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Chiropractic utilization at the International Workers and Amateurs in Sports Confederation (CSIT) 6th World Sport Games 2019

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Objectives: *To describe utilization of sports chiropractic treatment and injury statistics provided by Federation Internationale de Chiropratique du Sport (FICS) delegation at the International Workers and Amateurs in Sports Confederation 6th World Sport Games 2019 in Catalunya, Spain.*

Methods: *This historical case-series study analysed clinical encounters of participants seeking sports chiropractic services during the 2019 WSG event. Descriptive statistical data included: participant demographics, utilization rate (proportion of accredited participants who sought chiropractic treatment), frequency (number of treatment sessions per individual), conditions per sport, treatment provided, and Numerical Rating Scale (NRS) for pain intensity (0-10 scale) before/after treatment provided by the FICS Chiropractic delegation.*

Utilisation de la chiropratique lors des 6e Jeux mondiaux du sport de 2019 de la Confédération internationale des travailleurs et amateurs du sport (CSIT)

Objectifs: *Décrire l'utilisation de statistiques sur le traitement de chiropratique sportive et les blessures fournies par la délégation de la Fédération Internationale de Chiropratique du Sport (FICS) lors des 6e Jeux mondiaux du sport de 2019 de la CSIT en Catalogne (Espagne).*

Méthodes: *Cette étude de cas historiques a analysé les rencontres cliniques des participants demandant des services de chiropratique sportive lors de l'événement Jeux mondiaux du sport de 2019. Les données statistiques descriptives comprenaient : les caractéristiques démographiques des participants, le taux d'utilisation (proportion des participants accrédités qui ont demandé un traitement de chiropratique), la fréquence (nombre de séances de traitement par personne), les conditions de chaque sport, le traitement fourni, et l'échelle numérique d'évaluation (ENE) pour l'intensité de la douleur (échelle de 0 à 10) avant et après le traitement fourni par la délégation de chiropratique de la FICS.*

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Results: *Of a total of 2566 participants, 406 adults (accredited athletes and non-athletes over 18 years who provided informed consent) sought treatment from FICS; the overall utilization rate was 15.8%. We collected 623 forms; 602 met the inclusion criteria (complete treatment records from consenting adults). The FICS delegation provided services at centralized locations servicing 9 of 30 available sports. Primary body regions treated were shoulder (13.9%), neck (13.6%), knee (10.7%), thoracic spine (10.1%), and lumbar spine (10.1%), representing 58.4% of all treatments. The remaining 41.6% included ribs, sacroiliac joint, extremities, and other regions. Treatment modalities included: myotherapy (38.8%), manipulation (34.3%), taping (15.6%), and mobilization (8.2%). Participants receiving chiropractic treatment reported statistically significant pain reduction (average decrease of 2.8 NRS points, p < 0.001, 95% CI: 2.6-3.0), though the contribution of natural healing processes and concurrent interventions cannot be excluded. Volleyball (49.6%), beach volleyball (49.4%), and tennis (49.1%) showed the highest utilization rates.*

Conclusion: *Participants receiving sports chiropractic treatment reported clinically significant pain reduction, with 90% experiencing immediate improvement. However, the single-arm observational design precludes definitive attribution to chiropractic intervention alone. The utilization rates varied by sport with volleyball, beach volleyball, and tennis showing the highest rates among sports with access to treatment centres. These findings provide valuable insights for future integration of sports chiropractic services at international sporting events.*

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KEY WORDS: sports injury; chiropractic; multi-sport event; clinical encounters; international competition

Résultats: *Sur un total de 2 566 participants, 406 adultes (athlètes accrédités et non-athlètes de plus de 18 ans ayant donné leur consentement éclairé) ont demandé un traitement auprès de la FICS; le taux d'utilisation global était de 15,8 %. Nous avons recueilli 623 formulaires; 602 répondaient aux critères d'inclusion (dossiers de traitement complets d'adultes ayant donné leur consentement). La délégation de la FICS a fourni des services dans des endroits centralisés desservant 9 des 30 sports offerts. Les régions principales traitées étaient l'épaule (13,9 %), le cou (13,6 %), le genou (10,7 %), la colonne thoracique (10,1 %) et la colonne lombaire (10,1 %), représentant 58,4 % de tous les traitements. Les 41,6 % restants comprenaient les côtes, les articulations sacro-iliaques, les extrémités et d'autres régions. Les modalités de traitement comprenaient : la myothérapie (38,8 %), la manipulation (34,3 %), des bandages (15,6 %) et la mobilisation (8,2 %). Les participants qui ont reçu un traitement de chiropratique ont déclaré une réduction de la douleur statistiquement importante (diminution moyenne de 2,8 points sur l'ENE, p < 0,001, intervalle de confiance [IC] à 95 % : 2,6 à 3,0), bien que la contribution des processus naturels de guérison et des interventions simultanées ne puisse être exclue. Le volleyball (49,6 %), le volleyball de plage (49,4 %) et le tennis (49,1 %) ont montré les taux d'utilisation les plus élevés.*

