Published in final edited form as:

J AAPOS. 2008 December ; 12(6): 626–628. doi:10.1016/j.jaapos.2008.07.005.

Pediatric eye injuries related to consumer products in the United States, 1997–2006

Jennifer Moren Cross, PhD, RN^a, Russell Griffin, MPH^b, Cynthia Owsley, PhD, MSPH^a, and Gerald McGwin Jr., PhD, MS^{a,b,c}

^aDepartment of Ophthalmology, School of Medicine, University of Alabama at Birmingham, Birmingham, Alabama

^bDepartment of Epidemiology, School of Public Health, University of Alabama at Birmingham, Birmingham, Alabama

^cSection of Trauma, Burns, and Surgical Critical Care, Division of General Surgery, Department of Surgery, School of Medicine, University of Alabama at Birmingham, Birmingham, Alabama

Abstract

This study examines which consumer products are most commonly associated with pediatric eye injuries that are treated in emergency departments in the United States. The results demonstrate that, overall, boys experienced proportionally more consumer product–related eye injuries than girls, but eye injuries from specific product categories are more likely to be associated with one sex than the other. Age-specific patterns also revealed that certain product categories are more likely to be associated with eye injuries among different age groups. These findings are salient because children experience a disproportionate amount of ocular trauma, possibly resulting in visual disability or blindness and concomitant developmental delays. Given the heretofore lack of detailed information on products that may contribute to the burden of pediatric eye injuries in the United States, the results of the current study provide valuable information for identifying priorities for prevention and intervention.

Subjects and Methods

The data for this study are derived from the Consumer Product Safety Commission's National Electronic Injury Surveillance System (CPSC-NEISS) and represent all consumer product–related pediatric eye injuries (those aged 12 and under) that occurred from 1997 to 2006. Specific information regarding the NEISS is described elsewhere.¹ In brief, the NEISS is a national survey of hospital emergency departments conducted by the CPSC in collaboration with the Center for Disease Control's National Center for Injury Prevention and Control to collect information on injuries in the United States. During the study period, 101 hospital emergency departments were sampled from 1997 to 1999, and 100 hospital emergency departments have been sampled each year since. Procedures for data collection are described elsewhere.²

The CPSC defines a consumer product as an item produced for use by the public in or around a home, school, or recreational setting.¹ Some consumer products are monitored by other agencies (eg, vehicles, firearms, food, legal and illegal drugs, and certain medical

devices); therefore, the CPSC does not collect information on them. Physicians and nurses document whether a consumer product was involved with each injury (up to 2 products) and provide detailed information regarding the product. At the end of each day, a NEISS coordinator reviews the emergency department records and electronically sends pertinent case information to the CPSC. The product must directly damage the eye. For this study, only the first product code assigned is included in the analyses. The term “consumer” in consumer product–related eye injury refers to the product involved in the injury, not the injured person. Further, injuries to the eyelids and periocular surfaces were not able to be included in the analysis because these areas are generically classified by the NEISS as parts of the “face” and thus combine with other nonophthalmic portions of the face (eg, chin). Therefore, this study represents a select subset of all eye injuries treated in the emergency department because of the limited anatomy involved and because consumer products are not involved with every case of eye injury (ie, eye trauma may result from other sources, such as environmental elements).

The NEISS has several thousand numeric codes representing specific consumer products. More than 550 NEISS product codes were relevant for pediatric eye injuries occurring from 1997 to 2006, with most codes representing a small number of cases. To provide an intelligible description of the consumer products, 18 aggregated categories were constructed based on products having similar functions, including an “other” category. Sampling weights were used in all analyses so that the results presented herein can be taken to reflect national estimates.

Results

From 1997 to 2006, an estimated 512,079 consumer product–related pediatric eye injuries were treated in emergency departments in the United States. The majority of injuries were abrasions or contusions (44.6%), followed by conjunctivitis (12.4%), foreign body (8.9%), chemical burn (7.35%), laceration (4.9%), hemorrhage (3.4%), thermal burn (2.3%), and hematoma (1.1%); the remaining injury diagnoses each represented <1% of all eye injuries. Nearly two-thirds (62.5%) of the pediatric eye injuries were to boys. In addition, 15.6% of the eye injuries occurred to children younger than the age of 2 years, whereas those aged 2–4 years, 5–8 years, and 9–12 years each experienced 27% to 29% of the injuries. The most common individual consumer products associated with eye injuries were toys, pens and pencils, general-purpose household cleaners, adhesives, baseballs, bleaches (noncosmetic), cigarettes/cigars/pipes/tobacco, basketballs, tables, and fireworks.

