of Fireworks Device and Body Region Injured
June 22–July 22, 2012

Fireworks Type	Total	Region of the Body Injured					
		Arm	Eye	Head/Face/Ear	Hand/Finger	Leg	Trunk/Other
Total	5,200	100	600	1,000	2,100	700	800
All Firecrackers	1,200	*	*	500	500	100	100
Small	400	*	*	200	100	100	*
Illegal	200	*	*	100	100	*	*
Unspecified	600	*	*	200	300	*	100
All Rockets	600	*	*	200	300	100	100
Bottle Rockets	400	*	*	200	200	100	*
Other Rockets	200	*	*	*	100	*	100
Other Devices	1,800	*	300	200	1,000	200	100
Sparklers	600	*	100	*	500	*	*
Fountains	100	*	100	*	*	*	*
Novelties	300	*	*	100	100	100	*
Multiple Tube	100	*	100	*	100	*	*
Reloadable	500	*	*	*	300	100	*
Roman Candles	200	*	100	100	*	*	*
Helicopters	100	*	*	*	*	*	100
Homemade/Altered	*	*	*	*	*	*	*
Public Display	100	*	100	*	*	*	*
Pest Control Devices	100	*	*	100		*	
Unspecified	1,800	*	100	100	300	300	500

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 85 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, Roman Candles, and public display fireworks.

Hospital Treatment

An estimated 82 percent of the victims of fireworks-related injuries were treated at the emergency department and then released; about 11 percent of victims were treated and transferred to another hospital; approximately five percent were admitted to the hospital; and the remaining three percent of victims left without being seen.[10] The treat-and-release percentage was lower compared to that for all consumer products in 2012 because the percentage of the treated and transferred was higher for the fireworks-related injuries in the special study period.[11]

5. Telephone Investigations of Fireworks-Related Injuries

CPSC staff conducted telephone in-depth investigations of some fireworks incidents that occurred during the one-month special study period surrounding the 4th of July holiday (June 22, 2012 to July 22, 2012). Completed telephone investigations provided more detail about incidents and injuries than the emergency department information summarized in the narrative in the NEISS record. During the telephone interview, respondents were asked how the injury occurred (hazard pattern), what medical care they received following the emergency department treatment, and what long-term effects, if any, resulted from their injury. Respondents were also asked detailed questions about the fireworks involved in the incident, including their type, markings, and where they were obtained.

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

From the 181 emergency department-treated, fireworks-related injuries during the special study period, staff selected 98 cases for telephone investigations, of which 34 were completed and determined to be in scope, four were completed and found to be out of scope, and 60 were incomplete. Table 7 shows the final status of these investigations.

[10] Percentages may not sum to 100 due to rounding.
[11] For all injuries in 2012, 91 percent of patients were treated and released; one percent was transferred to other hospitals; six percent were admitted to the hospital; and two 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	98	100
Completed Investigation	38	39
In Scope	34	35
Out of Scope	4	4
Incomplete Investigations	60	61
Failed to Reach Patient	29	30
Victim Name Not Provided by Hospital	20	20
Victim Refused to Cooperate	11	11

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

Four cases were found to be out of scope after receiving information in the telephone investigation. Of these four out-of- scope incidents, one case was work-related, and the victims in the other three cases were treated for injuries or illnesses that were not related to fireworks. 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[12]

Of the 34 completed cases that were in scope, 23 (68 percent) involved males, and 11 (32 percent) involved females. There was one victim (3 percent) younger than five years of age; 10 victims (29 percent) ages five to 14 years old; eight victims (24 percent) ages 15 to 24 years old; eight victims (24 percent) ages 25 to 44 years old; six victims (18 percent) ages 45 to 64 years old; and the remaining victim (3 percent) was 71 years old. With respect to emergency department dispositions, six victims (18 percent) were admitted to the hospital; five (15 percent) were treated at the emergency department and transferred to another hospital; 22 (65 percent) were treated and released; and one victim (3 percent) left without being seen by a doctor.