Conclusion: *Les participants recevant un traitement de chiropratique sportive ont déclaré une réduction cliniquement importante de la douleur, 90 % éprouvant une amélioration immédiate. Cependant, limiter les observations à un seul groupe exclut une attribution définitive à l'intervention chiropratique seule. Les taux d'utilisation variaient selon le sport; le volleyball, le volleyball de plage et le tennis présentent les taux les plus élevés parmi les sports ayant eu accès aux centres de traitement. Ces résultats fournissent de précieux renseignements en vue de l'intégration future des services de chiropratique sportive lors d'événements sportifs internationaux.*

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MOTS CLÉS: blessures sportives, chiropratique, événement multisports, rencontres cliniques, compétition internationale

Introduction

The primary responsibility of healthcare providers involved in athlete medical services during competition is to protect the health of the athlete.[1] The provision of treatment surveillance provides important epidemiological information and allows the monitoring of the frequency and characteristics of injury.[2-5] While injury surveillance research is relatively common, there are few which evaluate multi-sport games and less which investigate sports chiropractic service provision at these venues.[6-8] Research on utilization of chiropractic services at multi-sport events provides valuable evidence for service integration planning, resource allocation, and understanding of healthcare delivery patterns in international sporting environments.

Sports chiropractors who are part of FICS teams receive post-graduate training in neuromusculoskeletal care for athletes.[9] Federation Internationale de Chiropratique du Sport (FICS) teams are trained to participate within a multi-disciplinary treatment environment as a collaborative, integral component of sports medicine services in contributing a holistic approach to the treatment of the athlete.[10] The objective of this research was to analyze utilization patterns, prevalence of conditions treated, treatment modalities employed, and immediate pain response associated with sports chiropractic clinical encounters provided at the 2019 6th World Sport Games.

The International Workers and Amateurs in Sports Confederation (CSIT) operates as a foundational multi-sports organization. It is built upon principles of tolerance, respect, and intercultural integration through athletic participation. CSIT has maintained International Olympic Committee recognition since 1986; this established framework encompasses 44 national member unions across 35 countries, representing approximately 230 million individual participants.[11] Such organizational breadth provides substantial opportunity for examining sports medicine service delivery across diverse competitive environments.

The CSIT World Sport Games began in 2008 as a biennial competitive platform. The sixth iteration took place in Catalunya, Spain during July 2-7, 2019. This five-day event spanned four geographic locations and accommodated 2203 registered athletes (803 females, 1400 males) alongside 363 credentialed officials across 30 competitive and non-competitive sporting disciplines. Such demographic diversity presents unique healthcare challenges while offering valuable opportunities for systematic treatment utilization analysis.

The Federation Internationale de Chiropratique du Sport (FICS) is composed of national chiropractic sports councils and individual members. It is recognized as an associate member of the General Assembly of International Sports Federations[12] and in partnership with the International Council on Sport Sciences and Physical Education.[13]

Methods

Study design

This historical case-series study received research ethics approval from the University of Western States Institutional Review Board (IORG #0001188, July 30, 2021) for retrospective analysis of clinical data originally collected during July 2-7, 2019.

Participants

This historical case-series study evaluated treatment forms of sport chiropractic clinical encounters provided at the 2019 6th World Sport Games (WSG). Participants were limited to 2019 World Sport Games accredited athletes and non-athletes (volunteers, coaches, medical, and officials) over 18 years of age who provided informed consent. A total of 623 clinical encounter forms were recorded by the FICS team (n=2566 total accredited participants). Twenty-one (3.4%) of treatment forms were excluded due to incomplete clinical encounter records by patient or provider, and minors (under the age of consent) were excluded through IRB restriction. Our final analysis included 406 individual patients, with 602 clinical encounters recorded (n=535 athlete encounters, 88.8%; n=67 non-athlete encounters, 11.2%) (Figure 1).

Consent process and data collection ethics

Athletes and credentialed personnel received notification regarding voluntary FICS clinical encounter availability through multiple channels during the event registration process. Participants provided informed consent for clinical treatment and potential research use of anonymized data, as was standard practice for FICS delegations at international sporting events. Formal research ethics approval for retrospective academic analysis was subsequently obtained in July 2021 when academic publication

