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Guest Editorial

From Operational Readiness to Athlete Readiness: Adapting Military Dental Protocols for Sports Dentistry

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1. SHARED READINESS DEMANDS IN MILITARY AND SPORT

Elite athletes and military personnel operate in environments in which physical readiness, psychological resilience and uninterrupted availability are highly valued. Both groups may train intensively, travel frequently and perform under pressure, and both may experience disproportionate consequences when an avoidable oral-health condition becomes symptomatic at a critical time. These shared demands make military dental-readiness systems a useful source of principles for sports dentistry, while recognising that the two settings differ in purpose, governance and individual autonomy.

For an athlete, optimal oral health supports participation in training and competition and reduces the likelihood that pain, infection or urgent treatment will interrupt preparation, travel or performance[1]. Defence dentistry similarly uses an occupationally focused model of periodic inspection, risk classification and treatment completion to minimise preventable dental morbidity and loss of operational time[2]. The relevance to sport lies not in transferring military systems unchanged, but in adapting their emphasis on surveillance, prioritisation and preparedness to an athlete-centred environment.

The objective is not to exclude athletes with oral disease, but to identify and manage conditions that could

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cause pain, impaired function, treatment disruption or preventable absence during training, travel or competition. Any readiness framework must therefore support clinical decision-making without replacing athlete autonomy or the multidisciplinary medical-clearance process.

2. TRANSLATING MILITARY DENTAL FITNESS INTO ATHLETE ORAL-HEALTH READINESS

Military dental systems use classification to distinguish personnel at low risk of an emergency from those who require treatment or whose dental status is undetermined[3,4]. A comparable approach may help sports organisations move beyond episodic treatment towards structured prevention. Caries-risk assessment, periodontal evaluation and periodic review can identify athletes who require closer surveillance or earlier intervention[5].

The term oral-health readiness is preferable to dental fitness because it encompasses the teeth, periodontium, oral soft tissues, occlusion, orthodontic appliances, previous trauma and orofacial function. It also avoids implying that the dentist alone determines an athlete's overall eligibility to participate.

A proposed Athlete Oral Health Readiness Classification is presented in Table 1. It is intended

Table 1. Proposed athlete oral health readiness classification

Category	Classification	Definition	Recommended action
AOHR 1	Oral-health ready	No active oral condition requiring treatment and a low anticipated risk of an oral-health emergency during the defined review period.	Routine preventive care and periodic review.
AOHR 2	Oral-health ready with routine treatment needs	A condition requires attention but is unlikely to cause pain, infection, functional impairment or an emergency during the planned training or competition period.	Schedule treatment when the sporting calendar permits; monitor before travel or major competition.
AOHR 3	Conditionally oral-health ready	A condition requires priority management or monitoring, but participation may continue where clinically appropriate, possibly with precautions or temporary modification.	Individualised treatment, precautions and reassessment before major competition or travel.
AOHR 4	Oral-health readiness undetermined	The examination is incomplete or overdue, or sufficient clinical information is unavailable to assign a readiness category.	Complete the examination and necessary records before assigning readiness.
AOHR 5	Temporarily unfit for participation on oral-health grounds	An acute oral, dental or maxillofacial condition creates a substantial and immediate risk of serious deterioration, emergency treatment, impaired function or further harm during participation.	Temporarily withhold participation, provide urgent treatment and reassess before clearance.

as a practical framework for discussion and prospective validation rather than as an established standard.

AOHR 5 should be reserved for clinically significant situations such as spreading odontogenic infection, uncontrolled oral bleeding, unstable dentoalveolar or maxillofacial trauma, severe uncontrolled pain, swelling affecting eating or hydration, a postoperative state in which contact or travel may compromise healing, or an oral condition that prevents the safe use of mandatory protective equipment. These examples are illustrative rather than exhaustive.

3. PREVENTIVE SURVEILLANCE AND EVENT-ALIGNED TREATMENT

A sports-dentistry program should distinguish between periodic oral-health surveillance and pre-event oral-health readiness assessment. Periodic surveillance identifies active disease and long-term risk, whereas pre-event assessment considers whether an existing condition is likely to cause pain, infection, fracture, functional impairment or urgent treatment during a defined training, travel or competition period.

Assessment may include active caries and pulpal or periapical disease, periodontal inflammation, symptomatic or partially erupted third molars, unstable restorations or prostheses, previous dental trauma, overjet and lip competence, orthodontic appliances, mouthguard requirements, anticipated travel and access to emergency dental services. The competitive calendar should guide the timing of elective treatment so that athletes do not enter major events with unresolved disease or inadequate healing.

Treatment completion alone does not necessarily establish immediate readiness. Adequate healing time should be considered before travel, contact training or competition. The interval should be individualised according to the procedure performed, tissue healing, pain and swelling, infection risk, medication requirements, occlusal stability, sport-specific impact exposure and access to follow-up care. Military protocols for aviation, diving and other special-duty services illustrate the value of procedure-specific recovery planning, although sports-specific protocols require separate validation.

4. YOUTH ATHLETES AND ORTHODONTIC CONSIDERATIONS

Youth athletes require age-appropriate surveillance because the dentition, jaws and occlusion are still developing[6]. Assessment should consider eruption, previous trauma, caries risk, overjet, lip competence, interceptive or corrective orthodontic needs and the presence of removable or fixed appliances.