The most frequently used fireworks devices in these incidents were aerial shells,[13] which were associated with 12 incidents (35 percent). Firecrackers were involved in six (18 percent) incidents, three (9 percent) were related to large illegal firecrackers, and the other three (9 percent) were related to firecrackers of unspecified size. Unspecified

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

devices were associated with four incidents (12 percent). Novelty devices and public displays each accounted for three incidents (9 percent), followed by fountains and sparklers each with two incidents (6 percent). Roman Candle 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 39 percent of the victims selected for the telephone investigations responded.

Hazard Patterns

The hazard patterns described below are based on the incident descriptions obtained during the telephone investigations and summarized in Appendix B. When an incident has two or more hazard patterns, the hazard pattern most likely to have caused the injury was selected. Hazard patterns are presented in Table 8, below.

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

Hazard Pattern	Number of Cases	Percent
All	34	100
Misuse	23	68
Holding Fireworks in Hand	8	24
Lighting Fireworks Improperly	5	15
Playing with Used Fireworks	4	12
Igniting Fireworks Too Close to Someone	3	9
Setting Fireworks Improperly	2	6
Playing with Lit Fireworks	1	3
Malfunction	7	21
Errant Flight Path	4	12
Debris	3	9
Other	4	12
Possible Debris	3	9
Unknown	1	3

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

Misuse (23 victims injured, 68 percent)

Twenty-three victims were injured when fireworks were used in ways that depart from proper usage.

Holding Fireworks in Hand.

- In Case 4, an M-80 exploded in a 54-year-old male victim's hand. The victim claimed that the firework went off too fast, but he also stated that was his fault. The victim sustained fractures to his three fingers.
- In Case 5, a 58-year-old male lit a mortar-type of firework and it went off in his hand. He thought that he might have lit the firework improperly. The victim suffered severe damage to his left hand and lost his index finger.
- In Case 11, a 51-year-old male stated that when he lit the fuse of a mortar, the fuse fell off, and the extended paper caught fire instead. The mortar exploded in the victim's hand. Two fingers of his left hand were fractured, and bones were shattered.
- In Case 15, an 11-year-old female suffered burns to her left thumb and index fingers when a firecracker (size unknown) exploded in her hand.
- In Case 20, a 13-year-old male found a firework by the railroad behind his house. The firework exploded in the victim's hand before he thought it would. During the telephone interview, the victim's mother stated that the police believed it was a homemade device. The victim suffered burns to his hands and a corneal abrasion to his left eye.
- In Case 21, a 15-year-old male ignited a rocket and held it in his hand instead of putting it on the ground. The firework went off quickly and it burned the victim's right index finger.
- In Case 24, a 19-year-old male found a firecracker (size unknown) in the backyard. The victim lit the firecracker and it went off in his hand. The victim suffered a laceration and burn to his finger.
- In Case 26, a 25-year-old male lit a mortar in his hand and the mortar blew up. The victim sustained third-degree burns to his hand and side.

Lighting Fireworks Improperly.

- In Case 3, a 23-year-old male stood over a mortar and lit the fuse. The victim stated that the fuse hopped and the mortar blew up in his face instead of going into the sky. The victim lost his right eye and suffered burns to his face, arms, and legs.
- In Case 9, a 26-year-old male was playing with fireworks with his friends. He lit a firework, and it shot up and hit him in the right eye. The victim sustained an abrasion to his right cornea, hemorrhage to his right eye, and blurred vision.
- In Case 10, a 32-year-old male ignited a bottle salute on the ground. He did not move away quickly enough, and the firework exploded. The victim said that he was about 12" away. He suffered lacerations and burns to his face that required more than 50 stitches, and his hearing was affected.

- In Case 19, a 12-year-old male stood on a wood boat in his backyard and ignited ground spinners. He lit spinners and tossed them to the ground. One of the spinners hit the rail of the boat and exploded. Some of the debris went into his right eye. The victim suffered abrasion to his eye.
- In Case 31, a 37-year-old male lit a mortar, and the firework blew up as soon as he dropped it into a cannon. The victim did not have time to move away. He sustained an open wound to his right wrist and burns to his stomach, left hand, and fingers.

Playing with Used Fireworks.

