



## Amusement Ride-Related Injuries and Deaths in the United States: 2003 Update



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## Executive Summary

This report presents estimates from the U.S. Consumer Product Safety Commission (CPSC) on amusement ride injury and fatality incidents. CPSC has jurisdiction over mobile amusement rides and does not have jurisdiction over fixed-site amusement rides. However, past staff reports have presented estimates for both fixed-site and mobile amusement rides, since both estimates are derived from the same sources and fixed-site estimates may provide a useful comparison.

CPSC amusement ride injury estimates are derived from a system known as NEISS. NEISS collects injury data from a statistical sample of about 100 hospital emergency rooms distributed throughout the U.S. Because fixed-site injuries occur in a relatively small number of locations, the sites of amusement and theme parks, the number of recorded injuries in NEISS depends to a large degree on the geographical closeness of the NEISS hospitals to the parks. Thus, the utility of NEISS for estimating fixed-site ride injuries may be limited.

Additionally, in 2001, a hospital that had accounted for a large share of the NEISS fixed-site injuries left NEISS. This situation resulted in a drop in the estimated number of amusement ride injuries due solely to the change in the makeup of the NEISS hospital sample.

Because of these concerns about fixed-site injury estimates, the body of this report does not provide fixed-site ride injury estimates. To maintain continuity with the past reports and to provide some measure of fixed-site ride injuries, the appendix of this report addresses fixed-site ride injury estimates. As in previous reports, inflatable rides, such as inflatable slides and bounces, are considered separately.

- In 2002, mobile amusement rides accounted for an estimated 3,000 (95% Confidence Interval: 1,800 – 4,200) non-occupational injuries treated in hospital emergency rooms.
- Based on hospitals in the NEISS system for the entire time period 1997-2002, there is no statistically significant trend, positive or negative, for mobile amusement ride injuries over the period from 1997 to 2002.
- In 2002, inflatable rides, such as inflatable slides and bounces, accounted for an estimated 2,500 (95% Confidence Interval: 1,200 – 3,800) non-occupational injuries treated in hospital emergency rooms.
- The inflatable ride injuries have a statistically significant upward trend over the period from 1997 to 2002.
- From 1987 to 2000, for mobile and fixed-site amusement rides combined, there were an estimated 4.5 amusement-ride fatalities per year. When this report was prepared, CPSC had reports of 3 amusement ride fatalities in 2003, 2 in 2002, and 3 in 2001. CPSC may become aware of additional fatalities for the years 2001 through 2003.

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## Introduction

This report presents estimates from the U.S. Consumer Product Safety Commission (CPSC) on amusement ride injury and fatality incidents.

The Consumer Product Safety Act Section 3(a)(1) describes an *amusement ride* as

...any mechanical device which carries or conveys passengers along, around, or over a fixed or restricted route within a defined area for the purpose of giving its passengers amusement, which is customarily controlled or directed by an individual who is employed for that purpose and who is not a consumer with respect to that device, and which is not permanently fixed to a site.

This description includes so-called *mobile rides*, rides that are moved from location to location as part of fairs, carnivals, parties, or other events. It excludes so-called *fixed-site rides* found in amusement parks, theme parks, or otherwise fixed locations.

CPSC data sources do not distinguish between the two types of rides without additional analysis. Previous reports have presented estimates for both fixed-site and mobile rides, because they are derived from the same sources and the fixed-site estimates may provide a useful comparison [1,2,3,4,5,6,7].

CPSC staff derives injury estimates from the National Electronic Injury Surveillance System (NEISS) [8]. NEISS collects injury data from a statistical sample of about 100 hospital emergency rooms distributed throughout the U.S. Because fixed-site injuries occur in a relatively small number of locations, the sites of amusement and theme parks, the number of recorded injuries in NEISS depends to a large degree on the geographical closeness of the NEISS hospitals to the parks. Thus, the utility of NEISS for estimating fixed-site ride injuries may be limited.

Additionally, in 2001, a hospital that had accounted for a large share of the NEISS fixed-site injuries left NEISS. The hospital that replaced it did not have a large number of fixed-site ride injuries. This situation resulted in a drop in the estimated number of amusement ride injuries due solely to the change in the makeup of the NEISS hospital sample. CPSC staff does not have sufficient information to judge whether the pre-2001 sample or the post-2001 sample of NEISS hospitals gives more accurate estimates of fixed-site ride injuries. The loss of this randomly chosen, high-contributing hospital raises the question of whether, presently, an important segment of the hospital population, i.e. hospitals near amusement parks, is adequately represented.

Because of these concerns about the NEISS fixed-site ride estimates, the body of this report does not include fixed-site injury estimates. To maintain continuity with the past reports and to provide some measure of fixed-site injuries, the appendix of this report addresses fixed-site ride injury estimates.

Fatality estimates come from sources other than NEISS and do not experience the difficulty that the fixed-site injury estimates experience. Therefore, the body of this report does include both mobile and fixed-site fatality estimates. For more information on the

methodology of the injury and fatality data sources and estimation, refer to the methodology sections of this report.

