NEISS
The National Electronic Injury Surveillance System
A Tool for Researchers

Division of Hazard and Injury Data Systems
U.S. Consumer Product Safety Commission

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Executive Summary

This paper provides a description of the National Electronic Injury Surveillance System (NEISS), includes specific examples of how the Consumer Product Safety Commission (CPSC) and some other Federal agencies use NEISS and shows how other researchers can use NEISS data to address issues within their own areas of interest.

Background

Since the Commission's inception, data from an emergency department system have proven to be the single most effective means for fulfilling the Commission's data needs. Among other Commission data sources are death certificates, medical examiners' reports, fire data from the National Fire Incident Reporting System, reports of product-related problems from consumers, reports from lawyers and news clippings.

The large number of incidents seen in hospital emergency departments provides the volume needed to measure the number of injuries associated with the thousands of different consumer products in the marketplace. The necessary data are generally already available in the hospital record without placing an undue extra burden on the emergency department (ED) staff. Also, traditionally, hospitals have been willing to cooperate in the Commission's work to reduce consumer product-related injuries.

One of the more important considerations in selecting an appropriate data source is timeliness. The faster the data arrive at the Commission, the faster the Commission can take action to eliminate or reduce the injury problem. Emergency department data are available very quickly to the Commission. Once a record is collected, it is available to Commission analysts. This provides the Commission with very timely knowledge of the types of products associated with injuries treated in emergency departments. Timeliness is vital when investigations are conducted for selected incidents. It is most essential to follow up with an immediate investigation of a case before the victim's memory of the incident fades and before the product is lost or altered. When cases are selected for follow-back investigation, it is generally possible to speak with the accident victim, the victim’s parent, or a witness within the first few weeks after the accident.

Many injury victims seek treatment in hospital emergency departments, especially when the victim or his family perceives the need for immediate care. The apparent desire for immediate care also implies a certain severity. Therefore, it is likely that more severe injuries are treated in hospital emergency departments than in other places of medical care.

CPSC's long experience with data from hospital emergency departments has demonstrated that a large number of injury cases can be collected in an efficient, cost-effective manner. Over the last ten years, the annual number of cases collected has ranged from 173,000 to more than 375,000. The number of cases per year varies because of changes in the number of hospitals in the sample and the additional number of non-product-related cases collected from time to time to meet the needs of other agencies.

NEISS data are available to all and are typically used by other agencies of the Government, manufacturers, researchers, lawyers and the general public. Over time NEISS has provided the Commission and some other Federal agencies with timely national estimates of product-related injuries. Other Federal agencies have shared the system since 1978 by entering into interagency agreements with CPSC. These agreements fund the expansion of the system to collect data (through NEISS) that are outside the jurisdiction of CPSC. Because of these very successful joint endeavors, in the year 2000 CPSC initiated a major system expansion to collect ***all injuries*** rather than just consumer product-related injuries. With this move to collect all injuries through NEISS, the system will become an even more important research tool for other Federal agencies as well as other researchers.

While this paper primarily describes the use of NEISS by CPSC for product-related injuries, it also describes some results from the past agreements with other Federal partners. From these examples other data users may find parallels to some potential data analyses to be of particular interest.

Tracing CPSC's History of Emergency Department Systems for Monitoring Product-related Injuries

The current NEISS is a sophisticated probability sample of emergency departments with data keyed directly into personal computers by staff at the participating hospitals. Its roots and evolution are traced in the sections that follow.

First NEISS (1971)

The first NEISS was designed in November and December of 1970. Based on a 1968 inventory of U.S. hospitals and 1960 population census data, the first NEISS comprised a statistically valid sample of 119 hospitals, representative of all general hospitals with emergency departments in the 48 contiguous States. The recruiting of hospitals together with training, equipping and operating the system began in May 1971 in the Bureau of Product Safety of the U.S. Food and Drug Administration. In July 1973, when the U.S. Consumer Product Safety Commission was activated, NEISS became the core data system of CPSC's Bureau of Epidemiology. At that time, data were entered at participating hospitals using paper tape teletype terminals.

Redesigned NEISS (1978)

In order to update and improve the initial system, on October 1, 1978 a redesigned NEISS was implemented.[1] The sampling frame for the redesigned NEISS consisted of hospitals listed on the National Center for Health Statistics' 1975 Master Facilities Inventory hospital computer tape. The redesigned NEISS sample was a probability sample of all hospitals with emergency departments throughout the U.S. and its territories. The hospitals on the sampling frame were stratified by size (annual number of emergency department visits) into four groups with an additional group covering hospitals with burn care centers. After hospitals were organized geographically within strata, substrata of equal numbers of hospitals were formed, and, finally, a simple random sample of primary and alternate hospitals was selected from each stratum.

[1] Waksberg, J. and Valliant, R. (1977). NEISS Sample Redesign. Rockville, MD: Westat, Inc.

The 1978 sample of 130 hospitals actually consisted of two half samples. Due to budgetary limitations, the full sample was never implemented. While plans had called for implementing the two half samples in two phases over a two-year period, the probability sample actually implemented consisted of 74 hospitals. Further budget cutbacks in 1984 reduced the sample to 64 hospitals. Because of hospitals going out of business, by early 1989 the sample size had fallen to 62. At that time, data were entered using terminals connected by telephone lines to a mainframe computer in Rockville, Maryland.

Updated Sample (1990)

In 1989 CPSC updated the sample to reflect a more current universe of hospitals with emergency departments in the U.S. and its territories.[2] First, a sampling frame was constructed from the most current information (1985) on U.S. hospitals with emergency departments. After dividing the sampling frame into four size strata based on the annual number of emergency visits reported by each hospital, the hospitals were ordered geographically within stratum. As a result of the changes between the 1975 and the 1985 sampling frames, 10 hospitals were added, 7 were dropped, and a number of others moved from one stratum to another. As of January 1990, the sample consisted of 65 hospitals. At that time the system began the use of personal computers for data entry in the hospitals. CPSC collected the data each night using a polling application run from a personal computer at CPSC headquarters.

Enhanced Sample (1991)

In 1991 a plan was implemented to increase the size of the NEISS sample, thereby restoring many of the properties associated with the full 130-hospital redesign sample. The implementation plan called for selecting and recruiting additional hospitals in each of the three larger strata, greatly increasing the number of reports to be collected. Increasing the number of reports to be collected also would decrease the time needed to complete follow-back studies. With the addition of 26 hospitals, the size of the NEISS sample increased to 91 in January 1991.

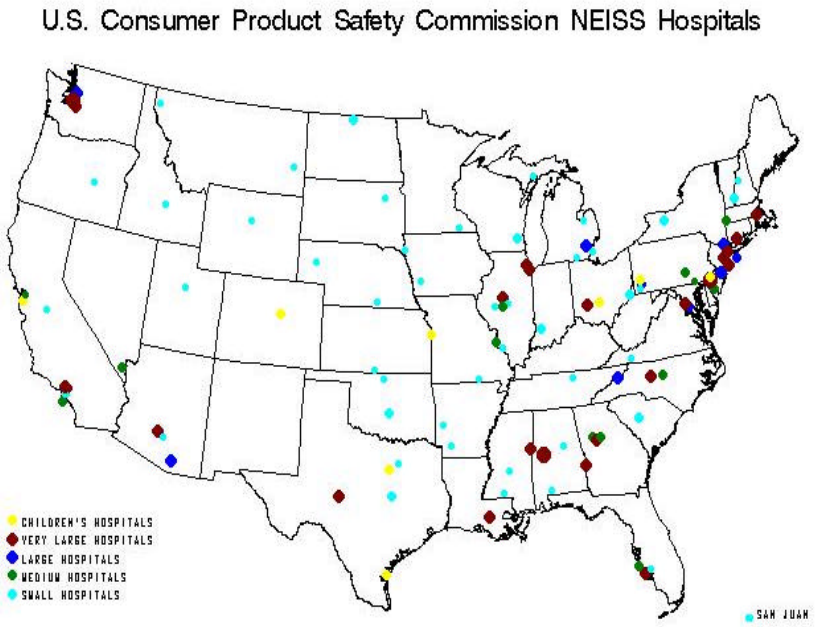
[2] Marker, D., Waksberg, J. and Braden, J. (1988). NEISS Sample Update. Rockville, MD: Westat, Inc.

That sample of 91 hospitals, a probability sample of hospitals with emergency departments in the U.S. and its territories, provided approximately 290,000 product-related injury reports each year.

Current Sample (1997 to date)

In 1997 CPSC again updated the NEISS sample to reflect a more current distribution of hospitals (in the U.S. and its territories) with emergency departments[3]. In the year 2000 this sample includes 100 hospitals grouped into five strata, four representing hospital emergency departments of differing sizes and a fifth representing emergency departments from children's hospitals. The changes in the sampling frame and the NEISS sample since 1978 are tracked in the NEISS Sample (Design and Implementation) paper[4]. Figure 1 illustrates the locations of hospitals currently participating:

Figure 1



[3] Marker, D. and Lo, A. (1996). Update of the NEISS Sampling Frame and Sample. Rockville, MD: Westat, Inc.

[4] Kessler, E. and Schroeder, T. (1999). The NEISS Sample (Design and Implementation). Washington, DC, U.S. Consumer Product Safety Commission, 1999.

