2020 Fireworks Annual Report

Fireworks-Related Deaths, Emergency Department-Treated Injuries, and Enforcement Activities During 2020

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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 non-occupational, fireworks-related deaths and injuries during calendar year 2020. The report also summarizes CPSC staff's enforcement activities during fiscal year 2020. [1]

Staff obtained information on fireworks-related deaths from news clippings and other sources in CPSC's Consumer Product Safety Risk Management System (CPSRMS). Staff also estimated fireworks-related injuries treated in hospital emergency departments from CPSC's National Electronic Injury Surveillance System (NEISS). Finally, CPSC staff conducted a special study of non-occupational fireworks-related injuries between June 21, 2020 and July 21, 2020. The special study included collecting and analyzing more detailed incident information, such as the type of injury, the fireworks involved, the characteristics of the victim, and the incident scenario. About 66 percent of the estimated annual fireworks-related, emergency department-treated injuries for 2020 occurred during that period.

Highlights of the report:

Deaths and Injuries

- CPSC staff received reports of 18 non-occupational fireworks-related deaths during 2020. Twelve of the deaths were associated with firework misuse, one death was associated with an electric match malfunction, and five incidents were associated with unknown circumstances. Reporting of fireworks-related deaths for 2020 is not complete, and the number of deaths in 2020 should be considered a minimum.
- Fireworks were involved with an estimated 15,600 injuries treated in U.S. hospital emergency departments during calendar year 2020 (95 percent confidence interval 12,300 – 19,000). The estimated rate of emergency department-treated injuries is 4.7 per 100,000 individuals in the United States, an increase from 3.1 estimated injuries per 100,000 individuals in 2019.
- There is a statistically significant trend in estimated emergency department-treated, fireworks-related injuries from 2005-2020. This trend estimates an increase of 202 fireworks injuries per year (p-value = 0.0029).
- An estimated 10,300 fireworks-related injuries (or 66 percent of the total estimated fireworks-related injuries in 2020) were treated in U.S. hospital emergency departments during the 1-month special study period between June 21, 2020 and July 21, 2020 (95 percent confidence interval 7,800 – 12,700).

[1] The 2020 federal fiscal year refers to the period of October 1, 2019 through September 30, 2020

Results from the 2020 Special Study

- Of the 10,300 estimated fireworks-related injuries sustained, 71 percent were to males and 29 percent were to females.
- Adults aged 25 to 44 years of age experienced about 35 percent of the estimated injuries, and children younger than 15 years of age accounted for 18 percent of the estimated injuries. In previous years, nearly half of the estimated emergency department-treated, fireworks-related injuries were to individuals younger than 20 years of age.
- Young adults 20 to 24 years of age had the highest estimated rate of emergency department-treated, fireworks-related injuries (17 injuries per 100,000 people). This number is approximately three times the rate of injury for the same group in 2019, and is driven by an increase in injuries among females. Older teens, 15 to 19 years of age, had the second highest estimated rate (6.1 injuries per 100,000 people).
- There were an estimated 1,600 emergency department-treated injuries associated with firecrackers and 900 with sparklers.
- The parts of the body most often injured were hands and fingers (an estimated 30 percent); head, face, and ears (an estimated 22 percent); eyes (an estimated 15 percent); legs (an estimated 13 percent); and arms (an estimated 12 percent).
- Forty-four percent of the emergency department-treated injuries were burns. Burns were the most common injury to hands, fingers, arms, and legs.
- Approximately 75 percent of the victims were treated at the hospital emergency department and then released. An estimated 21 percent of patients were treated and transferred to another hospital, or admitted to the hospital.
- CPSC staff conducted telephone follow-up investigations on a selected sample of fireworks-related injuries reported in NEISS during the special study period to clarify information about the incident scenario or fireworks type. A review of data from the seven completed follow-up investigations showed that most injuries were associated with misuse or malfunctions of fireworks. Most victims recovered or were expected to recover completely. However, there were victims who report that their injuries may be long term.

Enforcement Activities

Fiscal year 2020 presented unique challenges to CPSC's Office of Compliance and Field Operations (EXC) in its ability to conduct surveillance on imported fireworks and enforce the provisions of the Federal Hazardous Substances Act (FHSA)[2] and regulations under the FHSA. The SARS-CoV-2 (COVID-19) pandemic restricted CPSC staff from collecting samples as well as testing samples that were collected.

EXC staff was able to sample and test shipments of some fireworks both before and after the COVID-19 restrictions. Approximately 20 percent of the selected and tested shipments were found to

[2] 15 U.S.C. §§ 1261-1278

contain noncompliant fireworks. The noncompliant fireworks devices had a combined estimated import value of $208,000. The violations consisted of fuse violations and presence of prohibited chemicals. EXC staff requested corrective actions on these noncompliant fireworks and, in all cases, firms agreed to the corrective actions.

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1. Introduction

This report describes injuries and deaths associated with fireworks devices, as well as kits and components used to manufacture illegal fireworks, during the calendar year 2020. Reports for earlier years in this series can be found at: https://cpsc.gov/Research--Statistics/Fuel-Lighters-and-Fireworks1.

This report is organized into seven sections. Section 1 describes the data and statistical methods used in this analysis. Section 2 summarizes the 2020 fireworks-related incidents that resulted in deaths. Section 3 provides an annual estimate of fireworks-related, emergency department-treated injuries in the United States for 2020, and compares that estimate to previous years. Section 4 analyzes emergency department-treated, fireworks-related injuries during the month around July 4, 2020. Section 5 summarizes the telephone in-depth investigations of a subsample of the injuries that occurred during that period. Section 6 describes enforcement activities of CPSC's Office of Compliance and Field Operations during fiscal year 2020. The report concludes with a summary of the findings in Section 7. Appendix A is a table depicting the relationship between fireworks-related injuries and fireworks imports between 2005 and 2020. Appendix B provides details on the completed telephone investigations.

Sources of Information

Information on non-occupational, fireworks-related deaths during 2020 was obtained from CPSC's CPSRMS. CPSRMS combines the data from CPSC's Injury or Potential Injury Incident File (IPII), Death Certificate File (DTHS), and In-Depth Investigation File (INDP) into one incident database. Entries in IPII come from a variety of sources, such as newspaper articles, consumer complaints, lawyer referrals, medical examiners, and other government agencies. CPSC staff from the Office of Compliance and Field Operations conducted in-depth investigations of the deaths to determine the types of fireworks involved in the incidents and the circumstances that led to the fatal injuries.

Because the data in IPII are based on voluntary reports, and because it can take more than 2 years to receive all of the death certificates from the various states to complete the DTHS, neither data source can be considered complete for 2019 or 2020 fireworks-related deaths at the time this report was prepared. Consequently, the number of deaths should be considered a minimum. Staff updates the total number of deaths for previous years when new reports are received. Total deaths for prior years may not coincide with the number in reports for earlier years because of these updates.

The source of information on non-occupational, emergency department-treated fireworks-related injuries is CPSC's NEISS. NEISS is a probability sample of the U.S. hospitals with emergency departments.[3] 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 narrative of 140 to 400 characters[4] in length and that often contains a brief description of how the injury occurred.

To supplement the information available in the NEISS record, CPSC staff conducts a special study of fireworks-related injuries every year during the month around July 4. Staff focuses its efforts on fireworks incidents during this period because, in most years, about two-thirds to three-quarters of the

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

[4] The maximum available number of characters changed from 142 to 400 characters on January 1, 2019.

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 are then included in the NEISS narrative. In 2020, the special study period lasted from June 21 to July 21.