The remainder of this report is organized as follows: First, the report presents the injury methodology and estimates for mobile amusement rides and inflatable rides. The injury methodology section highlights certain changes from the last report affecting the injury estimation. Second, the report presents the fatality methodology and estimates for mobile and fixed-site amusement rides. Third, the report summarizes the recent in-depth investigations on amusement ride incidents. Appendix A examines the effect of the noted hospital leaving NEISS on the mobile and fixed-site ride injury estimates and presents the estimates with and without the hospital in NEISS. Lastly, Appendix B provides some supplemental tables.

## Injuries

### Methodology

Data on non-occupational, amusement ride-related injuries were obtained from the National Electronic Injury Surveillance System (NEISS). NEISS is based on a stratified statistical sample of about 100 hospitals with emergency rooms (with 6 or more beds) in the United States and its territories. At NEISS hospitals, data are collected on product-related injuries. For each injury, the data includes codes for product, demographic, and medical information and a short narrative.

CPSC staff reviewed all NEISS injury cases for the calendar years 1997 through 2002 containing the product code for amusement rides. The year 1997 was chosen as a starting point, because it is the year that the NEISS sample last underwent a major update to reflect the current population of U.S. hospitals with emergency rooms. Based on information in the narratives of the cases, CPSC staff classified each injury case into one of six mutually exclusive and exhaustive categories: *not a ride*, *fixed-site*, *mobile*, *unknown-site*, *unknown if ride*, and *inflatable*.

Cases involving coin-operated rides or free-play attractions often found at restaurants or shopping centers, alpine and water slide amusements, wave machines, mechanical bulls, and playground equipment are examples of cases coded *not a ride*. Cases involving roller coasters or “whirling” rides are examples of cases coded *fixed-site*, *mobile*, or *unknown-site* rides. If the case narrative stated the name of an amusement park or that the incident occurred at a park, then the case was coded *fixed-site*. If the narrative stated that the incident occurred at a carnival, fair, or festival, then the case was coded *mobile*. If the narrative gave no site information, then the case was coded *unknown-site*. Cases involving inflatable rides, such as inflatable slides and “moon bounces,” regardless of their mobility were coded *inflatable*. Cases involving a “merry-go-round,” with no indication of whether it was playground equipment or an amusement ride as defined by the Consumer Product Safety Act, are examples of cases coded *unknown if ride*. Appendix Tables B1 and B2 contain frequency breakdowns of the six codes.

The *not a ride* and *unknown if ride* cases are removed from the analysis. For each year, the total sampling weight of the *unknown-site* cases is allocated to the *fixed-site* and *mobile* cases in proportion to the observed total sampling weights of the two categories of

cases. The *fixed-site* and *mobile* cases including the allocation of the unknown-site cases and the *inflatable* cases are used to produce the estimates of the fixed-site, mobile, and inflatable injuries.

As discussed above, a hospital that treated a large number of fixed-site amusement ride injuries left NEISS in 2001. (The hospital was in NEISS up to and including the year 2000 and was not in NEISS in the year 2001). This change in NEISS affects the CPSC fixed-site ride injury estimates and to some degree the mobile ride injury estimates. In order to evaluate the trends in mobile ride injuries independent of this hospital leaving NEISS, the injury estimates for 1997 to 2000 were recalculated without the hospital. The remaining hospitals in the sampling stratum of the hospital were reweighted, so that the total weight of the stratum remained the same. This adjustment procedure is performed in NEISS when a hospital fails to report for a given time period.

Although the injuries from the noted hospital are mainly fixed-site injuries, removing the hospital has some effect on the mobile ride estimates. This effect arises from the allocation procedure. Because the proportion of injuries that are *fixed-site* is smaller without the hospital, fewer of the *unknown-site* cases are allocated to the *fixed-site* estimate and more to the *mobile* estimate. Appendix A gives the unadjusted estimates.

The statistical sample design of NEISS is used to derive national estimates of amusement ride injuries and associated 95% confidence intervals. The 95% confidence intervals provide a measure of the statistical uncertainty of the estimates. The 95% confidence intervals have the property that with 95% statistical confidence they contain the actual number of U.S. injuries. The 95% confidence intervals used in this report are based on the normal approximation and are equal to the estimate plus and minus twice its standard error.

The trends in the injury estimates are evaluated with a regression procedure that accounts for the repeated measurements of each NEISS hospital over time. The procedure is known as a *two-stage analysis* [9]. In the first stage, the trend for each NEISS hospital was estimated with simple linear regression. The sums of the intercepts and slopes, and the associated standard errors, of all U.S. hospitals were estimated from the NEISS hospitals based on the sampling design of NEISS. Two-sided t-tests on the ratios of the slope estimates to their standard errors were used to test the hypotheses that the slope is equal to zero, implying that there is no trend.

Since the last report, the NEISS injury records for amusement rides have been extensively reviewed. Based on this review, historical estimates that appear in this report differ from those of previous reports. The largest difference is for the year 2001, in which the fixed-site estimate is lower and the mobile estimate is higher than in the previous report.

