

Dental Data of the Athens 2004 Olympic and Paralympic Games



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Key words

- Olympic Games
- Paralympic Games
- sports dentistry
- orofacial trauma
- mouthguard
- team dentist

Abstract

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The Athens University, School of Dentistry, accepted the challenge to organize the Dental Health Services in the Athens 2004 Olympic and Paralympic Games in order to provide the best quality of oral health services to the athletes, coaches, escort members and Olympic Village personnel. Data from the whole activity protocol of the Athens 2004 Games Dental Health Services – the reception, admission and treatment protocols, the facilities and the infrastructure, the number of cases treated per specialty and the experience gained – were recorded. During the

Olympic Games, there were more than 1400 dental cases in more than 650 patients, elite athletes, escort members, coaches and staff of the Olympic Village. Among them 313 fillings, 100 root canal therapies, 57 mouthguards and 9 dental trauma cases were treated. During the Paralympic Games, there were more than 240 dental cases in more than 220 patients. Among them 73 fillings, 12 root canal therapies, 21 extractions and 3 dental trauma cases were treated. In such events, highly trained dentists are needed and if possible, specialized in operative dentistry or endodontics. The role of team dentist seems to be of great importance.

Introduction

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Scheduled sports events require the provision of medical and dental care for large populations who come together under exceptional and unusual circumstances [15,16,18], which vary in their complexity and demand for this care [8, 11 – 13].

The 2004 Olympic and Paralympic Games were a mass gathering that certainly posed unique challenges for both organizers and volunteers, as far as ensuring public health and medical safety of its participants is concerned. Events took place in eleven different athletic complexes around and in metropolitan Athens. During the 17 days of the Olympic Games and the 12 days of the Paralympic Games, an estimated number of 5 million people from 201 countries stayed across the whole of the city. The Athens 2004 Olympic Committee was responsible for providing medical and dental services to all Olympic residential, training and competition sites. Subsequently the Paralympic Committee had the same responsibilities for the Paralympic Games. It is important to mention that the Olympic and Paralympic Committees (and Games) were not affiliated to each

other in any aspect apart from sharing the same infrastructures and facilities as was the case for dental services during both Games. Hereafter, unless otherwise stated, any reference will apply to both Olympic and Paralympic Games.

The main site for medical and dental care for the Olympic family residing in the Olympic/Paralympic Village was the Polyclinic. The dental clinic was situated within the Polyclinic and was assigned to serve all people with accreditation (people, other than spectators, who were working in the Olympic Village or otherwise participating in the Olympics).

The objective of this study was to examine the provision of dental services within the Polyclinic of the Olympic Village in the Athens 2004 Olympic and Paralympic Games and to supply data for planning future dental support in relevant events.

Materials and Methods

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In January 2004, the Athens 2004 Organizing Committee authorized the Athens Dental School to coordinate the setting and organization of the

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Bibliography

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dental clinic within the Polyclinic. The Scientific Board of the organizing team of the dental clinic, under the presidency of the Dean of the Athens Dental School, supervised the selection of volunteers and the whole setup of the clinic. For the Olympic Games, 29 dentists from the university personnel enrolled in the volunteer program. Among them there were faculty members and postgraduate students. There were also 28 dental assistants from the Greek Army Force nursing personnel (one per shift) along with undergraduate students (4th and 5th year students). For the Paralympic Games, the staff was half the size (14 dentists and an equal number of dental assistants).

The dental clinic was part of the Polyclinic of the Olympic Village situated within a five-minute walking distance from the main entrance and checking point of athletes and personnel. A lot of meetings and enormous effort resulted in making the five-room dental clinic operational. Three dental units were situated in the biggest room while a single one was in the second room for emergency surgery or confidential consultation. There was also a well equipped, small laboratory (both vacuum- and pressure-forming machines for mouthguard fabrication and other state-of-the-art devices for endodontic and prosthetic treatment), a secretarial office and a staff room.