After reading the incident case records, including the narrative descriptions of the fireworks device and the incident scenario, CPSC staff may assign a case for additional telephone investigation. Staff usually selects cases that 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 can collect information for one-fifth to one-half of the cases assigned. Information on the final status of the telephone interviews conducted during the 2020 special study is in Section 5 and Appendix B of this report.

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

As a result of this investigative process, three different levels of information may be available about a fireworks-related injury case. For 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. Additional information is typically available during the special study period because the NEISS records collected by the emergency departments usually contain the type of fireworks and additional details on the incident scenario. Finally, the most information is available for the subset of the special study cases where staff conducted telephone investigations. These different levels of information about injuries correspond to these different analyses in the report:

- Estimated national number of fireworks-related, emergency department-treated injuries

  This estimate is made using NEISS cases for the entire year, from records where fireworks were specified as one of the consumer products involved. For cases outside the special study period, as noted above, there is usually no information on the fireworks type, and limited information is available on the incident scenario. Consequently, there is not enough information to determine the role played by the fireworks in the incident. Thus, the annual injury estimate may include a small number of cases in which the fireworks device was not lit, or no attempt was made to light the device. Calculating the annual estimates without removing these cases makes the estimates comparable to previous years.

- Detailed analyses of injury patterns

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

- Information from telephone investigations

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

Statistical methods

Injuries reported by hospitals in the NEISS sample were weighted by the NEISS probability-based sampling weights to develop an estimate of total U.S. emergency department-treated, fireworks-related injuries for the year and for the special study month around July 4. Confidence intervals were estimated, and other statistics were calculated using computer programs that were written to take into account the sampling design.[5] 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 data, they have larger relative sampling errors (*i.e.*, larger coefficients of variation) than the annual injury estimate or the special study injury estimate. Therefore, interpretation and comparison of these estimates with each other, or with estimates from prior years, should be made with caution. 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.

[5] See Schroeder (2000).

2. Fireworks-Related Deaths for 2020

CPSC has reports of 18 non-occupational, fireworks-related deaths that occurred during 2020.[6] Reporting of fireworks-related deaths for 2020 is not complete, and the number of deaths in 2020 should be considered a minimum. Brief descriptions of the incidents, using wording taken from the incident reports, follow:

- In January, a 28-year-old female victim was fatally injured from a fireworks blast inside a vehicle. Emergency responders received a report that a car had blown up with an occupant inside. Upon arrival to the vehicle, responders noted that the windows were blown out of the vehicle and that the interior of the vehicle was damaged. The victim was located, unresponsive, away from the vehicle with blast injuries to her inner thighs and genital area. The emergency medical services report stated that the victim also had the appearance of a gunshot wound to her chest with no bleeding. The victim was transported to the hospital where she died. The ER trauma team was told that the victim was attempting to throw the firework out of the vehicle window when the firework got trapped in her groin area and exploded. The autopsy reports that the victim died due to a blast injury and did not mention a gunshot wound. A toxicology screen indicated the presence of illegal substances in the victim's system.

- In February, a 40-year-old male victim placed a commercial-grade firework device, inside a homemade mortar tube which was then lit in the driveway outside of his residence to celebrate an American football game. The victim was lighting traditional fireworks but ran out of them before lighting the commercial-grade device. The firework device did not deploy but instead exploded near the victim's face as he was bent over and lighting the fuse. The victim's wife called 911 as a result of the incident, and the subject was transported to the hospital, becoming unresponsive en route. The victim died at the hospital; the autopsy declared that the victim died due to a blast injury near his head. A toxicology screen indicated the presence of illegal substances in the victim's system.

- In May, a 65-year-old male victim was fatally injured by a homemade fireworks device. There were no witnesses to the accident; the victim was found by a witness after she heard a boom and saw a plume of smoke as she pulled up to the residence. The victim was holding a cigarette that fell to the ground after the incident; the witness indicated that the firework device may have been accidentally lit by the cigarette. The victim was driven to the hospital by his son where he was immediately ventilated and unable to speak. As a result of the incident, the victim sustained thermal burns on over 40 percent of his body surface area. After admission, the victim's condition declined and he died on May 14. The cause of death was thermal and inhalation injuries.

- In or around June, a 21-year-old male victim was involved an unknown type of firework device explosion on a roadway. The victim was transported to the local hospital where he was pronounced deceased; the cause of death was listed as anoxic-ischemic encephalopathy due to a face, neck, and chest blast injury. A toxicology report indicated the presence of illegal substances in the victim's system at the time of the incident.

[6] CPSC staff exclude incidents that are indirectly fireworks-related. For instance, fireworks that start fires and lead to deaths are excluded based on the logic that the fire is directly responsible for death.

- In June, a 34-year-old male victim died after he attempted to deploy a mortar firework from the passenger seat of a moving vehicle. The driver of the vehicle reports that the victim held the base of a mortar firework and pointed the top of the firework out of the vehicle window. The victim lit the firework and the base of the device compressed against his chest, causing his injuries. The victim had injuries on his face and hands, and was found unresponsive by police officers. The victim died after he arrived at the hospital and the witness had no life threatening injuries.

- In June, a 31-year-old male victim was instantly killed when he tried to deploy a commercial grade firework device. No further information is available.

- In June, a fireworks explosion during preparations for a firework show killed a 69-year-old male victim and an unknown individual, and injured three other people. The victims were setting up the fireworks in a climate-controlled barn with approximately 70 aerial shells that were positioned on the barn shelves. Approximately 26 of the 70 shells exploded during the incident, which, upon investigation, are believed to have been sparked by defective electric matches that the individuals were inserting into the connectors of the aerial shells as they were preparing for the show. All of the injuries were the result of explosive pressure and subsequent fire. No additional information was available at the time of this report.

- In July, a 21-year-old male victim was fatally injured while detonating a fireworks device in a school parking lot. The victim and his friend had been shooting fireworks at people in the parking lot when the victim attempted to light an artillery shell fireworks device. The device exploded near the victim's leg causing a large open wound. After the incident, the witness transported the victim to a local hospital in his vehicle. In the emergency room, medical staff attempted cardiopulmonary resuscitation but were unsuccessful. The victim died as a result of massive blood loss from damage to the femoral artery. Although the victim had no history of alcohol or drug use, a toxicology report indicated the presence of illegal substances in the victim's body.

- In July, a 21-year-old male victim died from injuries related to an artillery style mortar firework device explosion. The victim and his friend were initially lighting fireworks on their deck by shooting them out of artillery tubes; the two transitioned to larger fireworks and used tubes designed for the smaller firework to deploy the larger firework devices. Both individuals lit a firework device and both fireworks detonated in the tubes that the individuals were holding. The victim sustained blast injuries to his hands, chest, upper extremities, and lost consciousness on the deck. Bystanders attempted to resuscitate him until emergency services arrived and took him to the hospital. The victim died in the emergency room; his death certificate states the cause as exsanguination (severe blood loss).

- In July, a 33-year-old male victim died as a result of an illegal mortar firework device explosion. The police report that the victim was holding the device over his head and the firework ejected downward after the victim lit the device. The victim was found unresponsive by police with injuries to his body; he died after he was transported to a local hospital.

- In July, a 16-year-old male victim was injured from an unknown type firework explosion. The victim died on July 14; the death certificate states the cause of death as complications of blunt head trauma due to impact with exploding fireworks. The manner of death was determined to be accidental. No additional information was available at the time of this report.

- In July, a 23-year-old male victim had been lighting various types of firework devices to celebrate Independence Day in his driveway. The victim lit a firework device that had a mortar on top of a foot-long pole and held it above his head as he walked around the driveway. The device exploded and the victim fell to the ground; the victim's brother called 911. The victim sustained major trauma to his hands and fingers, and a large wound to his head. The victim died at the scene.