## Results: Mobile Ride Injuries

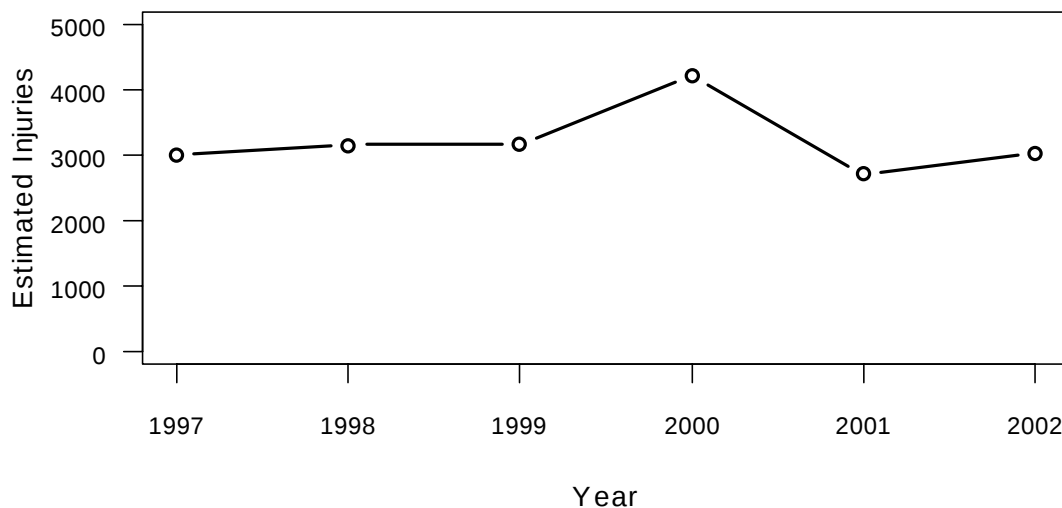
Table 1 gives the annual, non-occupational, injury estimates for mobile amusement rides for the years 1997 to 2002. As noted in the methodology section, the estimates for the years 1997 to 2000 have been adjusted to account for the noted hospital leaving NEISS. Appendix A contains the unadjusted estimates with the hospital. Based on the adjusted estimates, there is no statistically significant trend, positive or negative, in mobile amusement ride injuries from 1997 to 2002 (p-value 0.977).

Table 1 Adjusted, Non-Occupational, Mobile Amusement Ride Injury Estimates.

| Year | Estimate | 95% Confidence Interval |
|------|----------|-------------------------|
| 1997 | 3,000    | (1,500, 4,500)          |
| 1998 | 3,200    | (1,600, 4,700)          |
| 1999 | 3,200    | (1,900, 4,400)          |
| 2000 | 4,200    | (2,800, 5,600)          |
| 2001 | 2,700    | (1,400, 4,000)          |
| 2002 | 3,000    | (1,800, 4,200)          |

Source: U.S. Consumer Product Safety Commission, NEISS. The estimates are rounded to the nearest 100 injuries and may not sum to the totals due to rounding. The estimates for the years 1997 to 2000 have been recalculated to make them comparable to those for the years 2001 and 2002.

Figure 1: Adjusted, Non-Occupational, Mobile Amusement Ride Injury Estimates.



Source: U.S. Consumer Product Safety Commission, NEISS. The estimates for the years 1997 to 2000 have been recalculated to make them comparable to those for the years 2001 and 2002.

## Results: Inflatable Rides Injuries

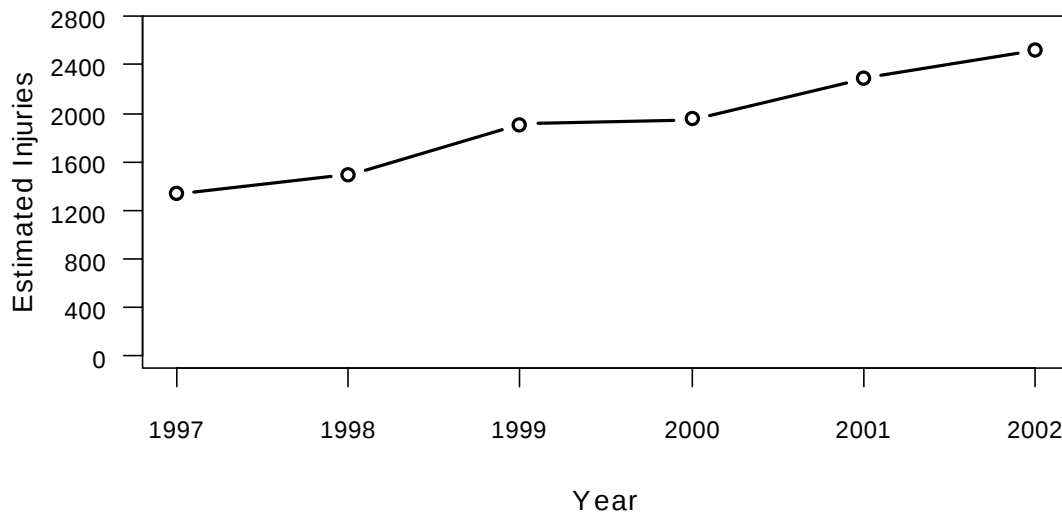
Table 2 and Figure 2 give the annual, non-occupational injury estimates for inflatable rides for the years 1997 to 2002. There was a statistically significant positive trend for the years 1997 to 2002 (p-value 0.018).