In the last room, there was a Trophypan digital panoramic system (Kodak 8000, ■city, country?) which was used for complex diagnostic problems and traumatic situations, e.g. suspected jaw fractures or tooth dislocations. In the room used for surgery, a Trophy Elitys (■manufacturer info, city, country?) intraoral x-ray system made it possible for the dental team to diagnose any problems arising from teeth, including injuries, fractures, toothache, cavities or lost fillings. Radiographs were captured using Kodak Insight (■manufacturer info, city, country?) intraoral dental film and Trophy STV pro2 (■manufacturer info, city, country?) intraoral video cameras could finally provide photographic images of injuries of the mouth or teeth (Eastman Kodak Company, ■city, country?■, 2004).

A main computer system supported the entire dental clinic; the files and the digital imaging taken per patient could be accessed by every computer monitor next to the dental chairs, as well as by other imaging units within the Polyclinic. This allowed immediate access to CT, MRI or ultrasound images if needed in major trauma cases. It was also possible to send digital X-ray images, CT scans and other dental and medical images and accompanying reports to specialists at the ATTIKO University Hospital in metropolitan Athens. This technology included a Kodak picture archiving and communications system (PACS), a Kodak radiology information system (RIS) at the Polyclinic and a Kodak PACS/RIS workstation at the University Hospital.

The dental clinic was equipped to perform all dental procedures. There were medications according to IOC guidelines for antidoping control, all available modern restorative materials, bonding techniques, polymer posts, cements and surgery equipment and materials. Furthermore, sterile vials containing Hank's balanced solution were handed to the field medical teams in all high-risk contact sports (boxing, wrestling, basketball, tae kwon do, field hockey, judo, soccer, badminton), in order to properly store any avulsed teeth if immediate replantation was impossible.

Special care was also given to the infection control policy for the prevention of cross-contamination (e.g., only single-use dental suits were used), while all used and dangerous materials were placed safely for waste.

For the Olympic Games, human resources were on duty from July 31st (ten days before the opening ceremony) to August 30th

(one day after the closing ceremony), until all delegations had departed. After a short break the clinic continued to offer dental services from September 11th to October 1st for the Paralympic Games, which followed the Olympics. While on duty, the dental clinic operated approximately 15 hours a day, having two groups of the above-mentioned personnel always available. Analytically, there was one doctor per specialty; meaning one for endodontics, operative dentistry, periodontology, oral surgery, as well as a dentist specialized in using the digital X-ray system and one prosthodontist whose main task was the construction of mouthguards. The former two specialized dentists did the initial screening and treatment, or referred the patient to the other doctors of the team if their knowledge and expertise were needed. The first shift was from 8:00 a.m. – 16:00 p.m. and the second from 14:00 p.m. – 10:00 p.m. each day. This program made it possible to have more personnel available during the rush hours at the Polyclinic (during the lunch break of both athletes and personnel of the Olympic Village).

For every new patient sent from the reception of the Polyclinic with a signed form (there was already information on his/her accreditation), a dental form was filled in for data collection. This form also included a concession for treatment, as well as a full dental history. All dental personnel were advised to clearly follow the instructions for the completion of this form.

Most of the involved dentists spoke at least two foreign languages fluently. For those patients, though, who were unable to communicate with the personnel, the option of an interpreter when arriving at the reception of the Polyclinic existed, so that no crucial data was lost and no misunderstandings were possible. Finally, it is important to mention that patients attending the Polyclinic for dental treatment or consultation were usually accompanied by a member of the medical team of their country. Almost every participating country in the Games had its own medical team with whom certain communication and collaboration had taken place in order to give the best support to the athletes in need.

Finally, as in all sports competitions in the Games organized by the International Olympic Committee, it was mandatory that dental services at the Polyclinic of the Olympic Village in 2004 Athens Olympic Games be provided by the organizing committee for those who were in need and were entitled to such services.

Results

▼ Olympic Games

The data from the original files of patients were used for the statistical analysis. Unless otherwise specified, the data were not separated for the preparation period (July 28 – August 13) from the data collected during the official dates of the Olympics (August 14 – 29). Analysis of the gender of people utilizing the dental clinic services is shown in **Fig. 1** while there was 1.82% lost information on this matter. The reason for the lost information was that, due to a technical error on the data form, the gender information box was omitted in the first forms used. Since there was no access to the records of the athletes or others, such information was impossible to retrieve. As for the main reason for attending the clinic, 65% of the cases were for pain relief.