- In July, a 33-year-old male victim was setting off illegal firework devices with his brother at their home. The victim had been drinking alcohol and lighting fireworks all day long. That night, the victim was going to light his last fireworks device, described as "stick-type." The victim walked around the corner and out of sight; no one witnessed the victim light the device. The victim's sister heard a loud "boom" and found the victim lying on his back with severe injuries to his stomach, chest, and hands. She called 911. Emergency personnel responded but could not revive the victim.

- In July, a 33-year-old male victim was fatally injured by a fireworks device explosion during a memorial celebration. The victim attempted to light a fireworks device that appeared to be a "dud." The victim then held the device in his hand and re-lit the device while holding his arm away from his chest. The firework device exploded, causing the victim to fall with a severe wound to his chest and neck. One of the witnesses to the incident called 911. Medical personnel responded to the incident and transported the victim to a local hospital where the victim died of his injuries. The medical examiner indicated that the victim sustained blast injuries to his right upper chest, had a fractured right clavicle, fractured rib, multiple lacerations to his lung, pericardium and aortic root and left palm. The victim's death is reported to be caused as blast injuries due to fireworks explosion and the manner of death was accidental.

- In July, a 63-year-old male victim was fatally injured by a commercial-grade fireworks device at his residence. Early in the morning, the victim led his wife to their backyard to show her the fireworks that he intended to ignite. The victim's wife moved to the garage to observe the firework detonations and fell asleep. She was awakened by a loud "boom" and exited the garage to check on the victim. She found him lying on the ground with a firework cylinder between his legs and called 911. The police arrived and declared the victim dead on arrival after viewing the victim's injury. The autopsy reports the cause of death as lacerations of the brain and brain stem, and a blast injury to the head; a toxicology screen indicated the presence of illegal substances along with alcohol in the victim's system.

- In July, a 37-year-old male victim was lighting a firework when it discharged, striking him in the chest. The coroner's report describes a large firework injury on the victim's chest, approximately 1.9 by 1.2 inches, and reports the cause of death to be a fireworks injury to the chest. A toxicology report indicated the presence of illegal substances in the victim's body. No further information was available at the time of this report.

- In September, a 47-year-old male victim was fatally injured after he ignited an unknown type of fireworks while cleaning out a shed. The victim suffered extensive burns to over 90 percent of his body surface area. The manner of death was determined to be accidental. No additional information was available at the time of this report.

- In December, a 37 year-old male victim was injured in the torso and abdomen while holding an aerial shell style fireworks device. The victim was holding a lit mortar shell in the launch tube of the fireworks device when the bottom base of the launch tube exploded. The victim was struck in the abdomen and sustained an internal organ injury described as penetrating injury with evisceration (disembowelment). Immediately after the accident occurred, the victim's brother covered the victim and sustained pressure. The victim was transported to the local hospital and later died of his injuries. The victim was drinking alcoholic beverages at the time of the accident.

Including the 18 deaths described above, CPSC staff has reports of 136 fireworks-related deaths between 2005 and 2020, for an average of 8.5 deaths per year.[7]

[7] See previous reports in this series (e.g. the report for 2019: Marier, Tu and Ng (2020)). In the most recent three years, the number of deaths included 10 deaths in 2017, and 5 deaths in 2018, and 12 deaths in 2019. The data from 2017 to 2019 have been updated based on new incident reports received by CPSC staff during 2020, and may differ from previous reports.

3. National Injury Estimates for 2020

Table 1 and Figure 1 present the estimated number of non-occupational, fireworks-related injuries treated in U.S. hospital emergency departments between 2005 and 2020.

Table 1. Estimated Fireworks-Related, Emergency Department-Treated Injuries: 2005-2020

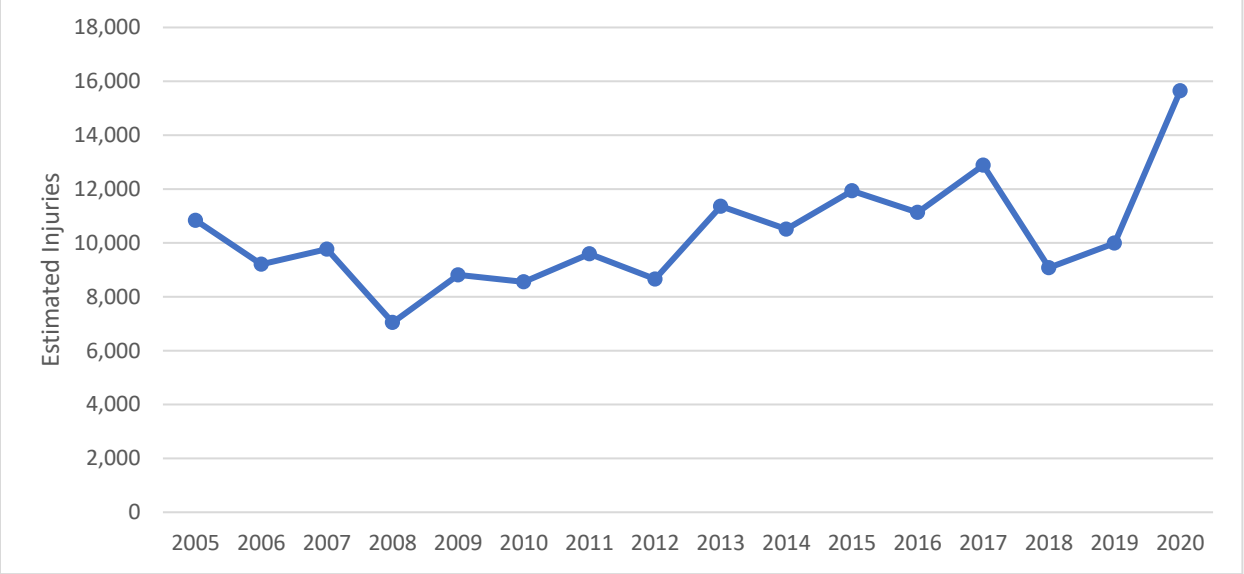
Year	Estimated Injuries	Injuries per 100,000 People
2020	15,600	4.7
2019	10,000	3.0
2018	9,100	2.8
2017	12,900	4.0
2016	11,100	3.4
2015	11,900	3.7
2014	10,500	3.3
2013	11,400	3.6
2012	8,700	2.8
2011	9,600	3.1
2010	8,600	2.8
2009	8,800	2.9
2008	7,000	2.3
2007	9,800	3.3
2006	9,200	3.1
2005	10,800	3.7

Source: NEISS, U.S. Consumer Product Safety Commission. Population Estimates for 2010 to 2020 are from Annual Estimates of the Resident Population for the United States, States, and the District of Columbia: April 1, 2010 to July 1, 2020 (NST-EST2020). U.S. Census Bureau. Population Division. Release Date: December 2020. Population estimates for 2005 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.

There is a statistically significant increasing trend in the fireworks-related injury estimates from 2005-2020 (p-value=0.0029).[8] The slope of the fitted trend line shows an increase of about 202 injuries per year. In calendar year 2020, there were an estimated 15,600 fireworks-related, emergency department-treated injuries (95 percent confidence interval 12,300 – 19,000). There were an estimated 10,000 such injuries in 2019. The difference between the injury estimates for 2019 and 2020 is statistically significant (p-value = 0.0001). It is possible that the cessation of public firework displays during the COVID-19 pandemic of 2020 spurred consumers to try out displays on their own, resulting in an approximately 50 percent increase in fireworks injuries.