Table 2: Non-Occupational, Inflatable Ride Injury Estimates.

| Year | Estimate | 95% Confidence Interval |
|------|----------|-------------------------|
| 1997 | 1,300    | (300, 2,300)            |
| 1998 | 1,500    | (500, 2,500)            |
| 1999 | 1,900    | (900, 2,900)            |
| 2000 | 2,000    | (700, 3,200)            |
| 2001 | 2,300    | (800, 3,700)            |
| 2002 | 2,500    | (1,200, 3,800)          |

Source: U.S. Consumer Product Safety Commission, NEISS. The estimates are rounded to the nearest 100 injuries.

Figure 2: Non-Occupational, Inflatable Ride Injury Estimates.



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

# Fatalities

## Methodology

CPSC maintains several casualty databases that contain incidents of amusement ride fatalities. These include the Death Certificate file (DTHS) and the Injury and Potential Injury Incident file (IPII) databases. The DTHS file contains coded death certificates purchased from states based on external cause codes that may indicate product involvement. The IPII file is made up of several sources, including newspaper articles, consumer hotline and internet entries, and medical examiner contributions. All records from these files for the period from January 1987 to July 2003 indicating a fatality and containing the product code for amusement rides were reviewed. The review ascertained which records were associated with the same fatality, determined whether the incident was in-scope of the analysis, and coded incidents into fixed-site, mobile, and unknown-site ride incidents. From these databases, the number of documented fatalities was determined. As in past reports, fatalities from inflatable rides are not included.

Because of the limits in obtaining evidence of fatalities, the number of documented fatalities may be an underestimate of the actual number of fatalities. Assuming that the two databases represent statistically independent sources, a method known as *capture-recapture* was used to produce an estimate of the total number of fatalities [10]. Because of the delay in obtaining death certificates, the most recent years were excluded from the capture-recapture analysis. Thus, although the documented number of fatalities covers the period from 1987 to July 2003, the estimated number from the capture-recapture analysis covers only the period from 1987 to 2000.

It is not possible to produce separate fatality estimates for mobile rides because of the relatively small number of fatalities and the presence of unknown-site fatalities. Therefore, only combined estimates for mobile and fixed-site ride fatalities are given. As mentioned in the introduction, the use of the fatality databases for fixed-site rides does not present a problem.

## Results: Mobile and Fixed-Site Fatalities

In the period from 1987 to 2000, the period with complete reporting, there were 52 reported fatalities from mobile and fixed-site amusement rides combined. Based on the capture-recapture methodology, there were an estimated 63 fatalities from 1987 to 2000 from mobile and fixed-site amusement rides combined. This represents an average of 4.5 estimated fatalities per year.

Table 3 gives the number of documented fatalities for fixed-site, mobile, and unknown-site rides for the period from 1987 to July 2003. The reporting for years 2001 through 2003 was incomplete at the time this report was prepared. There were 60 documented fatalities over this period: 42 from fixed-site rides, 10 from mobile rides, and 8 from unknown-site rides.

Table 3: Documented Non-Occupational Amusement Ride Fatalities, 1987-2003.

| <b>Year</b>  | <b>Fixed-Site</b> | <b>Mobile</b> | <b>Unknown-Site</b> | <b>Total</b> |
|--------------|-------------------|---------------|---------------------|--------------|
| 1987         | 4                 | 0             | 0                   | 4            |
| 1988         | 4                 | 1             | 3                   | 8            |
| 1989         | 3                 | 0             | 0                   | 3            |
| 1990         | 0                 | 0             | 0                   | 0            |
| 1991         | 3                 | 1             | 0                   | 4            |
| 1992         | 0                 | 2             | 0                   | 2            |
| 1993         | 1                 | 1             | 2                   | 4            |
| 1994         | 2                 | 0             | 0                   | 2            |
| 1995         | 3                 | 1             | 0                   | 4            |
| 1996         | 2                 | 1             | 0                   | 3            |
| 1997         | 3                 | 0             | 1                   | 4            |
| 1998         | 4                 | 2             | 1                   | 7            |
| 1999         | 6                 | 0             | 0                   | 6            |
| 2000         | 1                 | 0             | 0                   | 1            |
| *2001        | 2                 | 1             | 0                   | 3            |
| *2002        | 1                 | 0             | 1                   | 2            |
| *2003        | 3                 | 0             | 0                   | 3            |
| <b>Total</b> | <b>42</b>         | <b>10</b>     | <b>8</b>            | <b>60</b>    |

Source: U.S. Consumer Product Safety Commission, DTHS and IPII.

\*Reporting for these years was incomplete at the time this report was prepared.

## In-Depth Investigations

From July 2002 to July 2003, CPSC completed 14 in-depth investigations of amusement ride incidents. These investigations are not a random sample of incidents, but reflect agency concerns. In general, CPSC staff does not investigate fixed-site ride incidents, unless the ride is also used in a mobile setting. This year all the investigations are of mobile and inflatable rides.

