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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 1: General introduction

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

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Traumatic dental injuries (TDI) can occur across all age groups but they are most common in children and young adults. Twenty-five percent of children and 33% of adults experience trauma to the permanent dentition. In all age groups, males are more likely to have dental injuries than females. The prevalence of dental injuries in individuals with special health care needs is 23.2% (21% in males and 27% in females).

Although dental injuries can affect anyone at any time, there are certain risk factors such as age, behavior, forwardly placed front teeth, not following the rules of the game, environment (e.g., slippery conditions such as ice and wet surfaces, loose house mats, etc.), player safety equipment, conditions affecting normal functions and balance of the body, and participation in sports and physical activities. Hence, the most strategic measure for preventing dental and oral injuries and to reduce their complications is education on how to avoid them and what to do if an injury occurs. Primary care clinicians are uniquely positioned to help families prevent accidental trauma, including oral trauma, by providing anticipatory guidance at routine medical/dental visits. Dental professionals should be proactive in providing and evaluating the need for personal protection of their patients. It is also the responsibility of the clinician to consider non-accidental injuries (NAI) when evaluating any traumatic dental injury in all individuals. This is especially important in vulnerable individuals such as young children, people with special healthcare needs, and older people.

Dental professionals can play crucial roles in dental trauma prevention at all levels for all age groups. In primary prevention (that is, preventing the first injury), they can educate the patients and various stakeholders, provide preventive care by recognizing the risks and treating them, and offer guidance on the use of various safety devices and measures. Secondary prevention (that is, preventing further injuries to the same tooth/teeth) is almost entirely dependent upon dental professionals. They must be available in an emergency situation and knowledgeable to provide care by being well-versed with TDI management according to the International Association of Dental Traumatology (IADT) guidelines.

Education of the stakeholders of dental trauma such as the injured individual, parents/family/caregivers, school teachers, sports persons and coaches, and non-dental health care professionals, for the prevention and emergency management of TDI is an indispensable part of prevention. Dental professionals must be empowered and motivated to disseminate this information and play an important role in the prevention of TDI globally.

In this Special Issue of the journal, a series of papers, written by experts in the relevant areas addressed, have been published as general guidelines for the prevention of traumatic dental injuries. These papers were written after reviewing the relevant literature to ensure the information was contemporary and consistent with the scientific literature. Following initial writing by selected groups of experts, the papers were reviewed by the entire team, modified where required, and subsequently approved by the IADT and ASD Boards of Directors.

There are several aims of these papers with the overall aim being to highlight the important roles that dental professionals play in the prevention and management of TDI. The guidelines have intentionally been written in a very general format for easy understanding. Although these guidelines have been based on scientific findings, they have not been referenced in the usual manner used in scientific journal publications. However, "Recommended Further Reading" lists have been provided for those who wish to obtain more detailed, scientifically based information.

The papers have also been written in a format that should be understandable to most non-dental personnel so they can be used to educate the general public, the victims of TDI and any people who may be present at the scene of an accident so they can provide the appropriate first aid management for the injuries – such as parents, sports coaches, school teachers, team mates, by-standers, etc. They could also be presented to policymakers in order to promote TDI prevention measures.

The guidelines outline important aspects regarding the primary prevention of dental trauma, the use of mouthguards and faceshields, the secondary prevention of dental injuries to teeth that have been previously traumatized, education of the profession and the general public, the role of orthodontics for the prevention of dental and oral trauma, the Tooth SOS app, the role of dental professionals in preventing and managing dental trauma, and first aid for the general public.

AUTHOR CONTRIBUTION

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 2: Primary prevention of dental trauma across the life course

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KEYWORDS
avulsion, face shield, luxation, mouthguard, prevention, tooth fracture

Daily activities including recreation within the home, school, and workplace are the most commonly reported causes and locations of TDI. It is important to note that most oral and dental injuries occur during daily living rather than during organized sports. Falls are the most common cause of TDI and their prevention is of paramount importance. Modification of the environment should be considered for individuals of all ages, especially the very young and very old, as well as for individuals with conditions that affect movement and coordination (e.g., epilepsy and cerebral palsy). Increased awareness of the environment is essential and protective equipment must be used. Safety equipment such as stairgates, window guards, mobility assistance, removal of loose mats/flooring, and stabilization equipment should be used. They should conform to the appropriate standards, and they should be replaced if unsafe. Older people with mobility issues should be assessed for the need for additional stability equipment such as knee braces, walkers etc.