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

Figure 1. Estimated Fireworks-Related, Emergency Department-Treated Injuries
2005 - 2020



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

Appendix A contains a table showing estimated fireworks-related, emergency department-treated injuries and fireworks imports between 2005 and 2020.

Table 2 shows that each year, the number of victims treated are mostly white, followed by victims of an unknown race, black victims, and victims of an "other" race. The "other" race category contains Asian, Pacific Islander/Native Hawaiian, and American Indian/Alaskan Native individuals. CPSC began collecting ethnicity information in 2018, which includes information about whether a victim is Hispanic; as a result, ethnicity information cannot be included at this time.[9]

Figure 2 shows the trend by race across years; there is a statistically significant upward trend for white victims ($p = 0.0021$), but not black or "other" race victims. Between the years 2019 and 2020, there was an increase in the number of white victims ($p=0.0019$) and an increase in the number of "other race" victims ($p=0.0361$).

When comparing the proportion of victims with a known race to the US population[10], there were:

- proportionately fewer white victims (67% of victims, 76% of the U.S. identifies as white)
- proportionately more black victims (24.3% of victims, 13% of the U.S. identifies as black)
- proportionately fewer victims associated with an "other" race (8.7% of victims, 10% of the U.S. identifies as another race)

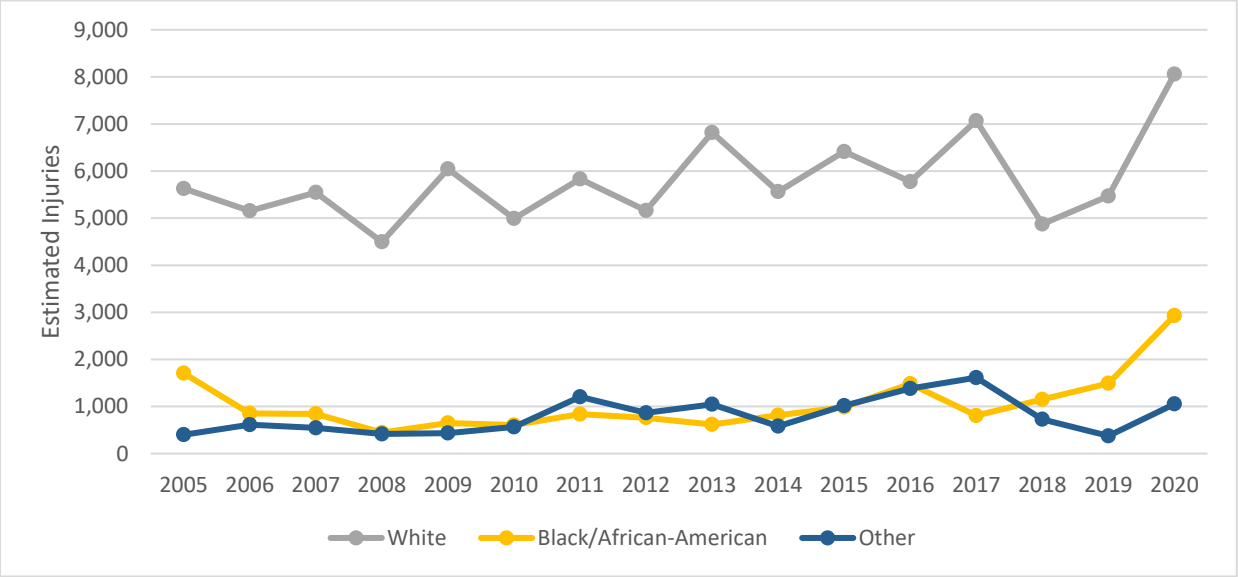
[9] The ethnicity indicator is missing for 24 percent of the fireworks victims in 2020, and thus ethnicity is excluded from this report.
[10] Total U.S. Population race estimates obtained from Census 2019 report estimates (NC-EST2019-ASR5H: Annual Estimates of the Resident Population by Sex, Age, Race Alone or in Combination, and Hispanic Origin for the United States: April 1, 2010 to July 1, 2019. Release Date: June 2020); Census 2020 estimates were not available at the time of this report.

Table 2. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Race
2005-2020

Year	White		Black/African-American		Other		Unknown		Total
	N	%	N	%	N	%	N	%	N
2005	5,600	51.9	1,700	15.7	400	3.7	3,100	28.6	10,800
2006	5,200	56.0	900	9.3	600	6.7	2,600	28.1	9,200
2007	5,500	56.8	800	8.6	500	5.6	3,000	29.0	9,800
2008	4,500	63.8	400	6.4	400	5.9	1,700	23.9	7,000
2009	6,000	68.6	600	7.4	400	4.9	1,700	19.1	8,800
2010	5,000	58.4	600	7.1	600	6.6	2,400	27.9	8,500
2011	5,800	60.8	800	8.7	1,200	12.6	1,700	17.9	9,600
2012	5,200	59.6	800	8.8	700	10.0	1,900	21.6	8,700
2013	6,800	60.0	600	5.4	1,000	9.2	2,900	25.4	11,400
2014	5,600	52.9	800	7.8	600	5.5	3,600	33.8	10,500
2015	6,400	53.7	1,000	8.3	1,000	8.5	3,500	29.5	11,900
2016	5,800	51.9	1,500	13.3	1,400	12.4	2,500	22.4	11,100
2017	7,100	54.9	800	6.3	1,600	12.5	3,400	26.4	12,900
2018	4,900	53.7	1,200	12.7	700	8.0	2,400	25.7	9,000
2019	5,500	54.7	1,500	14.9	400	3.8	2,700	26.6	10,000
2020	8,100	51.5	3,000	18.7	1,000	6.7	3,600	23.1	15,600

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

Figure 2. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Race
2005 - 2020



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

4. Injury Estimates for the 2020 Special Study: Detailed Analysis of Injury Patterns

The injury analysis in this section presents the results of the 2020 special study of fireworks-related injuries treated in hospital emergency departments between June 21, 2020 and July 21, 2020. During this period, there were an estimated 10,300 fireworks-related injuries (sample size=294, 95 percent confidence interval 7,800 – 12,700) accounting for 66 percent of the total estimated fireworks-related injuries for the year, which is not statistically different from the estimated 7,300 fireworks-related injuries in the 2019 special study period (p-value = 0.0974).

The remainder of this section provides the estimated fireworks-related, emergency department-treated 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 3 shows the estimated number and percent of emergency department-treated injuries by type of fireworks device during the special study period of June 21, 2020 to July 21, 2020.

Table 3. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Device Type
June 21 – July 21, 2020

Fireworks Device Type	Estimated Injuries	Percent
Total	**10,300**	**100%**
All Firecrackers	**1,600**	**16%**
Small	300	3%
Illegal	400	4%
Unspecified	900	9%
All Rockets	**600**	**6%**
Other Rockets	400	3%
Bottle Rockets	200	2%
Other Devices	**2,400**	**24%**
Multiple Tube	*	*
Reloadable	400	4%
Roman Candles	600	6%
Novelties	500	4%
Sparklers	900	9%
Fountains	100	1%
Homemade/Altered	**300**	**3%**
Unknown	**5,300**	**52%**

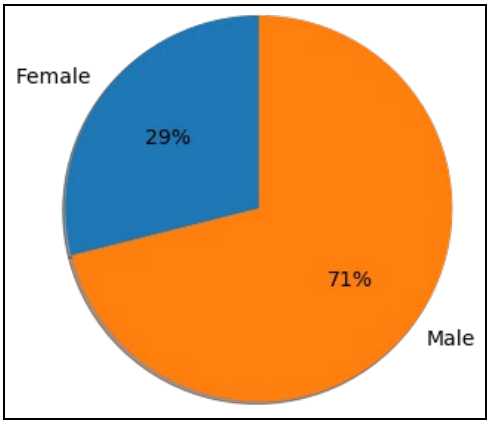
Source: NEISS, U.S. Consumer Product Safety Commission. Based on 287 NEISS emergency department-reported injuries between June 21, 2020 and July 21, 2020, and supplemented by 7 completed In-Depth Investigations. Fireworks types are obtained from the in-depth investigation, when available; otherwise, 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 CPSC's FHSA regulations (16 C.F.R. § 1500.17 (Banned hazardous substances)). Fireworks that may be illegal under state and local regulations are not listed as illegal, unless they violate the CPSC's FHSA regulations. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimates may not sum to subtotal or total due to rounding. Percentages are calculated from the actual estimates, and they may not add to subtotals or the total due to rounding.