- In Case 2, a 16-year-old male with his brother and friends went without permission to a nearby Indian reservation to look for fireworks that may not have been lit off all the way. The victim found a mortar-type of firework on the ground. He pulled the paper back on, exposed the fuse, and ignited it. The mortar blew up in his face immediately. The victim sustained bad burns to his forehead and permanent damage to his right eye.
- In Case 12, a two-year-old male picked up a used sparkler and it burned his hand. The victim suffered first-degree burns to his left hand.
- In Case 13, an eight-year-old male picked up a spent sparkler from the ground. The victim sustained a thermal burn to his finger.
- In Case 18, a 12-year-old male took powder from a bunch of fireworks described as "used" and put it all together into a mortar tube. He then put a fresh firework in the tube and lit the fuse. The whole thing blew up in his face. The victim sustained burns to his right eye and a scratch to his cornea. He burned off his eyelashes and some hair as well.

Igniting Fireworks Too Close to Someone.

- In Case 8, a 20-year-old male was walking on the sidewalk in his neighborhood, and neighbors were shooting off fireworks. A fragment from the fireworks went into his left eye. The victim sustained nerve damage to his left eye.
- In Case 25, a 20-year-old female was walking to a parking garage, and an unknown person threw an M-80 from a car. The firework made a very loud noise and caused a cinder block to explode. The cinder block hit the victim on her left ear. She suffered an ear rupture and could not hear from her left ear for two days.
- In Case 28, a 31-year-old female was at her friend's house to watch fireworks. When the victim heard a lady to her right hollering "look out," she turned and a firecracker exploded in her face near the eye. The victim suffered an eye injury.

Setting Fireworks Improperly.

- In Case 6, a 61-year-old male shot off fireworks in his backyard in the dark. He lit a sky rocket and put it in a tube without realizing that he put the firework upside down. The rocket flared and he thought that the deck may catch fire, so he reached to knock the rocket off the deck. The firework exploded when he did that. The victim sustained severe broken bones and tissue damage to his right hand.

- In Case 29, a 34-year-old female and her family were in their backyard setting off aerial shells. After the first shell went off, the tube fell over and the shells started shooting sideways. A shell hit the victim on her left ankle, and she suffered a first-degree burn and bruising to her ankle. The victim stated that they did not support the tube properly.

Playing with Lit Fireworks.

- In Case 23, a 17-year-old male tried to crush a lit fountain firework with his fist. The firework exploded when he did it. The victim suffered burns to his right hand.

Malfunction (seven victims injured, 21 percent)

Seven victims were injured when fireworks reportedly malfunctioned. These injuries resulted from errant flight paths and debris. 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.

Errant Flight Path.

- In Case 1, a five-year-old female played with other kids in the yard far from where the fireworks were set off. The first two fireworks went up into the air, but the third one went directly at the victim and hit her in the chest. The victim suffered second-degree burns to her chest and hands.
- In Case 7, an eight-year-old female was in the backyard, and her brother ignited a Roman Candle. One of the fireballs from the Roman Candle hit her eye. The victim sustained trauma to her eye.
- In Case 14, a nine-year-old male was watching fireworks set off by others by a river. A friend lit a rocket and it went sideways instead of going upward. The firework hit the victim under his arm and his shirt caught on fire. The victim sustained thermal burns to his chest, elbow, and right side.
- In Case 34, a 53-year-old female was in her backyard where a family friend ignited aerial shells. Instead of shooting upward, the shells went sideways and one hit the victim in her ankle. The victim suffered a first-degree burn and a bruise on her ankle.

Debris.

- In Case 16, an 11-year-old female and some children were setting off various fireworks in the backyard without adult supervision. One child lit a spinner that jumped and spun on the ground. Either debris or a spark from the spinner went into the victim's eye. The victim suffered an abrasion to her eye.
- In Case 22, a 16-year-old female was at a public display of fireworks. A piece of ash got in her eye. The victim suffered a scratch to her eyeball.
- In Case 32, a 45-year-old male was at his neighbor's backyard where different types of fireworks were being set off. Debris fell from one of the fireworks and hit the victim in his face. The victim sustained a laceration on his face.

Other (4 victims injured, 12 percent)

There were four victims whose injuries were probably related to fireworks based on the NEISS incident narrative and telephone in-depth investigation (IDI). However, the telephone IDI did not yield enough information to pinpoint the hazard definitively for these cases.

Possible Debris.