1 | AGE-APPROPRIATE PREVENTION

The clinician should always consider non-accidental injuries (NAI) when evaluating any traumatic dental injury, especially in vulnerable individuals. The age-appropriate prevention can be as follows:

1.1 | Infants (0–1 years old)

Supervision is required at all times. The American Academy of Pediatrics (AAP) recommends childproofing the home using safety gates, window locks, and furniture corner protectors. They also recommend banning the use of all walkers due to safety and developmental concerns. Parents must be aware and anticipate developmental milestones to avoid falls from a bed or changing table,

safe feeding practices, etc. Additional measures such as safe (soft) floorings/mats and keeping the play areas safe are also important. Clinicians must be especially aware to rule out NAI during history taking.

1.2 | Early childhood (1–4 years old)

Close supervision and continued awareness of possible risks are required by all adults supervising children (e.g., parents, childminders, and school teachers). Falls are the most common cause of fatal and serious head injuries in young children. It is important to child-proof the house, provide supervision when near dangerous things, and build awareness of potential risks. The AAP recommends against the use of trampolines in all environments. Safety measures for outdoor activities and sports should include mandatory helmets for bicycles, scooters, skateboards, and in-line skates. Mouthguards should also be considered. The need for safety to prevent road traffic accidents and sports-related trauma can be introduced at this age so that the children become accustomed to such recommendations in later parts of their lives. Additional measures such as the use of safe flooring/mats, safeguarding parks and play areas, and training the caregivers for emergency management of injured teeth are very important. Parents should be aware that non-nutritive sucking habits may cause the front teeth to be incorrectly positioned—such as being protruded or having an open bite. These problems are associated with an increased risk of TDI. Parents should discuss preventive measures with their family dentist who should also be available for the immediate care of TDI.

1.3 | Middle childhood (5–10 years old)

In this age group, the increased interactions during school and group play increase the risks of accidental injuries. There is a need for continued supervision by, and awareness of, school teachers and parents, without unnecessary constraints of independence. Education and awareness of personal safety also need to be emphasized directly to children within the home as well as in both athletic and educational settings. This is a good age to create awareness of the possible risks and provide basic knowledge of what to do when a traumatic dental injury occurs. It is important to ensure adult supervision in dangerous places or during hazardous activities. Safeguarding school play areas, parks, and sports training facilities along with introducing the effective use of protective devices such as helmets, facemasks, and mouthguards is essential. Early evaluation of the bite and the position of the teeth, along with establishing a connection with the family dentist, should be emphasized to parents.

1.4 | Adolescence/young adults (11–25 years old)

In this age range, group activities may increase the opportunity for physical contact in daily living and recreational activities. Emotional intelligence may be lacking and risk-taking behaviors may increase, especially if associated with bullying or if influenced by mood-altering substances such as alcohol and drugs. Increasing autonomy may not coincide with the need for increased awareness of personal safety. TDI increase due to the risks associated with violence/assault and road traffic accidents. Oral piercings can also lead to TDI and have been observed in 26% of patients with lip piercings and 46% of patients with tongue piercings. The American Association of Pediatric Dentistry (AAPD) opposes the practice of piercing any intra-oral and peri-oral tissues due to evidence of soft and hard tissue damage caused by them. Evaluation and management of the bite and position of the teeth are likely to reduce the risk of TDI in this age group. The modern world offers a lot of avenues to indulge in risk-taking behaviors such as performing stunts on bikes, skates, and other activities. Participating in these activities must be identified as a high-risk proposition and such individuals must be counselled to take appropriate safety precautions. As mentioned above, the identification of NAI, use of protective equipment on roads and sports activities, awareness of emergency management procedures, and availability of dental professionals for emergency care are essential in this age group.

1.5 | Adults (over 26 years old)

The risk of TDI reduces in adulthood. However, the risks increase when certain conditions occur—such as cognitive impairment, Alzheimer's disease, dementia, reduced capacity/awareness, physical disability, and vision defects. Any change in the person's ability to make decisions, to hear, or to see trip hazards will increase the risk of injury unless safety precautions are taken. Supervision and changes to the physical environment can help to alleviate these risks. A major cause of injury in such age groups is road traffic accidents and hence awareness regarding appropriate safety protocols must be increased.