There were no injuries due to public firework displays during 2020. Unknown fireworks devices were associated with the most injuries during the 2020 special study period. Multiple tube devices were involved in less than 1 percent of the total estimated injuries during the 2020 special study period.

Gender and Age of Injured Persons

Males experienced an estimated 2.3 fireworks-related, emergency department-treated injuries per 100,000 individuals during the special study period. Females had 0.9 injuries per 100,000 people. Figure 3 shows the distribution of estimated fireworks-related injuries by gender.

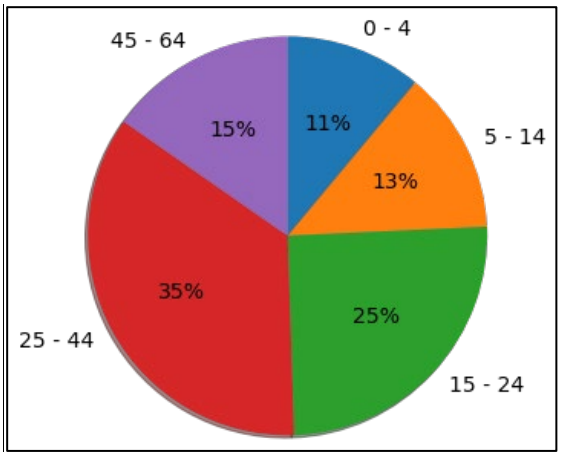
Figure 3. Estimated Injuries by Gender



Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020.

Children under 5 years of age experienced an estimated 1,100 injuries (11 percent of all fireworks-related injuries during the special study period), as shown in Figure 4 and Table 4. Children in the 5- to 14-year-old age group experienced an estimated 1,400 injuries. Breaking down that age group further, children 5 to 9 years of age had an estimated 600 injuries and children 10 to 14 years of age accounted for 700 injuries.[11]

Figure 4. Percentage of Injuries by Age Group



Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020.

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

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

years. However, 2020 saw a large increase in the emergency department visits related to fireworks injuries among females, notably in the 20 – 24 years age group (from under 50 incidents in the 2019 special study period to approximately 400 incidents in 2020--a 700 percent increase).

Table 4. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Age and Gender
June 21- July 21, 2020

Age Group	Total	Per 100,000 People	Male	Female
Total	10,300	3.2	7,300	3,000
0-4	1,100	5.3	800	400
5-14	1,400	3.3	1,000	400
5-9	600	3.1	500	200
10-14	700	3.5	500	200
15-24	2,600	8.5	1,700	900
15-19	1,300	6.1	900	500
20-24	1,300	17	900	400
25-44	3,600	4.2	2,800	800
45-64	1,600	1.9	1,000	500

Sources: NEISS, U.S. Consumer Product Safety Commission. NC-EST2019-AGESEX-RES: Annual Estimates of the Resident Population by Single Year of Age and Sex for the United States: April 1, 2010 to July 1, 2019. U.S. Census Bureau, Population Division. Release Date: June 2019. Based on the special study between June 21, 2020 and July 21, 2020. The oldest victim was 63 years of age. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Age subcategory estimates may not sum to the category total due to rounding.

When considering injury rates (number of injuries per 100,000 people), children and young adults had higher estimated rates of injury than the other age groups during the 2020 special study period. Young adults aged 20 to 24 years had the highest estimated injury rate at 17 per 100,000 population, approximately six times higher than 2019's estimate of 2.8 injuries per 100,000 population. This was followed by 6.1 injuries per 100,000 people from older teens 15 to 19 years of age, and 5.3 injuries per 100,000 people from children ages 0 to 4 years.

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

Table 4 shows the ages of those injured by the type of fireworks device associated with the injury. For children under 5 years of age, unknown fireworks devices accounted for 36 percent of the total estimated injuries for that specific age group.[12]

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

No clear relationship between age and known fireworks type is suggested by the data in Table 5. It is worth noting that the number of estimated injuries does not completely represent the usage pattern because victims are often injured by fireworks used by other people. This is especially true for rockets and aerial shells (*e.g.* multiple tube and reloadable devices), which can injure people located some distance away from where the fireworks are launched.

Table 5. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Device Type and Age Group
June 21 – July 21, 2020

		Age Group				
Fireworks Type	**Total**	**0-4**	**5-14**	**15-24**	**25-44**	**45-64**
Total	10,300	1,100	1,400	2,600	3,600	1,600
All Firecrackers	1,600	100	200	300	700	300
Small	300	*	*	100	200	100
Illegal	400	*	*	100	300	*
Unspecified	900	100	200	200	300	200
All Rockets	600	100	100	200	200	100
Other Rockets	400	*	100	100	100	100
Bottle Rockets	200	100	*	100	100	0
Other Devices	2,400	600	300	400	800	200
Multiple Tube	*	*	*	*	*	*
Reloadable	400	*	*	100	300	*
Roman Candles	600	100	*	300	200	*
Novelties	500	200	200	*	*	100
Sparklers	900	400	*	100	300	100
Fountains	100	*	100	*	*	*
Homemade/Altered	300	*	*	200	100	*
Unknown	5,300	400	700	1,400	1,800	1,000

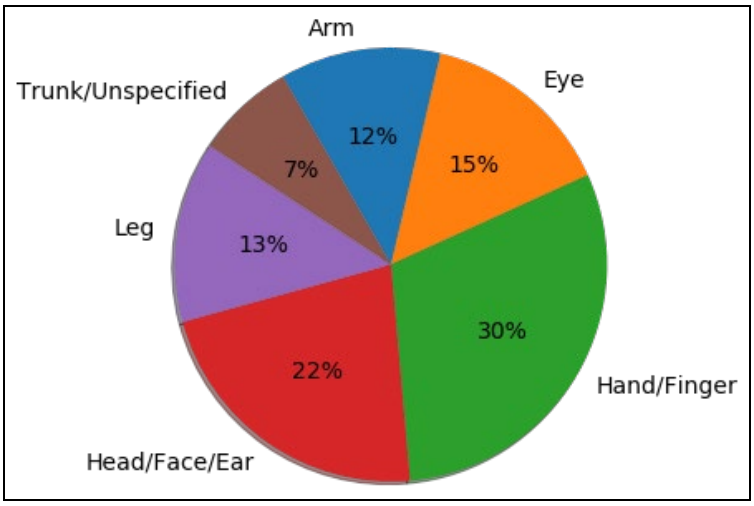
Sources: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Age subcategory estimates may not sum to the category total due to rounding.

As shown previously in Figure 2, males accounted for 71 percent of the estimated fireworks-related injuries, and females comprised 29 percent. Males and females were injured at approximately the same rate by fireworks device. Both males and females were most often associated with injuries from an unknown fireworks device (51 percent for males, 54 percent for females).

