# Policy on Prevention of Sports-related Orofacial Injuries

**Originating Committee**
Clinical Affairs Committee

**Review Council**
Council on Clinical Affairs

**Adopted**
1991

**Revised**
1995, 1999, 2002, 2006

## Purpose

The American Academy of Pediatric Dentistry (AAPD) is concerned about the prevalence of sports-related orofacial injuries in our nation's youth.

## Methods

A MEDLINE literature search was conducted using the terms "sports injuries", "injury prevention", "dental injuries", "orofacial injuries", and "mouthguard".

## Background

Increased competitiveness has resulted in a significant number of dental and facial injuries which represent a high percentage of the total injuries experienced in youth sports.[1,2] Over the past decade, approximately 46 million youths in the United States were involved in "some form of sports".[3] It further is estimated that 30 million children in the US participate in organized sport programs.[4] All sporting activities have an associated risk of orofacial injuries due to falls, collisions, and contact with hard surfaces. Sports accidents reportedly account for 10-39% of all dental injuries in children.[5] The administrators of youth, high school, and college football, lacrosse, and ice hockey have demonstrated that dental and facial injuries can be reduced significantly by introducing mandatory protective equipment. Popular sports such as baseball, basketball, soccer, field hockey, softball, wrestling, volleyball, and gymnastics lag far behind in injury protection for girls and boys. Youths participating in leisure activities such as skateboarding, inline or roller skating, and bicycling also benefit from appropriate protective equipment.[6-8]

Studies of dental and orofacial athletic injuries are reported throughout the medical and dental literature.[9,10] A review of literature published over the past 20 years showed that the injury rate varied greatly depending on the size of the sample, the sample's geographic location, the ages of the participants, and the specific sports involved in the study.[9,10] Although the statistics vary, many studies reported that dental and orofacial injuries occurred regularly and concluded that participation in sports carries a considerable risk of injury .[5,9-12]

Consequences of orofacial trauma for children and their families are substantial because of potential for pain, psychological effects, and economic implications. Children with untreated trauma to permanent teeth exhibit greater impacts on their daily living than those without any traumatic injury.[13] The yearly costs of injuries sustained by young athletes have been estimated to be as high as 1.8 billion dollars.[4] Although the incidence of dental and orofacial trauma is small in comparison to all sports-related accidents, the costs incurred are both disproportionate and high.[5] The National Youth Sports Safety Foundation in 2005 estimated the cost to treat an avulsed permanent tooth and provide followup care is between $5000 and $20,000 over a lifetime.[14]

The majority of sport-related dental and orofacial injuries affect the upper lip, maxilla, and maxillary incisors, with 50-80% of dental injuries involving the maxillary incisors.[5,9,10] Use of a mouthguard may protect the upper incisors. However, studies have shown that even with a mouthguard in place, up to 25% of dentoalveolar injuries still can occur.[15]

Identifying patients who participate in sports and recreational activities allows the healthcare provider to recommend and implement preventive protocols for individuals at risk for orofacial injuries. In 2000, a predictive index was based upon a defined set of risk factors that influence the chance of injury including demographic information (age, gender, dental occlusion), protective equipment (type/usage), velocity and intensity of the sport, level of activity and exposure time, level of coaching and type of sports organization, whether the player is a focus of attention in a contact or non-contact sport, history of previous sports-related injury, and the situation (ie, practice vs game).[12,16] Behavioral risk factors (eg, hyperactivity) also have been associated significantly with injuries affecting the face and/or teeth.[17]

A health professional may be able to modify certain risk factors such as a patient's dental anatomy and occlusion. The

frequency of dental trauma is significantly higher for children with increased overjet and inadequate lip coverage.[18,19] Initiating preventive orthodontic treatment in early- to middle-mixed dentition of patients with an overjet >3mm has been proposed to prevent traumatic injuries to permanent incisors.[18]

Although some sports-related traumatic injuries are unavoidable, most can be prevented.[12,14,20,21] Helmets, facemasks, and mouthguards have been shown to reduce both the frequency and severity of dental and orofacial trauma.[12] However, few sports have regulations that require their use. The National Federation of State High School Associations mandate mouthguards for only 4 sports: football, ice hockey, lacrosse, and field hockey.[21] Four New England states have been successful in increasing the number of sports requiring mouthguard use to include sports such as soccer, wrestling, and basketball.[21,22]

