

# NATIONAL CLINICAL GUIDELINES THE MANAGEMENT OF DENTAL INJURIES IN PROFESSIONAL SPORT

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## Version History

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## Abbreviations

The abbreviations used in this guideline are as follows:

<b>DMFT</b>	Decayed Missing Filled Teeth
<b>FDA</b>	Food and Drug Administration
<b>GI</b>	Gingival Index
<b>PI</b>	Plaque Index
<b>PDL</b>	Periodontal Ligament
<b>PPD</b>	Probing Pocket Depth
<b>TMJ</b>	Temporomandibular Joint
<b>TUE</b>	Therapeutic use exemption
<b>WADA</b>	World Anti-Doping Agency

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# 1 Information about this Guideline

## 1.1 Objective and Purpose of the Guideline

The purpose of this guideline is to define the appropriate prevention and management of dental injuries in professional athletes. The objective is to improve the appropriate treatment and referral of patients presenting to any provider organisation in Qatar. It is intended that the guideline will be used primarily by sport dentists, sport medicine physicians and other healthcare practitioners involved in the management of dental injuries in professional athletes in primary care and specialist outpatient settings.

## 1.2 Scope of the Guideline

The following aspects of care are included within this guideline:

- Highlights of the principles of sports dentistry, dental screening in athletes.
- Prevention of dental injuries in athletes.
- Diagnosis and management of dental injuries in professional sports.

## 1.3 Editorial Approach

This guideline document has been developed and issued by the Ministry of Public Health of Qatar (MOPH), through a process which aligns with international best practice in guideline development and localisation. The guideline will be reviewed on a regular basis and updated to incorporate comments and feedback from stakeholders across Qatar.

The editorial methodology, used to develop this guideline, has involved the following critical steps:

- Extensive literature search for well-reputed published evidence relating to the topic.
- Critical appraisal of the literature.
- Development of a draft summary guideline.
- Review of the summary guideline with a Guideline Development Group, comprised of practising healthcare professionals, subject matter experts and patient representatives, from across Qatar.
- Independent review of the guideline by the National Clinical Guidelines & Pathways Committee, appointed by the MOPH, from amongst stakeholder organisations across Qatar.

Whilst the MOPH has sponsored the development of the guideline, the MOPH has not influenced the specific recommendations made within it.

## 1.4 Sources of Evidence

The professional literature has been systematically queried using specially developed, customised, and tested search strings. Search strategies are developed to allow efficient yet comprehensive analysis of relevant publications for a given topic and to maximise retrieval of articles with certain desired characteristics pertinent to a guideline.

For each guideline, all retrieved publications have been individually reviewed by a member of the Editorial Team and assessed in terms of quality, utility, and relevance. Preference is given to publications that:

1. Are designed with rigorous scientific methodology.
2. Are published in higher-quality journals.
3. Address an aspect of specific importance to the guideline in question.

Further information about the literature search and appraisal process is included in the appendix.

## 1.5 Evidence Grading and Recommendations

Recommendations made within this guideline are supported by evidence from the medical literature and where possible the most authoritative sources have been used in the development of this guideline. In order to provide insight into the evidence basis for each recommendation, the following evidence hierarchy has been used to grade the level of authoritative nature of the evidence used, where recommendations have been made within this guideline.

Where the recommendations of international guidelines have been adopted, the evidence grading is assigned to the underlying evidence used by the international guideline. Where more than one source has been cited, the evidence grading relates to the highest level of evidence cited:

- **Level 1 (L1):**
  - Meta-analyses.
  - Randomised controlled trials with meta-analysis.
  - Randomised controlled trials.
  - Systematic reviews.
- **Level 2 (L2):**
  - Observational studies, examples include:
    - Cohort studies with statistical adjustment for potential confounders.
    - Cohort studies without adjustment.
    - Case series with historical or literature controls.
    - Uncontrolled case series.
  - Statements in published articles or textbooks.
- **Level 3 (L3):**
  - Expert opinion.
  - Unpublished data, examples include:
    - Large database analyses.
    - Written protocols or outcomes reports from large practices.

In order to give additional insight into the reasoning underlying certain recommendations and the strength of recommendation, the following recommendation grading has been used, where recommendations are made:

- **Recommendation Grade A (RGA):** Evidence demonstrates at least moderate certainty of a net benefit from the recommendation.
- **Recommendation Grade B (RGB):** Evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended.
- **Recommendation Grade C (RGC):** Evidence demonstrates potential harm that outweighs benefit; additional research is recommended.
- **Recommendation of the GDG (R-GDG):** Recommended best practice on the basis of the clinical experience of the Guideline Development Group members.

## 1.6 Guideline Development Group Members

The following table lists members of the Guideline Development Group (GDG) nominated by their respective organisations and the National Clinical Guidelines & Pathways Committee. The GDG members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

Guideline Development Group Members		
Name	Title	Organisation
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## 1.7 National Clinical Guidelines & Pathways Committee Members

The following table lists members of the National Clinical Guidelines & Pathways Committee (NCGPC), appointed by the MOPH. The NCGPC members have reviewed and provided their feedback and approval of the guideline document. Each member has completed a declaration of conflicts of interest, which has been reviewed and retained by the MOPH.

National Clinical Guidelines & Pathways Committee (NCGPC) members		
Name	Title	Organisation
Ms Huda Amer Al-Katheeri	Chair of the NCGPC, Director- Strategic Planning & Performance Department	Ministry of Public Health
Shk Dr Mohammed Hamad J. Al Thani	Co-Chair of NCGPC, Director of Public Health	Ministry of Public Health
Prof Anthony Akobeng	Chair Clinical Practice Guidelines Committee	Sidra Medicine
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Dr Chris Kenny	Executive Director Clinical and Service Development, Office of the Chief Medical Officer	Hamad Medical Corporation
Dr Egon Toft	VP and Dean	College of Medicine, Qatar University

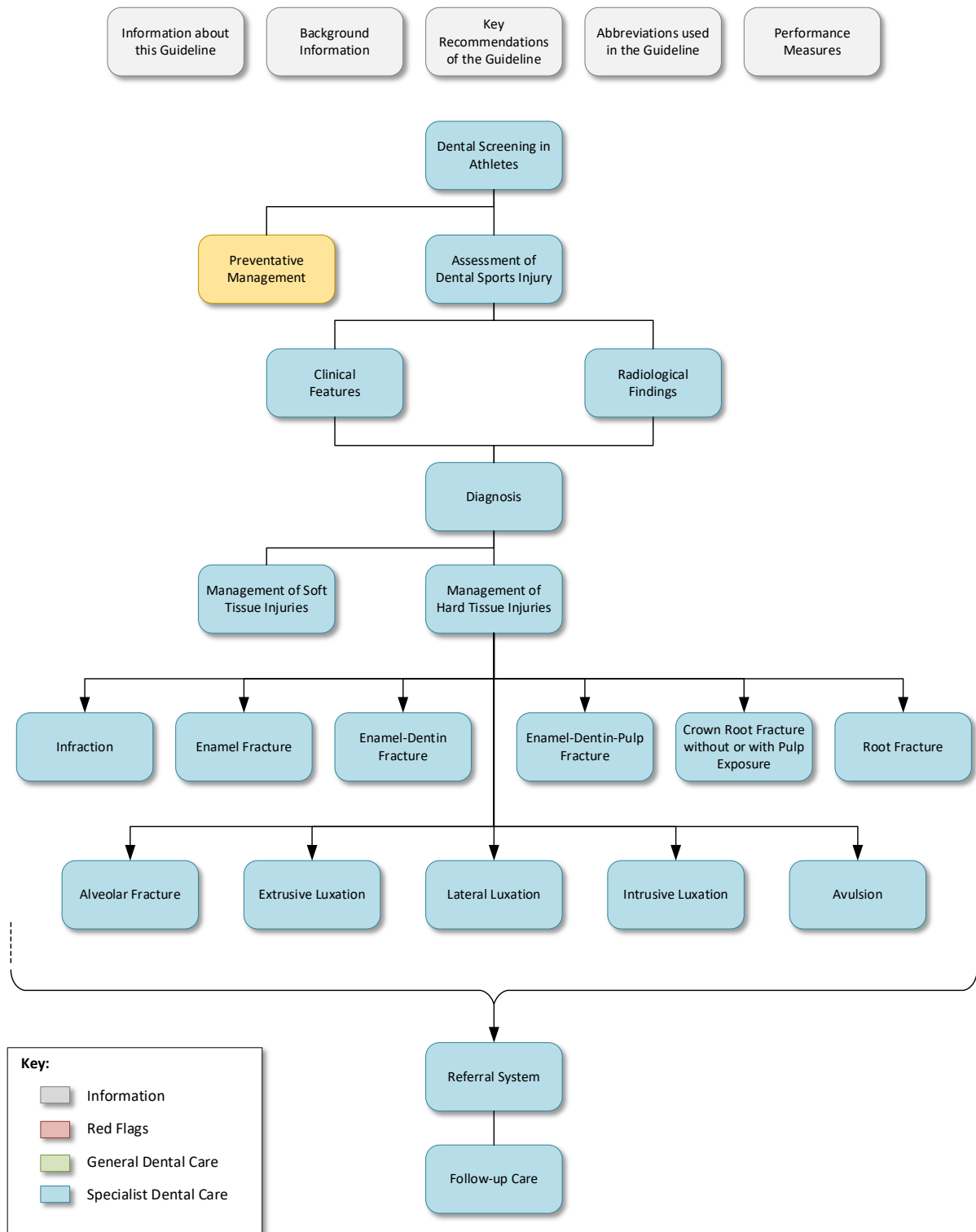
## 1.8 Responsibilities of Healthcare Professionals