Since initiating the most current sample update, CPSC has begun maintaining the currency of the sample by purchasing a new sampling frame each year. The new frame lists all hospitals in the U.S. and its territories having emergency departments and includes the annual number of emergency department visits (EDVs). After appropriate adjustments to assure that hospitals in the frame conform to the required specifications, the new sampling frame is used to ratio-adjust the statistical weights for the current NEISS hospital sample to the current total number of EDVs.[5] The result is that the NEISS sample weights more accurately reflect the total number of emergency department visits in the U.S. for the given year. These techniques help to avoid the need to adjust system estimates to account for the effects of changes in the sample.

Year 2000 Expansion

In the year 2000 CPSC managers initiated an important expansion to the NEISS by deciding to collect *all injuries* rather than just consumer product-related injuries. This expansion is based on two pilot studies that tested the feasibility of collecting all injuries through NEISS[6]. CPSC and the National Center for Injury Prevention and Control of the Centers for Disease Control (CDC) are jointly funding the Year 2000 NEISS expansion.

Once data for a sufficient period of time are collected under the expanded system, NEISS will provide national estimates of the total number of injuries treated in hospital emergency departments. In addition to the consumer product-related incidents that have always been collected, the expanded system includes the following types of injury and poisoning incidents:

- incidents where no product is mentioned (e.g. “fell to ground”)

- incidents related to products that are outside CPSC’s jurisdiction (e.g. motor

[5] Marker, D, et al, (1999). Comparisons of National Estimates from Different Samples and Different Sampling Frames of the National Electronic Injury Surveillance System (NEISS), Rockville, MD: Westat Inc.

[6] Quinlan, K.P., Thompson, M, Annest, J.L., Peddicord, J, Ryan, G. Kessler, E. and McDonald, A. (1999). Expanding the National Electronic Injury Surveillance System to Monitor All Nonfatal Injuries Treated in US Hospital Emergency Departments. *Ann Emerg Med.* 34:5, 638-645.

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vehicles, boats, aircraft, pesticides, food, drugs, medical devices, cosmetics, firearms, tobacco)

- incidents that occur during work for compensation, and
- incidents that are intentionally inflicted (e.g. assaults and attempted suicides).

Although the NEISS sample design was not altered to accommodate the system expansion, several variables were added or modified to provide for identifying the above-mentioned incidents.

Since sufficient data are not yet available under the expanded system, the examples in this paper are from earlier time periods. Furthermore, even while operating the expanded system, CPSC will continue its focus on products that fall under its jurisdiction. Nevertheless, surveillance data on all incidents will be available to other Agencies and to the public.

Description of the Four Level NEISS Data Collection Capability

The NEISS provides for four levels of data collection:

1. ongoing routine surveillance of emergency department injuries;
2. special emergency department surveillance activities;
3. follow-back telephone interviews with the injured person; and
4. more comprehensive on-site investigations with the injured person and other witnesses.

Each of these levels of data collection is described below.

1. Ongoing Surveillance

The NEISS continuously monitors product-related injuries treated in the 100 hospital emergency departments that comprise the probability sample. In-scope injuries seen in these emergency departments are reported to CPSC on a daily basis, seven days a week, 365 days a year. Thus, daily, weekly, monthly, seasonal or episodic trends can be observed.

The data collection process begins when a patient in the emergency department of a NEISS hospital relates to a clerk, nurse, or physician how the injury occurred. The various emergency department staff members enter this information in the patient's medical record. At the end of the day, a person designated as a NEISS coordinator gleans the records for in-scope cases. The NEISS coordinator is someone designated by the hospital who is given access to the ED records. NEISS coordinator duties are sometimes performed by an ED staff member and sometimes by a person under contract to CPSC. CPSC data collection specialists train NEISS coordinators and conduct ED staff orientation during on-site hospital visits.

For all in-scope cases, the NEISS coordinator abstracts information for the specified NEISS variables. The coordinator uses a *NEISS Coding Manual*[7] to apply numerical codes to the NEISS variables. For CPSC, the key variable is the one that identifies any consumer product mentioned. The coordinator is trained to be as specific as possible in selecting among the approximately 900 product codes in the *NEISS Coding Manual*. Another essential variable is the free-text narrative description from the emergency department record of the "incident scenario." Up to two lines of text are provided for this narrative that often describes what the patient was doing at the time of the accident. The specific NEISS variables are listed below:

Basic Surveillance Record Variables (prior to year 2000 expansion)

Date of Treatment
Case Record Number
Age of Patient
Gender of Patient
Injury Diagnosis
Body Part Affected
Disposition (Treated and
Released, Hospitalized...)
Product(s) Mentioned
Locale
Fire / Motor Vehicle Involvement
Whether Work-related
Race and Ethnicity
Incident Scenario
Whether intentionally inflicted (Year 2000 expansion)

[7] U.S. Consumer Product Safety Commission. (1999). NEISS Coding Manual. Washington, DC: U.S. Consumer Product Safety Commission.

The NEISS coordinator transcribes all necessary information to coding sheets and then enters the coded data into a personal computer installed at the hospital for NEISS work. As the information is entered, computer programs ensure valid entries. Whenever unacceptable keystrokes or invalid combinations of coded data are detected, those errors must be corrected before the case will be accepted. CPSC collects the data each night by telephone without human assistance. The data are subsequently added to the NEISS database residing on a local area network at CPSC headquarters in Bethesda, MD. These data are then immediately available to Commission staff for review and analysis. Potential errors such as illogical coding combinations (e.g., a one-year-old victim driving a riding lawn mower) are noted by CPSC staff who contact the coder either via computer or telephone to verify and/or correct the entries. In addition to checking for coding accuracy, hospital reporting is carefully monitored for timeliness and completeness.

2. Special ED Surveillance Activities

In the second level of NEISS, a limited amount of additional data are sometimes abstracted from the emergency department record and collected nightly along with the usual surveillance data. Two examples of different types of second-level surveillance studies are described below:

Fireworks Injuries - During a 30-day period around the Fourth of July, extra data are collected on all injuries involving fireworks. The special study concentrates on identifying the types of fireworks involved. Diagrams and illustrations are used to aid in identifying the specific product. The CPSC uses data from the special studies to monitor injury trends and to assess the effectiveness of the fireworks regulation.

Ingestions Among Young Children – Because of the vulnerability of young children to drugs and other potentially poisonous substances, CPSC collects some additional data for ingestions by children under five years of age: symptoms, treatment, contact with a poison control center or other medical person and disposition of product container. These additional ED surveillance data have become an ongoing part of the surveillance system.

Also, in the majority of years since 1978, as part of interagency agreements, CPSC has collected second level surveillance data for other Federal agencies. Most recently, CPSC has collected special surveillance data on firearm incidents for National Institute for Injury Prevention and Control (NCIPC), on work-related incidents for the National Institute for Occupational Safety and Health (NIOSH), on air bag deployment incidents for the National Highway Traffic Safety Administration (NHTSA) and on medical device incidents for the Food and Drug Administration (FDA). In addition to the basic NEISS surveillance data, each of these studies required that additional data be added through the use of a second data entry screen.

3. Follow-back Investigation Levels of NEISS (Levels 3 and 4)

Because the surveillance and special study levels only reflect product involvement, not necessarily product causation, follow-up investigations are often needed to gather more detailed information. Therefore, the NEISS surveillance level is complemented by two levels of investigative follow-up -- telephone interviews and on-site investigations. The vast majority of completed investigations are done by telephone.

It is important to note that the statistical properties associated with NEISS surveillance level data also pertain to follow-back studies whenever the surveillance cases are selected for the follow-back study with known probability. The statistical weights for data from follow-back studies are adjusted to account for the secondary level of sampling and for non-response.

A. Telephone Follow-back Investigations (Level 3 of NEISS)

In most years, only a small percentage (< 1%) of the surveillance cases have been selected for follow-back investigation. Cases selected depend on requirements to support specific CPSC projects. Telephone interviews with victims or witnesses provide additional information on the events surrounding the injury incidents. The telephone investigation reports provide information about the accident sequence, human behavior, and the role of the consumer product in the accident. They also describe the environment, the victim, and the product. These telephone

investigations comprise the third level of the four-level NEISS. For the overwhelming majority (90%) of the cases, the telephone interview provides sufficient information for Commission purposes. For the remaining 10 percent of the cases, further detail is sought through assignment for an on-site investigation, the fourth level of the NEISS.

B. On-Site Follow-Back Investigations (Level 4 of NEISS)

When even more detail is required (site measurements, photographs of the site and/or the product, etc.), CPSC conducts an on-site investigation. A CPSC investigator visits the scene of the incident and obtains detailed information about the product, the victim and the environment, including information about the accident sequence, human behavior, and the role of the product in the accident. The investigator may take photographs of the victim, the product, and the accident site. The product may be examined or collected for laboratory study. The investigator attempts to reconstruct the sequence of events by talking with the victim, his family, witnesses, the attending physician and anyone else having knowledge of the incident. He may examine, collect and include police, fire and coroner reports in the final investigation report. Such on-site investigations represent the fourth and most detailed level of the four level data collection system known as NEISS.

Note that names and addresses of victims are used only to allow collection of details on the incident and then are removed from all Commission files. The identity of the victim does not appear in any reports.