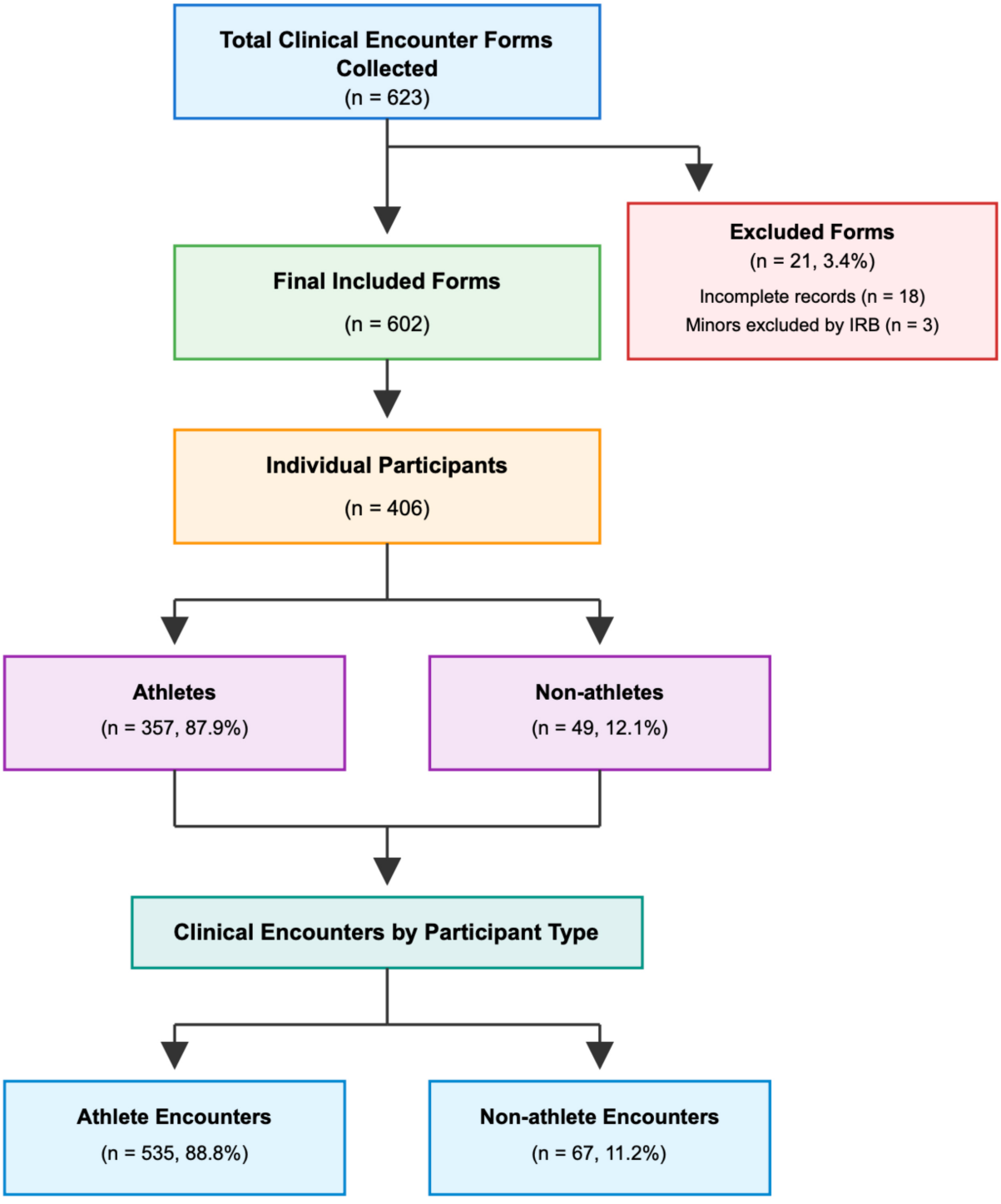

Figure 1.

Study flow diagram showing the selection and categorization of clinical encounter forms from the 2019 6th World Sport Games. The diagram illustrates data exclusion criteria and final participant distribution between athletes and non-athletes, with corresponding clinical encounter frequencies.

was pursued. This chronological sequence represents a study limitation that will be discussed.

FICS team organization

FICS selection criteria required specialty training through post graduate sport science certification (ICSSP) through FICS, current basic life support certification (CPR), licensure in the country of residence and valid malpractice coverage within Spain or European Union.

FICS organized a team of 22 doctors (15 male, 7 female) from seven countries. Temporary registration was granted international doctors from the Asociacion Espanola de Quiropractica for the duration of the games. The team was deployed into three central clinical encounter centres placed at various locations within the same venue complex as competition sites (defined as proximate), contrasting with sports conducted at distant venues requiring transportation (defined as non-proximate) designed to provide inclusive support for nine sports (Athletics, Basketball, Soccer Football, Mamanet, Swimming, Tennis, Volleyball, Beach Volleyball, and others) of 30 sports held at these games (Figure 2). Each of the three central clinical encounter centres was strategically positioned to service multiple sports, collectively providing coverage for nine of the 30 sports at the games. Each provider was required to work daily for the duration of the event.