This guideline has been issued by the MOPH to define how care should be provided in Qatar. It is based upon a comprehensive assessment of the evidence as well as its applicability to the national context of Qatar. Healthcare professionals are expected to take this guidance into account when exercising their clinical judgement in the care of patients presenting to them.

The guidance does not override individual professional responsibility to take decisions which are appropriate to the circumstances of the patient concerned. Such decisions should be made in consultation with the patient, their guardians, or caregivers and should consider the individual risks and benefits of any intervention that is contemplated in the patient's care.

## 2 Management Pathway for Dental Injuries in Professional Sport

Click on a box below to see the relevant page of the Pathway.





### 3 Key Recommendations of the Guideline

The key recommendations of this guideline are as follows:

#### **Preventative Management** (*Section 5*):

- To maintain healthy oral tissues and prevent orofacial injuries, the following preventative measures are recommended for athletes: good oral hygiene, regular check-ups, healthy nutrition, use of mouth guards and avoidance of cigarette smoking and smokeless tobacco <sup>1-3</sup> [L1, RGA]. Refer to *Section 5.2* for further details).
- **A custom-fabricated mouthguard is the recommended mouth protector for athletes to reduce injuries to the teeth and surrounding soft and hard tissue [R-GDG].**
  - The mouthguard used by an athlete should be produced under the supervision of a dentist and should meet standard criteria <sup>4-6</sup> [L1, RGA]. Refer to *Section 5.2.1* for details of these criteria.
  - It is recommended that all athletes involved in professional sports especially high-risk sports, as well as those with medium risk for dental injuries, should be informed of the best characteristics of a custom-made mouthguard to ensure informed decision and promote compliance among athletes <sup>7,8</sup>.

#### **Dental Screening for Professional Athletes** (*Section 6*):

- A routine dental screening for athletes should include <sup>9</sup> [L1, RGA]:
  - Detailed History:
    - Medical history.
    - Dental History
    - Nutritional history.
  - Oral examination:
    - Extra-oral examination. This includes head and neck soft tissue examination:
      - Check for facial asymmetry.
      - Lymph node examination.
      - TMJ examination.
    - Intra-oral examination (Soft and hard tissue).
      - Oral cavity should be visually examined and then palpated wherever possible.
      - Intraoral soft tissue examination involves checking the soft tissues of the mouth, hard and soft palates, and tongue.
      - Hard tissue (tooth) examination. A full dental charting should be recorded including decayed, missing and filled teeth.
  - Radiographic examination: Intra-oral x-ray, panorama x-ray and CT scan may be required, depending on the findings and the condition of the athlete <sup>9</sup>

#### **Medications and Substances to be Avoided in Athletes** (*Section 7*):

- Any prescribed dental medication should comply with the requirements as provided in the *Prohibited List of the World Antidoping Agency (WADA)* and the *WADA International standard for Therapeutic Use Exemption (TUE)*<sup>10-12</sup>. Refer to *Section 7* for further details on the list of prohibited substances and methods.

### **Diagnosis of Dental Injuries in Professional Sports (Section 8):**

- To efficiently arrive at a correct diagnosis for the traumatised oral structures in the athlete, a systematic assessment is necessary including a thorough history, physical (visual, palpation, percussion, pulp vitality testing and mobility evaluation) and radiographic examination<sup>16,17</sup>. Intraoral and extraoral radiographs are useful for the evaluation of hard tissue injuries.
- Soft tissue injuries including abrasions, contusions and lacerations are caused by the effect of the teeth on the tissues during an injury<sup>13</sup>. Lip or cheek lacerations should be examined to rule out the presence of a tooth fragment or any foreign body in the wound<sup>13</sup> [L1, RGA].
- Following an injury, the maxillary labial frenas should be examined to rule out any tear and the tongue should be examined to rule out laceration or puncture<sup>13</sup> [L1, RGA].
- Refer to *Tables 8.1.1* and *8.2.1* for details of the clinical and radiologic findings in the different types of oral hard tissue injuries necessary to make the correct diagnosis.

### **Management of Oral Soft Tissue Injuries (Section 9.1):**

- Soft tissue injuries are usually managed by applying pressure to the injured area using gauze to aid haemostasis. If the laceration is severe or if the bleeding cannot be stopped, sutures are recommended<sup>15</sup> [L1, RGA].

### **Management of Oral Hard Tissue Injuries (Section 9.2):**

- **Infraction:**
  - No treatment is required unless there is a severe infraction<sup>16,17</sup> [L1, RGA]. In this case, seal with resin to prevent discoloration of the infraction line<sup>16,17</sup>.
- **Enamel Fracture:**
  - If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin<sup>16,17</sup> [L1, RGA].
- **Enamel-Dentin Fracture:**
  - If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin<sup>16,17</sup> [L1, RGA].
  - When the fracture is within 0.5mm of the pulp and there are no signs of bleeding in the tooth, use calcium hydroxide as a base then restore the tooth using composite resin<sup>16,17</sup> [L1, RGA].
- **Enamel-Dentin-Pulp Fracture:**
  - Root canal treatment, pulp capping or partial pulpotomy can be performed<sup>16,17</sup> [L1, RGA].
  - If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin<sup>16,17</sup> [L1, RGA].
- **Crown Root Fracture Without and With Pulp Exposure:**
  - As a first aid, stabilise the loose part to the adjacent teeth<sup>16,17</sup> [L1, RGA]. In cases of open apices, root canal treatment or partial pulpotomy to preserve the pulp are recommended<sup>16,17</sup> [L1, RGA].
  - Later, several interventions can be offered, including fragment removal with gingivectomy or ostectomy, orthodontic extrusion of the apical fragment, surgical extrusion, root submergence or extraction<sup>16,17</sup> [L1, RGA]. Fragment removal and subsequent restoration of the apical fragment exposed above the gingival level can also be a choice in case of crown root fracture without pulp exposure (R-GDG).
- **Root Fracture:**
  - If the coronal part is displaced, reposition it immediately<sup>16,17</sup> [L1, RGA].
  - Later, perform a radiographic examination and stabilise the tooth using a splint for 4 weeks or more if the fracture is closer to the cervical area. Monitor for 1 year and perform root canal treatment if pulp necrosis develops<sup>16,17</sup> [L1, RGA].

