



# Nonfatal Motor-Vehicle--Related Backover Injuries Among Children --- United States, 2001--2003

Motor-vehicle (MV)--related backovers (i.e., incidents involving children being struck by or rolled over by a vehicle moving in reverse) represent a risk for severe injury and death (1,2). To characterize nonfatal MV backover injuries among children, CDC analyzed data from the National Electronic Injury Surveillance System All Injury Program (NEISS-AIP). This report summarizes the results of that analysis, which determined that, during 2001--2003, an estimated 7,475 children (2,492 per year) aged 1--14 years were treated for nonfatal MV backover injuries in U.S. hospital emergency departments (EDs). The report also highlights differences in type and severity of MV backover injuries by age and underscores the need for effective interventions. NEISS-AIP data can increase the understanding of nonfatal MV backover injuries and help guide the development of prevention strategies, such as education, environmental improvements, and changes in vehicle design, that might help reduce these injuries among children.

NEISS-AIP provides data on approximately 500,000 consumer product-- and injury-related ED cases each year. Operated by the U.S. Consumer Product Safety Commission, the program collects data on initial visits for all types and causes of injuries treated in EDs (3). NEISS-AIP data are drawn from a nationally representative subsample of 66 of 100 hospitals selected as a stratified probability sample of U.S. hospitals with a minimum of six beds and a 24-hour ED.

For this study, MV backover injury cases were identified from narratives abstracted from medical records. NEISS-AIP obtains data for each nonfatal injury regarding the principal diagnosis, body part primarily affected, external cause of injury, ED discharge disposition, and location of the incident (e.g., home or public place). Cases were defined as nonfatal injuries to children aged 1--14 years as a result of being struck by or rolled over by an MV (e.g., car, truck, van, or sport utility vehicle) moving in reverse in a driveway, parking lot, or on a street. Cases involving child pedestrians (i.e., children standing, sitting, lying, playing, or walking) or children riding bicycles or tricycles near or behind an MV were included. Cases involving children injured while getting into or

out of stationary MVs were excluded.

Each case was assigned a sample weight based on the inverse probability of selection; these weights were summed to provide national estimates of MV backover injuries. Estimates were based on weighted data for 168 children treated for MV backover injuries at NEISS-AIP hospital EDs during 2001--2003. Population estimates for 2001--2003 were obtained from the U.S. Census Bureau to compute injury rates. A direct variance estimation procedure was used to calculate 95% confidence intervals (CIs) and to account for the complex sample design.

Of the 168 cases identified, 81 (48.2%) involved children aged 1--4 years; 92 (54.8%) of the children were male. Injuries occurred predominantly to the head, face, and neck region (47 cases [28.0%]) and to the extremities (90 cases [53.6%]). Injuries to the head, face, and neck region decreased with age, from a high of 31 (38.3%) among children aged 1--4 years to a low of three (7.5%) among those aged 10--14 years. Injuries to the extremities, specifically the lower part of the body, increased with age, from 24 (29.6%) among children aged 1--4 years to 29 (72.5%) among those aged 10--14 years. Ninety-four (56.0%) children sustained minor contusions and abrasions, and these varied by age group, from 40 (49.4%) among those aged 1--4 years to 25 (62.5%) among those aged 10--14 years. More serious injuries, such as fractures and internal injuries, occurred among 47 (28.0%) children; this proportion decreased with age, from 32 (39.5%) among children aged 1--4 years to seven (17.5%) among those aged 10--14 years.

The 168 study cases were weighted to provide estimates for the United States overall. During 2001--2003, an estimated 7,475 (CI = 4,453--10,497) children were treated in EDs for nonfatal MV backover injuries, at an annual rate of 4.40 per 100,000 age-specific population (CI = 2.62--6.18) ([Table](#)). Among all ages, the rate for females (4.60) was slightly higher than that for males (4.21). Approximately 86% of the injured children were classified as pedestrians; these children sustained MV backover injuries at a rate six times greater (3.78) than that of children who were riding a bicycle or tricycle (0.62). Nontraffic events (i.e., those not occurring on public roadways) accounted for approximately 61% of MV backover incidents, a rate of 2.67. Location of the incident was known in approximately 80% of cases; the majority of injuries occurred either at home (47.4%) or on public property (31.9%). For at least 40% of all cases, injuries occurred in driveways or parking lots. A majority of injured children (78.1%) were treated and released from the ED.