More analytically, 658 patients in total attended the dental clinic; one hundred and fifty-eight prescriptions for medications were recorded while 101 examinations were made with no fur-

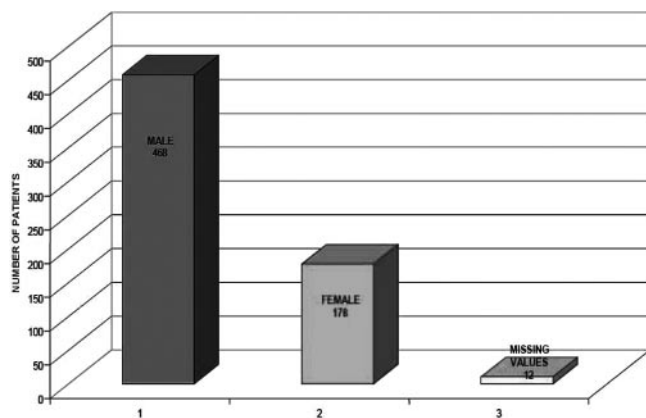


Fig. 1 The gender of patients attending the dental clinic during the 2004 Olympic Games.

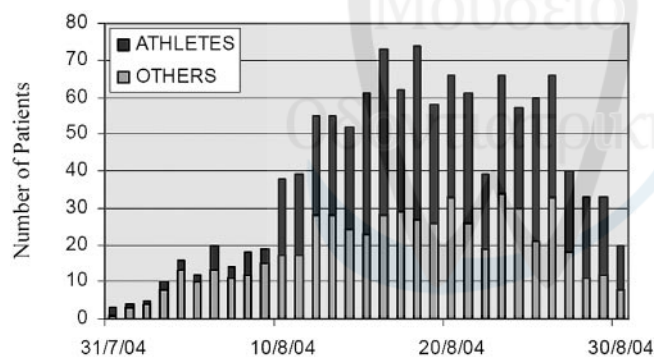


Fig. 2 Number and classification of accredited persons attending the dental clinic per day through the Athens 2004 Olympic Games.

Table 1 Dental treatments performed in the dental clinic during the 2004 Olympic Games

	Number of patients
Total number of patients	658
Examinations only	101
Prescriptions for medication	158
Scalings	89
Fillings	313
Temporary fillings	31 (20 were replaced with permanent)
Desensitization	11
Endodontic treatments	100 teeth (144 visits)
Extractions	65
Crown lengthenings	3
Surgical drainage	1
Crown cementations	24
Partial denture repair	4
Temporary bridge creation	1
Work on implant	1
Mouthguards	57
Traumas	9 (6 TTS* applied)
Total events	1426

*TTS: titanium trauma splint

ther dental assistance given. Detailed description of the dental treatment provided is shown in **Table 1**. It is worth noticing that all endodontic and restorative procedures were done under rubber dam isolation. Also, 9 trauma cases were documented. More specifically, there were lateral luxations of two teeth in two athletes, one avulsion and one cusp fracture, which all occurred during boxing competitions. One enamel fracture was reported in sailing and one in badminton competition. Finally, crown-root fractures were diagnosed and treated in two teeth of the same athlete of taekwondo, and also one lateral luxation and one crown fracture in wrestling competition. The rest of the traumatic injuries occurred in nonathletic activities. Six of the traumatic injuries that needed splinting of teeth, were treated with flowable resin and titanium trauma splint (TTS), a flexible splinting device made of titanium.

As for the origin of the people attending the dental clinic, the statistics revealed that the top ten countries were those shown in **Table 2**. Greece was the first in the total number of attending patients. More specifically, 97 patients were recorded, among whom there were 10 athletes. Cuba, with 21 athletes asking for

Table 2 Number of patients per country during the Athens 2004 Olympic Games (top ten)

Country	Number of patients
Greece	97 (10 athletes)
Cuba	26 (21 athletes)
Russia	25 (14 athletes)
Jamaica	20 (16 athletes)
Algeria	19 (13 athletes)
Spain	15 (14 athletes)
Nigeria	12 (9 athletes)
Angola	11 (9 athletes)
Moldavia	10 (9 athletes)
Pakistan	10 (8 athletes)

dental assistance during the games, was the first in the rank of countries according to athletes' attendance, followed by Jamaica, Russia and Spain.