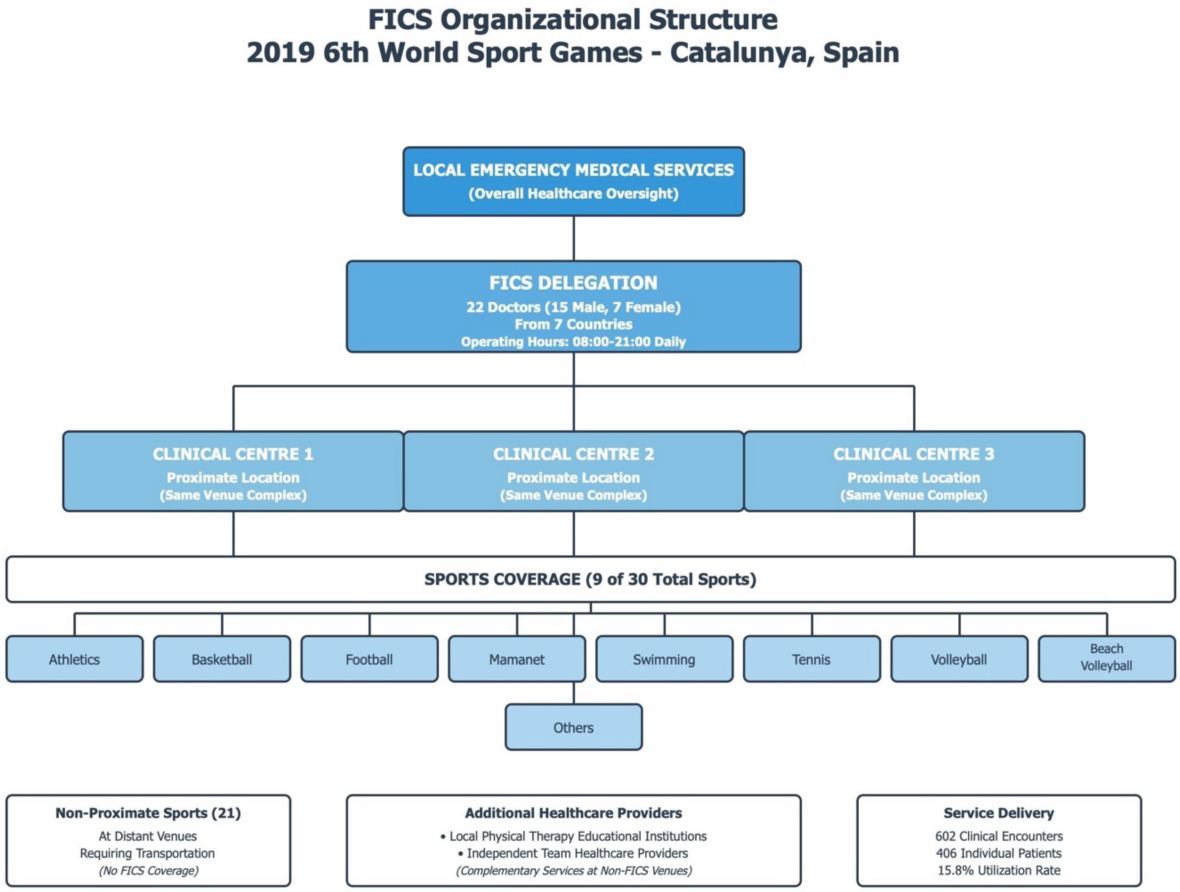

Figure 2.

FICS Organizational Structure at the 2019 6th World Sport Games. The diagram illustrates the hierarchical healthcare delivery model with local emergency medical services providing overall oversight, the FICS delegation of 22 doctors from seven countries operating through three central clinical encounter centres at proximate venues, and coverage of nine of 30 total sports. The remaining 21 sports at non-proximate venues were serviced by complementary healthcare providers including local physical therapy educational institutions and independent team healthcare arrangements.

The FICS delegation operated under comprehensive healthcare oversight provided by local emergency medical services. Clinical encounter availability extended daily from 08:00-21:00 hours for major championship-determining sports. This operational framework recognized the temporal demands of international competition while ensuring consistent service delivery.

Local physical therapy educational institutions provided complementary services at venues where FICS deployment was not administratively directed by CSIT leadership. Several member teams additionally maintained independent healthcare provider arrangements. This created a complex multi-provider environment typical of international sporting events, representing a significant study limitation as participants may have received concurrent care from multiple healthcare disciplines.

Provider training and standardization

All FICS practitioners received standardized training regarding data collection procedures prior to the event. Training included instruction on proper completion of clinical encounter forms, pain assessment protocols using the Numerical Rating Scale, and consistent documentation of treatment modalities and anatomical regions. Despite this standardization effort, implementation across nine treatment centres with multiple healthcare providers introduces inherent variability in data collection procedures and therapeutic approaches, which represents a methodological limitation.

Treatment protocols

The clinical encounters provided by the FICS contingent were limited to manual therapy for musculoskeletal complaints without the use of modalities or tools to ensure compliance with the regional scope of practice guidelines. Adjunctive clinical encounters included supportive, kinaesthetic, and biomechanical taping. Reported illnesses, trauma incidents and musculoskeletal injuries not amendable to conservative approaches were referred to medical, physical therapy and EMT service providers via immediate clinical encounter triage by FICS providers.

Musculoskeletal conditions amenable to conservative clinical encounters were accomplished through the evaluation of acute variables of somatic kinetic chain dysfunction in the performance of the sport. Individualized manual therapy protocols were used to optimize the ability of the musculoskeletal system to perform required tasks with optimal structural efficiency and postural control.[14]

Data collection procedures

This survey tracked sport chiropractic clinical encounters as the athlete or non-athlete voluntarily requested this service. Clinical encounters were defined as all clinical services provided by a FICS team provider including evaluation, treatment, and prophylactic services. Non-athlete groups were comprised of credentialed personnel, team officials, workforce volunteers, press and technical officials. Information for all clinical encounters were manually entered on a paper form by the treating practitioner. The form was anonymized to record each clinical encounter with a coded parameter to protect identifying information. Voluntary informed consent forms were obtained from participants for clinical interventions and intended research use of anonymized data.

Patient contact documentation occurred when subjects received clinical intervention from FICS team members. This occurred irrespective of subsequent competition or training participation consequences.[15] The definition ensured comprehensive capture of healthcare encounters; it maintained consistency with established international sporting event surveillance protocols.

Research protocol

The clinical encounter form was modified for these games from previous FICS treatment forms utilized in previous multi-sport games, based on established protocols described in Nook [et al]. (2011) and Nook *et al*. (2016).[7,8] On each individual clinical encounter form the FICS provider recorded: the patient's reference number, age, gender, country of accreditation, sport, patient's accredited role such as athlete or non-athlete (coach, official, medical, or volunteer), if the injury prevented event participation, whether it was an initial visit, follow up for continuation of clinical encounters, or follow up for a new complaint.