Table 1 demonstrates that, overall, sports was the most common product category associated with pediatric eye injuries, followed by household cleaning chemicals, toys (not including toy guns), furniture, and desk supplies. Compared with girls, generally at least twice as many boys experienced eye injuries resulting from sports, toy guns, tools/hardware, and recreational vehicles. In contrast, slightly more girls than boys experienced eye injuries from household cleaning chemicals and swimming pools/equipment. Unfortunately, racial information for 39% of the children was not collected, so results could not be stratified by race. Age-related patterns are also evident. The proportion of eye injuries related to sports, swimming pools/equipment, toy guns, and recreational vehicles increased within every age category. In contrast, the proportion of eye injuries attributed to household cleaning chemicals, furniture, and baby items decreased with age. Worthy of note is that children who were 2–4 years of age experienced proportionally more eye injuries from toys compared with all other age groups. Also, desk supplies were associated with proportionally more eye injuries among 5- to 8-year-old children compared with all other age groups.

Discussion

Eye injuries represent the principal source of pediatric monocular visual disability and monocular blindness in the United States, and a disproportionate amount of ocular trauma is incurred by children.³ Developmental disabilities may result from such visual impairments, rendering long-term financial and quality of life implications.⁴ To address these problems, *Healthy People 2010* includes among their objectives reducing visual impairment and blindness and increasing the use of protective eyewear in recreational activities and hazardous situations around the home.⁵ It has been suggested that pediatric eye trauma may be largely prevented by the education of children, use of protective eyewear, and increased parental supervision.⁶ A number of past studies have focused on eye injuries from specific types of events or activities (eg, sports or fireworks), but few studies have attempted to comprehensively identify mechanisms associated with pediatric eye trauma.

The results of this study provide guidance concerning which product categories place boys or girls, or particular age groups, at greater risk for eye injury so that the aforementioned prevention tactics may be tailored accordingly. This study demonstrated that boys experienced proportionally more consumer product-related eye injuries than girls, but eye injuries from certain product categories are more likely to be associated with one gender than the other. Likewise, age-specific patterns revealed that certain product categories are proportionally more likely to be related to eye injuries among different age groups.

The results of this study should be considered in light of several limitations. Only eye injuries treated in hospital emergency departments were included in the present study. Injuries treated in the emergency department may be more severe than those treated in other settings (eg, private physician offices or hospital ambulatory clinics). Without information on injury severity, it is not possible to determine which products, although perhaps less frequent, are the most dangerous in terms of producing more injuries associated with permanent vision loss. Emergency departments do, however, treat a mix of serious and minor injuries making it a good starting point to investigate circumstances surrounding eye injuries. It is notable that the information herein does not provide details regarding the causes of eye injury, only that certain consumer products were associated with the injury. In addition, certain types of injuries that can be associated with consumer products (eg, contact dermatitis) were not included in this study, which may exclude a significant number of eye injuries from various chemicals. Thus these types of products may be underestimated with respect to their association with pediatric eye injuries.

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Table 1
Consumer product categories associated with eye injuries in the United States, 1997–2006

Product category	Overall (%) n = 512,079	Gender (%) [‡]		Age in years (%) [§]				
		Male n = 319,797	Female n = 192,165	32 n = 80,002	2–4 n = 139,342	5–8 n = 143,236	9–12 n = 148,654	
Sports	13.5	16.3	8.9	1.2	3.9	14.0	28.7	
Household cleaning chemicals	11.2	10.5	12.5	30.2	14.0	4.9	4.4	
Toys*	7.8	8.3	7.1	6.4	10.5	9.2	4.8	
Furniture	6.6	6.3	7.2	10.9	8.8	6.4	2.6	
Desk supplies	6.3	5.8	7.2	3.2	4.8	8.9	6.9	
Other chemicals and compounds	3.9	4.0	3.6	4.8	5.3	3.3	2.5	
Swimming pools/equipment	2.8	2.4	3.5	0.7	1.5	3.8	4.3	
Toy guns [†]	2.6	3.4	1.1	0.0	0.9	2.4	5.6	
Tools/hardware	2.0	2.4	1.2	0.6	2.2	2.1	2.2	
Playground equipment	1.6	1.4	1.8	1.0	2.1	1.9	1.0	
Lawn and garden	1.0	1.2	0.8	0.57	1.0	1.2	1.1	
Apparel	1.0	0.9	1.1	1.2	0.7	1.4	0.7	
Recreational vehicles	0.9	1.2	0.5	0.2	0.4	1.2	1.6	
Appliances	0.7	0.7	0.8	0.6	1.0	0.7	0.5	
Baby items	0.5	0.4	0.7	2.2	0.5	0.2	0.0	
Automotive chemicals	0.5	0.6	0.3	0.8	0.9	0.2	0.2	
Storage and organization	0.4	0.3	0.6	0.6	0.7	0.3	0.2	
Other	36.7	34.1	41.1	35.0	40.9	38.0	32.5	
Total	100.0	100.2	100.0	100.2	100.1	99.9	99.8	

* Excludes toy guns.

[†] Includes gas, air or spring-operated guns (including BB guns).

[‡] Sex global *p*-value < 0.0001.

[§] Age global *p*-value < 0.0001.