- In Case 27, a 29-year-old female was at a friend's house watching fireworks. She was taking pictures when a piece of metal hit her right hand. She was not sure whether the metal came from the fireworks or something on the ground. The victim sustained a laceration on her right hand, which required five stitches.
- In Case 30, a 37-year-old female was at a public display of fireworks, and debris was falling from the sky. The victim stated that when she got home and took off the baby carrier, which she had been wearing, debris that had fallen on it, flipped off and hit her in the eye. The victim assumed that debris was from the fireworks display.
- In Case 33, a 71-year-old male complained that his eye was hurt after watching a public show of fireworks. The victim thought that he might have gotten an ember from the fireworks in his eye.

Unknown.

- In Case 17, an 11-year-old male ignited various fireworks in his backyard and suffered thermal burns to his pubic region. The victim's mother believed that one of the ground spinners went up to the victim's bathing suit pant leg and burned him, but she did not see the victim with the firework specifically.

Long-Term Consequences of Fireworks-Related Injuries

Victims were asked if there were any long-term consequences of their injuries. Most (24 of 34, or 71 percent) expected complete recoveries with no long-term effects. Some of the victims reported that they have experienced or might suffer long-term effects of the injuries as follows:

- In Case 1, the victim suffered second-degree burns to her chest and hands when a firework hit her in the chest. The victim's mother did not know whether there would be any long-term effect as a result of the injuries.
- In Case 2, the victim sustained permanent damage to his right eye when an aerial shell exploded in his face.
- In Case 3, the victim lost his right eye when a mortar blew up in his face.
- In Case 5, the victim sustained severe damage to his left hand and lost his index finger when a mortar went off in his hand. He might not regain full function of his left hand.

- In Case 6, the victim suffered severe broken bones and tissue damage to his right hand as he tried to knock a lit stick rocket off his deck and the firework exploded. He did not think that he will ever recover fully.
- In Case 7, the victim sustained eye trauma by a fireball from a Roman Candle. Her mother was not sure if there would be any long-term effect as a result of the injury.
- In Case 8, the victim suffered nerve damage to his left eye when a fragment from fireworks went into his eye. The victim stated that his vision was still blurry and might not come back.
- In Case 9, the victim sustained eye injuries when a firework hit his right eye. The victim stated that it is likely for him to develop a vision problem or possible blindness as a result of the injury.
- In Case 11, the victim suffered fractures and shattered bones to two fingers of his left hand when a mortar exploded in his hand. He was not sure if there would be any long-term effect from his injury.
- In Case 28, the victim suffered an eye injury when a firecracker exploded in her face. The victim was told that she will probably have permanent spots in her eyesight.

Where Fireworks Were Obtained

Of the 34 telephone survey respondents, 19 (56 percent) knew where the fireworks were obtained. Nine respondents reported that the fireworks had been obtained from a stand; six stated the fireworks were obtained from a store; and four indicated that the fireworks were acquired from a relative.

Nine victims (26 percent) reported that they did not know the source of the fireworks. This is typically the situation when the victim did not purchase or light the fireworks device that caused the injury.

Three victims (9 percent) stated that they found the fireworks in their backyard or on the ground of an Indian Reservation. The remaining three respondents (9 percent) declared that they were injured at a public display of fireworks.

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 2012, compliance staff continued enforcement of the fireworks regulations through surveillance of imported products; routine inspections of fireworks retailers; and sample collections for analysis and testing. CPSC staff's enforcement activities are focused on reducing the number of fireworks-related deaths and injuries.

CPSC staff has worked 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 Customs and Border Protection (CBP). CPSC staff continues to work with the U.S. Department of Justice on cases involving companies and/or individuals selling chemicals and components used to make illegal fireworks.

CPSC staff maintains as a priority the investigation of sales of kits and components to make illegal and dangerous firecracker type explosives, such as M-80s and Quarter Sticks. Staff communicates actively with the industry to ensure adequate understanding of the regulations and an open dialogue if any issues should arise. In 2012, staff worked with fireworks importers and trade organizations to discuss violations that were found and test methods.