- **Alveolar Fracture:**
    - Reposition the displaced part and stabilise using a splint for 4 weeks, and suture any gingival lacerations <sup>16,17</sup> [L1, RGA].
  - **Concussion:**
    - Treatment is not needed, evaluate the status of the pulp at least once per year <sup>16,17</sup> [L1, RGA].
  - **Subluxation:**
    - Treatment is not needed <sup>16,17</sup> [L1, RGA].
    - Upon the patient's request, a splint can be used for 2 weeks to stabilise the tooth <sup>16,17</sup> [L1, RGA].
  - **Extrusive Luxation:**
    - Smoothly re-insert the tooth into the socket and stabilise it for 2 weeks using a splint <sup>16,17</sup> [L1, RGA].
    - If pulp necrosis is expected, perform root canal treatment <sup>16,17</sup> [L1, RGA].
  - **Lateral Luxation:**
    - Apply local anaesthesia. Reposition the tooth using forceps or digitally, remove it from the bony lock carefully and insert it into its position in the socket, and stabilise it using a splint for 4 weeks <sup>16,17</sup> [L1, RGA].
    - If pulp necrosis occurs, perform root canal treatment <sup>16,17</sup> [L1, RGA].
  - **Intrusive Luxation:**
    - If the intrusion is less than 3 mm, do not interfere for 2-4 weeks and allow for spontaneous tooth movement <sup>16,17</sup> [L1, RGA].
    - Surgical or orthodontic repositioning is required if the intrusion is 3-7 mm <sup>16,17</sup> [L1, RGA].
    - Surgical intervention is the only choice if the intrusion is greater than 7 mm <sup>16,17</sup> [L1, RGA]. After repositioning, stabilise the tooth with a splint for 4 weeks and perform root canal treatment after 2-3 weeks <sup>16,17</sup> [L1, RGA].
  - **Avulsion:**
    - In the case of tooth avulsion, it is essential to keep the patient calm and aim to replant the tooth <sup>16,17</sup> [L1, RGA].
    - To do so, hold the tooth by the crown without touching the roots, and if the roots are soiled, wash the tooth with cold running water for no more than 10 seconds, then insert it into the socket and encourage the patient to bite on a handkerchief to hold it in position <sup>16,17</sup> [L1, RGA].
    - If replantation is not applicable, it is recommended to preserve the tooth as soon as possible and not later than an hour, in milk, saliva, or any appropriate storage medium such as tissue culture/transport medium or saline <sup>16,17</sup> [L1, RGA].
    - Whether you succeed or not in replanting the tooth, the patient should receive immediate emergency dental treatment <sup>16,17</sup> [L1, RGA].
- Avulsions should be treated within 60 minutes <sup>5</sup>.
  - Luxation, fracture with pulp exposure and pain, root fracture and soft tissue injuries should be managed within 6 hours <sup>5</sup>.
  - Other fractures should be treated within 24 hours <sup>5</sup> [L1, RGA].

#### **Referral System for Dental Injuries in Professional Sports (Section 10):**

- All professional athletes who sustain significant dental injuries should be referred to the sport dentistry team for specialist assessment and management [R-GDG].
- Refer to *Section 10* for specific conditions for referral from the Sports Dentist to other Specialist Care.

**Follow-Up (Section 11):**

- The recommendations for follow-up after regular check-ups depend on the outcome of the dental visit<sup>9</sup> [L1, RGA].
  - If the athlete is healthy and has no pathological or functional findings, follow-up is recommended in 6 months<sup>9</sup> [L1, RGA].
  - If the screening reveals at least one finding, a prevention and treatment plan should be initiated and additional examination should be requested<sup>9</sup> [L1, RGA].
  - If multiple severe findings are detected, treatment should be started immediately and a prevention plan should be initiated<sup>9</sup> [L1, RGA]. Refer to *Table 11.1* for follow-up recommendations for various types of oral hard tissue injuries<sup>14</sup> [L1, RGA].

## 4 General Principles of Sports Dentistry

### 4.1 Definition of Sports Dentistry

Sports dentistry is a subcategory of sports medicine and an emerging field in dentistry, it involves the prevention and management of orofacial injuries in athletes <sup>4,15</sup>. Orofacial injuries encompass injuries to the stomatognathic system including the <sup>15</sup>:

- Teeth.
- Jaws.
- Soft tissues connected to the teeth and jaws.
- Facial muscles.
- Temporomandibular joint (TMJ).

The status of this system affects the wellbeing and the performance of athletes and their risk of orofacial injury <sup>15</sup>. There is a risk of orofacial trauma in almost all sports due to falls, collisions and contact with hard surfaces or sports equipment <sup>5</sup>.

Orofacial injuries in sports can be classified into <sup>1</sup>:

- Soft tissues injuries such as abrasions, contusions and lacerations of the lip or cheek.
- Hard tissues injuries such as tooth intrusions, luxation, crown and/or root fractures, complete avulsions and dental-facial fractures.
- Combination of soft and hard tissue injuries.

Most injuries affect the lip, maxilla, and maxillary incisors and involve lacerations, crown fractures, and avulsions. The most common dental injuries are crown fractures followed by subluxations and avulsions <sup>5</sup>.

### 4.2 Composition of the Sports Dentistry Team

A specialised group of health care practitioners dealing with the management of orofacial injuries. The sports dentistry team is a branch of the sports medicine team. The core members of sports dentistry team include sports dentists, dental assistants, and dental hygienists [**R-GDG**]. The sports dentistry team work in collaboration with other members of the sports medicine team which include sports physicians, dietitians, physiotherapists, massage therapists and sports psychologists <sup>10</sup>.

### 4.3 Roles of the Sports Dentistry Team

The main roles of the sports dentistry team in Qatar include<sup>9</sup>:

- Pre-season dental screening to detect early dental problems.
- Educate athletes to maintain good oral health<sup>9</sup>. This is achieved through:
  - Performing regular check-ups and advice on oral hygiene and nutrition <sup>9</sup>.
  - Advising the athletes on the methods of prevention of orofacial trauma <sup>9</sup>.
- Provide emergency treatment for orofacial injuries.
- Provide preventative measures for orofacial injuries.
- Improve awareness on oral health and how it impacts athlete's performance.
- Support other clinical colleagues on how to deal with the different types of oral or dental injuries in the field when no dentist is available.
- Establish an emergency dental trauma protocol for matches and games including proper referral of dental trauma athletes.

Other services that can be provided by a Sports Dentistry Team in Qatar [**R-GDG**]:

- Setting up specialist polyclinic during special events (e.g. World Cup 2022).
- Providing general dental treatment.
- Fabrication of custom-fitted mouth guard.
- Providing on-site emergency treatment in the field of play.
- Facilitating appropriate referral pathway for injured athletes, monitor and ensure their fitness to play again.

In addition to their experience in general dentistry, sports dentists and other members of the sports Dentistry team should be equipped with the skills to deal with various situations occurring in different sports.

Their training should involve <sup>16</sup>:

- Diagnosis and treatment of orofacial trauma including dental injury.
- Knowledge on dental trauma prevention.
- Knowledge of WADA guidelines for athletes.
- Fabrication of custom fitted mouthguards.

Sports dentists are also encouraged to collaborate with a trusted support network of dental specialists such as endodontists, orthodontists, oral surgeons, paedodontists and periodontists <sup>16</sup>.

## 5 Oral Health and Prevention of Dental Injuries in Sports

The risk of orofacial and dental trauma can be reduced by maintaining good oral health and using the proper gear for prevention <sup>2</sup> [**L1, RGA**].