In **Fig. 2**, the number of patients per day attending the clinic along with their classification is reported. The busiest days were the ones between the 1st and 12th day of the games (starting the counting from the day of the opening ceremony). Accordingly, in **Fig. 3**, the number of new patients per day is shown. It is also obvious that approximately 30 new patients visited between the 1st and 12th day of the games. The largest number recorded was that of 43 new patients on the 10th day of the games.

Table 3 shows the detailed classification of patients of the dental clinic into athletes (almost 50%) and other people (personnel, coaches, accompanying persons, etc.). Finally, it is reported that the largest number of athletes seeking dental treatment were athletes (also known as track and field) with 75 patients in total, followed by boxing, swimming, basketball and field hockey (**Table 4**). *please check sentence*

Paralympic Games

The data from the original files of patients were used for statistical analysis. Unless otherwise specified the data were not separated for the preparation period (September 11th – September 16th) and the after-competition period (September 29th – October 1st) from data collected during the official dates of the Paralympics (September 17th – 28th). Analysis of the gender of patients admitted to the dental clinic is shown in **Fig. 4**.

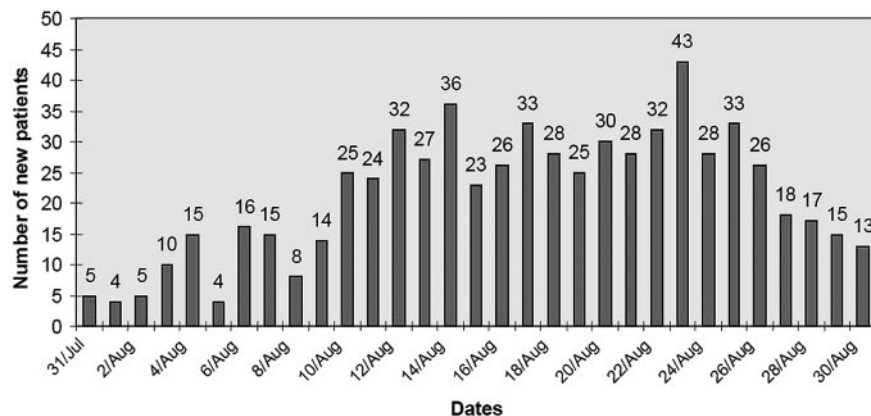
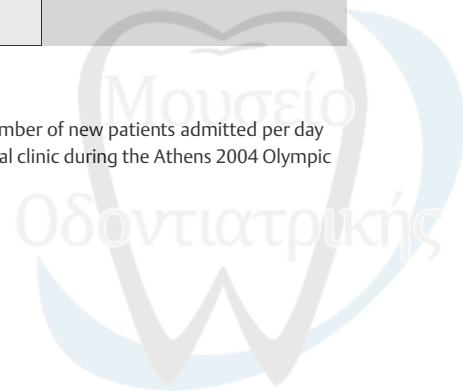


Fig. 3 Number of new patients admitted per day at the dental clinic during the Athens 2004 Olympic Games.

Table 3 Detailed classification of patients of the dental clinic in the Athens 2004 Olympic Games

Accreditation	Number of patients	%
Athletes	325	49.39%
Coaches	87	13.22%
Other persons	246	37.39%

Table 4 The sports with the biggest numbers of incoming patients (athletes) during the Athens 2004 Olympic Games

Sport	Number of athletes
Athletics	75
Boxing	48
Swimming	30
Basketball	19
Field Hockey	15

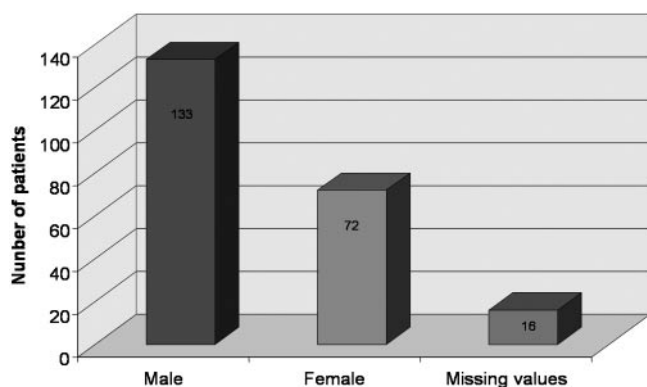


Fig. 4 The gender of patients attending the dental clinic during the 2004 Paralympic Games.