2 | INDIVIDUALS WITH SPECIAL NEEDS (ALL AGES)

People with special needs are defined as those individuals with any physical, developmental, mental, sensory, behavioral, cognitive or emotional impairment or a limiting condition that requires medical management, healthcare intervention, and/or the use of specialist services or programs. Any condition that affects an individual's ability to understand or maintain safety in daily living or to appreciate certain hazards could potentially lead to an increased risk of dental trauma and complications for accessing and managing any injury. Some specific categories of special needs—such as Attention-Deficit/Hyperactivity Disorder (ADHD), Trisomy 21, epilepsy, and cerebral palsy—have been reported to be associated with an increased risk of dental trauma.

Prevention of dental injuries is particularly important for individuals with special needs as they may be unable to attend general

family dentists as they often require special measures for routine dental care. Access to appropriate dental care may also be limited or very difficult in an emergency situation following a TDI. Preventive measures should focus on the awareness of the risks and adult supervision of physical activities. Supportive and protective equipment such as helmets and face shields should be considered for individuals with significant neuromuscular or intellectual disabilities. In addition, certain special healthcare needs situations—such as Hemophilia, bleeding disorders, and patients on anti-cancer therapy—require special considerations for prevention and management of TDI.

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 3: Mouthguards for the prevention of dental and oral trauma

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KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

Millions of individuals across the world participate in sports and thereby potentially put themselves at increased risk of injury to their teeth and mouths. Many injuries can be prevented with the use of a mouthguard. Mouthguards have been proven to be effective in preventing dental injuries and are recommended for use in many sports that have an increased risk of dental injury.

There are three main types of mouthguards (Table 1):

Type1: Stock mouthguards.

Type 2: Mouth-formed mouthguards.

Type 3: Custom-made mouthguards.

The first two types are readily available in retail settings. The stock mouthguard is meant to be used immediately out of the package without being fitted to the teeth. These mouthguards tend to be bulky and poorly fitting such that athletes report difficulty with speaking and breathing during sporting activities. The Stock mouthguards are often used by patients who are undergoing orthodontic treatment as they fit easily over the orthodontic appliances and they do not inhibit tooth movements. However, the protective effectiveness of this type of mouthguard is limited as they are very loose and do not remain in place.

Mouth-formed mouthguards are usually shaped by heating a pre-made appliance in boiling water (hence the common name of "boil and bite") or by heating it in a microwave. These come in a wide variety of styles; some are simple, but some are more sophisticated.

TABLE 1 Summary of mouthguard types and their advantages/disadvantages.

Stock mouthguard (SMG)	Pre-determined sizes No adjustment possible Most inexpensive type of MG, available in retail settings Poor fit – Easily dislodged; must be clenched on to retain in the mouth; might be difficult to speak or breathe with one in place
Thermoplastic, mouth-formed mouthguard (MFMG) 'boil and bite'	Adapted to fit the individual by heating in hot water and molding in the oral cavity using biting and soft tissue pressures. Most commonly used type – relatively inexpensive, widely available in retail settings, more comfortable than SMG (improved fit and retention). Poor fit unless properly molded. Often difficult to fit over and around existing fixed orthodontic appliances.
Custom mouthguard (CMG)	Fabricated for the individual from dental impressions or digital scans, with vacuum forming and heat pressure as well as innovative 3D-printing technologies. The most comfortable, the most retentive, and the most protective type of mouthguard. Protection can be customized for individual sports. Most expensive type of MG.

Some can be made to fit the mouth reasonably well, but they are bulky and cause difficulty with speaking and breathing. They are considered to be less effective than the custom-made mouthguards.

Custom-made mouthguards are produced from an exact image (impression/mold or scan) of an individual's teeth. The traditional method uses a plaster cast made from an impression of the teeth, but newer technology utilizes 3D-printed models or intraoral scans of a player's teeth. These mouthguards fit extremely well as they are custom-made. They are very comfortable to wear, they allow the athlete to speak and breathe easily, and they remain in place during participation in all sports. They can be customized for different sports, such as by increasing the thickness and extensions for added protection. They can also be made with specific individualized decorations, team colors, etc. Custom mouthguards are highly recommended for athletes undergoing orthodontic treatment as they can be designed to allow for the orthodontic movement of the teeth.