Statistical Properties of NEISS

Estimates – Because the NEISS is a probability sample of all hospitals with emergency departments in the U.S. and its territories, it has statistical properties that provide for measuring the magnitude of a problem through national estimates. Each case collected has an associated statistical weight based on the sample design.[8] Also, the sample design provides a method for adjusting the statistical weights of cases from

[8] Kessler, E. and T. Schroeder. (1999). The NEISS Sample (Design and Implementation), Washington, DC, U.S. Consumer Product Safety Commission.

participating hospitals to account for the non-participation from other hospitals. The basic (or historical) national estimate is the sum of the statistical weights (adjusted, as needed) for all cases of interest. For example, in 1998 there were an ***estimated 147,994 toy-related injuries*** treated in hospital emergency departments in the U.S. In order to produce national estimates of injuries, one must use the statistical weights rather than raw case counts. Because the statistical design provides different statistical weights for hospitals by the stratification variable (annual number of emergency department visits), one must also use weighted data (rather than raw counts) when data analyses use percentages or proportions.

Sampling Errors – Because NEISS estimates are based on data from a sample of hospital emergency departments rather than from a census of all emergency department data, they are subject to sampling (or standard) errors. Sampling errors describe the variability associated with estimates from sample surveys. (The standard error is the square root of the variance.) This variability is related to the statistical design of the particular survey. Sampling errors provide a measure of the variability that occurs by chance because only a sample is surveyed; they describe the precision of the estimates. Specific sampling (standard) errors may be computed for a given set of data, from which a 95 % confidence interval around the estimates can be constructed. CPSC often presents sampling variation in the form of a coefficient of variation (c.v.) The c.v. of an estimate is the standard error divided by the estimate. For example, the specifically ***computed coefficient of variation (c.v.) for1998 toy-related injuries is .06 (6 percent of the estimate).*** The 95 % confidence interval, constructed from the coefficient of variation, is shown below:

	Estimate	95% Confidence Interval
1998 toy-related injuries	147,994	130,590 – 165,398

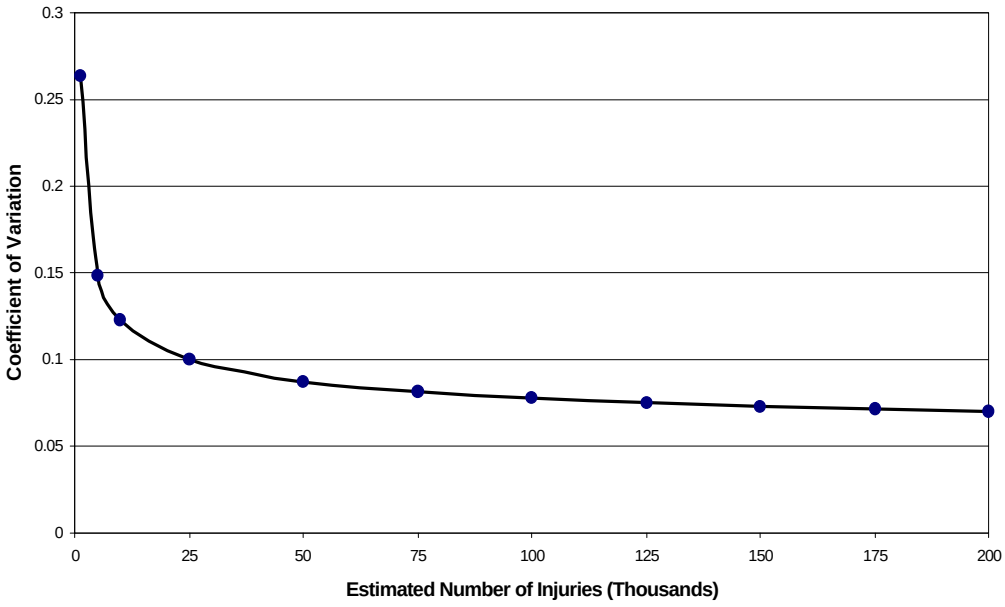
147,994 ± (1.96 * 147,994 * .06) = 147,994 ± 17,404 = (130,590, 165,398)

For convenience, ***estimated generalized sampling errors*** for recent NEISS estimates can be used to approximate the specific sampling error.[9] Generalized sampling errors are plotted below in Figure 2 as coefficients of variation; i.e. one sampling error as a percent of an estimate of a given size. For a 95 percent confidence interval around an estimate, as shown above, multiply the estimate by the c.v. by 1.96. Then the result is added to and subtracted from the estimate to form the 95 percent confidence interval.

Reading from the graph below, a NEISS estimate of approximately 150,000 has an estimated generalized coefficient of variation of about .07, or 7 percent of the estimate. The results shown below can be compared with the results for the toy-related example shown above.

150,000 ± (1.96 * 150,000 * .07) = 150,000 ± 20,580 = (129,420, 170,580)

Figure 2: Estimated generalized coefficients of variation for NEISS estimates of varying size



[9] Kessler, E. and T. Schroeder. (1998). National Electronic Injury Surveillance System (NEISS) Estimated Generalized Relative Sampling Errors. Washington, DC: U.S. Consumer Product Safety Commission.

Trend Data Issues

For the purpose of comparing estimates over time periods when different sampling frames and different samples have been in place, CPSC statisticians have developed methods to statistically adjust the basic (or historical) NEISS estimates. The adjustments smooth the data across different samples when some discontinuity in the estimates has occurred because of the differences in sampling frames and samples. It is possible to construct such adjustments if there is a period of time when both old and new samples are in operation. CPSC has been fortunate to have collected data in "overlapping" samples for 6 and 9 months respectively during the last two major updates of the NEISS. The adjustment factors were derived by comparing estimates in different years from the two NEISS samples.[10] The adjusted estimate is the basic (or historical) estimate multiplied by the adjustment factor.

These adjustments are illustrated below in Figures 3 and 4 that plot the historical (unadjusted) and the adjusted estimates for skateboards and for soccer for the years 1991 through 1998. Note that the adjusted estimates are slightly higher than the unadjusted estimates for skateboards and slightly lower for soccer.

[10] Marker, D, et al, (1999). Comparisons of National Estimates from Different Samples and Different Sampling Frames of the National Electronic Injury Surveillance System (NEISS), Rockville, MD: Westat Inc.

Figure 3: Historical (unadjusted) and adjusted estimates for skateboard injuries treated in hospital emergency departments, 1991-1998

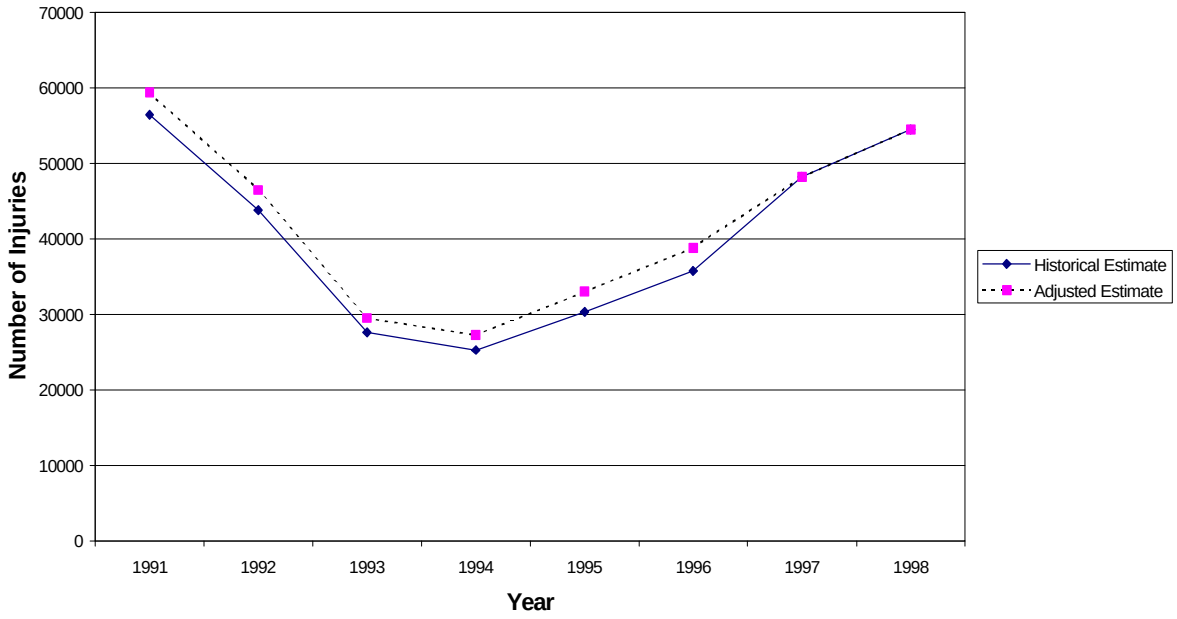
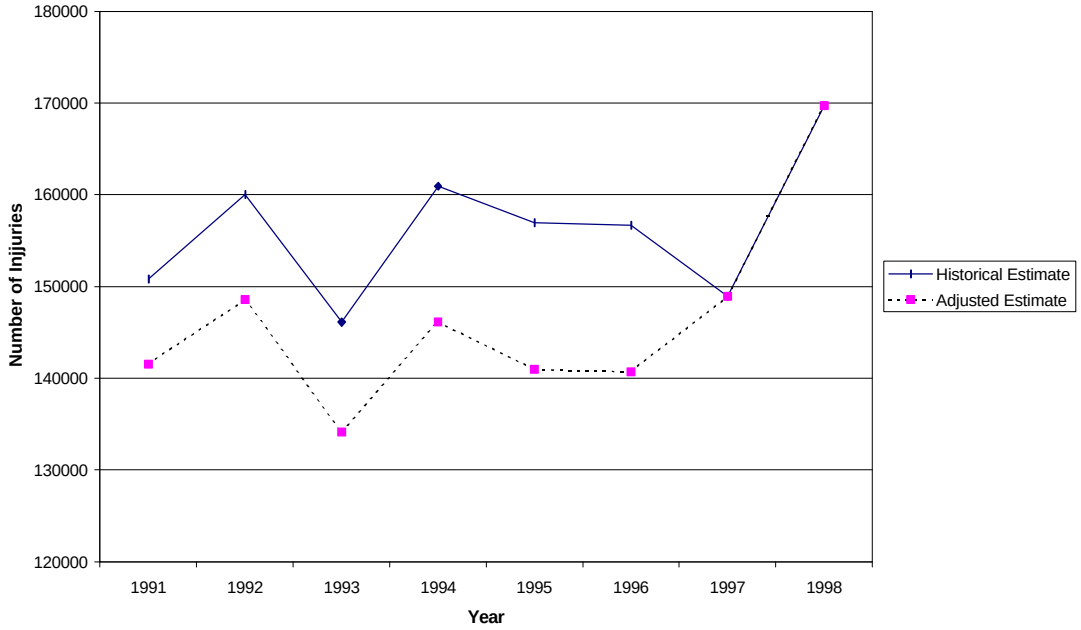