The Compliance and Field Operations staff continues to monitor imported shipments of consumer fireworks in cooperation with CBP. The Compliance staff reviews data provided by CBP and notifies the importer and broker when a shipment is identified 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 past violation history of the type of device, whether the items had been sampled previously and other factors. With assistance from CBP, staff from CPSC selectively sampled and tested numerous shipments of imported fireworks in fiscal year 2012 for compliance with the FHSA. Approximately 30 percent of the shipments sampled and tested were found to contain fireworks that were noncompliant. The overwhelming majority of violations centered on overloaded report composition in aerial fireworks devices. Under 16 CFR §1500.17(3) fireworks devices with an intended audible effect are limited to 2 grains of pyrotechnic composition. Staff also found an increase in violations for the fuse burn time requirement under 16 CFR §1507.3(a)(2). 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.[14] CPSC staff continues to work closely with its counterpart Chinese agency, the General Administration for Quality Supervision, Inspection and Quarantine (AQSIQ).

[14] These data are from 2012 statistics from the U.S. International Trade Commission. There were 201.2 million pounds of fireworks imported, with 197.8 million pounds from China (98 percent), and 1.7 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 0.8 million pounds.

7. Summary

In 2012, there were six reported fireworks-related deaths. However, reporting for 2012 may not be complete at this time. Emergency department-treated injuries are estimated at 8,700 for 2012.

During the one-month special study period from June 22, 2012 to July 22, 2012, there were an estimated 5,200 emergency department-treated injuries. In 2012, children under 15 years old experienced about 30 percent of the estimated injuries, and males of all ages experienced 74 percent of the estimated injuries.

Also, similar to previous years, more than half the estimated injuries during the special study period in 2012 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 (an estimated 41 percent of the injuries), followed by the head, face, and ears (19 percent), trunk (15 percent), legs (13 percent), eyes (12 percent), and arms (1 percent). Most of the estimated injuries (82 percent) involved treat-and-release dispositions. An estimated 15 percent were treated and transferred to another hospital or admitted to the hospital where the emergency department was located.

Among the different types of fireworks, firecrackers were involved in 23 percent of the estimated injuries. Sparklers were associated with 12 percent of the injuries, and bottle rockets were associated with eight 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 associated with eye irritations; and (3) errant flight paths. 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 effect of their injuries will or might be long-term.

Finally, in 2012, CPSC staff's enforcement activities remained at a high level. CPSC staff worked with CBP to sample imported fireworks and to seize illegal shipments. 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 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 1997–2007, peaking in 2005 at 275.1 million pounds. From 2008 to 2012, the fireworks imports have been relatively steady except for 2011. In 2011, the fireworks importation increased to 227.9 million pounds from the 199.6 million pounds imported in 2010. In 2012, the fireworks imported decreased to 201.2 million pounds. The number of estimated emergency department-treated injuries has fluctuated between 7,000 and 11,000, with the largest number of injuries occurring in 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 4.3 in 2012, which increased slightly from the previous year.

Table A-1
Estimated Fireworks-Related Injuries and
Estimated Fireworks Imported into the U.S. 1997–2012

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)	Injuries Per 100,000 Pounds
2012	8,700	201.2	4.3
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

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 7.6 percent of the total imports in 2012. 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 1997 and 2008 may be due to different mixtures of types of fireworks imported over time, or an overall decrease in injuries among all types of fireworks. Similarly, the increase in injuries per 100,000 pounds in 2012 may have resulted from different fireworks mixtures, a decrease in importation of fireworks, or just statistical variation. The data do not provide enough information to determine the relative contribution of these factors.