### 5.1 Oral Health and Athletes Performance

Poor oral health can affect the well-being and the quality of life of athletes, this in turn may indirectly affect their performance and increases their risk of injury <sup>3,9,15,17,18</sup> [**L1, RGA**]. For instance, tooth decay and periodontal diseases may lead to a sustained inflammation or infection and pain for the athletes.

The cost of this to the athlete could be a loss of training time from urgent and more frequent need for dental treatment, altered nutrition, lower physical levels of recovery from exercise that include less sleep. All of these ultimately could lead to increased risk of cardiovascular and musculoskeletal injuries in the athlete<sup>3,9,15,17,18</sup>. Moreover, defective dental occlusion and TMJ disorders have a direct effect on the posture, muscle strength, plantar arch and gait thus leading to an increased risk of injury <sup>3,9,15,17,18</sup>.

Sports can have an adverse effect on the oral health of the athletes, including <sup>3,9,15,17,18</sup> [**L1, RGA**]:

- Increased risk of trauma to the teeth, soft tissues, bone and TMJ in contact and combat sports without proper protection.
- Increased risk of tooth decay, erosion, and periodontal disease due to the intake of certain supplements and sports drinks that are rich in acids and sugar.
- Increased risk of periodontal disease, abrasion and bruxism in the teeth due to sports-related stress.
- Increased risk of erosion due to the exposure to low pH chlorinated water in aquatic sports.
- Increased risk of xerostomia due to eating disorders, dehydration, mouth breathing and stress.

## 5.2 Preventative Management

To maintain healthy oral tissues and prevent orofacial injuries, several preventative measures can be applied<sup>2</sup>. The following preventative measures are for athletes<sup>1-3</sup> [**L1, RGA**]:

- **Dental screening and regular check-up:**
  - Athletes should have pre-season screening and at least two check-ups per year.
- **Oral hygiene:**
  - Athletes should be advised to brush their teeth and gums at least twice daily for no less than two minutes using a toothbrush and fluoride toothpaste. It is also recommended that athletes should clean between teeth with floss or interdental brushes at least once daily.
  - Athletes should brush their teeth after 30 minutes of having a sugary meal.
  - If brushing is not possible after eating, it is advisable to use sugar-free gum or rinse the mouth with water.
- **Nutrition:**
  - Athletes should be advised to maintain a healthy varied diet, stay hydrated, avoid acidic and unnecessary high sugar food and drinks.
  - Real food to include milk, yoghurt, nuts, and cheese are considered better snack options as they are less likely to cause tooth decay.
  - The effect of sports drinks and other high-sugar containing drinks on the teeth can be reduced by rinsing the mouth with water after consumption to regulate the oral pH and consuming them using a reusable straw or suitable sports drinks bottles to minimise the contact with the teeth.
  - All athletes should be advised to brush their teeth 30 minutes after drinking sports drinks.
- **Protection:**
  - The use of protective equipment, such as a custom-fitted mouthguard, is highly recommended among athletes, especially those who engage in contact sports. Athletes should avoid washing their mouthguard with high sugar containing drinks in the field of play. Helmets and facemasks may be needed for some sports.
- **Smoking:**
  - Smoking and smokeless tobacco have a negative effect on oral health and should be avoided.

### 5.2.1 Mouthguards

Sports Dentists play a vital role in the prevention and treatment of sports-related dental and orofacial injuries, through appropriate dissemination of relevant information [**R-GDG**]. It is recommended that all athletes involved in professional sports especially high-risk sports, as well as those with medium risk for dental injuries should be informed of the best characteristics of a custom-made mouthguard to ensure informed decision and promote compliance among athletes<sup>7,8</sup>.

The mouthguard (gumshield or mouth protector) is a resilient device applied or placed inside the mouth to reduce injuries to the teeth and surrounding soft and hard tissue<sup>19</sup>.

The role of the mouthguard is to minimise the risk of dental and jaws fractures by absorbing and restructuring shock<sup>19</sup>. In addition, it fills the space caused by missing teeth and prevents lacerations by protecting the soft tissues<sup>19</sup>.

The mouthguard used by an athlete should be produced under the supervision of a dentist and should meet standard criteria, including<sup>4-6</sup> [**L1, RGA**]:

- Done on a stone model of the impression of the athlete.
- Made with FDA approved material.
- Protects the teeth in the arch and the supporting tissues efficiently.

- Has the correct thickness in all areas, and at least a 4mm thickness in the occlusal or labial area.
- Has even occlusal contact.
- Able to absorb impact without being displaced.
- Has as minimal effect as possible on speech.
- Has no effect on breathing.
- Extent of mouth guard should be to the first molar, not more.
- Routinely examined for fit and function. The frequency of examination is determined by the dentist depending on:
  - Age of the athlete.
  - Type of sport and the amount of involved contact.
  - Athlete's care for the mouthguard.

There are three types of mouthguards available <sup>4,5</sup>:

- **Type I: Custom-fabricated mouthguard.**
  - Made using a dental model of the patient's mouth through the vacuum-forming or heat-pressure lamination technique.
  - It prevents lacerations by acting as a buffer between soft tissue and teeth, prevents tooth fractures and jaw dislocation, and opposing teeth are protected from contact with each other. It also reduces the risk of mandibular fractures and TMJ displacement.
  - It does not interfere with speech and breathing, provides better protection, comfort and retention than other types of mouthguards.
  - **A custom-fabricated mouthguard is the recommended mouth protector for athletes to reduce injuries to the teeth and surrounding soft and hard tissue[R-GDG].**
- **Type II: Mouth-formed mouthguard (boil-and-bite).**
  - Made using a thermoplastic substance that is dipped in hot water and altered using the finger, tongue, or bite pressure to fit the mouth.
  - It provides less protection, comfort, and retention than a custom-fabricated mouthguard but is common among athletes.
- **Type III: Stock mouthguard.**
  - Available over the counter and cannot be modified.
  - It requires clenching the teeth together to be held in place and provide protection, thus it interferes with breathing and speaking.
  - It is not recommended for professional athletes.

## 6 Dental Screening for Professional Athletes

A routine dental screening for athletes should include <sup>9</sup> [L1, RGA]:

- Detailed History:
  - Medical history.
  - Dental History
  - Nutritional history.
- Oral examination:
  - Extra-oral examination. This includes head and neck soft tissue examination:
    - Check for facial asymmetry.
    - Lymph node examination.
    - TMJ examination.
  - Intra-oral examination (Soft and hard tissue).
    - Oral cavity should be visually examined and then palpated wherever possible.
    - Intraoral soft tissue examination involves checking the soft tissues of the mouth, hard and soft palates, and tongue



- Hard tissue (tooth) examination. A full dental charting should be recorded including decayed, missing and filled teeth.
- Radiographic examination: Intra-oral x-ray, panorama x-ray and CT scan may be required, depending on the findings and the condition of the athlete<sup>9</sup>

## 7 Medications and Substances to be Avoided in Athletes

Any prescribed dental medication should comply with the requirements and *International Standards* of the *World Antidoping Agency* (WADA) and should not affect physical exercise.

The prohibited classes of substances and methods, include<sup>11,12</sup>:

- Substances and methods prohibited at all times.
- Substances and methods prohibited in competition.
- Substances and methods prohibited in certain sports.