The ability to prevent dental injuries in sports depends almost entirely on the use of mouthguards. Faceshields can also be a good adjunct in those sports where helmets are worn. Athletes should be both educated and encouraged to utilize these proven devices. Dental professionals should be knowledgeable about mouthguards, and in particular, custom mouthguards. They should educate and encourage all patients who participate in sports to use mouthguards and other protective equipment. Asking patients about their participation in sports and guiding them in their choice of mouth protection is as important as the prevention of other dental conditions such as dental caries and periodontal disease.

Mandatory rules to ensure athletes wear mouthguards during training and competition should be considered for many sports, but especially for those with aggressive activities that have a high rate of injuries to the teeth and mouth. Such activities must be identified for risk of TDI, and recommendations for trauma prevention must be established. Enforcement of the rules for mandatory use of mouthguards is also essential.

Dentists should be familiar with the criteria for ideal MG fabrication (Table 2) to ensure they provide appropriate protection for the individual activity.

TABLE 2 Criteria for ideal mouthguard fabrication.

Coverage	Cover all maxillary teeth to the distal aspect of the second permanent molars.
Thickness*	• Labial surface of central incisors: 3–4 mm. • Occlusal surface of posterior teeth: 2–3 mm. • Incisal edge of anterior teeth: 4 mm. • Palatal: 1 mm.
Labial extension	2 mm short of vestibular reflection, rounded in cross-section.
Palatal extension	Just beyond the cervical margin of the palatal surface of the teeth, tapered in cross-section.
Occlusion	Balanced occlusion.

*The thicknesses listed pertain to the most frequently used materials applied to athletic mouthguards currently.

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Dental Traumatology WILEY

The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 4: Faceshields for the prevention of dental and oral trauma

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

Protective faceshields, or facemasks, are recommended to prevent injuries to the face and mouth but they can also be used as a protective device while recovering from an injury. Faceshields can reduce injuries to the teeth, mouth, eyes, nose and bones of the face. Faceshields are effective in reducing dental injuries in various sports. For example, when used in American football, there was a 50% reduction in the number of dental injuries. The introduction of faceshields to helmets in ice hockey also led to a reduction in dental injuries.

Facemask use in American football, youth and amateur ice hockey, softball, lacrosse, cricket, amateur boxing and Irish hurling should ideally be mandatory, or at least greatly encouraged. Other sports that should consider the use of facial protection are baseball, softball, field hockey and martial arts.

Rules for faceshield use can apply to all players or to certain team positions for the primary prevention of oral and dental injuries. Faceshields can be used for protection while a player is recovering from an injury such as a facial or mandibular fracture, especially in sports such as basketball and ice hockey where nasal fractures and mandibular fractures are common. In recent years, such use has also been witnessed in soccer. Faceshields can be used in conjunction with mouthguards to provide extra protection to the teeth and mouth, especially after a previous injury where the teeth are extremely vulnerable (for example, when splinted or when extensive restorative dentistry is in progress). In addition to usage in sports, faceshields can also be valuable for professionals whose livelihood involves a risk of injury and re-injury to the face or mouth (for example, firefighters, individuals in the construction industry, etc.).

Faceshields come in a variety of formats. They are often attached to a helmet that is specifically designed for certain sports—such as American football, ice hockey, lacrosse, cricket batters or wicketkeepers. They can also be worn independently—such as for basketball and softball fielders. Faceshields that are not attached to helmets can be purchased either as generic "off the shelf" devices or they can be custom-made for an individual.

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Dental Traumatology WILEY

The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 7: Orthodontics for the prevention of dental and oral trauma

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, face shield, luxation, mouthguard, prevention, tooth fracture

Many factors play a role in the cause of traumatic dental injuries (TDI). It is important for dentists to advise patients and their parents about the predisposing risk factors associated with some malocclusions. The vast majority of TDI occur in the maxillary anterior (upper front) teeth in young girls and boys. Two major factors that increase the risk of such injuries are an increased overjet (protruding upper teeth) and lip incompetence (lips do not close easily). Children with other conditions such as severe underbite, open bites, and crossbites are also more susceptible to TDI.

Consideration of these predisposing factors leads to the obvious question of whether orthodontic intervention for people with these conditions will help to prevent injuries to their teeth. Orthodontic treatment at an early age through the use of various functional fixed (braces) or removable (plates) appliances can help to reposition the teeth so that they are in a more favorable position and less susceptible to dental injuries.