Appendix B
Completed Telephone Investigations

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
1	5	Female	Thermal Burns	Upper Trunk	Admit	Unspecified	The victim was playing with other kids in the yard far from where the fireworks were being set off. The first two fireworks went up into the air, but the third one went directly at the victim and hit her in the chest. The victim suffered second-degree burns to her chest and hands.	The victim was admitted to the hospital for one day. After discharge, the victim had additional medical visits to determine if she needed a skin graft. The victim had not recovered when the telephone interview was conducted.
2	16	Male	Thermal Burns	Face	Admit	Aerial Shell	The victim, his brother, and their friends went without permission to a nearby Indian reservation looking for fireworks that may not have been lit off all the way. The victim found a mortar type firework on the ground. He pulled the paper back, exposed the fuse and lit it. The firework exploded immediately in his face. The victim suffered bad burns to his forehead and permanent damage to his right eye.	The victim was admitted for two days. After discharge, the victim saw an eye doctor for his eye injury. He had not recovered when the interview was conducted.
3	23	Male	Other	Eye	Admit	Aerial Shell	The victim was standing over a mortar and lighting the fuse. He stated that the fuse hopped and the mortar blew up in his face instead of going into the sky. The victim lost his right eye and suffered burns to his face, arms and legs.	The victim was admitted for three days. After discharge, the victim had surgery to treat his injuries. He had not recovered when he was interviewed for this report, and he stated that he will never recover from his injuries.
4	54	Male	Fracture	Finger	Admit	Large Firecracker	An M-80 exploded in the victim's hand. The victim claimed that the firework went off too fast, but he also stated that it was his fault. The victim sustained fractures to three of his fingers.	The victim was hospitalized for one day. After discharge, the victim had additional medical visits to check his wound and physical therapy to move his fingers again. He had not fully recovered when he was interviewed.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
5	58	Male	Amputation	Finger	Admit	Aerial Shell	The victim lit a mortar type of firework and it went off in his hand. He thought that he might have lit the firework improperly. The victim sustained severe damage to his left hand and lost his index finger.	The victim was air-lifted to the Emergency Department (ED) and admitted for four days. After discharge, the victim had additional medical visits. He was still recovering when he was interviewed and did not know when he will fully recover.
6	61	Male	Fracture	Hand	Admit	Stick Rocket	The victim was shooting off fireworks on his back deck in the dark. He lit a skyrocket and put it in a tube without realizing that he put the firework upside down. The firework was flaring and he thought that the deck may catch fire, so he reached to knock the firework off the deck. The firework blew up when he did that. The victim sustained severe broken bones and tissue damage to his right hand.	The victim was hospitalized for two days. After discharge from the hospital, the victim had surgery. He had not recovered at the time of the interview and did not think that he will ever recover fully.
7	8	Female	Other	Eye	Treat and Transfer	Roman Candle	The victim was in her backyard, and her brother ignited a Roman candle. One of the balls from the firework hit the victim's eye. The victim sustained trauma to the eye.	The victim was taken to the ED and then transferred to another hospital. Following the hospitalization, the victim had surgery to treat her eye. She had not recovered at the time of the interview. Her mother said that it might take a year or more for her to recover but was not sure about that.
8	20	Male	Other	Eye	Treat and Transfer	Fountain	The victim was walking on the sidewalk in his neighborhood, and neighbors were shooting off fireworks. A fragment from the fireworks went into the victim's left eye. The victim was not positive about the firework that injured him, but he believed it could have been a fountain firework. He sustained nerve damage to his left eye.	The victim was transferred to another hospital for eye surgery. He was hospitalized for two days. After discharge, the victim had an additional medical visit to check if his eye was healing from the surgery. He had not recovered from the injury when he was interviewed for this report.
9	26	Male	Contusions Abrasions	Eye	Treat and Transfer	Unspecified	The victim was playing with fireworks with his friends. He lit a firework, and it shot up and hit him in the eye. He suffered an abrasion to his right cornea, hemorrhage to his right eye, and blurred vision.	The victim had additional check-ups with eye specialists for his injury after the ED visit. He had not recovered and his vision was still blurred when he was interviewed for this report.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
10	32	Male	Thermal Burns	Face	Treat and Transfer	Large Firecracker	The victim ignited a bottle salute on the ground in his backyard. He did not move away quickly enough, and the firework exploded. He said that he was about 12" away. The victim suffered lacerations and burns to his face that required 50 plus stitches, and his hearing was affected.	The victim was taken to the ED and then transferred to another hospital. During the interview, the victim did not want to talk much about the incident and the medical treatment. But he did state that he had not recovered at the time of the interview and was expecting a full recovery in four to six months.
11	51	Male	Fracture	Hand	Treat and Transfer	Aerial Shell	The victim stated that he was going to ignite a mortar that went into a pipe. When he lit the fuse of the mortar, the fuse fell off and the extended paper caught fire instead. The mortar exploded in his hand. Two fingers of his left hand were fractured, and the bones were shattered.	The victim was transferred and hospitalized for 14 days. After discharge, the victim had additional medical visits to see how his injuries were healing and he will have physical therapy. He had not recovered when he was interviewed.
12	2	Male	Thermal Burns	Hand	Treat and Release	Sparkler	The victim picked up a used sparkler and it burned his hand. He suffered first-degree burns to his left hand.	The victim recovered completely in a week.
13	8	Male	Other	Finger	Treat and Release	Sparkler	The victim picked up a used sparkler from the ground, which he thought had cooled off. The victim sustained a thermal burn to his finger. His father treated his burn at home. About two weeks later, his finger got infected. The victim was taken to the ED, and he was treated and released.	The victim recovered fully in a week.
14	9	Male	Thermal Burns	Upper Trunk	Treat and Release	Rocket	The victim and his aunt were watching fireworks set off by others by a river or sandbar. A friend ignited a rocket. The firework went sideways instead of going upward and hit the victim under his arm. His shirt caught on fire. The victim knew to drop and roll to stop the fire. He sustained thermal burns to his chest, elbow and right side.	The victim fully recovered in 20 days.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