Table 5 Dental treatments performed in the dental clinic during the Athens 2004 Paralympic Games

	Number of patients
Total number of patients	221
Examinations only	72
Prescriptions for medication	13
Scalings	17
Fillings	73
Temporary fillings	16 (3 were replaced with permanent)
Desensitization	3
Endodontic treatments	12 teeth (67 visits)
Extractions	21
Surgical drainage	1
Crown cementations	1
Temporary bridge creation	1
Traumas	3
Oral hygiene instructions	7
Total events	240

One of the main reasons (57.47%) for seeking help was for pain relief. More analytically, a total of 221 patients visited the dental clinic for various reasons. All results are summarized in **Table 5**. Among others, 3 traumas were documented: one cusp fracture and two enamel fractures.

Table 6 shows the origin of the patients attending the dental clinic for the top ten countries. Again, Greece was first regarding the total number of attending people for the reasons mentioned previously. Iran was the first in the rank of countries according to athletes attending, followed by Russia, Morocco and Jordan.

In **Fig. 5** the number of patients attending the clinic per day is reported. It is clearly shown that the busiest days were the ones between the 1st and 3rd and 8th and 9th day of the games (starting with the day of the opening ceremony). The biggest number recorded was that of 17 patients on the 9th day of the games.

Table 7 shows the detailed classification of patients attending the dental clinic into athletes and other people (personnel, coaches, accompanying persons, etc.).

Finally, it was reported that the most common sport field, meaning the one with the biggest number of athletes seeking dental treatment, was athletics **correct word?** with 23 patients in total, followed by power lifting, wheelchair tennis, wheelchair basketball and judo (**Table 8**).

Discussion

Since there are no reports published concerning the dental data from previous Paralympic Games and since these Games closely

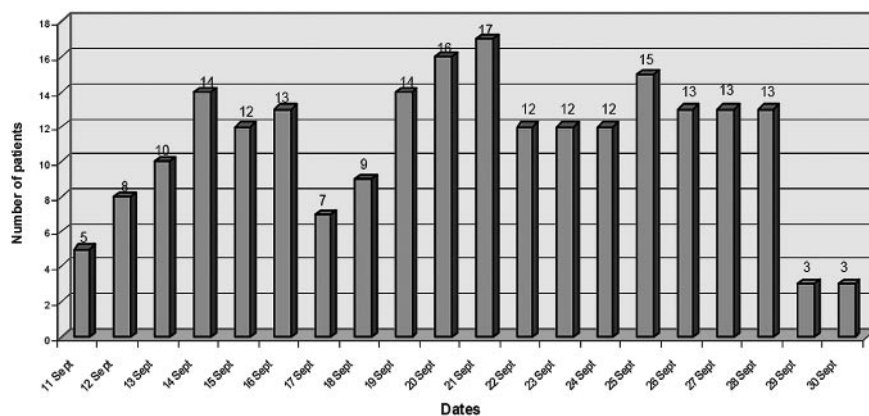


Fig. 5 Number of accredited persons admitted to the dental clinic per day during the Athens 2004 Paralympic Games.

Table 6 Number of patients per country during the Athens 2004 Paralympic Games (top ten list)

Country	Number of patients
Greece	46 (3 athletes)
Iran	16 (9 athletes)
Russia	12 (8 athletes)
Marocco	6 (3 athletes)
Jordan	6 (2 athletes)
Mexico	4 (2 athletes)
Egypt	3 (2 athletes)
Esthonia	3 (2 athletes)
Algeria	3 (2 athletes)
China	3 (3 athletes)

followed the Olympic Games, any trend will be mainly based on evidence drawn from the latter.