**Substances Prohibited at all Times** (i.e. in- and out-of-competition):

- **S0 Non-approved drugs.**
- **S1 Anabolic agents:**
  - 1a Anabolic Androgenic Steroids (AAS).
  - 1b Endogenous AAS and their metabolites and isomers, following administration.
- **S2 Peptide hormones, growth factors, related substances, and mimetics:**
  - Erythropoietin and agents affecting erythropoiesis such as:
    - Erythropoietin-receptor agonists.
    - GATA inhibitors.
    - Transforming growth factor beta signalling inhibitors.
    - Innate repair receptor agonists.
    - Hypoxia-inducible factor activating agents.
  - Peptide hormones and their releasing factors.
    - Chorionic gonadotrophin (CG) and luteinising hormone (LH) in males.
    - Corticotrophins and their releasing factors.
    - Growth Hormone (GH), its fragments and releasing factors.
- **S3 Beta-2 agonists:**
  - All beta-2 agonists except salbutamol (maximum of 1600µg/24 hours), inhaled formoterol (maximum 54µg/24 hours) and inhaled salmeterol (maximum 200µg/24 hours).
- **S4 Hormones and metabolic modulators:**
  - Aromatase inhibitors.
  - Selective oestrogen receptor modulators (SERMs).
  - Anti-oestrogenic substances.
  - Agents preventing activin receptor IIB.
  - Metabolic modulators:
    - Activators of the AMP-activated protein kinase.
    - Insulins and insulin-mimetics.
    - Meldonium.
    - Trimetazidine
- **S5 Diuretics and masking agents:**
  - All diuretics and masking agents, except local administration of felypressin, drospirenone and pamabrom.

**Prohibited Methods:**

- **M1:** Manipulation of blood and blood components.
- **M2:** Chemical and physical manipulations.
- **M3:** Gene and cell doping.

**Substances Prohibited in Competition:**

In addition to the classes and methods stated above, the following medications are prohibited in-competition:

- **S6 Stimulants:**
  - All stimulants except:
    - Clonidine.
    - Imidazole derivatives for topical/ophthalmic use.
- **S7 Narcotics.**
- **S8 Cannabinoids:**
  - Including natural cannabinoids (cannabis, hashish and marijuana) and synthetic cannabinoids ( $\Delta 9$ -tetrahydrocannabinol and other cannabimimetic), except cannabidiol.
- **S9 Glucocorticoids:**
  - All prohibited when given orally, intravenously, intramuscularly or rectally.

**Substances Prohibited in Certain Sports.**

Beta-blockers are prohibited in-competition only in the following sports:

- Archery\*.
- Automobile sports.
- Billiards.
- Darts.
- Golf.
- Shooting\*.
- Skiing/Snowboarding in ski jumping, freestyle aerials and snowboard halfpipe/big air.
- Underwater sports.

\*Also prohibited *out-of-competition*.

It is suggested that in case of the need to prescribe any prohibited substance to athlete, the *WADA International Standard for Therapeutic Use Exemption* may be referred and followed at all times<sup>12</sup>.

## 8 Diagnosis of Dental Injuries in Professional Sports

A sound knowledge, immediate evaluation and proper management of the injury are essential to the immediate care of an athlete. The dentist plays a valuable role in the management of these injuries and prompt action could greatly improve outcomes [R-GDG].

To efficiently arrive at a correct diagnosis for the traumatised oral structures in the professional athlete, a systematic assessment is necessary including: a thorough history, physical (visual, palpation, percussion) and radiographic examination and additional tests such as pulp vitality testing and mobility evaluation<sup>16,17</sup>. Intraoral and extraoral radiographs are useful for the evaluation of hard and soft tissue injuries.

### 8.1 Clinical Features

Soft tissue injuries including abrasions, contusions and lacerations are caused by the effect of the teeth on the tissues during an injury<sup>13</sup>. Lip or cheek lacerations should be examined to rule out the presence of a tooth fragment or any foreign body in the wound<sup>13</sup> [L1, RGA].

Following an injury, the maxillary labial frenas should be examined to rule out any tear and the tongue should be examined to rule out laceration or puncture<sup>13</sup> [L1, RGA].

Hard tissue injuries involve infraction, fracture, luxation, avulsion, TMJ dislocation and jaw fracture<sup>10,14,20</sup>. The diagnosis of these injuries is defined in *Table 8.1.1*<sup>10,14,20</sup>.

Type of Injury	Characteristics
<b>Infraction</b>	<ul style="list-style-type: none"> <li>• A fissure (crack) in the enamel without causing other damages to the tooth structure.</li> <li>• Percussion test reveals no tenderness.</li> </ul>
<b>Enamel Fracture</b>	<ul style="list-style-type: none"> <li>• Complete break in the enamel.</li> <li>• Loss of enamel without visible damage to the dentin.</li> <li>• Normal mobility.</li> <li>• Not tender.</li> <li>• Sensibility pulp test usually positive.</li> </ul>
<b>Enamel-Dentin Fracture</b>	<ul style="list-style-type: none"> <li>• Damaged enamel and dentin with loss of tooth structure and without pulp exposure.</li> <li>• Normal mobility.</li> <li>• Not tender.</li> <li>• Sensibility pulp test usually positive.</li> </ul>
<b>Enamel-Dentin-Pulp Fracture</b>	<ul style="list-style-type: none"> <li>• Damage to the enamel and dentin, affecting tooth structure and involving the pulp.</li> <li>• Pulp sensitive to stimuli.</li> <li>• Not tender.</li> <li>• Normal mobility.</li> </ul>
<b>Crown Root Fracture without Pulp Exposure</b>	<ul style="list-style-type: none"> <li>• Damage to the enamel, dentin and cementum affecting tooth structure, without pulp exposure.</li> <li>• Involves the area below the gingival margin.</li> <li>• Tender.</li> <li>• Movable coronal fragment.</li> <li>• Sensibility pulp test usually positive for apical fragment.</li> </ul>

Type of Injury	Characteristics
<b>Crown Root Fracture with Pulp Exposure</b>	<ul style="list-style-type: none"> <li>• Damage to the enamel, dentin and cementum affecting tooth structure, with pulp exposure.</li> <li>• Tender.</li> <li>• Movable coronal fragment.</li> </ul>
<b>Root Fracture</b>	<ul style="list-style-type: none"> <li>• Movable or displaced coronal fragment.</li> <li>• Tender.</li> <li>• Negative sensibility test implies transient or permanent neural damage.</li> <li>• Possible bleeding of the gingival sulcus.</li> <li>• Possible changes to the colour of the crown (red or grey).</li> <li>• Status of the pulp should be observed.</li> </ul>
<b>Alveolar Fracture</b>	<ul style="list-style-type: none"> <li>• Damage to the alveolar bone and may involve adjacent bone.</li> <li>• Segment mobility and dislocation with the possibility of several teeth moving together.</li> <li>• Misalignment of the fractured alveolar segment causing changes to the occlusion.</li> </ul>
<b>Concussion</b>	<ul style="list-style-type: none"> <li>• Tender tooth.</li> <li>• Lacking displacement or increased mobility.</li> <li>• Positive sensibility test.</li> </ul>
<b>Subluxation</b>	<ul style="list-style-type: none"> <li>• Tender tooth.</li> <li>• Increased mobility without displacement.</li> <li>• Gingival crevice bleeding.</li> <li>• Negative sensibility testing due to transient pulpal damage.</li> <li>• Pulpal response should be observed for accurate diagnosis.</li> </ul>
<b>Extrusive Luxation</b>	<ul style="list-style-type: none"> <li>• Longer and mobile tooth.</li> <li>• Negative sensibility test.</li> </ul>
<b>Lateral Luxation</b>	<ul style="list-style-type: none"> <li>• Displaced tooth in a palatal/lingual or labial direction.</li> <li>• Immobile.</li> <li>• Metallic (ankylosed) sound upon percussion.</li> <li>• Fractured alveolar process.</li> <li>• Negative sensibility test.</li> </ul>
<b>Intrusive Luxation</b>	<ul style="list-style-type: none"> <li>• Axially displaced tooth into the alveolar bone.</li> <li>• Immobile.</li> <li>• Metallic (ankylosed) sound upon percussion</li> <li>• Negative sensibility test.</li> </ul>
<b>Avulsion</b>	<ul style="list-style-type: none"> <li>• Complete loss of a tooth.</li> </ul>
<b>TMJ Dislocation</b>	<ul style="list-style-type: none"> <li>• Displacement of the mandibular condyle from the articular joint in the temporal bone.</li> <li>• Unilateral or bilateral.</li> <li>• Malocclusion.</li> <li>• Pain in and around the TMJ upon pressing outwards on the interior border of the mandible.</li> </ul>

Type of Injury	Characteristics
Jaw Fracture	<ul style="list-style-type: none"> <li>Malocclusion.</li> <li>Pain and movement of the fractured segment upon pressing outwards on the interior border of the mandible.</li> </ul>

**Table 8.1.1:** Diagnosis of different types of oral hard tissue injuries <sup>10,14,20</sup>.

## 8.2 Radiographic Findings

The radiographic findings for the different types of oral hard tissue injuries are presented in *Table 8.2.1* <sup>14</sup>.