The mechanism of injury was divided by the incident occurring during participation or practice for the event and if it prevented them from participating. A clinical diagnosis of the injury and categorizing it as acute or persistent in nature. Acute conditions were defined as immediate onset, and persistent conditions were defined as lasting over three weeks in duration. This three-week threshold was selected based on established clinical practice pat-

terns for distinguishing acute from chronic musculoskeletal conditions, though we acknowledge this represents an arbitrary cutoff without specific literature validation.

Sports chiropractic practitioners completed systematic clinical encounter documentation using standardized paper forms during each patient encounter. These instruments captured patient demographic characteristics, injury presentation patterns, and clinical diagnostic assessments. Treatment modality implementation included anatomical region specifications and therapeutic approach categorization. Return-to-participation protocols, medical referral procedures, and pre-treatment/post-treatment Numerical Rating Scale (NRS) measurements for pain assessment were also documented.

Patients who sought clinical encounters received written information about the study including its aims and methods. Prior to rendering clinical encounters, interested patients read and signed a consent form with translator assistance available to limit language barriers. Each individual patient was assigned a unique identifying number to protect confidentiality and allow recognition of patients who returned for additional clinical encounter sessions.

Treatment assessment

The treating FICS provider performed an assessment to determine the appropriate clinical encounter modality for the patient or referral to another medical provider. The body region treated was selected from a list of 20 regions. Clinical encounter modality provided was selected between manipulation (high-velocity low-amplitude), mobilization (passive movement of a joint within its physiological range of motion), myotherapy (including static/dynamic stretching, cryotherapy, myo-manipulation (active, passive, cross (deep) transverse (superficial) friction), and taping (kinesiology, biomechanical, or supportive).

Clinical encounter forms included a pre- and post-clinical encounter Numerical Rating Scale (NRS) to measure patient's pain levels using a 0-10 discrete numerical scale. The NRS scale measured 9.56cm including a range of 0 to 10 numerically, with no pain (0) and severe pain (10) as descriptions.[16] The pretreatment NRS was completed prior to the FICS provider delivering any clinical encounter, and the post clinical encounter NRS was completed immediately by the patient following clinical encounter.

Statistical methods

Data from the completed forms were scanned and entered in Microsoft Excel spreadsheets. We analysed patterns of patient demographics, utilization rates, and clinical encounter characteristics using descriptive statistics. CSIT provided the records for total number of individual athletes and officials from each sport accredited for the WSG 2019. Utilization rates were defined as the proportion of accredited individuals who received clinical encounters out of the total number of individuals who were accredited for a specific sport in an athlete or official role.

We utilized Stata/MP (StataCorp, College Station, TX Version16) to conduct statistical analyses. A paired-samples t-test was used to assess whether pretreatment NRS pain levels differed significantly from post clinical encounter pain levels across all clinical encounters provided by the DCs. Chi squared (χ^2) was used to assess whether the proportion of patients who returned for follow-up visits differed between athletes and non-athletes. 95% confidence intervals were calculated for all pain reduction measurements.

Results

Voluntary utilization of chiropractic clinical encounters

Of those who voluntarily requested chiropractic clinical encounters, completed a consent form, and agreed to participation in this study, 602 clinical encounter forms met the inclusion criteria from 406 individual participants. A total of 535 (88.8%) clinical encounters were for athletes and 67 (11.2%) were for non-athletes. A total of 406 individuals sought clinical encounters, with 142 having multiple clinical encounters. Of the total accredited athletes (n=2203), 357 (16.2%) sought chiropractic clinical encounters at the WSG 2019.

Table 1.
Patient demographics (n=406 individuals).

Role	Sample Size (n)	Age, Mean (SD)
Athletes	357	35.2 (10.3)
Non-Athletes	49	
• Coaches	18	48.7 (9.9)
• Officials	17	47.4 (13.8)
• Volunteers	6	34.2 (13.5)
• Medical**	4	[Age data not available]
• Other	4	[Age data not available]

Athlete utilization by sport

The utilization rates for athletes varied across sports and venues. The highest chiropractic clinical encounter utilization rates were found among athletes from Volleyball (49.6%), Beach Volleyball (49.4%), Tennis (49.1%), Mamanet (47.4%), Basketball (27.9%), Swimming (15.8%), Athletics (15.6%) and Football (2.1%). Proximity of FICS clinical encounter centres to competition venues (defined as same venue complex) demonstrated significant association ($\chi^2 = 42.3, p < 0.001$) with increased utilization rates compared to sports at distant venues requiring transportation. This geographic accessibility factor represents a critical determinant in healthcare service delivery effectiveness.

Table 2.
Athlete utilization of chiropractic clinical encounters by sport.