| Task Number   | State | Narrative                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 020604HNE7348 | VA    | A mobile carnival ride became stuck in its activation mode for an estimated 15 to 30 minutes. A county inspector surmised that contact points within the ride's electrical panel fused causing the on/off switch to become inoperable. Six out of approximately 20 children on the ride were transported to local hospitals for treatment of nausea-related symptoms.                                                                              |
| 020716HCN0633 | TX    | Two victims, a 15-year-old female and a 6-year-old female, fell out of a car of an amusement ride when the car door suddenly opened while the ride was in operation. The two victims fell approximately 10 feet to the ground below. Both victims sustained broken legs as a result of the incident.                                                                                                                                               |
| 020812HNE7429 | NY    | Eleven children sustained various injuries when an inflatable, outdoor slide tipped over while they were playing on it.                                                                                                                                                                                                                                                                                                                            |
| 020816HCN0731 | ND    | A 42-year-old female sustained multiple fractures to her arms when a steel stabilizing cable on an amusement ride broke loose from the ride and struck her in the back, knocking her to the ground.                                                                                                                                                                                                                                                |
| 020816HCN0740 | OH    | Two males, ages 52 and 47 years, were riding on an amusement ride at the Ohio State fair, when the two-person chair they were in detached from the support arm of the ride. The men were flung 15 to 20 feet, slamming to the ground face down still restrained in the seat. The two were treated at an area hospital and released.                                                                                                                |
| 020821HCN0747 | OH    | Seven children, ages 3 to 10, were riding on a portable, amusement roller coaster ride at the Richland County fair in Mansfield, Ohio. A mechanical failure caused the safety mechanism to suddenly stop the ride, pitching the victims into the safety bars securing them. The victims suffered from bloody noses, cuts under eyes, stomach welts, sore necks, etc.                                                                               |
| 020827CWE5027 | CA    | A boy almost 3-years old fell out of an amusement ride at a state fair. The operator tried to catch him but missed. The boy landed on his feet but lost his balance and fell on his face receiving a scrape on his head. A state inspector conducting a post-incident inspection of the ride found no problems or malfunctions. There is a question as to whether the boy fell out accidentally or was scared and deliberately pushed himself out. |

| Task Number   | State | Narrative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 020910CAA1821 | VA    | An 11 year-old male fell as he was standing to disembark from an inflatable slide at a county fair amusement complex and broke his right arm in the fall.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 021002CWE5002 | CA    | Two children, ages 10 and 13, were injured. The first received a large bump on the forehead and the second a broken right wrist, when they fell out of a bucket (cage) of an amusement ride. The ride was not under power at the time, but the cages were moving as a result of an unbalanced passenger load. As the children were preparing to unload, the operator lost his grip on the door, which he had opened, and the cage moved away from him. The shift in the center of gravity due to the open door caused the cage to tilt downward, and the children fell out. |
| 021016HNE7523 | MA    | An 8-year-old male sustained facial fractures and facial lacerations when he was pulled from a moving car on an amusement ride after he had reached his hand out and touched or grabbed one of the steel uprights of this amusement ride. No permanent injuries appear to have resulted from this incident, which has been attributed to rider error by the state amusement ride supervisor.                                                                                                                                                                                |
| 021119CCC2114 | TX    | A 10-year-old male reportedly suffered whiplash while on a mobile amusement ride. The victim's parents took him and his sister to a mobile carnival where the ride was located. The day after the incident, the victim was taken to a local doctor who prescribed over-the-counter medication.                                                                                                                                                                                                                                                                              |
| 030122CCN0286 | MI    | A 2-year-old girl sustained injuries to her left hand after attempting to touch a fan located inside an inflatable amusement attraction. Three of her fingers were lacerated. She was taken to the doctor, treated and released. No other injuries were sustained. The victim's mother feels the attraction is unsafe because the exposed fan was not covered and was easily accessible to children playing inside the amusement attraction.                                                                                                                                |
| 030320HNE7862 | FL    | Ten people, ranging in age from 11 to 37, were riding a mobile amusement ride at a carnival when the ride was in the second turn around and suddenly crashed down to the ground. Two people suffered bruises and abrasions. Two of the riders were taken to the local hospital. They were treated and released the same day. Two other victims suffered back, neck, and leg pain and soreness from the incident.                                                                                                                                                            |
| 030522CCC2463 | IL    | A teenager fell head first off an inflatable obstacle course slide and died four days later of a traumatic head injury. The obstacle course belonged to the U.S. Army and they were supervising the event. The U.S. Army has an open investigation and a lawsuit is pending.                                                                                                                                                                                                                                                                                                |

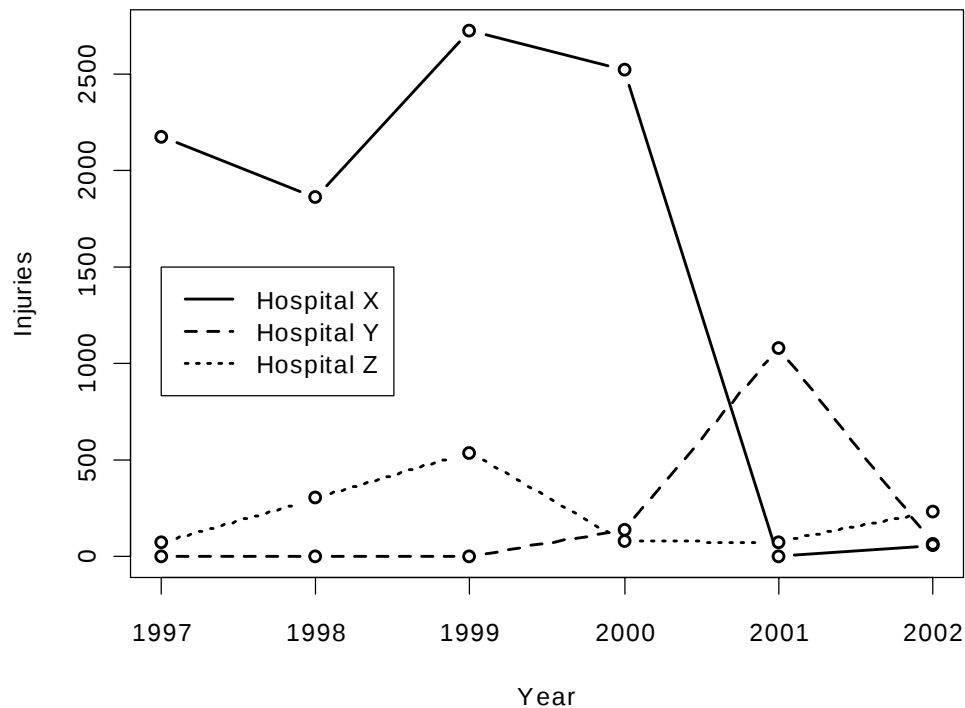
## **Appendix A: Fixed-Site Injury Estimates**