Figure 4: Historical (unadjusted) and adjusted estimates of soccer-related injuries treated in hospital emergency departments, 1991-1998



Also adding complexity to the issue of comparing estimates from NEISS over time is the fact that some definitions and operational rules have changed. Even the set of cases that are considered in-scope for CPSC may have been affected by expanding the rules to collect data for other agencies because of the possibly overlapping

definitions. Also, management decisions concerning which products are under the Commission's jurisdiction may have varied over time. In addition, some product codes had been added, deleted, combined or split into two or more codes. It is essential that NEISS data users understand these issues, especially when conducting trend analyses. Product code changes are tracked in a "Product Comparability Table"[11] maintained by NEISS managers. For example, the table indicates that beginning in 1994, the original product code (1202) for "bicycles or accessories" was retired. Two new product codes covering different types of bicycles were added:

5033 – Mountain or all-terrain bicycles or accessories, and
5040 – Bicycles or accessories (excluding mountain or all-terrain bicycles).

Therefore, to compare all bicycle injuries over time, it is necessary to use all three product codes. For outside researchers unfamiliar with some of these issues, it may be wise to seek the advice of CPSC statisticians to determine design and operational factors to consider when undertaking data analyses.

How Researchers Use NEISS

One, two, three, or all four levels of NEISS may be employed in producing estimates and in conducting special studies. When follow-back study cases are selected with specified probabilities, those studies also carry the statistical properties built into the surveillance levels of NEISS (i.e., provide for national estimates and construction of confidence intervals for the estimates). This enables the analyst, for example, to make national estimates of hazard patterns determined in follow-back studies.

The NEISS data are used in many different ways. In the simplest form, an estimate from NEISS can be used to raise consumer awareness in a press release. At the other end of the spectrum are extremely detailed studies of specific products that

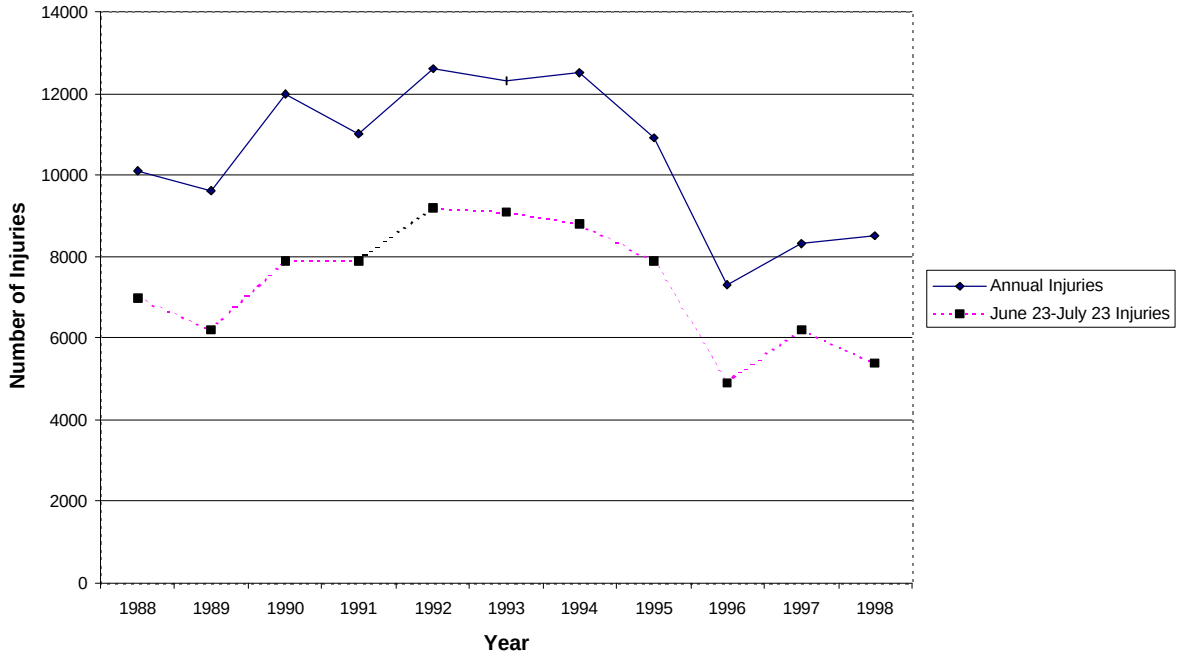
[11] U.S. Consumer Product Safety Commission. (1999). Product Code Comparability Table. Washington, DC: U.S. Consumer Product Safety Commission.

provide data on the number and types of injuries associated with specific hazard patterns. These studies set the stage for standards development, both voluntary and mandatory. The examples, which follow, cite some of the ways NEISS data have aided the decision-making process.

Fireworks-related injury estimates

Annual and special (second level) surveillance study period (June 23 – July 23) estimates related to fireworks are shown below for calendar years 1988-1998:[12]

Figure 5: Estimated number* of fireworks-related injuries treated in hospital emergency departments, 1988-1998



*Note that estimates for 1988-1996 were adjusted to account for a new sampling frame and do not match values published in 1997 or earlier.

Ingestions among Young Children

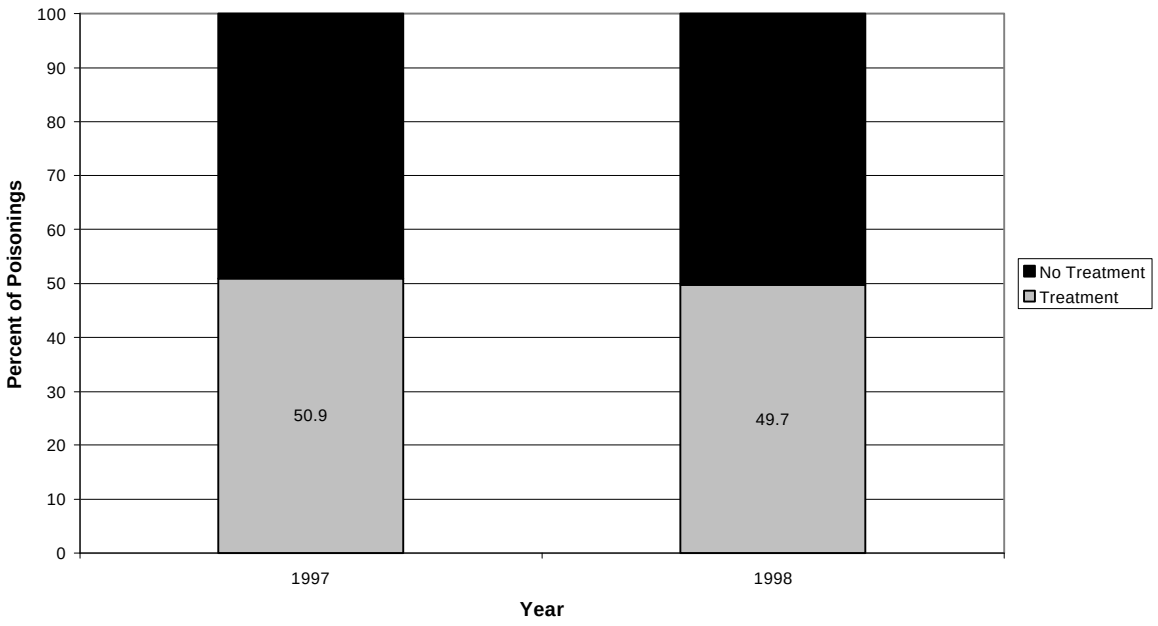
Because of the vulnerability of young children to drugs and other potentially poisonous substances, CPSC collects some additional surveillance data for ingestions by children under age five. The special data variables seek information on the child's

[12] Greene, M. (1999). Fireworks-Related Injuries. Washington, DC: U.S. Consumer Product Safety Commission. 1999.

symptoms, treatment, whether other medical care was sought and disposition of product container. This additional ED surveillance data has become an ongoing part of the surveillance system.