Body Region Injured and Injury Diagnosis

Figure 5 presents the distribution of estimated emergency department-treated injuries by the specific parts of the body injured. Hands and fingers were associated with an estimated 3,100 injuries. These were followed by an estimated 2,300 head/face/ear region injuries; 1,500 eye injuries; 1,400 leg injuries; 1,200 arm injuries; and 800 trunk/other injuries.

Figure 5. Body Regions Injured

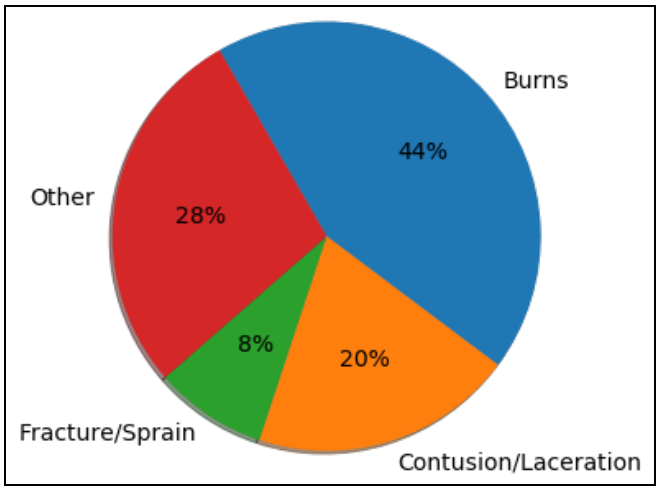


Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020. Arm includes NEISS codes for upper arm, elbow, lower arm, shoulder, and wrist. Head/Face/Ear regions include eyelid, eye area, nose, neck, and mouth but not the eyeball. Leg includes upper leg, knee, lower leg, ankle, foot, and toe. Trunk/other regions includes chest, abdomen, pubic region, "all parts of body," internal, and "25-50 percent of body."

Figure 6 shows the diagnoses of the estimated injuries associated with fireworks devices. Burns, with 4,500 estimated injuries were the most frequent injury diagnosis. Contusions and lacerations were associated with 2,000 estimated injuries and fractures and sprains were associated with 900 estimated injuries. The remaining 2,900 estimated injuries were attributed to other diagnoses.[13]

[13] Estimated injuries may not sum to the total due to rounding. Percentages are calculated from the actual injury estimates.

Figure 6. Types of Injuries



Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020. Fractures and sprains also include dislocations. "Other diagnoses" include all other injury categories. Percentages may not sum to 100 due to rounding

As shown in Table 6, burns accounted for most of the injuries to hands/fingers, over half of the estimated injuries to arms, and half of the estimated injuries to legs. Contusions and lacerations were the most frequent injuries to the head/face/ear regions. Other diagnoses were the most frequent injuries to eyes and the trunk/other regions.

Table 6. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Body Region and Diagnosis
June 21 – July 21, 2020

		Diagnosis			
Body Region	**Total**	**Burns**	**Contusions/ Lacerations**	**Fractures/ Sprains**	**Other Diagnoses**
Total	10,300	4,500	2,000	900	2,900
Arm	1,200	800	100	300	100
Eye	1,500	200	500	*	700
Head/Face/Ear	2,300	500	900	200	700
Hand/Finger	3,100	2,000	200	400	600
Leg	1,400	700	300	*	400
Trunk/Other	800	300	100	*	400

Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020. Fractures and sprains also include dislocations. "Other diagnoses" include all other injury categories. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimated injuries may not sum to subtotals or totals due to rounding.

Types of Fireworks Device and Body Region Injured

Table 7 presents estimated injuries by the type of fireworks device and body region injured.

Table 7. Estimated Fireworks-Related, Emergency Department-Treated Injuries by Type of Fireworks Device and Body Region Injured
June 21 – July 21, 2020

		Region of the Body Injured					
Fireworks Type	Total	Arm	Eye	Head/Face/Ear	Hand/Finger	Leg	Trunk/Other
Total	10,300	1,200	1,500	2,300	3,100	1,400	800
All Firecrackers	1,600	300	200	300	600	200	100
Small	300	100	*	100	200	*	*
Illegal	400	100	*	100	200	*	100
Unspecified	900	100	200	100	300	200	*
All Rockets	600	100	100	200	200	*	*
Other Rockets	400	100	*	100	100	*	*
Bottle Rockets	200	*	100	100	100	*	*
Other Devices	2,400	200	200	700	1,000	100	200
Multiple Tube	*	*	*	*	*	*	*
Reloadable	400	*	100	200	200	*	*
Roman Candles	600	100	*	200	200	*	*
Novelties	500	*	*	200	200	*	100
Sparklers	900	100	100	100	400	100	100
Fountains	100	*	*	100	*	*	*
Homemade/Altered	300	100	*	100	100	*	*
Unknown	5,300	600	1,000	1,100	1,200	1,000	400

Source: NEISS, U.S. Consumer Product Safety Commission. Based on the special study between June 21, 2020 and July 21, 2020. Estimates are rounded to the nearest 100 injuries. Estimates of fewer than 50 injuries are denoted with an asterisk (*). Estimated injuries may not sum to subtotals or totals due to rounding.

The majority of injuries resulted from fireworks devices of an unknown type; this uncertainty results from victims' (or parent/guardians') inability to identify the firework device that injured them, when asked.

Hospital Treatment

An estimated 75 percent of the victims of fireworks-related injuries in the special study period were treated at the emergency department and then released; about 13 percent of the victims were admitted to the hospital. Approximately 8 percent of the victims were treated and then transferred to another hospital. The remaining 4 percent of victims had other dispositions (*i.e.*, left the hospital without being seen or were held for observation).[14] The percentage of victims that were treated-and-released for fireworks-

[14] The percentages are calculated from actual injury estimates and may not sum to 100 due to rounding.

related injuries was lower than for all consumer products in 2020 and the percentages of the treated and transferred or admitted were higher for the fireworks-related injuries in the special study period than those for all consumer products. This trend is the same as seen in prior years.

For all injuries associated with consumer products in 2020, 84 percent of patients were treated and released; 12 percent were admitted to the hospital; 2 percent of patients were transferred to other hospitals; and 2 percent had other dispositions, including left hospital without being seen, held for observation, or dead on arrival. [15]

[15] Comparisons are calculated using actual injury estimates and differences may not appear due to rounding.

5. Telephone Investigations of Fireworks-Related Injuries

CPSC staff conducted in-depth telephone investigations of a sample of fireworks incidents that occurred during the 1-month special study period surrounding the 4th of July holiday (June 21, 2020 to July 21, 2020). 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 287 emergency department-treated, fireworks-related injuries during the special study period, staff selected 209 cases for telephone investigations, of which 7 were completed and determined to be in scope, and 202 were incomplete. Table 8 shows the final status of these investigations, including the reasons why some investigations were incomplete.

Table 8. Final Status of Telephone Investigations

Final Case Status	Number of Cases	Percent
Total Assigned	209	100
Completed Investigation	7	3
In Scope	7	3
Incomplete Investigation	202	97
Failed to Reach Patient	109	52
Victim Name Not Provided by Hospital	59	28
Victim Refused To Cooperate	33	16
Incident Purge[16]	1	0

Short descriptions of the 7 completed in-scope cases are found in Appendix B. The cases are organized in order of emergency department disposition, with Admitted (to the hospital) first, followed by Treated and Released, and Left without Being Seen by a Doctor. Within dispositions, cases are in order of increasing age of the victim.

[16] Purged due to victim fatality. NEISS assignments are typically purged for one of three reasons: the record is a duplicate, the incident was a fatality, or the interview request was a duplicate.