As discussed in the body of this report, a hospital that had accounted for a large share of the NEISS fixed-site ride injuries left NEISS in 2001. This appendix examines the effect of this hospital leaving NEISS and presents the mobile and fixed-site estimates with and without the hospital. The inclusion of the fixed-site estimates here is intended to provide continuity with past reports and to provide a range of estimates of fixed-site injuries that may be useful to researchers and policy makers in the fixed-site amusement ride area. For example, the fixed-site estimate may be compared to other independent fixed-site estimates, such as the one produced in the article [11]. To maintain anonymity, this appendix refers to this hospital as Hospital X.

Hospital X was last part of NEISS in December 2000, when the hospital chose not to continue to participate in NEISS. In 2001, a replacement hospital for Hospital X was added to NEISS, as is typically done for hospitals that leave NEISS. The replacement hospital is chosen to be (1) in the same stratum, which in this case means it has a similar number of yearly emergency room visits, and (2) is in the same geographic region. Replacement hospitals (or original hospitals) are not chosen for the purpose of a particular product, such as amusement rides. The replacement for Hospital X has not contributed many amusement ride-related injuries.

The effect of Hospital X is seen in Figure A1. Figure A1 shows the weighted counts of fixed-site injuries for the three hospitals that accounted for the largest number of fixed-site injuries from 1997 to 2002. The weighting comes from the NEISS design and reflects the contribution of the injuries to the total NEISS estimate. From the figure, the dominance of Hospital X in the period from 1997 to 2000 and its drop-off after 2000 is evident. The values of Hospital X in 2001 and 2002 are those of its replacement hospital. The figure also shows that in 2001, there was a single-year spike in fixed-site injuries in one hospital, Hospital Y.

Figure A1: Weighted Fixed-Site Amusement Ride Injury Counts for Top 3 Hospitals: 1997 to 2002



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

Table A1 and Figure A2 display the injury estimates for the years 1997 to 2002, which include the effect of Hospital X for the years 1997 to 2000. It is important to note the large confidence intervals for the fixed-site estimates in the years 1997 to 2000, the years with Hospital X. This implies there is large uncertainty in the fixed-site estimates for these years, which is caused by a single hospital accounting for a large number of injuries.

The effect of Hospital X leaving NEISS at the end of 2000 is to reduce the estimate of the number of fixed-site injuries in the years 2001 and 2002 as compared to the years 1997 to 2000, regardless of the actual trend in fixed-site injuries. In others words, the actual trend may be negative, positive, or neutral, but the estimated trend is more negative than it would have been had Hospital X remained in NEISS.

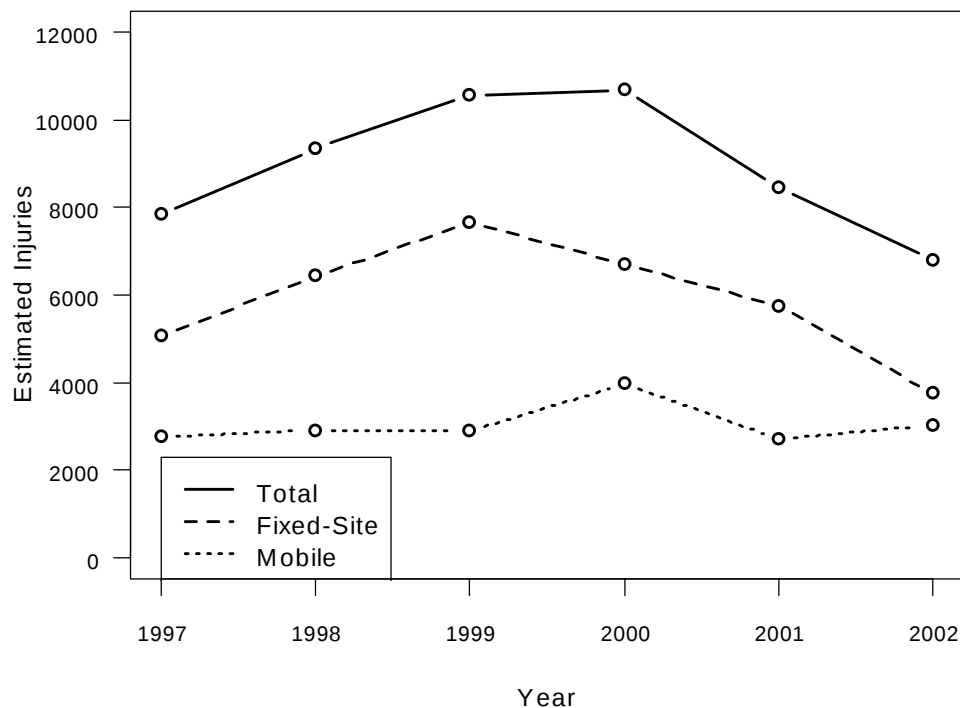
The effect of the Hospital X absence in 2001 is partially masked by the spike in injuries for Hospital Y in 2001. This again is reflected in the somewhat large uncertainty for the fixed-site estimate in 2001.