In 1997 and 1998 there were an estimated 91,437 and 92,855, respectively, children under age 5 treated in hospital EDs for ingestions with the potential for poisoning. As indicated below in Figure 6, these surveillance data report that approximately one-half of all patients received some form of "treatment" in the ED.

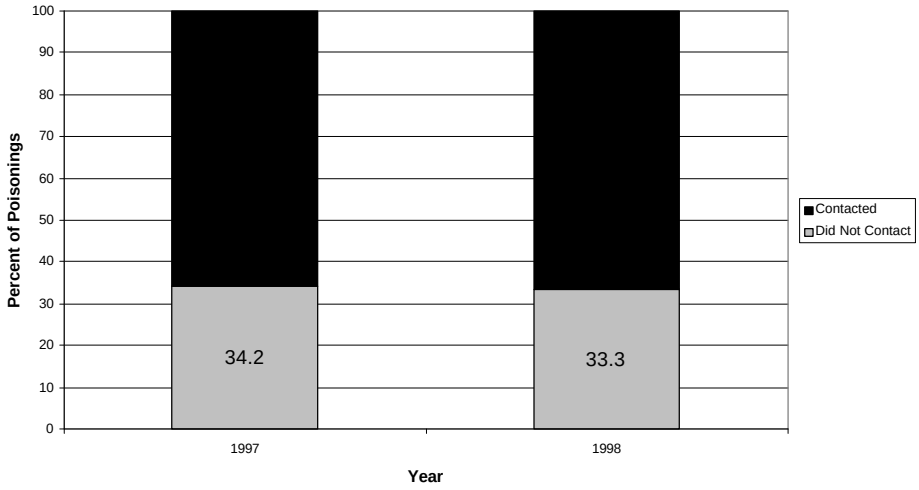
Figure 6: Estimated percent of children's poisonings* seen in hospital emergency departments that received "treatment," 1997-1998



*Excluded are approximately 8 percent of the incidents because they provided no information for this variable.

For the NEISS records that included a response for the variable, the ED staff contacted the Poison Control Center for approximately two-thirds of these potentially poisonous incidents (See Figure 7.)

Figure 7: Estimated percent of children's poisonings* treated in hospital EDs by whether ED staff contacted a Poison Control Center, 1997-1998



*Excluded are approximately 28 percent of the incidents because they provided no information for this variable.

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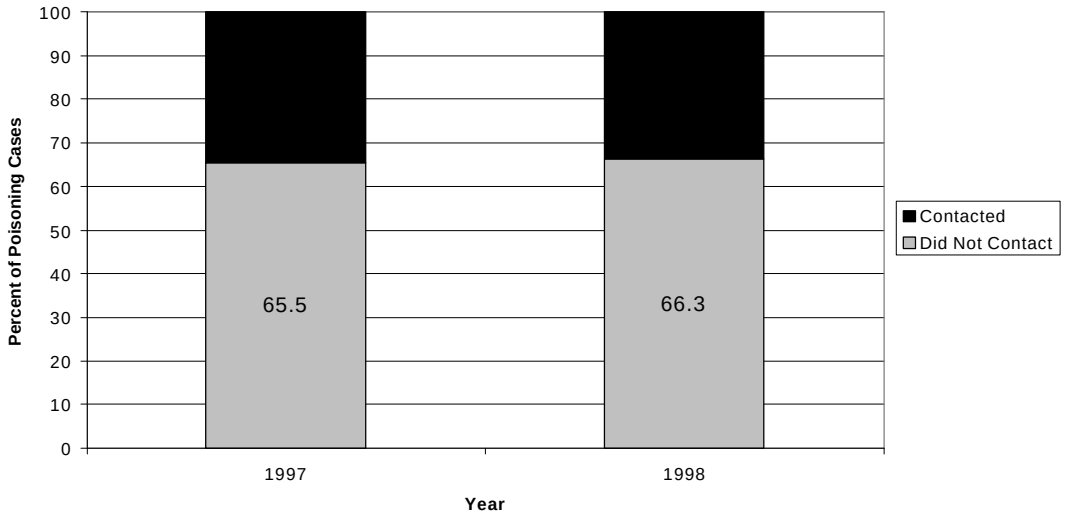
The ED records for slightly more than one-half (56 %) of the incidents included information on whether a Poison Control Center has been contacted prior to the ED visit. Among this group, about one-third indicated a Poison Control Center had been contacted prior to the ED visit.

Figure 8: Estimated percent of children's poisonings* treated in hospital EDs by whether a Poison Control Center was contacted prior to ED visit, 1997-1998



*Excluded are approximately 44 percent of the incidents because they provided no information for this variable.

Choking Hazards

CPSC staff observed that from 1980 - 1988 there were an estimated average of 38,000 children under the age of six treated each year in hospital emergency departments for ingestion and aspiration injuries related to consumer products. While the majority of these potential choking incidents involved products such as money, jewelry, nails, tacks, screws, sewing articles, desk supplies, etc., roughly 10 percent involved children's products (toys or nursery items). As part of the Commission's efforts to assess the need for amendments to existing requirements to address choking hazards, staff conducted a special NEISS study from October 1987 through December 1988. The study data, in conjunction with data from other sources, indicated that a large portion of the items associated with choking incidents involved products that were inappropriate for the environment of very young children, pointing to the need for a safety alert to the general public on this subject.

Study data also indicated that a number of injuries either involved products not subject to either mandatory or voluntary requirements designed to address choking hazards, or involved products which would fail existing requirements. For these reasons, it appeared that the majority of products involved in choking incidents would not be addressed by modifications to the test fixtures currently used to screen for hazardous products, and that other options would also need to be considered in addressing choking hazards associated with children's products.

Sports and Older Americans

As shown below in Table 1, a CPSC study[13] reports that sports injuries to people aged 65+ have increased 54 % from 1990 to 1996. This sports-related injury increase in emergency department visits to older persons (from 34,000 to 53,000) over the seven-year period was greater than the sports-related increase for any other age group. Furthermore, the increase is greater than the increase in the population for this age group and is greater than the increase associated with other consumer products. In both 1990 and 1996 males accounted for about 60% of the injured group while comprising only 40% of the population aged 65 and over. The study found that the hospitalization rate was lower (10%) for these sports-related injuries than for all consumer product-related injuries for this group (18%).

Table 1
Estimated of Selected Sports-related Injuries Treated in Hospital Emergency Departments to Persons Aged 65+ in 1990 and in 1996

	Year	
	1990	1996
Total*	**34,400**	**53,000**
Bicycles	6,289	11,002
Exercise and Equipment	3,007	8,197
Golf	5,988	8,127
Snow Skiing	1,716	5,432
Fishing	4,983	5,268
Tennis	2,821	2,818
Swimming and Diving	1,620	2,623

*Note: Totals include all other sports-related injuries for this age group.

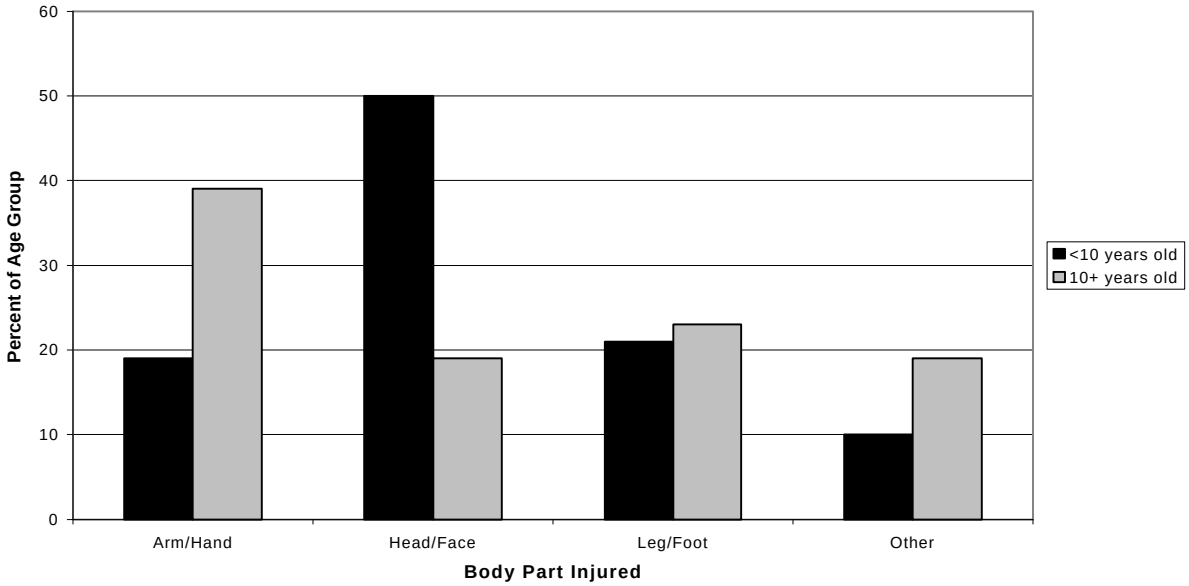
[13] Rutherford, G. and T. Schroeder. Sports-Related Injuries to Persons 65 Year of Age

The largest number of sports-related injuries for the age 65 and older population was related to bicycles or bicycling. Most of the bicycle-related injuries resulted from falls, with injuries to the head comprising 21% of the total. Virtually none of the fall victims was wearing a helmet at the time of the incident.

