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Wet and wounded: Pediatric facial trauma from swimming and diving

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ABSTRACT

Objectives: Swimming has been reported as the most common recreational activity among American youths, while diving remains a popular youth activity as well. We characterize the most common facial injuries occurring during these activities and evaluate facial fracture mechanisms and demographic trends, as this information may be helpful in preventative counseling as well as diagnosis.

Methods: The National Electronic Injury Surveillance System was assessed for swimming- and diving-related facial injuries in children from 2007 to 2016. Estimates of national injury incidence were recorded, and patient diagnoses, demographics, and injury mechanisms were evaluated.

Results: In the 10-year period assessed, 789 NEISS entries extrapolated to an estimated 27,709 patients nationwide were analyzed. The yearly incidence fluctuated but steadily rose from 2013 to 2016. Males comprised a majority of injuries (58%), and laceration was the most common diagnosis (65%), followed by abrasion/contusion (22%) and fracture (9%). Facial fractures were most likely to involve the nasal bones (87%). Swimming injuries were more numerous overall (74%), but a greater proportion of diving injuries resulted in fracture (12% vs. 7%). Teenagers were also more likely to suffer fractures than were younger children involved in the same activities.

Conclusion: Most analyses of swimming and diving injuries have focused on spinal and orthopedic trauma. Nevertheless, the nature of headfirst diving and swim strokes suggest facial trauma is an underappreciated concern for clinicians. These findings reinforce the need for safer swimming and diving practices and serve as a useful resource for physicians managing pediatric facial injuries.

1. Introduction

As the school year comes to a close and warmer weather arrives each spring, millions of American children participate in summer recreational activities. Among the most popular of these activities are swimming and diving, with an estimated 50 million Americans participating in swimming yearly [1]. In fact, swimming has often been reported as the most common recreational activity among children, with over 16 million participating annually [1]. In addition, competitive swimming and diving remain popular among young athletes, with some 290,000 high school students competing on swim and dive teams each year [1]. There are more than 2800 clubs nationwide registered with USA Swimming [2] and greater than 300 clubs associated with USA Diving [3]. As such, swimming and diving are likely to remain popular activities among American youths well into the future.

Several prior analyses have examined swimming and diving injuries [4–6], often with an emphasis on spinal trauma [7,8]. Numerous studies [9,10] have analyzed large cohorts of emergency department (ED)

visits pertaining to swimming and diving incidents. However, no analyses to date have specifically examined facial injuries resulting from these activities or the impact of these injuries on the pediatric population that participates so heavily in them. Facial injuries can severely compromise quality of life and have a long-term impact on both physical and psychological wellbeing [11–13]. These consequences and the heightened impact of swimming and diving-related facial trauma in children, whose facial structures have not finished developing, represent important considerations for physicians involved in the care of children and adolescents. In this analysis, we address an important epidemiological gap in the literature and provide clinicians with a more thorough understanding of the most common and most serious pediatric facial injuries sustained while swimming and diving. Specifically, we analyze the most common facial injuries sustained, the mechanisms most frequently associated with facial fractures, and demographic differences in injury diagnoses.

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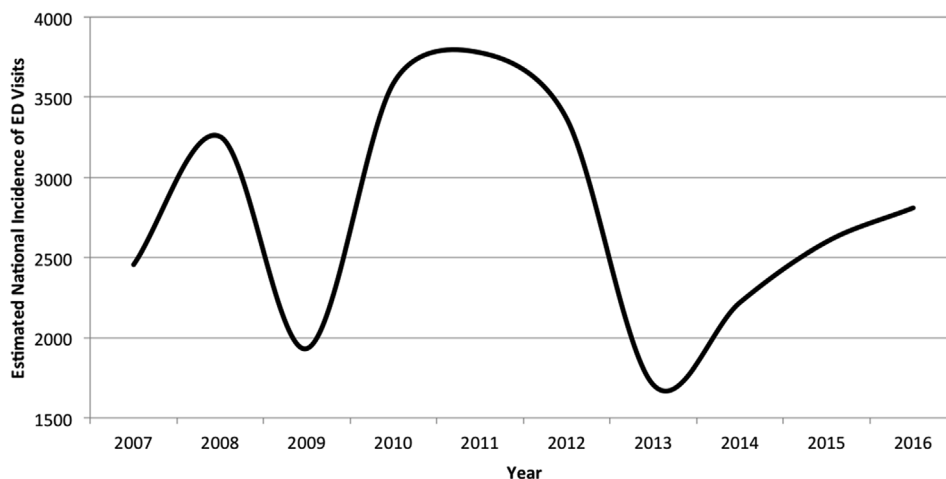


Fig. 1. Estimated number of ED visits for swimming- and diving-related pediatric facial trauma from 2007 through 2016.