15	11	Female	Thermal Burns	Finger	Treat and Release	Firecracker, Size Unknown	The victim set off a firecracker (size unknown) on July 4th. Her parent stated that the victim either held the firework too long or the firework went off before the victim thought it would. The firecracker exploded in the victim's left hand. She suffered burns to her left thumb and index fingers. Her parent did not witness the incident and was told by the victim what had happened.	The victim had additional medical treatments following the ED visit. She had not recovered at the time of the interview. Her parent thought it might take four to six weeks for her to fully recover.
16	11	Female	Other	Eye	Treat and Release	Novelty Device	The victim was in a neighbor's backyard, and the children were setting off various fireworks without adult supervision. One child ignited a spinner that jumped and spun around on the ground. Either debris or a spark from the spinner went into the victim's eye. The victim suffered abrasion to the eye.	The victim recovered completely in three days.
17	11	Male	Thermal Burns	Pubic Region	Treat and Release	Novelty Device	The victim and his mother were in the backyard, and the victim was igniting various fireworks that came in one box. His mother believed that one of the ground spinners went up to the victim's bathing suit pant leg and burned him, but she did not see him with the firework specifically. The victim sustained thermal burns to his pubic region.	The victim fully recovered in ten days.
18	12	Male	Thermal Burns	Eye	Treat and Release	Unspecified	The victim and his parents were about to leave a party where they had been lighting off fireworks. The victim's parents told him to pop off any fireworks that he had left. The victim took the powder from a bunch of used fireworks and put it all together into a mortar firing tube. He then put a fresh firework in the tube and lit the fuse. The whole thing blew up in his face. The victim suffered burns to his right eye and a scratch to his cornea. He burned off his eyelashes and some hair.	The victim received treatment from his pediatric eye specialist after the ED visit. He completely recovered in two weeks.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
19	12	Male	Contusions Abrasions	Eye	Treat and Release	Novelty Device	The victim was standing on a wood boat in the backyard and igniting ground spinners. He lit the spinners and tossed them to the ground. One of the spinners hit the rail of the boat and exploded. Some of the debris went into his right eye. The victim suffered an abrasion to his eye.	The victim fully recovered in three days.
20	13	Male	Contusions Abrasions	Eye	Treat and Release	Homemade Device	The victim found a firework by the railroad track behind his house, and it exploded in his hands before he thought it would. The victim told his mother that it was a firecracker, but his mother stated in the telephone interview that it looked like a grenade and the police believed that it was a homemade device. His mother did not witness the incident. The victim sustained burns to his hands and a corneal abrasion to his left eye.	The victim had a follow-up with an ophthalmologist after the ED visit, and he fully recovered in a week or two.
21	15	Male	Thermal Burns	Finger	Treat and Release	Rocket	The victim ignited a rocket and held it in his hand instead of putting it on the ground. The firework went off quickly and it burned his right index finger. The victim's mother stated that the victim did not read the instructions. The victim suffered a first-degree burn to his right index finger.	After the ED visit, the victim saw a burn specialist in another hospital to treat his injury. He fully recovered in nine days.
22	16	Female	Contusions Abrasions	Eye	Treat and Release	Public Display	The victim was watching a public display of fireworks. A piece of ash got into her eye. She suffered a scratch to her eyeball.	The victim saw an eye doctor for follow-up after the ED visit, and she fully recovered in a week.
23	17	Male	Thermal Burns	Hand	Treat and Release	Fountain	The victim tried to crush a lit fountain firework with his fist. The firework exploded. He sustained burns to his right hand.	The victim had an additional medical visit for follow-up, and he recovered completely in a month.
24	19	Male	Laceration	Finger	Treat and Release	Firecracker, Size Unknown	The victim found a firecracker in the backyard. He lit the firecracker and it exploded in his hand. The victim suffered a laceration and burn to his finger.	The victim had an additional medical visit to remove the stitches, and he recovered fully in two days.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
25	20	Female	Internal Injury	Head	Treat and Release	Large Firecracker	The victim was walking to a parking garage, and someone threw from a car a firework that might be an M-80 per the police. The firework made a very loud noise and caused a cinder block to explode. The cinder block hit the victim on her left ear. The victim suffered an ear rupture and could not hear from her left ear for two days.	The victim fully recovered in two days.
26	25	Male	Thermal Burns	Hand	Treat and Release	Aerial Shell	The victim ignited a mortar in his hand and the firework blew up. He sustained third-degree burns to his hand and side.	The victim was sent to a burn unit for additional treatment after the ED visit. He had not recovered when he was interviewed for this report.
27	29	Female	Laceration	Hand	Treat and Release	Multiple Tube Device	The victim was at a friend's house where fireworks were being ignited. The victim stated that she was not sure about the fireworks type, but she believed they were "cake" fireworks. The victim was taking pictures when a piece of metal hit her right hand. She was not sure if the metal came from the firework or something on the ground. The victim sustained a laceration on her right hand, which required five stitches.	The victim recovered fully in six days.
28	31	Female	Other	Eye	Treat and Release	Firecracker, Size Unknown	The victim was at a friend's house on the 4th of July to watch fireworks. When the victim heard a lady to her right hollering “look out,” she turned and a firecracker exploded in her face near the eye. She suffered an eye injury.	The victim had surgery after the ED visit, and she was still being treated for her injury when she was interviewed for this report.
29	34	Female	Thermal Burns	Ankle	Treat and Release	Aerial Shell	The victim's family was at their backyard setting off fireworks. Aerial shell fireworks were ignited. After the first shell went off, the tube fell over and the shells started shooting sideways. A shell hit the victim in her left ankle, and she sustained a first-degree burn and bruising to the ankle. The victim stated that they did not support the tube properly.	The victim had additional medical visits to treat her injury. She fully recovered in a month.