Bicycles

During 1991, CPSC staff used NEISS data to conduct a special study of bicycle injuries. An estimated 588,000 bicycle-related injuries were treated in hospital emergency departments in 1991. Follow-up investigations of a statistical sample of approximately 600 of these cases provided substantial information on the hazard patterns associated with these incidents. Uneven surfaces were most commonly mentioned as the cause of the incident. As shown in Figure 9 injuries to the head and face were most common in victims under 10 years of age and injuries to the arm and hand were most common in older victims. [14]

Figure 9: Estimated number of bicycle injuries treated in hospital emergency departments by body part injured and age group, 1991

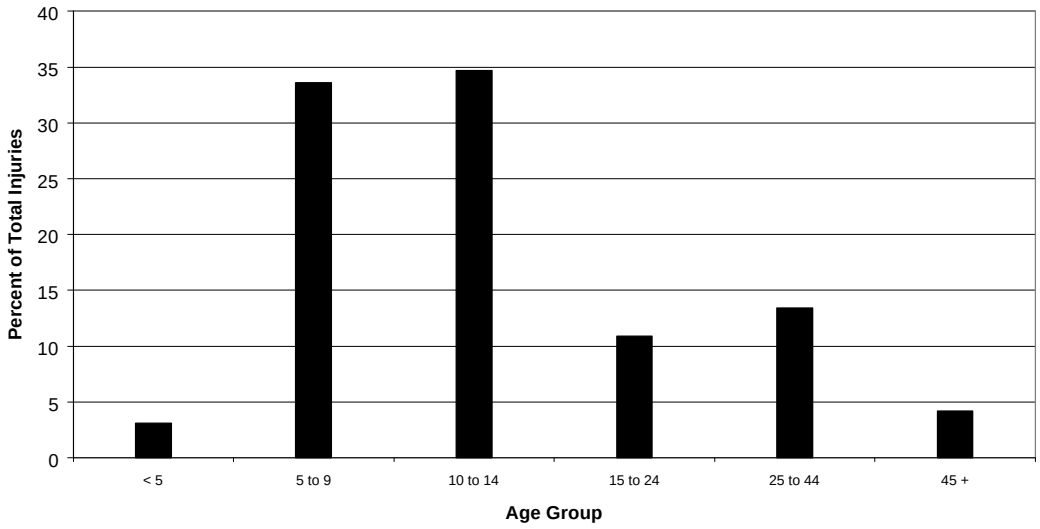


and Older. Washington, D.C.: U.S. Consumer Product Safety Commission.

[14] Rodgers, G., Tinsworth, D., Polen, C. Cassidy, S., Trainor, C., Heh, S. and Donaldson, M. (1994). Bicycle Use and Hazard Patterns in the United States. Washington, D.C.: U.S. Consumer Product Safety Commission.

The vast majority of the incidents involved children aged 5-14 (see Figure 10).

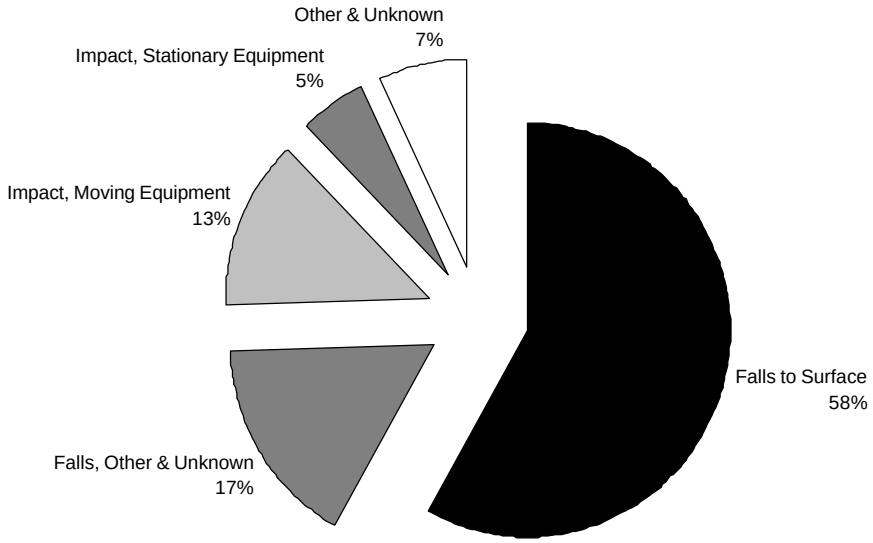
Figure 10: Estimated bicycle injuries treated in hospital EDs by age group in 1991



Playground Equipment

In 1988, staff conducted a special follow-back study of playground equipment-related injuries in order to evaluate the safety of various surfacing materials. Study data showed that falls to the surface below playground equipment accounted for about 60 percent of the injuries (see Figure 11); in fact, these falls accounted for about 90 percent of the injuries judged to be most serious. [15]

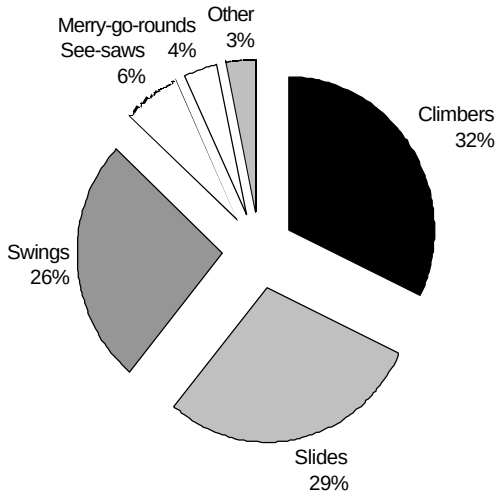
Figure 11: Hazard patterns associated with injuries related to public playground equipment and treated in hospital emergency departments, NEISS follow-back study, April-December 1988



[15] Tinsworth, D. and Kramer, J. (1990). Playground Equipment-Related Injuries and Deaths. Washington, D.C.: U.S. Consumer Product Safety Commission.

As Figure 12 illustrates, climbers, slides and swings were the pieces of equipment most often involved in public playground incidents.

Figure 12 : Estimated percent of type of public playground equipment associated with injuries treated in emergency departments, NEISS special study, April-December, 1988



Fractures were the most commonly reported injury. These data suggested that natural and paved surfaces accounted for a larger proportion of injuries than might have been expected based on the proportion of such surfaces in use. One might conclude that the presence of protective surfaces might have reduced the frequency as well as the severity of the injuries. The Commission has published a handbook providing its recommendations for safe public playground design. Another playground follow-back study was conducted in 1999. The results are not yet available.

Power Lawn Mowers

Data collected through several major NEISS studies have been used to 1) identify the hazards to be addressed in a mandatory standard for walk-behind, power lawn mowers, and 2) evaluate the effectiveness of the mandatory standard in addressing blade-contact injuries associated with walk-behind power mowers manufactured after July 1, 1982.

When the first study was conducted, it documented each of the major hazard patterns and provided associated injury estimates so that the Commission could evaluate the potential benefits of each provision of a proposed standard. It also established a baseline of injury data associated with each of these hazard patterns against which data from later studies could be compared in evaluating the effectiveness of the standard. The study findings were used in support of the mandatory product safety standard for walk-behind power lawn mowers. The study revealed that a large share of the injuries resulted from operators clearing the discharge chute of the mower with their hands while the mower was running and the blade was turning. As a result of this finding, the standard includes a provision for a safety system to stop the blade from turning when the operator releases the handle.

Another frequent hazard identified in the study and subsequently addressed in the standard was that of thrown objects. This pattern occurred when the mower ran over a rock, stick or other solid object. When struck by the blade, an object could be thrown from the mower with enough force to injure and, in some cases, to kill. After considerable testing of lawn mowers, new designs were developed to reduce the risk of injuries related to thrown objects.

Follow-up studies conducted in recent years have documented a significant decline in injuries associated with walk-behind, power mowers. NEISS estimates for walk-behind power mowers and for ride-on power mowers for 1983-1993 are depicted in Figure 13 below:

Figure 13: Estimated number of walk-behind and ride-on power mower injuries treated in hospital emergency departments, 1983-1993

Chain Saws

In the late 1970's, in response to a petition and an increase in the frequency of ED treated injuries associated with chain saws, a project was established to explore how best to reduce these injuries.

The chain saw project included one of the most extensive and detailed, multi-year studies conducted through NEISS. The information gathered was critically important to CPSC engineers and Federal and corporate officials in developing the industry voluntary standard. The most pressing hazard associated with chain saws was rotational kickback, a sudden violent backward and upward rotation of the chain saw when the upper tip of the moving chain comes in contact with an object. This hazard pattern was estimated to have accounted for about 12,000 emergency department injuries in 1982. As a result of the details gathered through on-site reconstruction of accidents and laboratory testing, approaches were developed to specifically address this most dangerous of chain saw hazards.