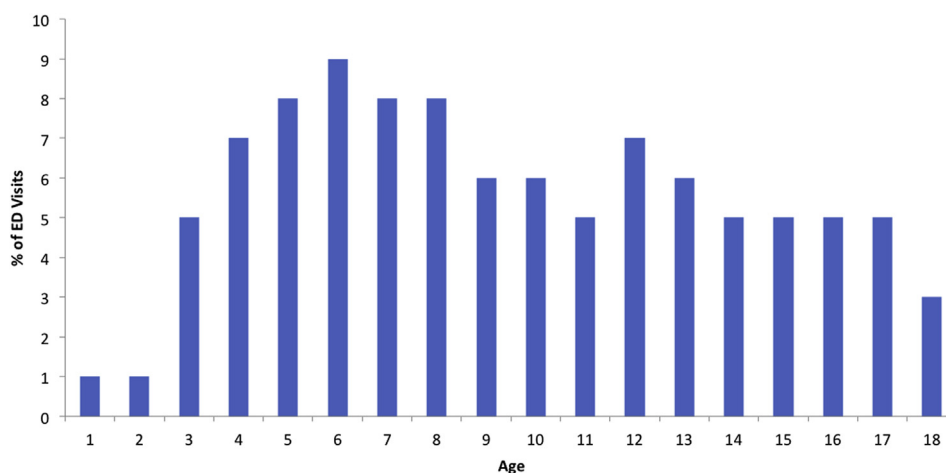


Fig. 2. Age distribution of 789 entries analyzed.

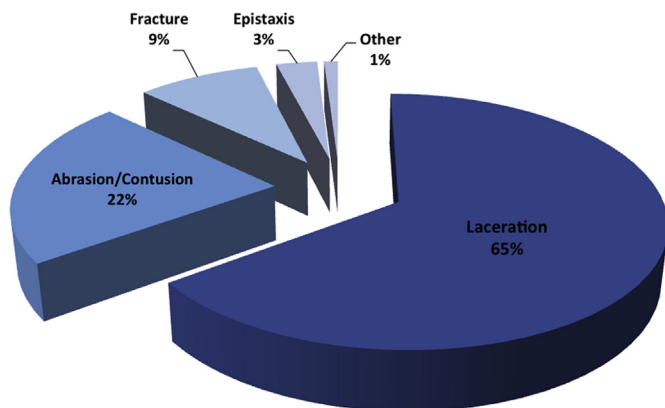


Fig. 3. Distribution of facial injury diagnoses.

2. Methods

The National Electronic Injury Surveillance System (NEISS) is a valuable public health research tool operated by the United States Consumer Product Safety Commission. This resource compiles information from patients entering approximately 100 emergency departments nationwide. These EDs have been selected as nationally representative examples of the more than 5000 US hospitals equipped with their own emergency departments. Using the data gathered, the

NEISS then provides an estimated national incidence of injuries related to a wide variety of activities. Data are stratified according to activity or object involved, diagnosis, body part, age, sex, and a number of other variables using a set of “product codes.” This database has been an important epidemiological tool in many previous studies, both within otolaryngology [14–21] and many other specialties [22–29].

In February 2018, the most recent 10-year period of data (2007–2016) was searched for ED visits involving individuals age 18 years and younger related to facial trauma sustained while swimming (NEISS product code 3274) and diving (NEISS product code 1278). Entries tagged with code 3274 were considered “swimming” injuries, while those tagged with code 1278 were considered “diving” injuries. Entries tagged with both of these codes were evaluated individually to determine whether the diagnosed injury occurred while the patient was actually swimming or was performing a dive or jump. Injuries unrelated to acute facial trauma (e.g. sunburn, allergic reaction, contact dermatitis with swimming pool chemicals) were excluded. In total, 789 unique NEISS entries extrapolated to 27,709 ED visits met inclusion criteria and were assessed for patient age, sex, primary injury diagnosis, and a short narrative description of each incident. Fracture type and mechanism were recorded from the narrative description of each incident as well.

2.1. Statistical analysis

Fisher’s exact test was employed for comparison of categorical

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