Summary Statistics

Of the 7 completed in-scope cases, 4 involved males, and 3 involved females. There was one victim aged 0 to 4 years old; two victims aged 5 to 14 years old; and four victims aged 15 to 33 years old. One victim was admitted to the hospital, one victim was held for observation and transferred, three victims were treated and released, and two victims left without being seen.

The type of fireworks devices involved in two of the incidents was unspecified. Smoke bombs were associated with one incident, reloadable aerial shells[17] were associated with four incidents.

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 investigations on more serious injuries and incomplete NEISS records. Three percent of the victims selected for the telephone interviews completed the survey.

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 had two or more hazard patterns, staff selected the hazard pattern most likely to have caused the injury. Hazard patterns are presented in Table 9, below, and a detailed description of the incidents follows Table 9. Case numbers refer to the case numbers shown in Appendix B.

Table 9. Hazard Patterns as Described in Telephone Investigations for Fireworks-Related Injuries

Hazard Pattern	Number of Cases	Percent of Total
Total Cases	7	100%
Malfunction	3	43%
Errant flight path	2	29%
Early detonation	1	14%
Misuse	3	43%
Improper distance	2	29%
Improper Preparation	1	14%
Unknown	1	14%

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

Malfunction (3 Victims, 43 percent of total)

Errant Flight Path

- Case 1: A 19-year-old female victim was in a yard when she was struck by a mortar-style firework device. The firework was lit without the victim's knowledge and flew directly toward the victim. The victim then turned and was struck by the device, leaving a second degree burn approximately four inches in diameter on the victim's left buttock.
- Case 3: A 5-year-old male victim injured his eye as a result of a rocket-style fireworks device incident. The victim's mother lit the firework and stepped back for the ignited device to wait for detonation. However, instead of shooting vertically as intended, the device shot horizontally and hit the victim in his face. As a result of the incident, the victim was admitted to the hospital and lost his right eye.

Early Detonation

- Case 6: A 33-year-old female victim was struck in the face by a fireworks device while trying to light. After the incident, the victim's fiancé drove her to the hospital where they flushed her eyes as she was unable to see. Her face and hair were also burned. The victim is now speaking with a therapist about the emotional impacts of the incident.

Misuse (3 Victims, 43 percent of total)

Improper Distance

- Case 7: A 3-year-old male victim and his father lit a smoke bomb in the street of their neighborhood. After lighting the firework device, they ran away from the device. During the run, either smoke or a foreign object from the device entered the victim's eye and caused a burning sensation; the victim was unable to open his eyes immediately after the incident. The victim's eyes were cleaned at the emergency department and recovered within a day.
- Case 3: A 7-year-old female victim lit the end of an aerial shell style firework device with a sparkler. The aerial shell was brought to her by a neighbor child; the victim had been instructed to use only sparklers. After the aerial shell was lit by the sparkler, the neighbor dropped the shell which caught the attention of the victim's guardians. Upon noticing the lit firework, the victim was instructed by her guardian to run away, but did not run far before the firework device detonated. The firework burned her left upper calf.

Improper Preparation

- Case 2: A 24-year-old male victim and his friends were shooting mortar-style fireworks out of a tube. The victim's friend used a small tube to pack a large firework, and upon ignition, detonated on the victim and his friends. The victim received second degree burns on his left hand from the incident.

Unknown (1 Victim, 14 percent of total)

Unknown

- Case 5: A 21-year-old male victim and his family were walking up the street to start to light fireworks when the victim was hit on the head with a firework device or firework device particles. At the time of the incident, the victim was saying hello to his neighbors who were setting off their own fireworks. The firework caused a three-inch gash on the victim's head that required a staple and two stitches at the emergency department.

Long Term Consequences of Fireworks-Related Injuries

Respondents were asked if there were any long-term consequences of their injuries. Six of the seven victims (86 percent of the total) experienced or expected complete recovery, with no long-term consequences. However, one victim described their expected long-term adverse consequences:

- Case 1: A rocket-style firework flew horizontally and hit the victim in the face. The victim lost his right eye as a result of the incident.

Where Fireworks Were Obtained

Of the 7 telephone survey respondents, 6 knew where the fireworks were obtained. All six respondents who knew the location that the fireworks were obtained stated that the fireworks were purchased from a store.

One of the 7 respondents did not know the source of the fireworks. This is typically the case when the respondent did not purchase the firework that caused injury.

6. **Enforcement Activities**

Fiscal year 2020 presented unique challenges to CPSC's Office of Compliance and Field Operations (EXC) in its ability to conduct surveillance on imported fireworks and enforce the provisions of the Federal Hazardous Substances Act (FHSA)[18] and regulations under the FHSA. The SARS-CoV-2 (COVID-19) pandemic limited CPSC staff collecting samples as well as testing samples that were collected.

CPSC staff was able to sample and test shipments of some fireworks both before and after the COVID-19 restrictions. Approximately 20 percent of the selected and tested shipments were found to contain non-compliant fireworks. The noncompliant fireworks devices had a combined estimated import value of $208,000. The violations consisted of fuse violations and presence of prohibited chemicals. EXC staff requested corrective actions on these non-compliant fireworks and, in all cases, firms agreed to the corrective actions.

[18] 15 U.S.C. §§ 1261-1278

7. Summary

In calendar year 2020, there were 18 reported non-occupational fireworks-related deaths. However, reporting for 2020 may not be complete at this time. There were an estimated 15,600 fireworks-related emergency department-treated injuries for calendar year 2020.

During the 1-month special study period from June 21, 2020 to July 21, 2020, there were an estimated 10,300 emergency department-treated fireworks-related injuries. Adults aged 25 to 44 years of age experienced about 35 percent of the estimated injuries, and males of all ages experienced 71 percent of the estimated injuries.

Additionally, 44 percent of the estimated injuries during the special study period involved burns. Burns were the most common injury to hands, fingers, arms, and legs. The parts of the body most often injured were hands and fingers (an estimated 30 percent of the injuries); followed by head, face and ears (22 percent); eyes (15 percent); legs (13 percent); arms (12 percent); and trunk/unspecified (7 percent). Most of the estimated injuries (75 percent) were treated-and-released. An estimated 21 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 involved in 9 percent of the estimated injuries during the special study period. Firecrackers, as a whole, were involved in 16 percent; roman candles, as well as rocket-type devices were associated with 6 percent each. Novelties and reloadable tube devices were associated with 4 percent of injuries each. Homemade or altered fireworks were associated with 3 percent of injuries, and multiple tube devices were associated with less than 50 total incidents which at a maximum equates to one-half of 1 percent of injuries. The majority of fireworks-related injuries, 52 percent, were associated with unknown firework device types.

A review of data from telephone follow-up investigations showed that the typical causes of injuries were due to both the misuse and malfunction of fireworks. At the time of the telephone investigation, which was conducted typically 1 to 2 months after the injury, most victims had recovered from their injuries. One of the 7 respondents interviewed reported that the injury will be long term.

Finally, in fiscal year 2020, CPSC staff continued to actively monitor import shipments of fireworks and products in the marketplace. CPSC staff worked with the U.S. Customs and Border Protection agency to sample imported fireworks. Compliance staff conducted inspections at fireworks retailers to collect samples for analysis and testing for compliance with mandatory requirements.