Table A1: Non-Occupational, Amusement Ride Injury Estimates Including Hospital X

|      | Mobile Ride |                         | Fixed-Site Ride |                             | Total    |                         |
|------|-------------|-------------------------|-----------------|-----------------------------|----------|-------------------------|
| Year | Estimate    | 95% Confidence Interval | Estimate        | 95% Confidence Interval     | Estimate | 95% Confidence Interval |
| 1997 | 2,800       | (1,500, 4,100)          | 5,100           | (-200, 10,300) <sup>1</sup> | 7,800    | (2,400, 13,300)         |
| 1998 | 2,900       | (1,600, 4,200)          | 6,400           | (1,600, 11,300)             | 9,300    | (4,500, 14,200)         |
| 1999 | 2,900       | (1,900, 4,000)          | 7,700           | (800, 14,500)               | 10,600   | (3,700, 17,400)         |
| 2000 | 4,000       | (2,700, 5,200)          | 6,700           | (400, 13,000)               | 10,700   | (4,300, 17,000)         |
| 2001 | 2,700       | (1,400, 4,000)          | 5,800           | (2,700, 8,800)              | 8,500    | (5,200, 11,800)         |
| 2002 | 3,000       | (1,800, 4,200)          | 3,800           | (2,500, 5,000)              | 6,800    | (5,100, 8,500)          |

Source: U.S. Consumer Product Safety Commission, NEISS. The estimates are rounded to the nearest 100 injuries and may not sum to the totals due to rounding. As discussed in the report, the estimates differ from those in previous reports due to a review of coding. Note 1: The actual value must be greater than zero. However, the confidence interval is expressed as equal to the estimate plus and minus twice its standard error for consistency.

Figure A2: Non-Occupational, Amusement Ride Injury Estimates Including Hospital X.



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

In order to evaluate the trends in injuries independent of the effect of Hospital X leaving NEISS, the injury estimates were recalculated without Hospital X for the years 1997 to 2000. As described in the injury methodology section, the remaining hospitals in the sampling stratum of Hospital X were reweighted so that the total weight of the stratum remained the same.

Table A2 and Figure A3 display the injury estimates for the years 1997 to 2002 excluding Hospital X. Note that removing Hospital X has the effect of increasing the mobile ride estimates. As previously noted, if there are other such hospitals in the U.S. with large numbers of fixed-site injuries, then the fixed-site injury estimates in Table A2 may be low. However, since Hospital X leaving NEISS does not affect the estimates in Table A2, the estimates in Table A2 are used for the evaluation of trends.

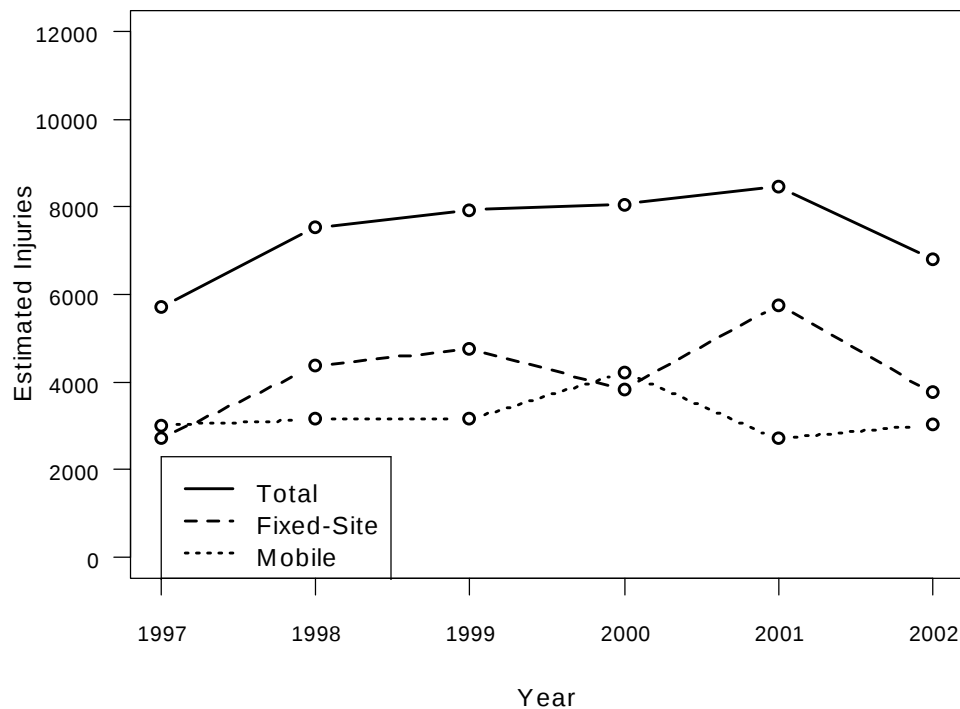
The p-value for mobile ride injuries was 0.977, the p-value for fixed-site ride injuries was 0.231, and the p-value for total ride injuries was 0.241. Therefore, accounting for the effect of Hospital X leaving in 2001, there are no statistically significant trends, positive or negative, for mobile, fixed-site, or total ride injuries over the period from 1997 to 2002.