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Incident Description	Medical Treatment and Prognosis
30	37	Female	Contusions Abrasions	Eye	Treat and Release	Public Display	The victim was at a public display of fireworks, and debris was falling from the sky after some of the fireworks were set off. The victim stated that when she got home and took off the baby carrier she had been wearing, the debris that had fallen on it flipped up and hit her in the eye. The victim assumed that the debris was from the fireworks display.	The victim fully recovered in three days.
31	37	Male	Contusions Abrasions	Hand	Treat and Release	Aerial Shell	The victim was lighting a mortar, it blew up as soon as he dropped it in a cannon. The victim did not have time to move away. He sustained an open wound to his right wrist, burns to his stomach, left hand and fingers.	The victim had not recovered when he was interviewed for this report, but he expected a full recovery in a few more weeks.
32	45	Male	Laceration	Face	Treat and Release	Unspecified	The victim was at his neighbor's backyard where different types of fireworks were being set off. Debris was falling from one of the fireworks and hit the victim in the face. The victim suffered a laceration on his face.	The victim recovered completely in a week.
33	71	Male	Foreign Body	Eye	Treat and Release	Public Display	After watching a public fireworks show at a local firehouse, the victim complained that his eye hurt. The victim thought that he might have gotten an ember from the fireworks show in his eye. He suffered no real injury.	The victim recovered in two hours.
34	53	Female	Other	Lower Leg	Left without Being Seen	Aerial Shell	The victim was in her backyard where a family friend ignited aerial shells. Instead of shooting upward, the shells went sideways and one hit her in the ankle. The victim sustained a first-degree burn and a bruise on her ankle.	The victim fully recovered in three days.