The usage of multidisciplinary physical therapies at the Rio de Janeiro 2016 Olympic Summer Games: an observational study

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Highlights

- A multidisciplinary team approach is evident in athlete healthcare in the Olympic Polyclinic
- The majority of the athlete encounters had an average of 2.9 different treatment modalities
- Athletes reported "injury" as the main reason for physiotherapy visits (2.8 encounters/athlete)
- Most of total immersion ice bath visits (98%) were for recovery purposes

Abstract

Objective: To describe the usage of physical therapies services – physiotherapy, osteopath, chiropractic, and sports massage – by athletes and non-athletes at the Rio 2016 Olympic Games Polyclinic, and across different sports.

Methods: Treatments delivered by the multidisciplinary team of physical therapies were recorded throughout the 32 days of operation of the Olympic Polyclinic by entry into an Electronic Medical Record system. Encounters included information on provider discipline, treatment modalities, and athlete reason for use of the service. Cold-therapy total immersion ice baths (TIIB) were provided as part of the services, but were reported and analysed separately.

Results: There were 4,993 encounters (4,038 athlete, 955 non-athlete encounters) in 1,395 athletes and 393 non-athletes, (12.4%) of all athletes seeking treatment. For all four provider disciplines, as well as for TIIB, the primary reason for athlete attendance was for recovery (52% of all encounters), followed by injury treatment (30%), and maintenance (16%). Athletes reported "injury" as the main reason for physiotherapy visits (92% of all encounters,2.8 encounters per athlete), chiropractic (94%,1.9) and osteopathy (91%,1.8) visits. Almost all TIIB visits were used for recovery purposes (98% of all TIIB encounters; 2.1 encounters per athlete). Athletes from handball (37% of all handball athletes), followed by judo (22%), and athletics (21%), presented the largest user groups.

Conclusion: This is the first paper from an Olympic Polyclinic to evaluate the physical therapies' activity, and athlete's reason for use of the multidisciplinary physical therapies team, including total immersion ice bath provision. These results emphasise the importance of a multidisciplinary approach.

Key words: physiotherapy; multidisciplinary team; treatment; total immersion ice bath; Olympic athlete; injury.

Introduction

The protection of the health of the athlete is the core objective of the International Olympic Committee

(IOC) Medical and Scientific Commission.[1] During Olympic Games, the combined group of physiotherapists from the National Olympic Committees (NOCs) and the hosts´ Organising Committee of the Olympic Games and Paralympic Games (OCOG) form the single largest professional group working for athlete health protection.[2,3]

While the role of a sports physiotherapist traditionally has been to provide treatment and rehabilitation of injuries,[4] the advancing role of the physiotherapy profession is to also provide interventions on injury prevention, athlete recovery and to support athlete performance.[5] Also, physiotherapy and the other disciplines osteopathy, chiropractic, and sports massage, have become a greater integral part of the sports medicine team, and thereby essentially contribute to an holistic approach for the care of the athlete.[5]

The physical therapies disciplines, including physiotherapy, osteopaths, chiropractors, and sports massage practitioners, now provide a multidisciplinary approach providing a comprehensive spectrum of skill mix.[5-8] A multidisciplinary team approach makes use of knowledge and expertise of different disciplines to provide better healthcare for the athlete, compared with disciplines working in isolation.[5-11]

In the Rio 2016 Olympic Games, 11,238 athletes from 207 National Olympic Committees were competing in 28 sports, encompassing 306 events. Over the 32-day period of the Games, including the pre- and post-competition period, a total of 1,101 injuries and 651 illnesses were recorded among the participating athletes.[12] Many of these athletes availed of multidisciplinary physiotherapy and physical therapies Polyclinic services.