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### **Editorial Note:**

The findings in this report indicate that, during 2001--2003, an estimated 2,492 children aged 1--14 years were injured annually after being struck by or rolled over by an MV moving in reverse. Many were pedestrians near or behind an MV and were at home when the incident occurred. The majority were treated and released from hospitals. A study by the National Highway Traffic Safety Administration examined death certificate data and identified approximately 47 deaths in 1998 among children aged <19 years that were attributable to MV backover injuries (4). Of these deaths, 21 occurred in driveways. The results of this study are consistent with those of other studies that illustrate the risk children face when left unattended near or behind an MV (1,2,5--7).

The findings in this report are subject to at least four limitations. First, NEISS-AIP captures only injuries treated in hospital EDs and does not include children seen in physician offices and clinics or who might not have received medical care. Second, NEISS-AIP provides national estimates only and does not allow for estimates by region, state, or local jurisdiction. Third, cases were identified from narratives obtained from medical records, but not all medical charts contained complete descriptions of events, such as whether a vehicle was in reverse. Finally, in cases with multiple injuries, only data regarding the most severe injury are recorded.

Various prevention strategies, including education, environmental modifications, and changes in vehicle design, might reduce the risk for MV backover injuries among children. Public education to increase awareness among parents and caregivers should emphasize the following: 1) adults should adequately supervise children who are playing in areas near parked MVs, 2) drivers should look carefully for children before and while backing up, and 3) MVs should be locked in garages or driveways with keys kept out of reach of children (6,8). Potential environmental modifications include fenced driveways, fenced play areas away from driveways and streets, and circular driveway designs that eliminate the need to back out. Potential automobile modifications include back-up warning alarms when vehicles are placed in reverse or mirrors, sensing devices, or cameras to alert drivers to out-of-sight objects, such as small children (1). Research is needed to determine the effectiveness of such approaches.

Data from injury surveillance systems such as NEISS-AIP highlight the preventable morbidity and mortality resulting from MV-related backover injuries in children. Effective engineering and environmental approaches to prevent MV-related backover injuries need to be identified, evaluated, and disseminated to public health and transportation officials and policy makers for implementation nationwide. Meanwhile, drivers and caregivers can take simple precautions to prevent these injuries. To this end, child MV safety programs and health professionals should ensure that parents, caregivers, and the public are aware of the risks for injury associated with MV backovers and appropriate prevention measures.

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## Table

**TABLE. Estimated annual number, percentage, and rate of nonfatal motor-vehicle-related backover injuries treated in emergency departments (EDs) among children aged 1–14 years, by selected characteristics — United States, 2001–2003**

Characteristic	Estimated no.*	(%)	Rate†	(95% CI‡)
<b>Age group (yrs)</b>				
1–4	1,246 <sup>¶</sup>	(50.0)	—	—
5–9	603	(24.2)	3.02	(1.69–4.35)
10–14	642	(25.8)	3.05	(1.41–4.68)
<b>Sex</b>				
Male	1,220	(49.0)	4.21	(2.62–5.80)
Female	1,271	(51.0)	4.60	(2.23–6.98)
<b>Activity at time of injury</b>				
Riding bicycle or tricycle	350	(14.0)	0.62	(0.32–0.92)
Pedestrian**	2,142	(86.0)	3.78	(2.16–5.41)
<b>Type††</b>				
Traffic	519 <sup>¶</sup>	(20.8)	—	—
Nontraffic	1,514	(60.7)	2.67	(1.49–3.86)
Unspecified	459	(18.4)	0.81	(0.13–1.50)
<b>Location of incident</b>				
Home	1,180	(47.4)	2.08	(1.13–3.04)
Public§§	794	(31.9)	1.40	(0.70–2.11)
Other/Unspecified	518 <sup>¶</sup>	(20.8)	—	—
<b>Disposition at ED discharge</b>				
Treated and released	1,945	(78.1)	3.44	(2.15–4.72)
Hospitalized or transferred¶¶	547 <sup>¶</sup>	(21.9)	—	—
<b>Total</b>	<b>2,492</b>		<b>4.40</b>	<b>(2.62–6.18)</b>

\* Estimates are based on 168 cases that occurred during a 3-year period that were weighted to provide a nationally representative sample; numbers might not add to total because of rounding.

† Per 100,000 population.

‡ Confidence interval.

¶ Estimate might be unstable because the coefficient of variation is >30% or was based on fewer than 20 cases.

\*\* Includes injuries incurred by children who were standing, sitting, lying, playing, walking, in or near driveway, parking lot, or other location.

†† "Traffic" refers to events occurring on public roadways; "nontraffic" includes those events that occurred at all other locations (e.g., driveways or parking lots).

§§ Includes street, school, sports arena, or other public place.

¶¶ Includes patients transferred to another facility for specialized care.

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