Type of Injury	Findings and Recommendations
Infraction	<ul style="list-style-type: none"> <li>No abnormalities.</li> <li>A periapical view is recommended.</li> <li>Additional radiographs may be required depending on the symptoms.</li> </ul>
Enamel Fracture	<ul style="list-style-type: none"> <li>Loss of enamel.</li> <li>Periapical, occlusal and eccentric exposures are recommended to rule out luxation or root fracture.</li> <li>Lip or cheek exposures are recommended to rule out the presence of tooth fragments or foreign bodies.</li> </ul>
Enamel-Dentin Fracture	<ul style="list-style-type: none"> <li>Loss of dentin and enamel.</li> <li>Periapical, occlusal and eccentric exposures are recommended to rule out luxation, root fracture or tooth displacement.</li> <li>Lip or cheek exposures are recommended to rule out the presence of tooth fragments or foreign bodies.</li> </ul>
Enamel-Dentin-Pulp Fracture	<ul style="list-style-type: none"> <li>Loss of dentin and enamel.</li> <li>Periapical, occlusal and eccentric exposures are recommended to rule out luxation, root fracture or tooth displacement.</li> <li>Lip or cheek exposures are recommended to rule out the presence of tooth fragments or foreign bodies.</li> </ul>
Crown Root Fracture without Pulp Exposure	<ul style="list-style-type: none"> <li>Apical extension of fracture not detected.</li> <li>Periapical, occlusal and eccentric exposures are recommended to identify root fracture lines.</li> </ul>
Crown Root Fracture with Pulp Exposure	<ul style="list-style-type: none"> <li>Apical extension of fracture not detected.</li> <li>Periapical, occlusal and eccentric exposures are recommended to identify root fracture lines.</li> </ul>
Root Fracture	<ul style="list-style-type: none"> <li>Horizontal or oblique plane root fracture.</li> <li>Horizontal fractures detected using periapical 90 degrees angle film with the central beam through the tooth.</li> <li>Oblique fractures are better detected using occlusal radiographs with varying horizontal angles.</li> <li>Cone Beam Computed Tomography (CBCT) may be employed as an additional test [R-GDG].</li> </ul>

Type of Injury	Findings and Recommendations
<b>Alveolar Fracture</b>	<ul style="list-style-type: none"> <li>• Fracture lines between the marginal bone and the root apex.</li> <li>• Three angulations and occlusal film are recommended.</li> <li>• Panoramic radiograph is recommended to identify the fracture lines course and position.</li> </ul>
<b>Concussion</b>	<ul style="list-style-type: none"> <li>• No abnormalities.</li> </ul>
<b>Subluxation</b>	<ul style="list-style-type: none"> <li>• No abnormalities.</li> </ul>
<b>Extrusive Luxation</b>	<ul style="list-style-type: none"> <li>• Periodontal ligament space increased apically.</li> </ul>
<b>Lateral Luxation</b>	<ul style="list-style-type: none"> <li>• Periodontal ligament space increased apically</li> <li>• Eccentric or occlusal exposures are recommended.</li> </ul>
<b>Intrusive Luxation</b>	<ul style="list-style-type: none"> <li>• Total or partial absence of the periodontal ligament space from the root.</li> <li>• Apical location of the cemento-enamel junction towards the intruded tooth rather than in adjacent non-injured teeth, and to the marginal bone level.</li> </ul>

**Table 8.2.1:** Radiographic findings for different types of oral hard tissue injuries <sup>14</sup>.

## 9 Management of Dental Injuries in Athletes

Avulsions should be treated within 60 minutes <sup>5</sup>. Luxation, a fracture with pulp exposure and pain, root fracture and soft tissue injuries should be managed within 6 hours <sup>5</sup>. And other fractures should be treated within 24 hours <sup>5</sup> [L1, RGA].

### 9.1 Management of Oral Soft Tissue Injuries

Soft tissue injuries are usually managed by cleaning the wound and then applying pressure to the injured area using gauze to aid haemostasis. If the laceration is severe or if the bleeding cannot be stopped, sutures are recommended <sup>13</sup> [L1, RGA].

### 9.2 Management of Oral Hard Tissue Injuries

The management of oral hard tissue injuries is summarised in the table below:

Type of Injury	Treatment Recommendations
<b>Infraction</b>	<ul style="list-style-type: none"> <li>• No treatment is required unless there is a severe infraction <sup>14,20</sup> [L1, RGA]. In this case, seal with resin to prevent discoloration of the infraction line <sup>14,20</sup>.</li> </ul>
<b>Enamel Fracture</b>	<ul style="list-style-type: none"> <li>• If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Enamel-Dentin Fracture</b>	<ul style="list-style-type: none"> <li>• If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin <sup>14,20</sup> [L1, RGA].</li> <li>• When the fracture is within 0.5mm of the pulp and there are no signs of bleeding in the tooth, use calcium hydroxide as a base then restore the tooth <sup>14,20</sup> [L1, RGA].</li> </ul>

Type of Injury	Treatment Recommendations
<b>Enamel-Dentin-Pulp Fracture</b>	<ul style="list-style-type: none"> <li>• Root canal treatment, pulp capping or partial pulpotomy can be performed <sup>14,20</sup> [L1, RGA].</li> <li>• If the fractured part is available, preserve it to bond it with the tooth, otherwise restore the tooth using composite resin <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Crown Root Fracture with or without Pulp Exposure</b>	<ul style="list-style-type: none"> <li>• Stabilise the loose part to the adjacent teeth <sup>14,20</sup> [L1, RGA].</li> <li>• In cases of open apices, root canal treatment or partial pulpotomy to preserve the pulp are recommended <sup>14,20</sup> [L1, RGA].</li> <li>• Later, several interventions can be offered, including fragment removal with gingivectomy or ostectomy, orthodontic extrusion of the apical fragment, surgical extrusion, root submergence or extraction <sup>14,20</sup> [L1, RGA].</li> <li>• Fragment removal and subsequent restoration of the apical fragment exposed above the gingival level can also be a choice in case of crown root fracture without pulp exposure [R-GDG]</li> </ul>
<b>Root Fracture</b>	<ul style="list-style-type: none"> <li>• If the coronal part is displaced, reposition it immediately <sup>14,20</sup> [L1, RGA].</li> <li>• Later, perform a radiographic examination and stabilise the tooth using a splint for 4 weeks or more if the fracture is closer to the cervical area. Monitor for 1 year and perform root canal treatment if pulp necrosis develops <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Alveolar Fracture</b>	<ul style="list-style-type: none"> <li>• Reposition the displaced part and stabilise using a splint for 4 weeks, and suture any gingival lacerations <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Concussion</b>	<ul style="list-style-type: none"> <li>• Treatment is not needed, evaluate the status of the pulp at least once per year <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Subluxation</b>	<ul style="list-style-type: none"> <li>• Treatment is not needed <sup>14,20</sup> [L1, RGA].</li> <li>• Upon the patient's request, a splint can be used for 2 weeks to stabilise the tooth <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Extrusive Luxation</b>	<ul style="list-style-type: none"> <li>• Smoothly re-insert the tooth into the socket and stabilise it for 2 weeks using a splint <sup>14,20</sup> [L1, RGA].</li> <li>• If pulp necrosis is expected, perform root canal treatment <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Lateral Luxation</b>	<ul style="list-style-type: none"> <li>• Apply local anaesthesia. Reposition the tooth using forceps or digitally, remove it from the bony lock carefully and insert it into its position in the socket, and stabilise it using a splint for 4 weeks <sup>14,20</sup> [L1, RGA].</li> <li>• If pulp necrosis occurs, perform root canal treatment <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Intrusive Luxation</b>	<ul style="list-style-type: none"> <li>• If the intrusion is less than 3 mm, do not interfere for 2-4 weeks and allow for spontaneous tooth movement <sup>14,20</sup> [L1, RGA].</li> <li>• Surgical or orthodontic repositioning is required if the intrusion is 3-7 mm <sup>14,20</sup> [L1, RGA].</li> <li>• Surgical intervention is the only choice if the intrusion is greater than 7 mm <sup>14,20</sup> [L1, RGA]. After repositioning, stabilise the tooth with a splint for 4 weeks and perform root canal treatment after 2-3 weeks <sup>14,20</sup> [L1, RGA].</li> </ul>
<b>Avulsion</b>	<ul style="list-style-type: none"> <li>• In the case of tooth avulsion, it is essential to keep the patient calm and aim to replant the tooth <sup>14,20</sup> [L1, RGA].</li> <li>• To do so, hold the tooth by the crown without touching the roots, and if the roots are soiled, wash the tooth with cold running water for no more than 10 seconds, then insert it into the socket and encourage the patient to bite on a handkerchief to hold it in position <sup>14,20</sup> [L1, RGA].</li> <li>• If replantation is not applicable, it is recommended to preserve the tooth as soon as possible and not later than an hour, in milk, saliva, or any appropriate storage medium such as tissue culture/transport medium or saline <sup>14,20</sup> [L1, RGA]. Do not store in water <sup>14,20</sup> [L1, RGC].</li> <li>• Whether you succeed or not in replanting the tooth, the patient should receive immediate emergency dental treatment <sup>14,20</sup> [L1, RGA].</li> </ul>