Table A2 Non-Occupational Amusement Ride Injury Estimates Excluding Hospital X

|      | Mobile Ride |                         | Fixed-Site Ride |                         | Total    |                         |
|------|-------------|-------------------------|-----------------|-------------------------|----------|-------------------------|
| Year | Estimate    | 95% Confidence Interval | Estimate        | 95% Confidence Interval | Estimate | 95% Confidence Interval |
| 1997 | 3,000       | (1,500, 4,500)          | 2,700           | (1,700, 3,700)          | 5,700    | (3,700, 7,700)          |
| 1998 | 3,200       | (1,600, 4,700)          | 4,400           | (2,800, 6,000)          | 7,500    | (5,300, 9,800)          |
| 1999 | 3,200       | (1,900, 4,400)          | 4,800           | (2,600, 7,000)          | 7,900    | (5,600, 10,200)         |
| 2000 | 4,200       | (2,800, 5,600)          | 3,800           | (2,200, 5,400)          | 8,100    | (6,000, 10,100)         |
| 2001 | 2,700       | (1,400, 4,000)          | 5,800           | (2,700, 8,800)          | 8,500    | (5,200, 11,800)         |
| 2002 | 3,000       | (1,800, 4,200)          | 3,800           | (2,500, 5,000)          | 6,800    | (5,100, 8,500)          |

Source: U.S. Consumer Product Safety Commission, NEISS. The estimates are rounded to the nearest 100 injuries and may not sum to the totals due to rounding. The years 1997 to 2000 have been adjusted to make them comparable to the years 2001 and 2002.

Figure A3: Non-Occupational Amusement Ride Injury Estimates Excluding Hospital X



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

## Appendix B: Supplemental Tables

Table B1: Weighted Counts of Injuries by Ride Codes Including Hospital X.

| <b>Year</b>  | <b>Not A Ride</b> | <b>Fixed-Site</b> | <b>Mobile</b> | <b>Unknown-Site</b> | <b>Unknown-If Ride</b> | <b>Inflat-able</b> | <b>Total</b> |
|--------------|-------------------|-------------------|---------------|---------------------|------------------------|--------------------|--------------|
| <b>1997</b>  | 1,786             | 4,204             | 2,298         | 1,343               | 799                    | 1,331              | 11,761       |
| <b>1998</b>  | 1,894             | 4,887             | 2,214         | 2,245               | 734                    | 1,493              | 13,468       |
| <b>1999</b>  | 2,214             | 6,104             | 2,319         | 2,137               | 986                    | 1,907              | 15,667       |
| <b>2000</b>  | 1,933             | 5,301             | 3,148         | 2,232               | 1,084                  | 1,953              | 15,651       |
| <b>2001</b>  | 3,077             | 4,285             | 2,013         | 2,160               | 1,234                  | 2,292              | 15,061       |
| <b>2002</b>  | 3,571             | 2,696             | 2,178         | 1,919               | 2,077                  | 2,523              | 14,963       |
| <b>Total</b> | 14,475            | 27,477            | 14,171        | 12,036              | 6,914                  | 11,498             | 86,571       |

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

Table B2: Weighted Counts of Injuries by Ride Codes Excluding Hospital X.

| <b>Year</b>  | <b>Not A Ride</b> | <b>Fixed-Site</b> | <b>Mobile</b> | <b>Unknown-Site</b> | <b>Unknown-If Ride</b> | <b>Inflat-able</b> | <b>Total</b> |
|--------------|-------------------|-------------------|---------------|---------------------|------------------------|--------------------|--------------|
| <b>1997</b>  | 1,614             | 2,075             | 2,307         | 1,324               | 678                    | 1,404              | 9,402        |
| <b>1998</b>  | 1,853             | 3,140             | 2,268         | 2,117               | 683                    | 1,571              | 11,631       |
| <b>1999</b>  | 2,196             | 3,494             | 2,315         | 2,119               | 848                    | 1,854              | 12,827       |
| <b>2000</b>  | 1,751             | 2,876             | 3,166         | 2,010               | 961                    | 2,026              | 12,791       |
| <b>2001</b>  | 3,077             | 4,285             | 2,013         | 2,160               | 1,234                  | 2,292              | 15,061       |
| <b>2002</b>  | 3,571             | 2,696             | 2,178         | 1,919               | 2,077                  | 2,523              | 14,963       |
| <b>Total</b> | 14,062            | 18,566            | 14,248        | 11,649              | 6,481                  | 11,670             | 76,675       |

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

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