To date, there have been few studies describing the use of physiotherapy services at major multisport events, Pan-American Games,[13] Africa Games,[14] and the World Student Games.[15] There have only been two studies published, evaluating the use of physiotherapy services delivered from the polyclinic during Olympic Games,[2,16] in addition to a brief report about the British Headquarters physiotherapy activities during the Seoul 1988 Olympic Games[17], discusses the services provided to one National Olympic Team. The role of the multidisciplinary team approach, providing physiotherapy, osteopathy, chiropractic, and sports massage, and the use of total immersion ice baths, for athletes from all competing National Olympic Teams has not been previously documented in an Olympic polyclinic setting.

We therefore aimed to 1) provide an analysis of the use of the physical therapies services – physiotherapy, osteopath, chiropractic, and sports massage – by athletes and non-athletes, 2) gain an understanding of which disciplines and interventions were utilised the most across different sport, and 3) understand the reasons why athletes used these services.

Methods

During the Rio 2016 Olympic Games, the core of OCOG provided physiotherapy and physical therapies services were delivered from the Polyclinic in the athlete Olympic Village.

In addition to NOCs providing their own dedicated physician and physiotherapy services, the polyclinic OCOG services were available to all the competing 11,274 athletes from 207 NOCs. This also included care for accompanying NOC-accredited coaches, trainers, team managers, and members of the OCOG-workforce and the Olympic (IOC-accredited) family.

The polyclinic was open for a total of 32 days from the '*pre-competition period*' (23rd July to the 5th August, 14 days), the '*duration of Olympic competitions*' (5th to the 21st August, 16 days) and two days of '*post-competition*' until the 23rd August.

Staffing of the multidisciplinary team

The physiotherapy services in an Olympic setting consists of multidisciplinary team, fulfilling the requirements of appropriate education, skills and experience.[18]

The multidisciplinary physical therapies team at the Rio Olympic Games comprised of 250 physiotherapists, 190 sports massage practitioners, 30 osteopaths and 30 chiropractors, all of whom were certified and licenced to practice in accordance with Olympic health care requirements. Each member of the Physical Therapies team for Rio 2016 was required to volunteer for 10 days all members were required to work 8 hours a day on average, there were two daily rotas: 7am to 3pm and 2pm to 11pm.

The protocol for the physical therapies services structure and organisation is specific for service of athletes at the time of an Olympic Games. Hence the organisational requirements may deviate from other parts of the world, as for example in Brazil, where physiotherapists can deliver a variety of treatment modalities if additional certificates in different skill sets are achieved. In Rio, all OCOG physiotherapists were members of the Brazilian Physiotherapy Association and international volunteers had international qualifications recognised by the World Confederation for Physical Therapy. The 30 osteopaths and the 30 chiropractors were recognised by COFFITO/ABFO (Brazilian osteopath physiotherapist association). International chiropractors and osteopaths were required to have internationally recognised qualifications by the general osteopathic council (GOC) and by the general chiropractic council (GCC), respectively. The 250 sports massage practitioners met the requirements of validated certification in sports massage. Acupuncture was solely provided by sports medicine physicians and administered in the facilities of the physiotherapy department in accordance with the OCOG protocols. While it is acknowledged that many physiotherapists are qualified to deliver acupuncture, the delivery of acupuncture was specific to the OCOG for the Rio Games. The international team members were only authorized to practice inside the Polyclinic, and for the

32-day period of the Olympic Games. All polyclinic treatments were referred directly via either an NOC physiotherapist, or NOC or OCOG physician.

Clinical encounter form and Electronic Medical Records and definitions

All treatment modalities and interventions and provider disciplines and reason for attendance were recorded on an Electronic Medical Record (EMR) (GE-IOC Electronic Medical Records System, GE Centricity Practice Solution, USA) at the Rio Olympic Games. The definition of injury, adapted from the IOC's injury and illness studies, was: any injury incurred in competition or training, receiving medical attention, regardless of the consequences with respect to absence from competition or training.[19-21]

An 'encounter' described an individual polyclinic visit, which could comprise of a single or multiple treatment modalities provided within the same encounter. A 'treatment modality' described the type of intervention or treatment provided by a particular discipline (e.g. soft tissue techniques, electrotherapy, manipulation, taping etc). A 'provider discipline' described a professional group with specific qualifications and who are recognised to practice in that field, such as physiotherapy, osteopathy, chiropractor, and sports massage. Different disciplines could administer the same modality, such as manipulation techniques, which could be provided by a physiotherapist, osteopath or chiropractor, however as each of these disciplines has their own treatment approach with variation in the application of the technique, providing skill mix and a multidisciplinary approach.