References

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Appendix A

Fireworks-Related Injuries and Imported Fireworks

Table 10 reports the total estimated number of injuries per 100,000 pounds of imported fireworks. Table 10 shows an average of 238.9 million pounds of fireworks were imported each year between 2005 and 2020, with a standard deviation of 32.2 million pounds. Between 2005 and 2010, the number of imports declined from a peak of 275.1 million pounds in 2005 to a low of 199.6 million pounds in 2010. From 2011 to 2014, the number of imports were relatively steady with modest changes for some years. In 2015, fireworks imports reached their highest level since 2005, with an estimated 279.5 million pounds. Since 2015, the imports have remained relatively high compared to the 2008 to 2014 time period, with a high of 278.1 million pounds in 2018.

As for the number of estimated emergency department-treated fireworks-related injuries, 2018, with 9,100 injuries, had the lowest since 2013. The highest three annual estimated fireworks-related injuries were 15,600 in 2020, 12,900 in 2017, and 11,900 in 2015.

As shown in Table 10 below, the estimated number of injuries per 100,000 pounds of fireworks imported was 6.1 in 2020, which, with the exception of 2013, was the highest since 2005. The highest three estimated number of injuries per 100,000 pounds of fireworks were 6.3 injuries in 2013, 6.1 in 2020, and 5.2 injuries in 2017. For the other years, that number ranged between 3.4 injuries and 4.8 injuries per 100,000 pounds of fireworks imported.

Table 10. Estimated Fireworks-Related Injuries and Estimated Fireworks Imported into the United States 2005 - 2020

Year	Estimated Injuries	Estimated Fireworks Imports (millions of pounds)[¥]	Injuries Per 100,000 Pounds of Fireworks Imported
2020	15,600	255.0	6.1
2019	10,000	255.8	3.9
2018	9,100	278.1	3.3
2017	12,900	247.0	5.2
2016	11,100	262.3	4.2
2015	11,900	279.5	4.3
2014	10,500	219.6	4.8
2013	11,400	180.2	6.3
2012	8,700	201.0	4.3
2011	9,600	228.1	4.2
2010	8,600	199.6	4.3
2009	8,800	200.2	4.4
2008	7,000	208.3	3.4
2007	9,800	260.1	3.8
2006	9,200	272.1	3.4
2005	10,800	275.1	3.9

Source: Injuries from NEISS, U.S. Consumer Product Safety Commission. See Table 1 for further details. Estimated fireworks imports data from the U.S. International Trade Commission (ITC), using Harmonized Tariff Schedule (HTS code 3604.10). Imports include consumer fireworks (1.4G HTS codes 3604.10.90.10 and 3604.10.90.50) and display fireworks (1.3G HTS code 3604.10.10.00). Display fireworks were about 4.7 percent of the total imports in 2020. In addition to imported fireworks used in the United States, there is also a small amount of fireworks manufactured in the United States for domestic consumption; the data for these fireworks is not available from ITC and is not shown in this table.

[¥]Fireworks imports data were downloaded from the ITC website in April 2021. Fireworks imports data subject to change by ITC. These changes have typically been minor.

Table 10 should be interpreted with caution. First, while there may be a relationship between the number of fireworks devices and estimated injuries resulting from fireworks, the number of imported fireworks is not available. Table 10 uses the total import weight as an approximation for the number of fireworks devices.

Second, the total import weight over-represents heavy devices and under-represents light devices. A heavy device may not be more dangerous than a light device because a firework's weight includes things other than just the amount of explosive material.

In addition, international trade statistics do not provide weight by fireworks device types. It is not possible to associate injuries with the weight of different types of imported fireworks. As shown in Table 2 earlier in this report, different fireworks devices are associated with different numbers of injuries. Thus, the decrease in injuries per 100,000 pounds between 2005 and 2008 may be due to different mixtures of types of fireworks imported over time or an overall decrease in injuries among all types of fireworks. Similarly, the increase in injuries per 100,000 pounds in 2013 may have resulted from different fireworks

mixtures, a decrease in importation of fireworks, or just statistical variation. The data do not provide enough information to determine the relative contribution of these factors.

Appendix B

Telephone Investigations

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Narrative	Medical Treatment and Prognosis	Long Term Consequences	Hazard	Source
1	3	M	Other	Eye	Left	Novelty	On an evening in July, 2020, the victim and his father lit a smoke bomb in the street of their neighborhood. After lighting the firework device, they ran away from the device. During the run, smoke from the device entered the victim's eye and caused a burning sensation; the victim was unable to open his eyes immediately after the incident.	The victim's eyes were cleaned at the emergency department; the victim recovered within a day.	No long term consequences	Misuse, improper distance	A store
2	33	F	Burn	Head/Face/ Ear	Left	Unknown	In July, 2020, a 33 year old female victim was struck in the face by a fireworks device that she was trying to light. After the incident, the victim's fiance drove her to the hospital where they flushed her eyes. Her face and hair were also burned.	The victim was treated at the emergency department where her eyes were flushed. She is speaking with a therapist about the emotional impacts of the incident.	No long term consequences.	Malfunction, early detonation	A store
3	7	F	Burn	Leg	Treat and Release	Reloadable	In July, 2020, the victim lit the end of an aerial shell style firework device with a sparkler. The aerial shell was brought to her by a neighbor child; the victim had been instructed to only use sparklers. After the aerial shell was lit by the sparkler, the neighbor dropped the shell which caught the attention of the victim's guardians. Upon noticing the lit firework, the victim was instructed by her guardian to run away, but did not run far before the firework device detonated. The firework burned her left upper calf.	The victim went to the emergency department, where she was treated for burns. The victim required follow-up visits to change the bandage and ointment to reduce scarring.	No long term consequences	Misuse, improper distance	A store

Case	Age	Sex	Diagnosis	Body Part	Disposition	Fireworks Type	Narrative	Medical Treatment and Prognosis	Long Term Consequences	Hazard	Source
4	19	F	Burn	Arm	Treat and Release	Reloadable	In July, 2020, the victim was in a yard when she was hit by a mortar-style firework device on her left buttock. The firework was lit without the victim's knowledge and flew toward the victim. The victim turned and was struck by the device, leaving a second-degree burn approximately four inches in diameter on the victim.	The victim fully recovered three weeks after the incident.	Victim has slight loss of feeling and scarring on her body.	Malfunction, errant flight path	A store
5	21	M	Contusion /Laceratio n	Head/Face/ Ear	Treat and Release	Unknown	In July, 2020, the victim and his family were walking up the street to start to light fireworks when the victim was hit on the head with a firework device or firework device particles. At the time of the incident, the victim was saying hello to his neighbors who were setting off their own fireworks. The firework caused a three-inch gash on the victim's head that required a staple and two stitches at the emergency department.	The victim was treated at the emergency department and required follow-up visits that required treatment of the site to remove burned skin. Recovery took approximately 10 days.	No long term consequences.	Unknown, unknown	Unknown
6	24	M	Burn	Arm	Held for Observation	Reloadable	In July, 2020, the victim and his friends were shooting mortar-style fireworks out of a tube. The victim's friend used a small tube to pack a large firework, and upon ignition, detonated on the victim and his friends. The victim received second degree burns on his left hand from the incident.	The victim recovered within a month and did not need any follow up medical visits.	Potential loss of feeling in the victim's arm.	Misuse, improper preparation	A store
7	5	M	Other	Eye	Treat and Transfer	Other Rocket	In July, 2020, a 5 year old male victim was injured in his eye as a result of a malfunctioning rocket-style fireworks device. The victim's mother lit the firework and stepped back from the ignited device to wait for detonation. However, instead of shooting up as intended, the device shot horizontally and hit the victim in his face. As a result of the incident, the victim was admitted to the hospital and lost his right eye.	The victim received multiple surgeries to address the injuries from the incident.	The victim lost his eye.	Malfunction, errant flight path	A store