Due to the duration of the 2004 Athens Olympic Games (31 days) and the great number of accredited people at the Olympic Village (more than 10000), there was a certain need for dentists, basically during the second 10-day period of these Games. From the analysis of the data it is obvious that the number of new patients in the dental clinic increased gradually within the first ten days, while after the opening ceremony the number increased rapidly. These findings are in accordance with the data published for the 1996 Olympic Games [17].

The analysis of data shown in **Table 9** revealed a decrease in the utilization of dental services by athletes and officials during the Athens 2004 Olympic Games compared to the previous ones over the last 30 years [14]. The total number of patients compared to that of the Sydney 2000 Games was almost half. The number of mouthguards fabricated in Sydney (almost 400) in comparison with those fabricated in Athens (only 57) was one of the main reasons for the unexpected high number of patients in the former Games. In the Athens 2004 Olympic Games, mouthguards were provided, if requested, only to the entitled athletes (athletes of high risk sports). No signs, logos, or special characteristics were used on the simple translucent EVA material of the mouthguard. There were no memorial presents or dental products of any kind given to the patients and the dental team was there to do only the job required: to give emergency dental treatment. No such tendency could be implied for the Paralympic Games due to the lack of published data.

One thing that should be taken into consideration in such mass gathering events is the fact that the decision for treatment (e.g.,

Table 7 Classification of patients attending the dental clinic at the Athens 2004 Paralympic Games

Accreditation	Number of patients	%
Athletes	98	44%
Coaches	17	8%
Other persons	106	48%

Table 8 The sports with the biggest numbers of incoming patients (athletes) during the Athens 2004 Paralympic Games

Sport	Number of athletes
Athletics	23
Power lifting	7
Wheelchair tennis	4
Wheelchair basketball	4
Judo	3

Table 9 Total number of dental patients in Summer Olympic Games

City	Number of dental patients
Mexico City (1968)	1030
Munich (1972)	2278
Montreal (1976)	439
Moscow (1980)	no data
Los Angeles (1984)	630
Seoul (1988)	no data
Barcelona (1992)	681
Atlanta (1996)	906
Sydney (2000)	1200
Athens (2004)	658

for a new filling or the replacement of an existing one) is based on the signs and even more on the claimed symptoms. The dentist cannot tell for sure if there is a true discomfort that could turn into a problem or whether the patient is seeking free dental services, especially when word spreads within a team or around the Olympic Village about qualitative dental work in the dental clinic. This is the reason why the screening dentists were specialized in either endodontics or operative dentistry so that the treatment decision could be directed more by the signs and less by the claimed symptoms. Nevertheless, the data collected here-

in represent unbiased comparisons of the oral health in terms of gender or sports.

What is more, in the same report [14], a noted evolution in the treatment decisions was reflected by the reduction in the number of extractions and the favoring of endodontic treatments during the last five Olympic Games. The latter goes to show that in future mass gathering sports events, the dentists involved should be very experienced or, even better, specialized in endodontics, so the management of pain and the subsequent endodontic treatment can be accomplished in a very short time and in fewer appointments. The same trend for experience/specialization in operative dentistry applies to lost fillings and/or decayed teeth, as there is a tendency to permanently restore teeth instead of temporary filling placement.

The number of dentists working in the dental clinic along with their specialty training proved to be sufficient to face the number and the demands of the patients and contributed to the successful completion of this task, as verified by the comments of both patients and the International Olympic Committee Report regarding the level of quality of the services provided.

The diminishing number of patients could also be ascribed to the high quality of services that team dentists provided in their home countries, at least in most of the large delegations. It is clearly stated that the team dentist, due to the contemporary needs of first class champions, should be a crucial member of the national sports delegation and many countries have already adopted this advice. The major responsibilities of the team dentist should be 1) the education of the sports delegation about different oral and dental diseases and the illustration of possible problems that athletes or other personnel may encounter during the games, 2) adequate training and management of orofacial trauma during competition, 3) knowledge of the rules and regulations of the specific sport that the dentist is working for, 4) understanding of the antidoping control regulations and procedures, and 5) to have the necessary skills to fabricate a custom-made and properly fitted mouthguard to all participants in contact or collision sports of delegation [2]. To the authors' knowledge, the only team in the Athens 2004 Olympic Games that had a team dentist escorting the athletes was Brazil and none in the Paralympic Games.