Cold-therapy total immersion ice baths (TIIB) (standard protocol at 10°C for a treatment duration of 10 minutes)[22-24] was provided as part of the services, but has been reported and analysed separately. As a new addition to previous Games,[2,16] the EMR-system also required the reason for attendance to be recorded at the clinic´s registration desk: (1) advice (2) injury (3) injury prevention (4) maintenance, and (5) recovery. 'Maintenance', for instance, described an intervention that was aimed at supporting performance (excluding injury, recovery, advice or prevention).

All encounters were manually completed in Portuguese on a paper form, as required by Brazilian law.[25] Encounters were then entered into the EMR-system using anonymised classification codes for each parameter. Only OCOG polyclinic encounters were recorded and analysed in the present study.

Confidentiality and ethical approval

The data collection system and recording criteria were approved by the OCOG Medical Advisory Group. The IOC Medical Code on athlete confidentiality was strictly observed.[1]

We used the athlete accreditation number to query the IOC athlete database for the age, sex and nationality of the injured or ill athlete. We treated all information confidentially and deidentified our database after the Games. The study was approved by the Medical Research Ethics Committee of the South-Eastern Norway Regional Health Authority (2011/388), and OCOG medical advisory group.

Data analysis and statistics

Data analysis was completed on OCOG physiotherapy and physical therapies activities at the Olympic polyclinic only. Encounters were categorised by their accreditation status: athlete and non-athletes, sport, discipline visited (or provider), reason for visit and treatment modalities received. Data are presented descriptively only, with frequencies and proportions (%).

Results

During the Rio 2016 Olympic Games, and across all services, there were 4,993 encounters (4,038 athlete, 955 non-athlete encounters) by 1,788 accredited individuals (1,395 athletes, 393 non-athletes). Of all encounters, 40% were for sports massage (982 athlete-encounters and 309 non-athlete encounters), followed by physiotherapy (36%), chiropractic (12%), osteopathy (11%), acupuncture (0.5%). For 24 encounters, the provider discipline was unknown (Table 1). Overall, this equated to 12.4% of athletes seeking treatment. The non-athlete group comprised of NOC team officials (n=251, 63.9%), OCOG workforce volunteers (n=84, 21.4%), Olympic family members (n=38, 9.7%), press (n=10, 2.5%) and technical officials (n=8, 2.0%) (unknown n=2, 0.5%).

Table 1. Frequency of encounters (and number of individuals) by provider's discipline for athletes and non-athletes.

	Athletes (n=1395)	Non-athletes (n=393)	All encounters
Physiotherapy	838 (309)	327 (130)	1165
Chiropractic	164 (150)	138 (84)	302
Osteopathy	225 (117)	136 (64)	361
Acupuncture	6 (6)	4 (4)	10
Sports massage	982 (529)	309 (201)	1291
Tiib	1823 (874)	41 (32)	1864
Total	4038 (1395†)	955 (393†)	4993

† Athletes and non-athletes could attend different provider disciplines multiple times. For 24 encounters, the provider discipline was unknown. TIIB= Total immersion ice bath

Distribution of physical therapies encounters

During the Games, there was a gradual 2 peak build-up of athlete and non-athlete encounters: the first from the time of the opening of the Olympic Village to the start of the first day of competition '*pre-*

competition period', and the second during the first week and a half of the '*Olympic competitions period*' (Figure 1).