Type of Injury	Treatment Recommendations
Avulsion	<ul style="list-style-type: none"> <li>• <b>Following initial first aid management</b>, the treatment will depend on the maturity of the root (open apex or closed apex) and the periodontal ligament (PDL) cells status <sup>14,20</sup>. The PDL cells status is classified into 3 categories <sup>14,20</sup>: <ul style="list-style-type: none"> <li>○ Viable: tooth was replanted immediately.</li> <li>○ Viable but compromised: tooth was preserved in an appropriate medium within 1 hour.</li> <li>○ Non-viable: tooth was not preserved in an appropriate medium or preservation took place later than 1 hour following injury.</li> </ul> </li> <li>• If the tooth has been replanted, do not attempt to move it, instead clean the injured site with saline, chlorhexidine or water and suture any gingival laceration <sup>14,20</sup> <b>[L1, RGA]</b>.</li> <li>• Then perform a clinical and radiographic examination to make sure that the tooth returned to the original position <sup>14,20</sup> <b>[L1, RGA]</b>.</li> <li>• Stabilise the tooth with a splint for 2 weeks, prescribe systemic antibiotics, and evaluate the patient's need for a tetanus booster <sup>14,20</sup> <b>[L1, RGA]</b>. After 7-10 days, perform root canal treatment <sup>14,20</sup> <b>[L1, RGA]</b>.</li> <li>• If the tooth has been preserved in an appropriate medium within 1 hour of avulsion, clean the tooth using saline, apply anaesthesia, examine and wash the socket with saline, and replant the tooth without using force <sup>14,20</sup> <b>[L1, RGA]</b>. Following these steps, continue the treatment as mentioned above.</li> <li>• If the tooth has not been replanted and was not preserved in an appropriate medium within 1 hour of injury, replantation of the tooth is not recommended <sup>14,20</sup> <b>[L1, RGC]</b>.</li> <li>• However, if it is performed for aesthetic reasons or to maintain the alveolar bone contour, the tooth should be cleaned with gauze to remove any surrounding dead tissue, then root canal treatment should be done before or after replanting the tooth as described above <sup>14,20</sup> <b>[L1, RGA]</b>.</li> <li>• Following tooth replantation, patients should be advised to brush their teeth with a soft brush following each meal, rinse their mouth with 0.1% chlorhexidine twice daily for a week, have a soft diet for 2 weeks and avoid contact sports for 4 weeks <sup>14,20</sup> <b>[L1, RGA]</b>.</li> </ul>

**Table 9.2.1:** Treatments for different types of oral hard tissue injuries <sup>14,19</sup>.

## 10 Referral System for Dental Injuries in Professional Sports

**Referral from the field to the Sports Dentist:** All professional athletes who sustain significant dental injuries in the field of play should be referred to the sport dentistry team for specialist assessment and management **[R-GDG]**.

**Referral from the Sports Dentist to the Secondary Care Specialists:** Athletes with the following conditions should be referred to a maxillofacial, endodontic or orthodontic specialist <sup>21</sup> **[L1, RGA]**:

- Extra-oral or deep lacerations that require sutures with a high risk of scarring.
- Jaw fractures.
- TMJ injuries.
- Occlusion or occlusal plane disturbances.
- Facial asymmetry.
- Ocular signs.
- Pulp necrosis
- Crown and/or root fractures.



## 11 Follow-Up

The recommendations for follow-up after regular check-ups depend on the outcome of the dental visit<sup>9</sup> [L1, RGA].

If the athlete is healthy and has no pathological or functional findings, follow-up is recommended in 6 months<sup>9</sup>. If at least one severe finding is detected, treatment should be started immediately and a prevention plan should be initiated<sup>9</sup>. The follow-up recommendations for various types of oral hard tissue injuries are listed in *Table 11.1*<sup>14</sup> [L1, RGA].

Type of Injury	Follow-up Recommendations
<b>Infraction</b>	<ul style="list-style-type: none"> <li>Not needed.</li> </ul>
<b>Enamel Fracture</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 6-8 weeks and 1 year.</li> </ul>
<b>Enamel-Dentin Fracture</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 6-8 weeks and 1 year.</li> </ul>
<b>Enamel-Dentin-Pulp fracture</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 6-8 weeks and 1 year.</li> </ul>
<b>Crown Root Fracture without Pulp Exposure</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 6-8 weeks and 1 year.</li> </ul>
<b>Crown Root Fracture with Pulp Exposure</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 6-8 weeks and 1 year.</li> </ul>
<b>Root Fracture</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 4 weeks, 6-8 weeks, 4 months, 6 months, 1 year and 5 years.</li> <li>Splint removal after 4 weeks.</li> <li>Splint removal in cervical third fractures after 4 months.</li> </ul>
<b>Alveolar Fracture</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 4 weeks, 6-8 weeks, 4 months, 6 months, 1 year and 5 years.</li> <li>Splint removal after 4 weeks.</li> </ul>
<b>Concussion</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 4 weeks, 6-8 weeks and 1 year.</li> </ul>
<b>Subluxation</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 2 weeks, 4 weeks, 6-8 weeks, 6 months and 1 year.</li> <li>Splint removal after 2 weeks.</li> </ul>
<b>Extrusive Luxation</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 2 weeks, 4 weeks, 6-8 weeks, 6 months, 1 year, and once yearly for 5 years.</li> <li>Splint removal after 2 weeks.</li> </ul>
<b>Lateral Luxation</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 2 weeks, 4 weeks, 6-8 weeks, 6 months, 1 year, and once yearly for 5 years.</li> <li>Splint removal after 2 weeks.</li> </ul>
<b>Intrusive Luxation</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 2 weeks, 4 weeks, 6-8 weeks, 6 months, 1 year, and once yearly for 5 years.</li> <li>Splint removal after 2 weeks.</li> </ul>
<b>Avulsion</b>	<ul style="list-style-type: none"> <li>Clinical and radiographic examination after 4 weeks, 3 months, 6 months, 1 year, and once yearly for 5 years.</li> <li>Splint removal after 2 weeks.</li> </ul>

**Table 11.1:** Follow-up recommendations for different types of injuries<sup>14</sup>.

## 12 Key Considerations for Patient Preferences

Patient preferences refer to patient perspectives, beliefs, expectations, and goals for health and life, and to the steps employed by individuals in assessing the potential benefits, harms, costs, and limitations of the management options in relation to one another. Patients may have preferences when it comes to defining their problems, identifying the range of management options and selecting or ranking the outcomes used to compare these options.