Several scientific reviews have discussed this question. A Cochrane review concluded that "providing early orthodontic treatment for children with prominent upper front teeth is more effective for reducing the incidence of incisal trauma than providing one course of orthodontic treatment in adolescence." Analia and Liu concluded "that providing early orthodontic treatment/two stages for children with prominent upper front teeth is more effective for reducing the incidence of upper front teeth trauma (incisal trauma) than providing one course of orthodontic treatment in adolescence." Cobourne et al. concluded that "although early treatment does not result in improved overall outcomes when compared to later treatment, some consideration should be given to starting early when it is thought that there is a real increased risk of dental trauma or a child is being teased because of their overjet."

Hence, there is sound scientific evidence to support early intervention through orthodontic treatment to reduce the likelihood of

dental trauma in children whose teeth are in unfavorable positions. However, many other factors must also be considered by the parents and the treating dental practitioners when deciding whether to initiate orthodontic treatment at a young age.

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Dental Traumatology WILEY

The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 8: ToothSOS app

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

It is very common for people to access information available on online platforms (such as mobile applications [apps]). This may also apply to traumatic dental injuries (TDI). The International Association of Dental Traumatology (IADT) released the ToothSOS app in 2018. The aim of this app is to educate the general public, patients, athletes, coaches, athletic trainers, parents, teachers, and dental and medical professionals about TDI. It was also developed so that information was readily available to anyone in both emergency and non-emergency situations to enable them to provide appropriate first aid or professional management of an injury.

The app is freely downloadable on smartphones and has an interface for patients or the general public which has basic information about the various TDI and what to do as first aid measures (Figures 1 and 2).

The app also has a section with information for dental professionals which provides easy access to the most recent IADT guidelines and the step-by-step stages for the diagnosis and clinical management of TDI.

This app has been reported to be useful as a training tool for the emergency management of TDI among dentists and non-dentists. It can also be used for education regarding the prevention of TDI.

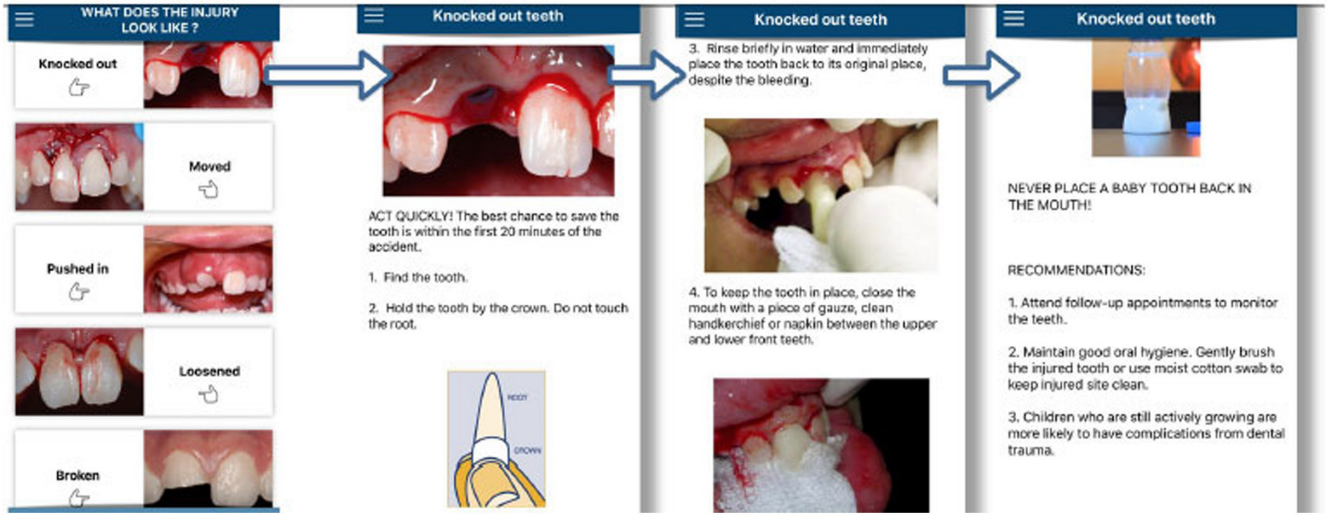

FIGURE 1 Patient section, tooth injury types, and recommendation screens of the ToothSOS app.