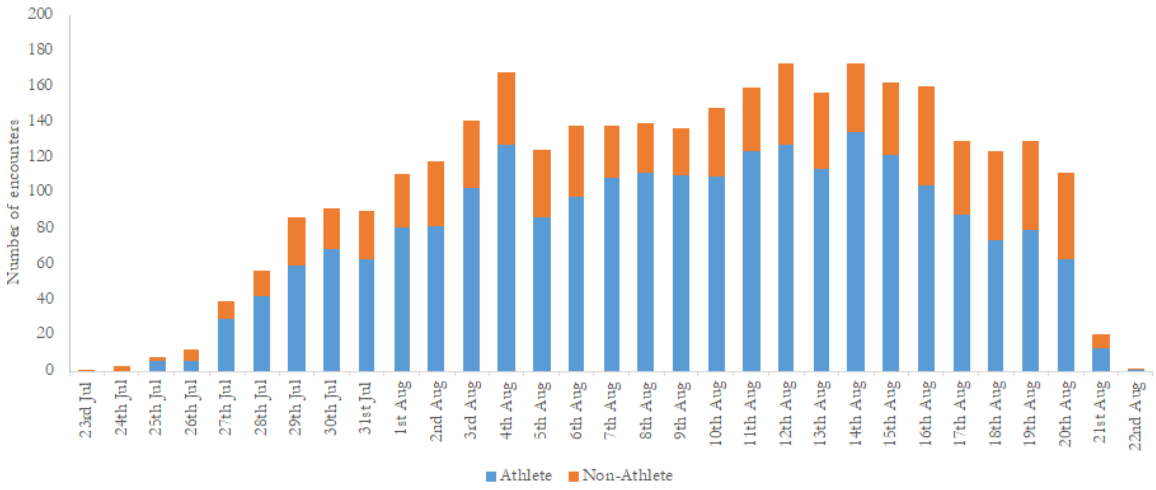

Figure 1. Distribution of physiotherapy and physical therapies encounters for athletes and non-athletes by date from 23rd July to 22nd August 2016.

During the pre-competition period, there were on average 71 encounters per day. During the first week and a half of the competition, the busiest days were those from the 12th to the 16th August with an average of 162 encounters per day.

Distribution of cold-therapy total immersion ice bath encounters

There were a total of 1,864 TIIB encounters reported between 28th Jul and 21st August, equating 1,823 encounters (98%) in 874 athletes and 41 encounters (2%) in 32 non-athletes. The usage of TIIB peaked in the first week of the competition period.

Athlete encounters by discipline provider, sport and treatment modalities

The 4032 treatments (excluding 6 acupuncture encounters) were administered during 1,395 athlete encounters, illustrating that the majority of encounters were comprised of several different treatment modalities, administered in the same visit. This equated on average 2.9 treatments per athlete encounter. Physiotherapy was the most utilized service, administrating 838 treatments in 309 athletes, equalling 2.7 encounters per athletes. Equivalent numbers for sports massage were 1.9 encounters per athlete, followed by osteopathy (1.9) and chiropractic with 164 treatment modalities (1.1) (Tables 1).

Table 2. Frequency of athlete encounters (and number of athletes) by sport.