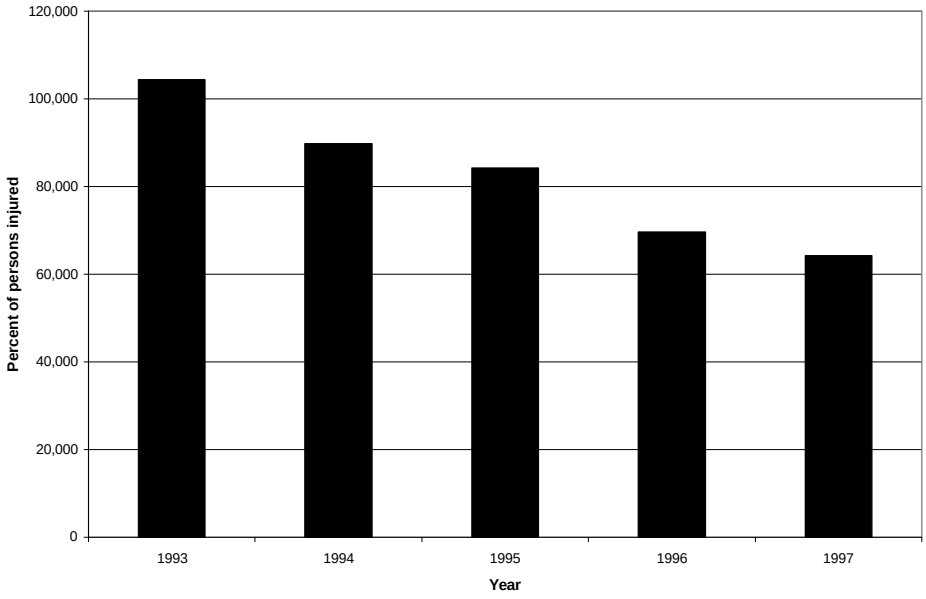
A special NEISS evaluation study, based on chain saw injuries reported through NEISS from 1975 through 1988, indicated that the safety improvements had an impact in reducing injuries and deaths associated with the rotational kickback hazard pattern. Chain saws with hand guards, chain brakes, nose-tip guards, or asymmetrical guide

bars were associated with fewer rotational kickback injuries. Reduced or low-kickback chain saws were associated with fewer rotational kickback injuries.

Firearms (Collected for CDC)[16]

Since the 1980's CPSC has collected firearm-related injury data for the National Center for Injury Prevention and Control (NCIPC) of CDC. After CPSC collects the data it is further refined by CDC. Figure 14 below shows the downward trend of nonfatal firearm-related injuries, a trend that CDC reports mirrors the trend for fatal firearm injuries.

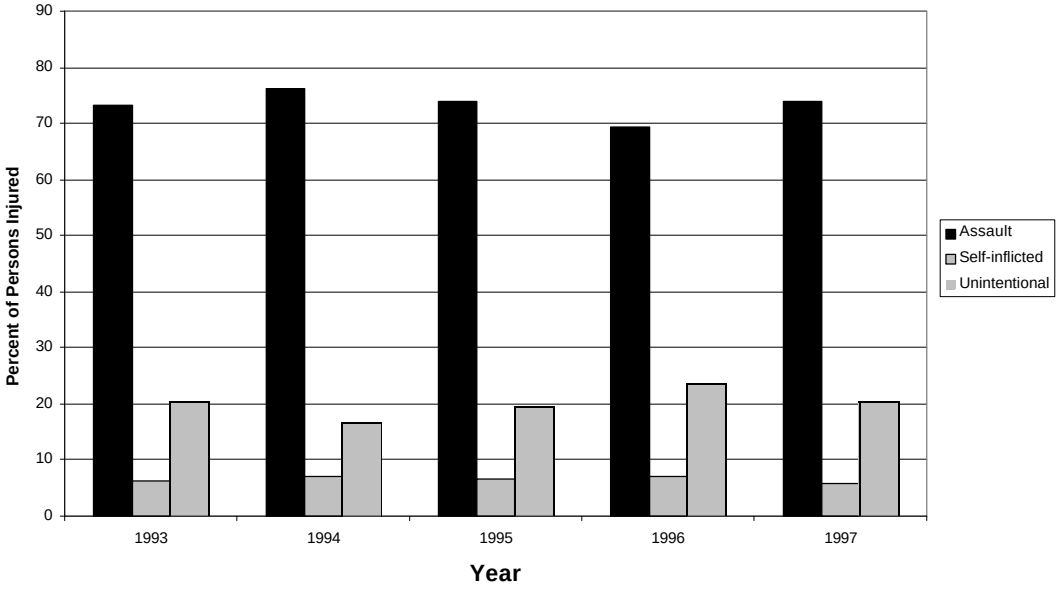
Figure 14: Estimated number of nonfatal firearm-related injuries treated in hospital emergency departments, 1993-1997



Injury intent is a special surveillance variable captured at the emergency department level of NEISS for the firearm-injury study. Figure 15 below shows that from 1993-1997 approximately 70 percent of nonfatal firearm-related injuries treated in hospital emergency departments were associated with assaults by one person on another.

[16]"Nonfatal and Fatal Firearm-Related injuries – United States, 1993-1997," *CDC MMWR Weekly*, 48(45), 1029-1034.

Figure 15: Percent of nonfatal firearm-related injuries treated in hospital emergency departments by intent of injury, 1993-1997



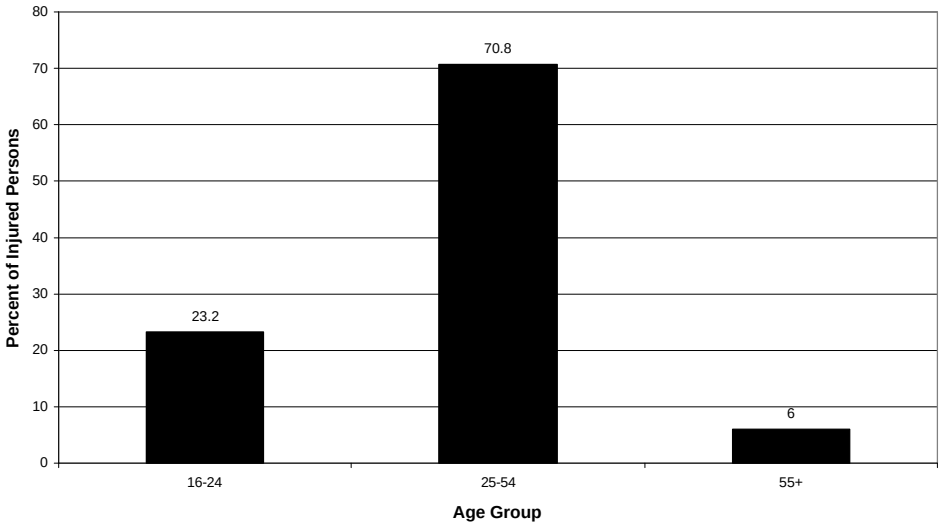
Occupational Injuries (National Institute for Occupational Safety and Health)[17]

NIOSH has shared the NEISS system periodically since 1978. In 1996 CPSC collected work-related injuries for NIOSH in a probability subsample of 65 NEISS hospitals. NIOSH further edits the data after receipt of the initial file from CPSC. NIOSH has funded several follow-back studies using NEISS data. Among the follow-back studies of occupational injuries were studies of: construction-related injuries, eye injuries, injuries among younger workers and injuries among farm workers.

Using surveillance level data NIOSH reported that in 1996 an estimated 3.3 million persons aged 16 or more were treated in U.S. hospital emergency departments for occupational injuries. As shown below in Figure 16, of these persons injured, 22 % were aged 16-24, 71% were aged 25-54 and 6% were aged 55+.

[17] Surveillance for Nonfatal Occupational Injuries Treated in Hospital Emergency Departments – United States, 1996. *CDC MWR Weekly,* 47(15).

Figure 16 : Percent of occupational injuries treated in hospital emergency rooms by age group, 1996



NIOSH reports that persons aged 18-19 years had the highest occupational injury rates (for both men and women). When workers aged 16-17 years are excluded, injury rates decreased with increasing age. The most frequent body parts injured were hands, fingers (30%), followed by sprains and strains (27%) and

lacerations (22%). Among all injuries, lacerations to the hands and fingers accounted for 15% of the injuries. Sprains and strains to the back, groin and trunk accounted for another 12% of the injuries.

All-Terrain Vehicles

Early in 1985, the study of injuries associated with all-terrain vehicles became a priority at CPSC. The NEISS data had shown an increase in injuries associated with ATVs from fewer than 3,000 in 1979 to 64,000 in 1984. The surveillance data alone were used to answer a few questions which arose about the injuries. The most important questions were -- 1) who was being injured and 2) how serious were the injuries. The 13.5 hospitalization rate for ATV accident victims, compared to the system average of less than five percent, demonstrated that many of the injuries were indeed serious. The surveillance data showed that people less that 25 years of age suffered most of the injuries. About one-third involved children under age 15.

Subsequent to this initial identification, quantification, and definition of the initial injuries associated with ATVs, additional analyses were performed using the on-site investigations which had been assigned from NEISS and other sources. Based on their findings, a multi-level study was designed. The results of this in-depth study were influential in bringing about an ATV Consent Decree signed jointly by CPSC, the U.S. Department of Justice and the major ATV manufacturers. Under the Consent Decree, no new 3-wheel ATVs are to be sold and ATV distributors are to use their best efforts to assure that dealers do not sell adult-size ATVs for use by children under age 16.

CPSC staff monitor compliance with these and other measures through follow-back investigations of current ATV NEISS injuries together with other special studies.

Baby Walkers

A special follow-back study in 1993-1994 identified that the vast majority (83%) of baby walker injuries involved falls down stairs. Nearly one-half of these falls down stairs occurred on basement stairs. In about one-half of the incidents the caregiver was in the same room or area with the child in the walker. These study results supported the need for new baby walker designs and led to the strengthening of the voluntary safety standard for baby walkers. As a result, newer baby walkers, designed to help prevent falls down stairs, have recently come on the U. S. market. The newer designs either have features that stop the walker on a top step or are wider than 36 inches, the width of a standard size interior doorway.