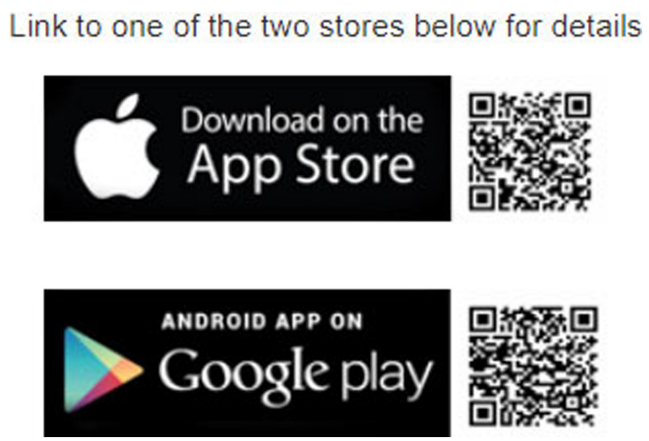

FIGURE 2 Links to download the free ToothSOS app.

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 5: Secondary prevention of dental injuries

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

Teeth which have been previously traumatized are vulnerable to further injury which may lead to unsuccessful long-term outcomes, even if they were successfully treated after the first injury. Restorations that have been placed to restore fractured teeth, including tooth fragments that have been bonded back onto the tooth, may be dislodged with further trauma, or the tooth itself may sustain a new fracture. Many teeth require root canal treatment as part of the management of an injury and these teeth tend to be weaker than normal teeth. Teeth that have been displaced during a dental injury must be given sufficient time to allow the periodontal ligament to fully heal (usually at least 3 months) before the subject returns to normal physical activities. The recommended splinting times for these teeth are based on studies that have investigated initial healing times. If teeth are re-injured during these healing times, the outcome for successful healing is adversely affected.

Patients who have suffered dental trauma should be fully informed of the need to allow time for healing. They should also be fully advised about the need for future protection of vulnerable teeth. Patient education should include oral hygiene instructions, how to care for the teeth, and the use of protective oral appliances (such as mouthguards) plus other facial protective devices (such as faceshields). Many traumatic dental injuries have lifetime implications for both the tooth and the patient. Hence, patient education regarding the protection of these affected teeth throughout their life is of paramount importance.

To prevent poor outcomes following dental trauma, dentists are often questioned as to when someone can return to sports participation or even daily life activities. This can be a complex question due to the multiple tissues that may be damaged during a traumatic dental injury. Therefore, the patient must be fully informed and educated about the total treatment required, the complete healing times for all structures/tissues damaged, and the future implications of the injuries.

Many dento-alveolar injuries require the use of a splint attached to the teeth to stabilize the teeth and the supporting bone. The splint allows proper healing of the periodontal ligament and the bone. Victims of trauma should not participate in active sports whilst a splint is in place as the healing will be incomplete and the teeth will be at increased risk of greater damage if another injury occurs. In addition, the lips and cheeks will be at risk of injury, such as lacerations, from the splint as splints often involve the use of wires attached to the teeth.

Athletes may be placed under intense pressure to return to play to maintain their competitive edge in their sport. Professional participants in sports may also feel pressure to return to participation for financial reasons. In recent times there has been some research on the fear of further injury after oral and dental injuries, especially in contact sports such as boxing. The decision to return to sport should be based on the professional advice of dentists, especially during the recovery and healing phases. Return to sport decisions are complex, multifactorial, and dependent on the severity of each injury. Unfortunately, there are currently no guidelines based on research so the advice of the dentist treating the patient is important since that dentist will have the best understanding of the specific injuries and the many factors involved. Decisions to return to sport should include appropriately designed and fabricated intraoral protective appliances as well as extraoral facial protection where indicated. Decisions to compete without appropriate protective equipment should be at the discretion of the treating dentist.

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for the prevention of traumatic dental injuries: Part 9: Role of dental professionals

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KEYWORDS
avulsion, face shield, luxation, mouthguard, prevention, tooth fracture

Dental professionals can play crucial roles in the prevention of traumatic dental injuries (TDIs) at many levels. Primary prevention includes education of people participating in sports or other activities where they are at risk of a TDI. It also includes the education of parents and other people involved (such as coaches, administrators, etc.). Dentists should provide preventive care by recognizing the risks and treating them, as well as by offering guidance on the use of protective devices and safety equipment. Education can be provided in person at dental clinics and hospitals, schools, and other community organizations. Online modes of education such as television channels, YouTube, and social media can also be used as effective means to spread the message as widely as possible. Regular dental examinations can help to identify and reduce the risks or chances of TDI and they are an ideal opportunity to provide customized mouthguards for patients.