Orthodontic components may increase the complexity of oral soft-tissue injury or create an urgent problem if damaged during training or competition. Mouthguard design may also require modification during active tooth movement. Protective planning should therefore involve the athlete, parent or guardian, where appropriate, orthodontist, sports dentist and coaching or medical team.

5. SPORTS NUTRITION AND ORAL-HEALTH RISK

Sports nutrition may influence oral-health risk. Frequent carbohydrate exposure, acidic beverages, energy gels, dehydration and reduced salivary flow may contribute to caries and erosive tooth wear in susceptible athletes[7]. The same nutritional strategies that support training and recovery may therefore increase the frequency or duration of oral exposure to fermentable carbohydrate and acid.

Risk-reduction advice should be individualised in collaboration with the sports-nutrition team. Practical measures may include limiting unnecessary sipping outside planned fueling periods, rinsing with water after acidic intake, avoiding immediate brushing following acid exposure, maintaining hydration, using fluoride toothpaste and arranging periodic assessment for early erosion, caries and gingival inflammation.

Recommendations should not compromise the athlete's evidence-based fueling or hydration plan.

6. OROFACIAL INJURY PREVENTION AND PROTECTIVE EQUIPMENT

Dental and dentoalveolar injuries are important components of sports-related orofacial trauma, particularly in contact, combat and projectile sports. Prevention should combine sport-specific rules, coaching, appropriate protective equipment, pre-participation assessment and an emergency action plan. Helmets, faceguards and mouthguards protect different anatomical regions and should not be treated as interchangeable devices.

Sports mouthguards are primarily recommended to reduce the risk and severity of dental, dentoalveolar and oral soft-tissue injuries[8,9]. Evidence that they prevent concussion, mandibular fractures or all forms of maxillofacial trauma remains insufficient. Custom-made mouthguards generally provide better adaptation, retention and comfort than stock or mouth-formed devices, which may support athlete acceptance and consistent use. Their performance also depends on appropriate design, thickness, fit, maintenance and replacement.

7. DIGITAL WORKFLOWS AND INSTRUMENTED MOUTHGUARDS

Intraoral and facial scanning, computer-aided design and manufacturing, and additive-manufacturing workflows may improve the reproducibility and personalization of selected protective devices[10]. These technologies may support customized mouthguards, facial protection and replacement workflows, but clinical performance should be evaluated against established safety, material and sport-specific requirements.

Instrumented mouthguards incorporate sensors such as accelerometers and gyroscopes to quantify head-acceleration events and impact exposure[11]. Their potential applications include impact surveillance, equipment evaluation and research into exposure patterns. They do not independently diagnose concussion. Their outputs depend on device fit, sensor characteristics, signal processing, thresholds and validation procedures and should be interpreted alongside clinical assessment and sport-specific context.

8. AIRWAY, NASAL BREATHING AND SLEEP-DISORDERED BREATHING IN ATHLETES

The expanding scope of sports dentistry may also include screening for airway and sleep-related concerns. Athletes may present with snoring, witnessed apneas, non-restorative sleep, excessive daytime sleepiness, mouth breathing, impaired recovery or recurrent upper-airway symptoms. Sports dentists are well placed to recognize these features and refer athletes for appropriate medical or sleep-specialist evaluation.

Craniofacial morphology, including transverse maxillary dimensions, mandibular position and upper-airway soft-tissue relationships, may contribute to airway anatomy[12]. However, these features should not be interpreted in isolation or used to diagnose obstructive sleep apnea. The relationship between nasal resistance, breathing route, sleep architecture and athletic performance is complex and requires interdisciplinary assessment.

The potential role of nasal breathing, paranasal-sinus nitric oxide and interventions directed at lip competence or breathing pattern may be of interest in selected athletes[13]. Any claims that these interventions improve oxygen delivery, stamina, aerobic performance or recovery should be supported by robust athlete-specific evidence and should distinguish physiological rationale from demonstrated clinical benefit.

Mandibular advancement devices hold the mandible in a forward position to improve upper-airway patency in selected patients with confirmed obstructive sleep apnea[14]. They should be prescribed as part of interdisciplinary care and require ongoing dental, periodontal, temporomandibular-joint and occlusal monitoring. They should not be presented as general performance-enhancing appliances for athletes without an appropriate diagnosis.

9. IMPLEMENTATION AND EVALUATION

Implementation could begin with pilot programs in national camps, residential academies, military-sport institutions and professional teams. Evaluation should include the distribution of oral-health readiness categories, treatment completed before competition, dental emergencies during travel, time lost from training, athlete and coach acceptability, cost, referral completion and the feasibility of integrating dental review with the annual sports-medicine calendar.

The most valuable exchange between military and sports dentistry may occur at the level of systems: structured surveillance, risk-based prioritization, treatment planning around periods of deployment or competition, emergency preparedness and disciplined evaluation of new protective technology. Sports dentistry can adapt these principles while retaining athlete autonomy, shared decision-making and sport-specific clinical judgement.

10. CONCLUSION

Military and sports dentistry share a commitment to prevention, readiness and the reduction of avoidable disruption. Military dental systems offer sports dentistry as a structured model of periodic surveillance, risk classification, treatment prioritization and emergency preparedness. Their value, however, lies in thoughtful adaptation rather than direct transplantation.

An athlete-centred oral-health readiness framework, aligned with the competition calendar and integrated within the multidisciplinary sports-medicine team, could reduce preventable oral-health emergencies and protect training availability. The next step should be prospective evaluation of the proposed five-category model in sporting academies, national camps and professional teams.

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