As shown in Table 2 below for 1997, baby walkers led the list of injuries related to nursery products.

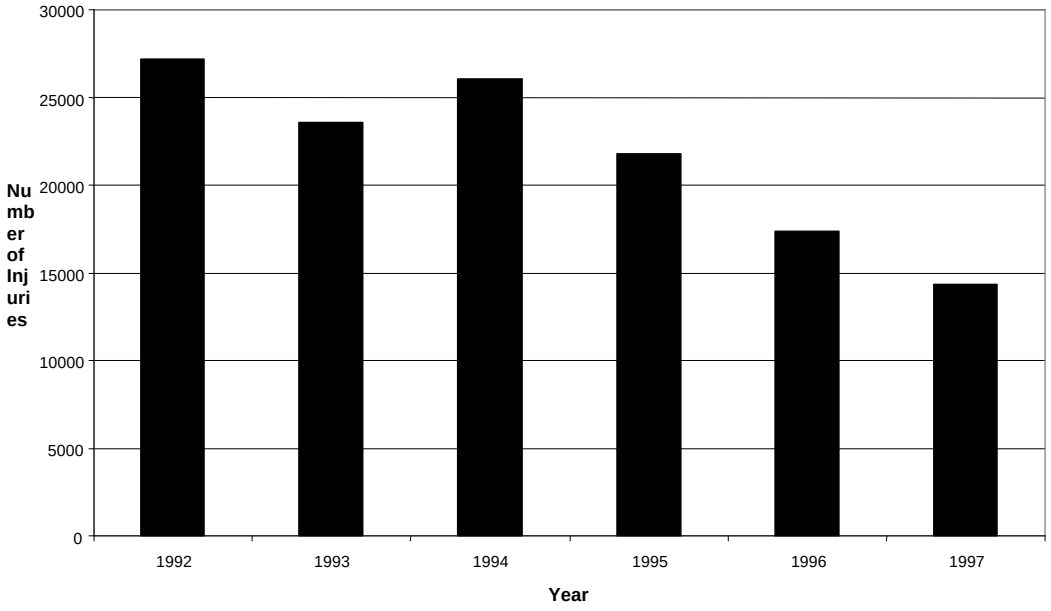
Table 2
Estimated Number of Nursery Product-Related Injuries for Children Under Age 5*
Treated in U.S. Hospital Emergency Departments, 1997

All	71,400
Baby Walkers	**15,510**
Strollers and Carriages	13,290
Infant Carriers and Car Seats (Excluding Motor Vehicle Incidents)	13,050
Cribs, Bassinets and Cradles (Including Crib Mattresses and Pads)	8,600
High Chairs	8,270
Playpens	1,980
Baby Gates or Barriers	1,720
Changing Tables	1,650
Other	7,300

*Note: Estimated injuries are rounded.

While working toward strengthening the voluntary standard, CPSC has considered a mandatory safety standard for baby walkers and has worked with the juvenile products industry on stationary alternatives. Although baby walker injuries continue to present a problem, Figure 17 shows that from 1992 to 1997 baby walker injuries to young children have decreased significantly.

Figure 17: Estimated baby walker-related injuries for months of age treated in hospitals EDs,



With new baby walkers meeting the strengthened safety standard together with the availability of alternative stationary baby walker designs, CPSC expects this decrease in injuries to continue.[18]

Shopping Carts

Another area of great concern to the Commission is the number of children's injuries related to shopping carts. As shown below in Figure 18, the estimated total number of injuries has risen significantly from 1985 to 1996 (from 16,900 to 22,200). Falls from shopping carts have also shown a significant increase (from 7,800 in 1985 to 16,000 in 1996). An analysis of the 1995-1996 incidents showed that 66% of fall victims were treated for head injuries. More than one-half of head injury victims suffered severe injuries such as concussions and fractures.[19]

[18] Jacobson, B. (1998). "Safer Baby Walkers." Consumer Product Safety Review. Vol. 3, No. 1, Washington, DC: CPSC.

[19] U.S. Consumer Product Safety Commission. Shopping Cart Injuries: Victims 5 years old and younger. Washington, DC: U.S. Consumer Product Safety Commission.

Figure 18 : Estimated number of shopping cart injuries for children under age 6 treated in hospital emergency departments, 1985-1996

As shown in the preceding examples, the NEISS is extremely versatile. It can produce quick answers or permit detailed analyses from complex studies. It can be used to compare injuries among products, to track trends, and to answer very specific questions about the circumstances associated with many different types of incidents. The data have been used both to identify problems and to identify areas in which suspected problems are less serious than had been believed. Negative findings from NEISS can be as valuable as the positive ones; for example, a lack of injuries reported through NEISS can be used as evidence that a hypothetical hazard has not resulted in numerous injuries treated in EDs.

The combination of statistical validity and versatility make the NEISS a very powerful tool for an injury researcher. With the expansion of NEISS to include all injuries, the Commission expects that many more researchers and other data users will benefit from the system.

Sharing the Data

The Commission is eager to make its data available to all interested users, including other Government agencies, other researchers, industry, and the general public.

The Commission makes all routinely collected data available to other Government agencies at no cost. However, when special additional data are needed by another Government agency, that agency may enter into an interagency agreement with the Commission to provide the additional data. This strategy has meant that two agencies can meet common goals through sharing a system already in place. This sharing also results in more efficient use of tax dollars, as one system serves two or more partners.

Since the late 1970's, through interagency agreements, CPSC has shared the capabilities of its data systems with a number of other Government agencies. In recent years, CPSC has provided motor vehicle air bag injury data to the National Highway Traffic Safety Administration (NHTSA), occupational injury data to the National Institute for Occupational Safety and Health (NIOSH), medical device injury data to the Food and Drug Administration (FDA), and firearm injury data to the Centers for Disease Control (CDC). Previously, CPSC provided intentional injury data to the Bureau of Justice Statistics (BJS), pesticide injury data to the Environmental Protection Agency (EPA) and mobile home injury data to the Department of Housing and Urban Development (HUD).

Under each of these partnerships CPSC has collected the routine NEISS data and special extra information on each case of interest to the other agency. Under certain agreements, follow-up investigations on cases of particular interest are also conducted. For example, CPSC and NIOSH have jointly conducted investigations of injuries associated with teenagers working in restaurants, injuries incurred while working in the farming and construction industries, and occupational eye injuries.

Indeed, this valuable means for sharing both the costs of the system and the results from the system led to the expansion of NEISS to collect all injuries.

Disseminating the Data

When Congress created the Consumer Product Safety Commission, it emphasized widespread sharing of information by the new agency and established a National Injury Information Clearinghouse for this purpose (Consumer Product Safety Act, Sec. 5(a) (1)). The Clearinghouse maintains data collected through the NEISS as well as other consumer product-related injury information, and supplies this material to interested parties upon request, usually in the form of computer printouts. Requesters may write or call the Clearinghouse to request information:

The National Injury Information Clearinghouse
U.S. Consumer Product Safety Commission
4330 East West Highway
Washington, D.C. 20207-0001
Tel: (301) 504-6424

Web Site

CPSC maintains a web site that includes general information about Commission activities, lists of selected publications and the latest information on product recalls. The web site address is: ***http://www.cpsc.gov***

Toll-free Hotline

CPSC is interested in learning about consumer product-related incidents associated with injuries or deaths. Report these through the web site or by calling the following toll-free number:

CPSC's Toll-free hotline 1-800-638-CPSC

Samples of Other Publications using NEISS Data

Annest, J. L., Mercy, J. A., Gibson, D.R. et al. (1995). National Estimates of Nonfatal Firearm-Related Injuries—Beyond the Tip of the Iceberg, *JAMA,* 273, 1749-1754.

McNeill et al. (1995). The Ongoing Hazard of BB and Pellet Gun-Related Injuries in the United States. Ann Emerg Med, 26:2, 187-194.

Cherry et al. Trend in Nonfatal and Fatal Firearm-Related Injury Rates in the U.S., 1985-1995.

Branche, C.M., Conn, JM, and Annest, J.L. (1997). Personal Watercraft-Related Injuries: A Growing public health concern, *JAMA*, 270, 663-665.

Rand, M.R. (1997). Violence-Related Injuries Treated in Hospital Emergency Departments. *Bureau of Justice Special Report* (publication NCH-156921). Washington, D.C.: U.S. Department of Justice.

Knight et al. (1995). A Detailed Analysis of Work-Related Injury Among Youth Treated in Emergency Departments, A*m J Ind Med,* 27, 793-805.

Schrieber, R.A., Branche-Dorsey, C.M., Ryan, G.W. et al. (1996). Risk Factors for Injuries from In-Line Skating and the Effectiveness of Safety Gear. *N Engl J Med,* 335, 1630-1635.

Kyle, S. B. (1996). Youth Baseball Protective Equipment Project Final Report. Washington, D.C.: U.S. Consumer Product Safety Commission.

Adler, P. (1999). Automatic Gate Related Injuries (1990-1998) and Deaths (1985-Present), Memorandum. Washington, D.C.: U.S. Consumer Product Safety Commission.

Adler, P.(1998). Snow Thrower-Related Hazards, 1990-1997, Memorandum. Washington, D.C.: U.S. Consumer Product Safety Commission.