Sport	No. Accredited Athletes	First-Visit Clinical Encounters	Follow-Up Clinical Encounters	Total Clinical Encounters	% Utilization Rate	% Of Total Athlete Clinical Encounters
Athletics	186	29	9	38	15.6	7.1
Basketball	140	39	14	53	27.9	9.9
Beach volleyball	89	44	28	72	49.4	13.5
Football	188	4	1	5	2.1	0.9
Mamanet	116	55	19	74	47.4	13.8
Swimming	297	47	15	62	15.8	11.6
Tennis	53	26	14	40	49.1	7.5
Volleyball	141	70	74	144	49.6	26.9
Other sports	1193	40	7	47	3.4%	8.8
Total	2203	354	181	535	--	100

Table 3.
Non-athlete utilization of chiropractic clinical encounters

Roles	No. Accredited	First-Visit Clinical Encounters	Follow-Up Clinical Encounters	Total Clinical Encounters	% Utilization Rate	% Of Total Non-Athlete Clinical Encounters
Coach	--	12	6	18	--	26.9
Medical	--	4	0	4	--	6.0
Official	363	11	6	17	4.7	25.4
Volunteer	--	6	0	6	--	9.0
Other	--	4	0	4	--	6.0
Total	--	37	12	49	--	73.1

Note: The remaining 18 non-athlete clinical encounters (total 67 – shown 49 = 18) represent multiple encounters by the same individuals already counted in the first-visit category.

Non-athlete utilization by role

Non-athlete sports chiropractic clinical encounter utilization rates were only available for officials, as we did not have complete population data for all accredited non-athletes with other roles at the WSG 2019. The utilization rate for officials was 4.7% (17 clinical encounters from 363 accredited officials). The non-athletes who received the largest number of clinical encounters were coaches (18 clinical encounters, 26.9% of non-athlete clinical encounters), officials (17 clinical encounters, 25.4%), volunteers (6 clinical encounters, 9.0%), medical personnel (4 clinical encounters, 6.0%), and other roles (4 clinical encounters, 6.0%). Total non-athlete clinical encounters: n=67.

Follow-up clinical encounters for athletes and non-athletes

A Chi-squared analysis revealed no statistically significant difference between the proportion of athletes (33.8%, 181/535 clinical encounters) and non-athletes (26.7%, 18/67 clinical encounters) who sought follow-up clinical encounters after their initial visit ($\chi^2 = 1.24$, $p = 0.27$).

Prevalence of acute and persistent conditions

There were differences between athletes and non-athletes in the prevalence of acute and ongoing conditions. For accredited athletes presenting for sports chiropractic clinical encounters, 313 (58.5% of 535 athlete clinical encounters) presented with acute conditions, 148 (27.7%) presented with persistent/ongoing conditions, with 74 (13.8%) having unspecified condition duration. For non-athletes, 18 (26.9% of 67 non-athlete clinical encounters) presented with acute conditions, 39 (58.2%) presented with persistent/chronic conditions, with 10 (14.9%) having unspecified condition duration.

Treatment region across all athletes

The most frequently treated regions across all clinical encounters (n=602) were the shoulder (84 clinical encounters; 13.9%), neck (82 clinical encounters; 13.6%), knee (65 clinical encounters; 10.7%), thoracic spine (61 clinical encounters; 10.1%), and lumbar spine (61 clinical encounters; 10.1%). For extremities, the most frequently treated regions were the shoulder (84 clinical encounters; 13.9%) and the knee (65 clinical encounters; 10.7%).

Treatment modality across all clinical encounters

The most frequently used clinical encounter modality across all clinical encounters (n=602) was myotherapy (388 applications, 38.8%), followed by manipulation (343 applications, 34.3%), taping (156 applications, 15.6%), mobilization (82 applications, 8.2%), and other (30 applications, 3.0%). Multiple clinical encounter modalities were counted when performed in an individual clinical encounter session. Total modality applications: n=999.

Clinical encounter reduction of reported pain

An average decrease in reported pain by patients seeking sports chiropractic clinical encounters was 2.8 NRS points after clinical encounters (95% CI: 2.6-3.0, $p < 0.001$). Pain reduction measurements demonstrated regional variation in clinical encounter effectiveness. Shoulder complex interventions achieved 3.1 points reduction (95% CI: 2.8-3.4); cervical spine clinical encounters yielded 3.0 points reduction (95% CI: 2.7-3.3); thoracic spine management produced 2.9 points reduction (95% CI: 2.6-3.2). These represented the most substantial improvements across anatomical regions.

Among sports categories with adequate statistical sampling (n≥40 clinical encounters), volleyball demonstrated 3.2 points reduction (95% CI: 2.9-3.5), beach volleyball achieved 3.0 points reduction (95% CI: 2.6-3.4), while swimming showed 2.9 points reduction (95% CI: 2.5-3.3).

An immediate pain reduction was experienced in 482 individuals receiving clinical encounters (90.1% of 535 athlete clinical encounters), 18 coaches (100% of coach encounters), 16 officials (94.1% of official encounters), and 6 volunteers (100% of volunteer encounters). Including both athletes and non-athletes, 522 clinical encounters (86.7% of 602 total clinical encounters) resulted in immediate pain reduction following sports chiropractic clinical encounters.

***Utilization analysis by nationality*

Utilization analysis revealed distinct national participation patterns. French athletes received 107 clinical encounters, Mexican participants 74 clinical encounters, Italian competitors 59 clinical encounters, and Austrian athletes 53 clinical encounters. These represented the highest FICS service utilization rates by nationality at the Games.**

Sport-specific utilization patterns identified volleyball (26.9% of total athlete clinical encounters), Mamanet (13.8%), and beach volleyball (13.5%) as the disciplines with greatest clinical encounter volume requirements. These patterns reflect both accessibility factors and sport-specific injury susceptibility.