Sports	Physio-therapy	Osteo-pathy	Chiro-practic	Sports massage	Tiib	All	Encounters per athlete	% of athletes (number of athletes)
Archery	3	-	6	3	1	13 (5)	2.6	3.9 (128)
Athletics	464	100	19	366	833	1782 (503)	3.7	21.2 (2367)
Badminton	6	3	5	5	8	27 (8)	3.4	4.7 (172)
Basketball	6	3	5	3	18	35 (18)	1.9	6.3 (287)
Beach Volleyball	1	1	2	2	8	14 (9)	1.6	9.4 (96)
Boxing	19	20	10	39	67	155 (47)	3.3	16.4 (286)
Canoe*	7	2	5	19	17	50 (33)	1.5	10.0 (331)
Cycling*	1	1	7	8	30	47 (24)	2.0	4.6 (521†)
Diving	-	1	-	3	15	19 (7)	2.7	17.7 (135)
Equestrian	1	1	1	5	-	8 (2)	4.0	1.0 (200)
Fencing	4	1	-	5	10	20 (10)	2.0	4.9 (204)
Football	1	-	-	3	88	92 (45)	2.0	8.9 (503)
Gymnastics*	31	5	21	15	27	99 (25)	4.0	7.8 (322)
Handball	1	3	2	82	186	274 (126)	2.2	36.7 (335)
Hockey	8	3	-	66	97	174 (55)	3.2	14.3 (384)
Judo	43	13	18	44	59	177 (87)	2.0	22.3 (390)
Modern Pentathlon	-	-	-	4	12	16 (5)	3.2	6.9 (72)
Rowing	8	5	5	12	70	101 (42)	2.4	7.7 (546)
Rugby 7s	5	1	4	35	1	47 (33)	1.4	11.3 (291)
Sailing	11	-	6	15	16	48 (20)	2.4	5.3 (380)
Shooting	5	6	9	19	3	42 (22)	1.9	5.6 (390)
Swimming*	76	18	16	142	91	344 (103)	3.3	9.7 (1056†)
Table Tennis	-	-	-	2	11	13 (8)	1.6	4.7 (172)
Taekwondo	14	-	1	21	34	70 (24)	2.9	18.9 (127)
Tennis	6	9	-	6	17	38 (12)	3.2	6.0 (199)
Triathlon	1	-	-	1	2	4 (3)	1.3	2.8 (109)
Volleyball	34	13	3	9	21	80 (35)	2.3	12.2 (288)
Water polo	-	-	-	-	19	19 (13)	1.5	5.0 (258)
Weightlifting	30	6	3	23	25	89 (31)	2.8	12.1 (256)
Wrestling	52	10	16	25	37	140 (40)	3.5	11.5 (349)
Total	838	225	164	982	1823	4032* (1395)	2.9	12.4 (11274†)

Acupuncture athlete encounters data (n=6) not included from this point forwards. Tiib=total immersion ice baths
*Canoe – sprint and slalom combined; Cycling - MTB, BMX, track and road combined; Gymnastics - artistic, rhythmic, trampoline combined; Swimming - swimming, open-water marathon, synchronised combined.
†10 and 5 double starters for cycling and swimming, respectively.

The sports using the physiotherapy, physical therapies and multidisciplinary services most frequently were athletics (n=1782 encounters, accounting for 46% of all encounters) followed by swimming (including synchronised and marathon) (344, 8%), and handball (274, 7%). Comparing service use as a percentage of all athletes in their sport, handball (n=355 handball players, 37% of all handball players), followed by judo (390, 22% of all judo athletes) and athletics (2,367, 21% of all track and field athletes) recorded the greatest usage. Sports recording the greatest use of sports massage services were primarily athletics followed by swimming and handball, and for total immersion ice baths, athletics followed by handball and swimming (Table 2).

Soft tissue and electrotherapy treatment modalities were most frequently used, accounting for 1,015 (31%) and 923 (28%) administered treatments, respectively, followed by manipulation and mobilisation techniques (n=685, 21%). While electrotherapy and soft tissue therapy were the most administered treatment modalities for physiotherapists, manipulation techniques and soft tissue therapies were most commonly administered for chiropractors and osteopaths (Figure 2).