Secondary prevention of TDI is almost entirely dependent upon dental professionals. Dentists must be well versed with the latest guidelines for the management of TDI that are published by the International Association of Dental Traumatology (IADT). Several clinical decision support tools such as the Tooth SOS app can also play important roles in providing immediate guidance. Dentists should be available to provide video or telephone consultations in emergency situations.

The information provided to the injured individual and/or the parents/caregivers must be adequate and in a manner that is understandable to them. The advice should be based on trying to avoid complications associated with the specific injury.

Trauma in children aged less than 6 years of age has some unique challenges that must be addressed by the dental professionals managing them. The IADT guidelines recognize this and mention that dental professionals who are well-versed in the management of children must be preferred in such situations. These scenarios are often stressful for children, parents/families, and the dental team. Hence, efforts must be made to instill a positive attitude in the injured children and improve their oral health-related quality of life.

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 10: First aid education

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The Guidelines for Prevention of Traumatic Dental Injuries were reviewed and approved by the Board of Directors of the International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD).

KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

First aid management of traumatic dental injuries (TDI) is defined as the immediate care provided to an injured person, usually at the site of an injury. It is often provided by people without any prior training in dental procedures. Knowledge about dental trauma first aid is very important but it has been reported to be deficient among many members of the public, such as parents, school teachers, sports coaches, etc.

Dental trauma first aid is an extension of general first aid and includes measures such as the control of bleeding, evaluation of nerve injuries, bone fractures, assessment of the airway, etc.

The first aid for TDI can be broadly categorized for three types of injuries:

a. Avulsion—when the tooth is knocked out of the mouth,
b. Crown fracture—when part of the tooth has broken away from the rest of the tooth, and
c. Luxation—when the tooth is knocked out of its normal position (but not completely out of the mouth).

AVULSION

First aid for an avulsed tooth requires prompt identification of the condition and knowledge of its management. The prognosis of an avulsed tooth is largely dependent on time and any delay in management can lead to poor outcomes. Teachers, school nurses, coaches, athletes, parents, and others should all be informed of the steps that need to be taken in the event of an avulsion. A dentist should be contacted for guidance using voice or video call, if needed, and for appropriate treatment after the emergency care. These contact details should be available at schools, sports facilities, emergency departments of hospitals, and online platforms.

First aid starts with the correct identification of whether the avulsed tooth is a primary (baby) or a permanent tooth. Primary teeth are generally quite small, and the injured person is usually less than 6 years of age. Replantation of primary teeth is not recommended whereas permanent teeth should ideally be replanted immediately at the site of injury.

The first aid measures recommended for an avulsed permanent tooth are as follows:

1. Calm the patient
2. Locate the tooth and identify it as a primary or permanent tooth - if it is a permanent tooth, then proceed as follows
3. Hold the tooth by the crown (the white, shiny smooth part). Touching the root (the yellow, pointy part) must be avoided
4. Rinse the tooth gently with milk, saline, or the victim's saliva. If none of these options are practical, use water.
5. Try to replant the tooth back into the socket after checking the correct orientation
6. The patient should gently bite on a piece of gauze, a handkerchief, or a napkin to hold the tooth in place after it has been placed back in its socket.
7. If the tooth cannot be placed back into its socket, it is very important to place the tooth in a storage solution as soon as possible to prevent it from drying out. Dehydration begins to occur within a few minutes, so swift action is required. Milk, saliva (for example after spitting into a glass or cup), or saline are all suitable and practical storage solutions, in decreasing order of preference. Ideally, water should not be used but it is preferable to letting the tooth dry out—however, saliva is always available so that is preferable to using water.
8. The patient should be immediately taken to a dentist or an emergency clinic along with the tooth (in the storage solution if not replanted).

CROWN FRACTURE

The primary intention in the case of a crown fracture is to preserve the fractured fragment since a dentist is often able to reattach it to the rest of the tooth. Fragment reattachment is particularly useful for fractured teeth in children and adolescents where extensive restorations, such as crowns, are not possible. It allows quick and easy restoration of the tooth which is better for the confidence and psychological well-being of the injured individual, and it also provides a stronger restoration compared to other materials that dentists use. When reattaching a fractured fragment, the fragment should not be dry so it is best to place it in a solution such as saliva, milk, or saline to prevent it from drying out.