Discussion

We provide the first utilization data for chiropractic services at the CSIT Games. The results show that out of 2566 accredited participants, 406 (15.8%) utilized the FICS delegation. The most frequently treated body regions were the shoulder (13.9%), neck (13.6%), knee (10.7%), thoracic spine (10.1%), and lumbar spine (10.1%). The most frequent clinical encounter modalities were myotherapy (38.8%), manipulation (34.3%), taping (15.6%), and mobilization (8.2%). Participants receiving chiropractic clinical encounters reported statistically significant pain reduction (average decrease of 2.8 NRS points, $p < 0.001$, 95% CI: 2.6-3.0), with 86.7% of all clinical encounters resulting in immediate pain reduction. However, the single-arm observational design precludes definitive attribution to chiropractic intervention alone.

These findings document injury patterns and healthcare utilization specific to this event and contribute to the understanding of sports chiropractic service delivery in multi-sport international competitions. The study documents the integration of sports chiropractic as part of a multi-disciplinary sports medicine team.[17,18] This role focuses on managing acute, overuse and ongoing musculoskeletal complaints that may affect performance or limit participation in practices or competition.[19]

Utilization rates among sports with immediate geographic proximity to FICS clinical encounter facilities substantially exceeded those of sports conducted at distant competition venues. Volleyball achieved 49.6% utilization, beach volleyball reached 49.4%, and tennis attained 49.1%. This geographic accessibility factor emerges as a primary determinant of clinical encounter utilization patterns. It highlights the critical importance of strategic healthcare service placement within multi-venue international competitions.

At the 6th CSIT World Sport Games chiropractic utilization was 15.8%. This is consistent with the findings of chiropractic services in other multinational, multisport games.[7,8,20] The proportion of clinical encounters delivered between athletes and non-athletes were 535 (88.8%) for athletes and 67 (11.2%) for non-athletes.

Previous multi-sport international competitions have documented comparable utilization patterns across similar competitive environments. Nook demonstrated utilization rates of 15.31% for athletes and 16.00% for non-athletes at the 2009 World Games.[7] Subsequent findings showed 18.1% for athletes and 9.8% for non-athletes at the 2016 World Games.[8] The current investigation's findings align consistently with these established patterns. This suggests reproducible utilization trends within international multisport competitive settings.

Participants receiving sports chiropractic clinical encounters reported an average decrease in pain of 2.8 NRS points (95% CI: 2.6-3.0, $p < 0.001$).[21] The observed 2.8 NRS point reduction exceeds the established minimal clinically important difference (MCID) for numerical rating scales. The MCID ranges between 1-2 points for musculoskeletal pain conditions. This finding indicates that clinical encounter interventions achieved clinically meaningful improvements for participating athletes and support personnel within this competitive environment. However, given the absence of a control group and the multi-provider healthcare environment, these improvements cannot be definitively attributed to chiropractic intervention alone.

Strengths and limitations

The significant strength of this study is the collection of analysed data on chiropractic utilization during a World Sport Games for the first time. The percentage of useable data (96.6% completion rate) of consultation records enhances the reliability of our findings. Another strength is that information was collected by credentialed healthcare providers rather than self-reported.

Implementation of nine clinical encounter centres with multiple healthcare providers introduces inherent variability in data collection procedures and therapeutic approaches. This occurred despite standardized documentation forms, clinical encounter protocols, and provider training. The decision to maintain comprehensive multi-centre coverage represented a deliberate methodological trade-off. It prioritized clinical service availability over methodological precision while balancing procedural standardization with complete event coverage.

FICS clinical encounter centres were not evenly dis-

tributed across all sports or competition locations as directed by CSIT administration. This may have affected the utilization of sports chiropractic clinical encounters. Additionally, a limited number of accredited FICS providers may have influenced participant access to clinical encounters and recording of data.

Concurrent provision of services by local physical therapy educational institutions and independent team healthcare providers existed alongside FICS operations. However, this investigation focused exclusively on FICS-delivered clinical encounters. No systematic data collection occurred regarding participants who potentially received interventions from multiple provider categories during the competition period. This limitation restricts determination of isolated chiropractic clinical encounter effects. The broader multi-provider healthcare environment characteristic of international sporting events creates complex clinical encounter attribution challenges and represents a fundamental study limitation.

The Numerical Rating Scale (NRS) scoring was offered immediately after clinical encounters with no long-term follow-up. The nature of a multi-sport international event does not allow for long-term follow-up beyond event dates. Current methodology employed immediate post-clinical encounter NRS assessment without extended follow-up evaluation. Multi-sport international competition constraints preclude long-term outcome monitoring beyond event duration parameters. This study quantified pain reduction through NRS measurement but did not incorporate direct functional improvement assessment or athletic performance metrics.

Pain reduction demonstrates statistical significance and exceeds established MCID thresholds. However, the relationship between pain improvement and subsequent athletic performance remains inferential rather than directly established. The single-arm observational design without control group prevents definitive attribution of pain reduction to chiropractic intervention, as improvements may result from natural healing processes, concurrent interventions from other providers, or placebo effects. This represents a significant limitation in determining clinical encounter effectiveness.