The contribution of a team dentist during screening and preparation of each Olympic/Paralympic team is of great importance. If athletes are under close inspection for their oral health and their problems are treated before competition, the number of dental patients in future Summer Olympic Games will decrease. It has also been suggested that one of the most important pieces of equipment that an athlete should have before leaving for the Games, especially if he or she is participating in a contact sport, is a custom-made and properly fitted mouthguard [15]. The team dentist should provide the athletes with such mouthguards [2,4], adequately educate them and promote the systematic use of mouthguards. These athletes of high-risk sports, as mentioned above, are recorded to have the most orofacial traumas caused by blows on the field. In the Athens 2004 Games there was no documentation of tooth intrusion and/or lip laceration, which are the most frequent dental injuries [1]. It is important to note that none of the athletes injured in these Games wore a properly fitted mouthguard or did not use a mouthguard at all.

As previously pointed out, problems in the orofacial area during sports competition are not very frequent [1,3,5]. Should they occur, however, they are the principal cause of poor performance

by a participant [2] and for a first-class athlete this may mean even dropping out of the Games with all relevant consequences. In a study carried out in 1991 by the Center of Sports Health and Exercise Sciences of Puerto Rico on different patterns of injuries in different sports, of the 791 body injuries, 34 or 4% were restricted to the orofacial area [9]. In the Athens 2004 Games, only 0.63% of the cases treated at the Polyclinic of the Olympic Village had to deal with trauma situations. In the majority of the cases, trauma was recorded for the anterior maxillary region, which is also in accordance with other findings [2,6]. Often appropriate rehabilitation of this type of injury requires extensive dental procedures [4]. It is vital that every dentist involved in dental services at the Polyclinic of the Olympic Village in future Games, be adequately trained to assist in this type of emergency and that he or she be aware of the different alternatives to treating the patient efficiently.

After the "glamorous" Olympic Games, working in the Paralympic Games is a unique experience, although there are serious difficulties to overcome. It is not only necessary to have first-rate professional skills, but also to be able to work in newly assembled teams, work in a stressful and unfamiliar clinic with a special population without having a previous training or experience [11]. In the Athens Polyclinic the dental staff consisted of volunteer dentists from the university personnel who provided enthusiasm and commitment and many of them were experienced in treating patients with physical disabilities. As almost all of the staff knew one another, collaboration was excellent. This guaranteed that any misunderstandings among the staff were avoided [9].

People with disabilities have poorer oral health status, due to poor oral hygiene and higher incidence of traumatic dental injuries compared with people without disabilities [17]. The poor oral health status of people with disabilities is also related to the difficulties they face in order to attend dental treatment. These difficulties include the cost of care, transportation difficulties, fear of the dentist and probably an inadequate number of dentists having the appropriate training to treat this kind of patient. In some cases there are also communication difficulties [17].

The results of our study indicate that athletes competing in the Paralympic Games who sought dental care were mainly from developing countries.

Conclusions

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1. The applied setting and organizing of the dental services proved sufficient to handle the numbers and demands of the entitled patients.
2. In large sports events, experienced and/or specialized dentists are needed to provide emergency care.
3. There is a specific need for dentists specialized in operative dentistry and endodontics.
4. The dentist should be designated to offer assistance mostly in trauma situations caused during high-risk and/or other contact sports competitions.
5. The issues of mandatory use of custom-made and properly fitted mouthguards in high-risk sports and dental trauma management need to be addressed before departing for the games and at the venue of the games.
6. The National Olympic and Paralympic Committees of the different countries participating in the Olympic Games should

include a team dentist as an integral part of their medical team.

7. The team dentist of every national delegation should give dental advice for treatment and trauma prevention measures to athletes at home prior to their departure to the Olympic and Paralympic Games.
8. In Paralympic Games, there is a specific need for dentists specialized in treating people with disabilities or dentists willing to spend time and have patience with these kind of patients.

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