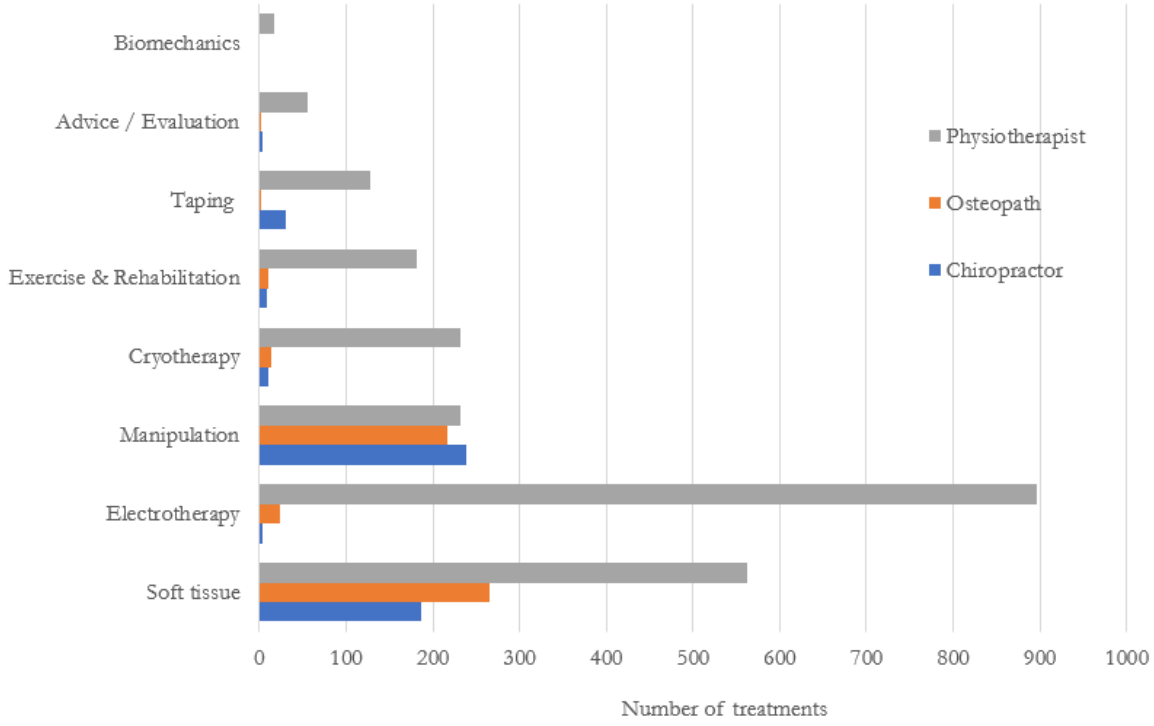

Figure 2. Frequency of athlete treatment modalities by discipline.

Athlete reason for polyclinic attendance

For all four provider disciplines, as well as for TIIB, the primary reason for athlete attendance was recovery (52% of all encounters), followed by injury treatment (30%), maintenance (16%), advice and evaluation (1.5%), and injury prevention (0.5%) (Table 3).

Table 3. Frequency of athlete encounters (and number of athletes) by reason for encounter and provider discipline.

	Advice	Injury treatment	Injury prevention	Maintenance	Recovery	All encounters
Physiotherapy	32 (32)	763 (273)	2 (2)	12 (11)	29 (25)	838 (309†)
Chiropractic	14 (14)	143 (137)	1 (1)	3 (3)	3 (3)	164 (150)
Osteopathy	6 (6)	212 (110)	2 (2)	1 (1)	4 (4)	225 (117)
Acupuncturist	-	-	-	2 (2)	4 (4)	6 (6)
Sports massage	9 (9)	3 (3)	-	648 (410)	322 (232)	982 (529)
TIIB	-	17 (17)	2 (2)	13 (13)	1791 (867)	1823 (874)

Total	61 (61)	1240 (540)	7 (7)	679 (440)	2153 (1135)	4038 (1395†)

† Athletes attended some provider disciplines more than once, and for different reasons. Reason for attendance was not known for 16 cases. TIIB= Total immersion ice bath

Athletes reported injury as the main reason for physiotherapy visits (92% of all encounters and 2.8 encounters per athlete), chiropractic (94% and 1.9) and osteopathy (91% and 1.8) treatment. Conversely, the majority of TIIB visits were made by athletes for recovery purposes (98% of all TIIB encounters; 2.1 encounters per athlete). For sports massage, the primary reason for attendance was maintenance (66% of all massage encounters, 1.6 encounters per athlete), followed by recovery (33%, 1.4 encounters per athlete).