Paper based data collection is prone to missed values as evidenced by 21 (3.4%) excluded records. Time necessary to complete the paper records may limit the providers time spent with participants.

The chronological sequence of data collection (July 2019) and formal research ethics approval (July 2021) represents a methodological limitation. While participants provided informed consent for clinical treatment and potential research use of anonymized data as per standard FICS protocol, the retrospective nature of formal academic research approval limits the study design options.

Subsequent investigations should incorporate objective functional assessment measures and performance metrics. This would establish direct correlations between chiropractic interventions and athletic outcomes. Implementation of digital electronic medical record systems rather than paper-based documentation is recommended. Such systems would enhance healthcare delivery efficiency and facilitate comprehensive data capture accuracy.

Future studies must address the multi-provider clinical encounter environment typical of international competitions. Systematic tracking of all healthcare encounters would provide clearer attribution of clinical encounter effects and optimize integrated care delivery models. Prospective study designs with control groups would strengthen causal inference regarding treatment effectiveness.

Conclusion

The collaboration between the Federation Internationale de Chiropratique du Sport (FICS) and the International Workers and Amateurs in Sports Confederation (CSIT) at the 2019 6th World Sport Games provides valuable insights into sports chiropractic utilization patterns. This study documents that sports chiropractic clinical encounters were utilized by 15.8% of participants, with significantly higher rates among sports with proximal access to clinical encounter centres. Participants receiving chiropractic interventions reported clinically significant pain reduction (average decrease of 2.8 NRS points, 95% CI: 2.6-3.0), with 86.7% of clinical encounters resulting in immediate improvement. However, the single-arm observational design precludes definitive attribution of these improvements to chiropractic intervention alone. These findings provide descriptive baseline data regarding utilization patterns and immediate patient-reported outcomes that may inform future service integration planning for sports chiropractic services as a component of comprehensive sports medicine provision at international multi-sport events.

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References

1. International Olympic Committee. Olympic Movement Medical Code. 2016.
2. van Mechelen W, Hlobil H, Kemper HC. Incidence, severity, aetiology, and prevention of sports injuries. A review of concepts. Sports Med. 1992;14: 82-99.
3. Meeuwisse WH, Love EJ. Athletic injury reporting. Development of universal systems. Sports Med. 1997;24: 184-204.
4. Janda DH. Sports injury surveillance has everything to do with sports medicine. Sports Med. 1997;24: 169-171.
5. Finch CF, Valuri G, Ozanne-Smith J. Injury surveillance during medical coverage of sporting events--development and testing of a standardised data collection form. J Sci Med Sport. 1999;2:42-56.
6. Nook BC, Nook DD. Demographics of athletes and support personnel who used chiropractic physicians at the 6th All African Games. J Sports Chiro Rehab. 1997;11(4): 136-139.
7. Nook DD, Nook BC. A report of the 2009 World Games injury surveillance of individuals who voluntarily used the International Federation of Sports Chiropractic delegation. J Manipulative Physiol Ther. 2011;34: 54-56.
8. Nook DD, Nook EC, Nook BC. Utilization of chiropractic treatment at the World Games 2013. J Manipulative Physiol Ther. 2016;39: 693-704.
9. Australian Chiropractic Association. Sports Chiropractic. 2021.
10. Proceedings of the United States Olympic Academy XI. The Role of the Chiropractic Physician in the Sports Medical Team. 1987:246-252.
11. CSIT World Games. About Us. 2023.
12. International Federation of Sports Chiropractic. About FICS. 2024.
13. International Council of Sport Science and Physical Education. 2024.
14. Bell DR, Padua DA. Influence of ankle dorsiflexion range of motion and lower leg muscle activation on knee valgus during a double-legged squat. J Athletic Training. 2007;42: S84.
15. Junge A, Engebretsen L, Alonso JM, et al. Injury surveillance in multi-sport events: the International Olympic Committee approach. Br J Sports Med. 2008;42: 413-421.
16. Salaffi F, Stancati A, Silvestri CA, Ciapetti A, Grassi W. Minimal clinically important changes in chronic musculoskeletal pain intensity measured on a numerical rating scale. Eur J Pain. 2004;8(4): 283-291.
17. Moreau WJ, Nabhan DC. Organization and multidisciplinary work in an Olympic high-performance center in USA. Revista Médica Clínica Las Condes. 2012;23:337-342.
18. Bigouette JP, Owen EC, Greenleaf J, James SL, Strasser NL. Injury surveillance and evaluation of medical services utilized during the 2016 Track and Field Olympic Trials. Orthop J Sports Med. 2018;6: 2325967118817843.
19. Dvorak J, Junge A, Grimm K, Kirkendall Q. Medical report from the 2006 FIFA World Cup Germany. Br J Sports Med. 2007;41: 578-581.
20. Vanhegan I, Palmer-Green D, Soligard T, et al. The London 2012 Summer Olympic Games: an analysis of usage of the Olympic Village 'Polyclinic' by competing athletes. Br J Sports Med. 2013;47(7): 415-419.
21. Beliveau PJH, Wong JJ, Sutton DA, et al. The chiropractic profession: a scoping review of utilization rates, reasons for seeking care, patient profiles, and treatment provided. Chiropr Man Ther. 2017;25:35.