The first aid measures recommended for a tooth with a crown fracture are as follows:

1. Calm the patient
2. Locate the tooth fragment and place it in a small container with sufficient saliva, milk, or saline to cover it completely
3. The fragment can be lost if washed in tap water over a sink—hence it is better to just place the fragment in one of the above solutions. The dentist can clean the fragment before any attempt to reattach it.
4. If the fractured fragment cannot be located, it is still essential to visit a dentist or an emergency clinic as soon as possible.
5. If there is any bleeding from the gums or the inside the tooth, place a moist piece of gauze, a cotton swab or a clean cotton cloth/handkerchief over the fractured portion of the tooth and ask the patient to gently bite on it and hold it in this position. The gauze, swab, or cloth can be moistened with milk, saliva, or saline.
6. The patient should be immediately taken to a dentist or an emergency clinic along with the fractured fragment.

LUXATION

Luxation injuries, although less severe than avulsions, are still considered to be an emergency due to symptoms such as bleeding, pain, displacement of the tooth, mobility of the tooth, and bite disturbances. Immediate repositioning and stabilization of the luxated tooth is required for better healing and long-term outcomes. Repositioning the tooth to its original position may be undertaken at the site of injury but it is usually better to urgently take the patient to a dentist who can perform this maneuver with greater precision and with less potential damage to the tooth.

The first aid measures recommended for a luxated tooth are as follows:

1. Calm the patient
2. Gently assess the affected tooth for pain (especially on biting), displacement, and mobility
3. Place a moist piece of gauze, a cotton swab, or a clean cotton cloth/handkerchief between the upper and lower teeth and ask the patient to gently bite on it, and hold it in this position. The gauze, swab, or cloth can be moistened with milk, saliva, or saline.
4. The patient should be immediately taken to a dentist or an emergency clinic.

FIRST AID TRAINING FOR EMERGENCY SERVICES PERSONNEL

Emergency paramedical and medical personnel should be trained to undertake an intraoral examination to determine whether any teeth have been avulsed, luxated, or fractured. They should also check for tooth mobility and occlusal (bite) alterations. They must also be trained to perform the first aid steps listed above.

Dental first aid should only be provided after performing routine evaluations to rule out head injuries, concussion, neural damage, internal bleeding, bruises, bone fractures, signs of abuse, and pain, as per standard protocols. The findings should be recorded and a dentist well-versed with the management of TDI should be consulted as soon as possible.

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The International Association of Dental Traumatology (IADT) and the Academy for Sports Dentistry (ASD) guidelines for prevention of traumatic dental injuries: Part 6: Education

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KEYWORDS
avulsion, faceshield, luxation, mouthguard, prevention, tooth fracture

Education of everybody potentially associated with traumatic dental injuries (TDI)—such as the injured individual, parents/family/caregivers, school teachers, sports persons and coaches, and non-dental health care professionals—regarding the prevention and emergency management of dental injuries is essential. Dental professionals must be empowered and motivated to disseminate this information to help prevent TDI globally.

The essential areas of education that should be addressed are:

1. The identification of conditions that make an individual more prone to dental trauma. This should include information about when it is appropriate to refer a patient for specialist assessment and/or management. Periodic general oral health screenings for caries, periodontal disease, and oral cancer are also highly recommended.
2. The use and availability of protective devices such as mouthguards, faceshields and helmets. This aspect is even more important for parents, school teachers, sports persons and coaches.
3. The different types of protective devices. Dental personnel must have the technical expertise to fabricate/provide them, and they must monitor the use of these devices after periodic intervals to assess them for wear and tear and any other issues.
4. Information regarding First Aid for TDI must be provided and reinforced periodically. A pictorial information mode either in the form of a chart or as a mobile application should be available.
5. The signs of the delayed consequences of TDI such as discoloration, pain, swelling, and tooth mobility. It is very important that the injured individuals, parents, coaches and school teachers are educated about these problems and their consequences. They should be aware of the need to contact a dentist if any of these signs are noticed.
6. Non-dental health care personnel (both emergency and non-emergency) must be educated to understand the greater chances

of TDI in individuals with special care health needs. This is also important for the parents/caregivers of such individuals, and teachers engaged in special schools and institutions.

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