Discussion

The present study is the first to evaluate the activity of the entire multidisciplinary physical therapies team and to provide a more in-depth understanding of athlete reliance on each discipline provider, including their reasons for seeking treatment during a major sporting event. In addition this study is the first to provide a more in-depth understating of the usage of total immersion cold baths during an Olympic competition. Over the 32 opening days, 1 in 8 athletes (12.4%) utilised the polyclinic services, mostly from athletics, swimming, handball, and judo. Of all disciplines, physiotherapy and sports massage were most frequently used. Physiotherapy, chiropractic and osteopathy were primarily requested for injury treatment, with cold-therapy total immersion ice baths most frequently used for recovery.

Distribution of physical therapies encounters, including TIIB

Similar to previous Games,[2,16] there was a bi-modal distribution of service use with a gradual build-up of all encounters from the time of the opening of the Olympic Village to the first days of competition, and again during the first week and a half of competition. These patterns of activity are important to understand in order to optimally plan and coordinate staffing and facilities for future Games.

Athlete utilisation of the Olympic polyclinic services has grown significantly over the past decade,[2,6,25-30] and again utilisation at the Rio 2016 Games was higher than that reported in any previous Olympic Games,[25,28,29] with a total of 4,993 individual encounters for all therapies recorded (4,038 athlete encounters, 81%). Observing physiotherapy and multidisciplinary therapies (only), 72% of all encounters in Rio were by athletes, and 28% by non-athletes. Athens[16] recorded 75% of the 457 physiotherapy and sports massage encounters for athletes, London[2] a total of 1,778 physiotherapy encounters with 1,219 of those (69%) for athletes. Hence, while rightly athletes continue to predominate Polyclinic usage, it is still

necessary to allow for approximately 20-30% of physiotherapy and physical therapies service provision for non-athletes.

In Rio, a total of 11 ice baths were available in the main treatment area of the polyclinic and their use accounted for 43.8% of all athlete encounters. In London 2012,[2] ice-baths accounted for only 10% of all athlete treatments, similar to Athens 2004 (9%).[16] Recent literature[32] suggests total immersion ice baths are more beneficial than passive recovery in the management of post exercise muscle soreness,[33] and there has been an increase in demand for TIIB.[32-36] The Rio Olympic Games service provision aimed to meet this demand, and this was positively reflected by increased uptake.

Encounters by discipline provider

For physical therapies services only, overall sports massage (40% of all encounters), followed by physiotherapy (36%) were the most utilised discipline providers during the Rio Games for both athletes and non-athletes.

Previous publications on multisport events have reported solely on physiotherapy and massage activities.[2,13-17] Observing physiotherapy encounters only, there was a slight decrease in utilisation during the Rio Games compared with London 2012.[2] While a significant reliance remains with physiotherapy,[2,16] increases in overall uptake of all physical therapies were possibly due to a greater dedicated level of service provision (e.g. TIIB), and the access to disciplines , such as chiropractic, osteopathy, and sports massage. These results illustrate the inclusion of a multidisciplinary service offering a greater skill-mix to the athletes requirements.[7,9-11,36]

Athlete encounters by sport

Of the 41 sports represented in the 2016 Rio Games, athletes from 30 sports used the multidisciplinary service. Athletes from handball (37% of all handball athletes), followed by judo (22%), athletics (21%) and taekwondo (19%) presented the largest user group. These numbers mirrored injury incidence data from the Rio 2016 Injury and Illness Surveillance study with these sports being in the top 20% of injuries reported in.[12]

Athlete treatment modalities

Soft tissue manual therapy and electrotherapy treatments were most common used by all disciplines followed by manipulation and mobilisation techniques, frequently used in the treatment of soft tissue and joint related injuries.[37-42] Compared with other disciplines, physiotherapists administered most electrotherapy and soft tissue modalities. In addition, physiotherapists provided the broadest spectrum of skills in terms of delivery of different types of treatment modalities. Demonstrated by the number of

treatment modalities administered per encounter (2.7 treatments per physio encounter), using more than one modality was considered to be a preferred treatment approach.[43-45]