It is important for healthcare professionals to develop an understanding of the patient as an individual and the unique way in which each person experiences a condition and its impact on their life.

The following recommendations are therefore made for physicians and other healthcare professionals regarding general principles of patient care in Qatar. All clinicians and health care practitioners involved in patients' care in the State of Qatar should:

- **Respect Patients:** Treat patients with respect, kindness, dignity, courtesy and honesty. Ensure that the environment is conducive to discussion and that the patient's privacy is respected, particularly when discussing sensitive, personal issues. Ask the patient how they wish to be addressed and ensure that their choice is respected and used.
- **Maintain Confidentiality:** Respect the patient's right to confidentiality and avoid disclosing or sharing patients' information without their informed consent. In this context, students and anyone not directly involved in the delivery of care should first be introduced to the patient before starting consultations or meetings, and let the patient decide if they want them to stay.
- **Clarify Third-Party Involvement:** Clarify with the patient at the first point of contact whether and how they like their partner, family members or carers to be involved in key decisions about their care or management and review this regularly. If the patient agrees, share information with their partner, family members or carers.
- **Obtain Informed Consent:** Obtain and document informed consent from patients, in accordance with MOPH policy and guidance.
- **Encourage Shared Decision Making:** Ensure that patients are involved in decision making about their own care, or their dependent's care, and that factors that could impact the patient's participation in their own consultation and care including physical or learning disabilities, sight, speech or hearing impairments and problems with understanding, reading or speaking English are addressed.
- **Disclose Medical Errors:** Disclose errors when they occur and show empathy to patients.
- **Ensure Effective Communication:** Explore ways to improve communication including using pictures, symbols or involving an interpreter or family members. Avoid using medical jargon. Use words the patient will understand and confirm understanding by asking questions.
- **Ensure Continuity of Care:** Provide clear and timely sharing of patient information between healthcare professionals especially at the point of any transitions in care.

## 13 Performance Measures

A list of performance measures is given in the table below. Healthcare organisations are encouraged to monitor service performance using the indicator definitions below.

Number	Numerator	Denominator
SD01	Number of athletes who received advice on oral hygiene and nutrition during regular check-ups <sup>4,8,10</sup> .	Total number of athletes who have had a check-up in the last 12 months.
SD02	Number of athletes who use custom fabricated mouthguard <sup>1,3,13</sup> .	Total number of athletes who have been advised to use a mouthguard in the last 12 months.
SD03	Number of athletes who had their avulsed tooth stored in a suitable storage medium within less than 60 minutes <sup>16-17</sup> .	Total number of athletes who had a tooth avulsion in the last 12 months.

**Table 13.1:** Performance measures.

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## Appendix: Detailed Description of the Literature Search

A systematic search for existing literature on dental injuries in professional sports was performed in the period October 27<sup>th</sup> – November 27<sup>th</sup>, 2019.

The search for clinical practice guidelines on management of dental injuries in professional sports was performed in the *PubMed* database and websites of relevant organisations and societies including the *American Dental Association* and the *Academy for Sports Dentistry*. The present guideline is primarily based on the *International Association of Dental Traumatology*, and the *World Dental Federation* guidelines and is supplemented with other relevant studies.

Peer-reviewed scientific publications were found in *PubMed* and via *Google Scholar* Internet search engine. Non-peer reviewed studies were identified in *bioRxiv*. Books were checked on *Amazon* and via *Google* and *Google Scholar* search engines. Personal opinions of healthcare professionals, information published on medical websites, and drug prescribing information sheets were found via *Google* search engine.

The included publications were identified using the terms “dental trauma” and specified with the following terms in combinations:

*Professional sport, guideline, definition, oral health, performance, injury, dental, tooth, orofacial, soft tissue, hard tissue, laceration, infraction, fracture, concussion, luxation, avulsion, risk factors, screening, diagnosis, prevention, management, treatment, orthopantomogram, cone beam radiography, mouthguard, medication, nutrition, check-up, referral, follow-up.*

Figure A.1 below outlines graphically the results of the search and application of exclusion criteria.

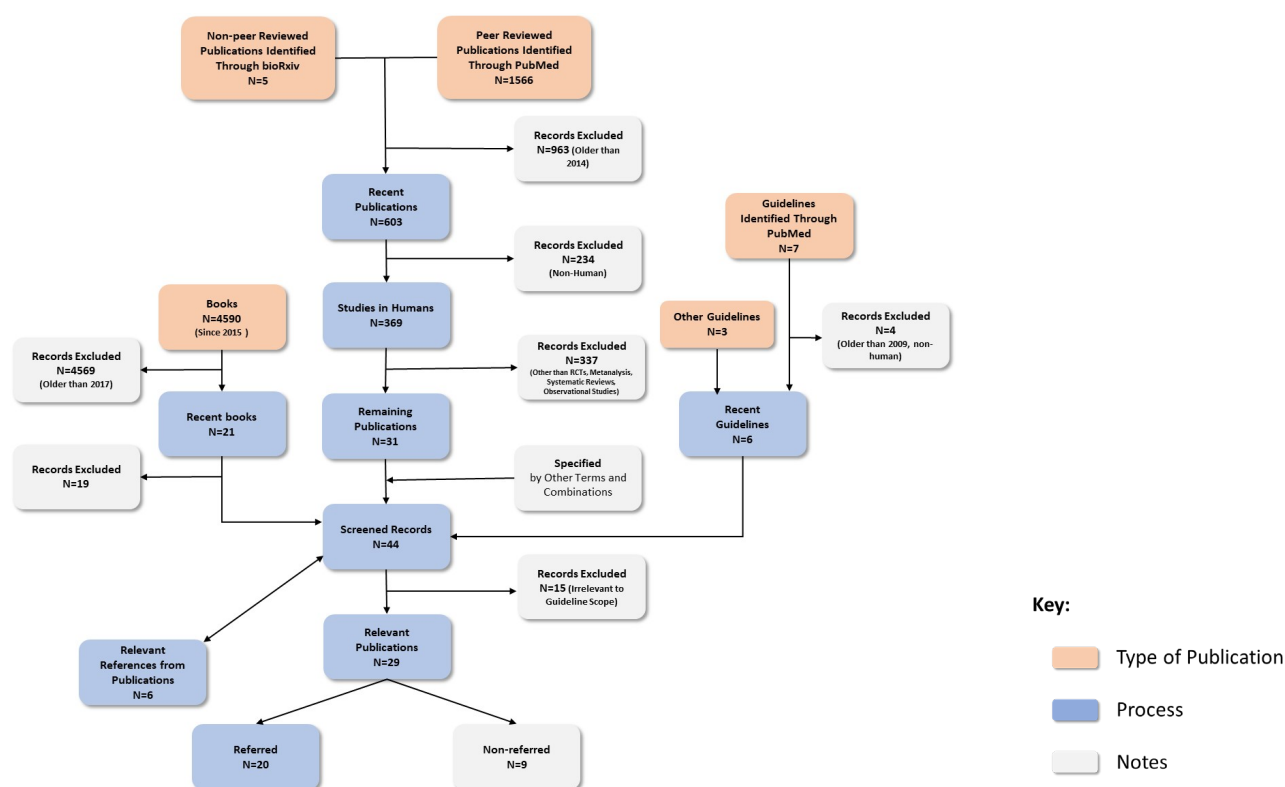


Fig A.1: Literature search results and application of exclusion criteria.

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