Initially used by professional boxers, the mouthguard has been used as a protective device since the early 1900's.[10,23] The mouthguard, also referred to as a gumshield or mouth protector, is defined as a "resilient device or appliance placed inside the mouth to reduce oral injuries, particulary to teeth and surrounding structures."[5] The mouthguard was constructed to "protect the lips and intraoral tissues from bruising and laceration, to protect the teeth from crown fractures, root fractures, luxations, and avulsions, to protect the jaw from fracture and dislocations, and to provide support for edentulous space."[24] The mouthguard works by "absorbing the energy imparted at the site of impact and by dissipating the remaining energy."[25]

The American Society for Testing and Materials (ASTM) classifies mouthguards by 3 categories[26]:

1. Type I – Stock mouthguards are purchased over-the-counter. They are designed for use without any modification and must be held in place by clenching the teeth together.[5,12]
2. Type II – Mouth-formed, also known as boil-and-bite, mouthguards are made from a thermoplastic material adapted to the mouth by finger, tongue, and biting pressure after immersing the appliance in hot water.[5] Available commercially, these are the most commonly used among athletes but vary greatly in protection, retention, comfort, and cost.[12]
3. Type III – Custom-fabricated mouthguards are produced on a dental model of the patient's mouth by either the vacuum-forming or heat-pressure lamination technique.[5,12] The ASTM recommends the custom mouthguard be fabricated for the maxillary arch for Class I and II occlusions, and on the mandibular arch for Class III malocclusions.[26] This type is superior in retention, protection, and comfort.[5,12,25,27,28] When this type is not available, the mouth-formed mouthguard is preferable to the stock or preformed mouthguard.[23,29,30]

The Academy for Sports Dentistry (ASD) "recommends the use of a properly fitted mouthguard; encourages the use of a custom fabricated mouthguard made over a dental cast and delivered under the supervision of a dentist; and supports a mandate for use of a properly fitted mouthguard in all collision and contact sports."[31]

Due to the continual shifting of teeth in orthodontic therapy, the exfoliation of primary teeth, and the eruption of permanent teeth, a custom-fabricated mouthguard may not fit the young athlete soon after the impression is obtained.[32] Several block-out methods used in both the dental operatory and laboratory may incorporate space to accommodate for future tooth movement and dental development.[32] By anticipating required space changes, a custom fabricated mouthguard may be made to endure several sports seasons.[32]

Parents play an important role in the acquisition of a mouthguard for young athletes. In a 2004 national fee survey, custom mouthguards ranged from $60 to $285.[33] In a study to determine the acceptance of the 3 types of mouthguards by 7- and 8-year old children playing soccer, only 24% of parents surveyed were willing to pay $25 for a custom mouthguard.[34] Therefore, cost may be a barrier.[33]

Attitudes of officials, coaches, parents, and players about wearing mouthguards influence their usage.[35] Although coaches are perceived as the individuals with the greatest impact on whether or not players wear mouthguards, parents view themselves as equally responsible for maintaining mouthguard use.[35,36] However, parental views about indications for mouthguard usage reveal a lack of complete understanding of benefits.[35] Players' perceptions of mouthguard usage and comfort largely determine their compliance and enthusiasm.[25,34] Therefore, the dental profession needs to influence and educate all stakeholders about the risk of sports-related orofacial injuries and preventive strategies.[23,33,37] Routine dental visits can be an opportunity to initiate patient/parent education and make appropriate recommendations for use of a properly-fitted athletic mouthguard.[12]

## Policy statement

The AAPD recommends:

1. dentists play an active role in educating the public in the use of protective equipment for sporting activities to prevent orofacial injuries;
2. continuation of preventive practices instituted in youth, high school and college football, lacrosse and ice hockey;
3. for youth participating in organized baseball and softball activities, an ASTM-certified face protector be required (according to the playing rules of the sport);
4. mandating the use of properly fitted mouthguards in other organized sporting activities with risk of orofacial injury;
5. prior to initiating practices for a sporting season, coaches/administrators of organized sports consult a dentist with expertise in orofacial injuries for recommendations for immediate management of sports-related injuries (eg, avulsed teeth);
6. continuation of research in development of a comfortable, efficacious, and cost-effective sports mouthguard to facilitate more widespread use of this proven protective device;
7. the Academy for Sports Dentistry and the International Association of Dental Traumatology be consulted as valuable resources for the professions and public.

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