Compared with the London 2012 Olympic Summer Games,[2] there was higher usage of electrotherapy in Rio 2016, but conversely, lower compared to Athens 2004.[16] These trends perhaps reflect a change in treatment approach as the scientific evidence evolves, as well as host nation philosophies towards treatment. Hence the question that continues to be debated in the literature remains, around which modalities are the most effective.[36,37,40,42,45]

Athlete reason for attendance

Recovery and 'treatment of injury' were the most common reasons for polyclinic attendance by athletes in Rio 2016. While earlier studies have reported injury treatment as the only reason for athlete attendance, [2,8,12-17,28-30] the present study provides more detailed previously unreported information on athletes diverse needs of the multidisciplinary services. Here, injury treatment represented 30% of athletes´ primary reason to enter the polyclinic after recovery (52% of all encounters). This analysis demonstrates the evolving and expanding role of physical therapies as part of the healthcare team who care for the athlete.

There was a strong reliance on total immersion ice baths to support the recovery process by athletes in the present study, similar to previous studies where it has been used as a primary recovery intervention.[32-36] The facilitation of total immersion ice baths is an area that should be included in athlete service provision at future major Games events.

Methodological considerations, strengths and limitations

As an advancement from previous Olympic Games,[2,16,17] the present study included recording of the integration of a multi-skillset team for athlete (and non-athlete) treatments, and athlete's reason for clinic attendance. It has been recognised in recent years that athletes do not always attend physical therapies for treatment of injuries, but also for assistance with sports performance, and more increasingly for recovery during the time of peak competition.[2-5,36] This is further supported by data presented in this study.

Compared to previous Games, the EMR-system allowed for recording up to four separate treatment modalities in one encounter. The expanded functionality additionally supported the entries of more detailed information on the multifaceted and multidisciplinary nature of athlete treatments. In light of no previous studies demonstrating the multidisciplinary services, which incorporate physiotherapists, osteopaths, chiropractors and sports massage practitioners working as a team, the Olympic set up of physical therapies services demonstrate that multidisciplinary team work incorporating several disciplines increases the level of care offered to the athlete.

As a limitation, data on athlete injury (anatomical area, diagnoses, onset and cause) were unavailable due to logistical challenges with Polyclinic data entry. While these data were available for the Rio 2016 Injury and Illness surveillance study,[12] mandating these data in physical therapies records in the future may provide additional information on athlete treatment requirements.

Also, only OCOG polyclinic encounters were collected in the present study. Hence, it is important to consider and further understand the treatment needs of athletes at medical stations at competition venues and on the field of play. Latterly, it may also be interesting to know if the athletes needs and requests are similar to those needs provided within the athlete´s NOC clinical team.

Conclusion

This is the first paper to inclusively evaluate not only physiotherapy but also that of the wider multidisciplinary physical therapies team providing services from the Rio 2016 Olympic Polyclinic. Over the 32 opening days, 1 in 8 athletes (12.4%) utilised the polyclinic services, mostly from athletics, swimming, handball, and judo. Of all disciplines, physiotherapy and sports massage were most frequently used by athletes, and primarily requested for injury treatment, with cold-therapy total immersion ice baths as most frequently used for recovery. These results provide new insights on athlete needs from the multidisciplinary services and can help to inform future major sporting event physiotherapy and physical therapies service provision planning.

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Figure legend

Figure 1: Bar graph displaying the distribution of physical therapies encounters for athletes and non-athletes by date 23rd July to 22nd of August 2016.

Figure 2: Bar graph displaying the distribution of total immersion ice bath (TIIB) for athletes and non-athletes by date from 28th July to 21st August 2016.

Figure 3: Frequency of athlete treatment modalities by discipline.

Table legend

Table 1: Frequency of encounters (and number of individuals) by provider's discipline for athletes and non-athletes.

Table 2: Frequency of athlete encounters (and number of athletes) by sport.

Table 3: Frequency of athlete encounters (and number of athletes) by reason for encounter and provider discipline.