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Multidisciplinary Sports Medicine Services: An Institutional Case Study of Indonesia Sport Medicine Centre

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ABSTRACT

Purpose of the study: This study examines the institutional structure, operational mechanisms, service programs, and contributions of the Indonesia Sport Medicine Centre (ISMC) Jakarta in managing sports injuries and supporting national athletic performance.

Methodology: A descriptive qualitative case study design was employed. Data were collected through in-depth semi-structured interviews with key institutional informants, direct field observations of ISMC facilities and operational processes, and systematic analysis of institutional documents including patient records and rehabilitation logs. Source triangulation and the Miles and Huberman interactive analysis model were applied to ensure validity and credibility of findings.

Main Findings: ISMC operates as Indonesia's first integrated private sports medicine clinic under PT Indonesia Sport Venture (ISV), supported by a multidisciplinary team of sports medicine specialists, physiotherapists, and sports science graduates. Core services include injury rehabilitation, Direct VO_2max testing, biomechanical and postural assessment (DIERS Formetric 4D), medical fitness, and corporate wellness. Between 2012 and 2015, ISMC treated 1,484 patients, including national athletes from multiple sports. Partnerships with PB PABSI, PRSI, PB Djarum, and PERSIB supported elite athlete screening and injury management.

Novelty/Originality of this study: This study contributes to the limited literature on sports medicine institutions in Indonesia by providing an institutional analysis of ISMC integrated with recent developments in global sports medicine. The study highlights the strategic importance of multidisciplinary sports medicine systems in enhancing athlete rehabilitation, injury prevention, and national sports performance.

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1. INTRODUCTION

The role of sports medicine in supporting elite athletic performance has expanded substantially in recent decades. Contemporary evidence indicates that the integration of sports medicine, physiotherapy, and sports science within a coordinated multidisciplinary framework is essential for optimizing athlete health outcomes, reducing injury burden, and accelerating safe return-to-sport processes [1]-[4]. Countries with well-established

sports medicine systems such as the United Kingdom, Australia, and the United States consistently demonstrate superior athlete performance outcomes in international competitions, suggesting that institutional capacity in sports medicine is a critical determinant of national sporting success [5], [6].

Sports injuries remain a persistent challenge in both elite and developmental sport contexts. Beyond the physical consequences, injuries impose significant psychological distress on athletes and disrupt team performance and long-term athlete development pathways [7]-[10]. Evidence-based rehabilitation approaches, including functional movement training and neuromuscular control interventions, have been shown to reduce reinjury risk and improve return-to-sport efficiency [11]-[14]. In parallel, advances in sports science technologies such as three-dimensional biomechanical analysis, direct VO_2max assessment, and movement screening systems have improved the precision of injury diagnosis and rehabilitation monitoring [15], [16].

Despite these advancements, the effectiveness of sports medicine systems is highly dependent on institutional organization and service integration. In many countries, including developing sport systems, sports medicine services are still fragmented, with weak coordination between medical, physiotherapy, and performance units [17]-[19]. This fragmentation often leads to inconsistent rehabilitation pathways and suboptimal decision-making in athlete return-to-play processes.

In Indonesia, the development of sports medicine infrastructure remains limited compared to the growing demands of elite and competitive sport participation. National sport development programs such as PRIMA have emphasized technical and physical training aspects, while structured integration of sports medicine services is still concentrated in major urban centers and elite institutions [20], [21]. As a result, many athletes face delayed access to specialist care, inconsistent rehabilitation protocols, and premature return-to-sport decisions influenced more by competition schedules than clinical readiness criteria [22], [23]. These conditions highlight a systemic gap between performance demands and medical support systems in Indonesian sport.

Within this context, the Indonesia Sport Medicine Centre (ISMC) Jakarta represents a pioneering private institution that attempts to address these structural limitations through an integrated sports medicine model. Established in 2012 under PT Indonesia Sport Venture (ISV), ISMC provides multidisciplinary services including sports injury rehabilitation, preventive screening, performance testing, and health promotion programs for both elite athletes and active populations [24], [25]. The institution is uniquely positioned within a broader sports business ecosystem, enabling direct access to professional teams and national athletes.

However, despite its strategic role, ISMC has received limited academic attention in indexed scientific literature. Existing research in sports medicine predominantly focuses on injury epidemiology, biomechanical risk factors, and the effectiveness of specific rehabilitation interventions, while institutional-level analyses of how sports medicine centers operate within national sport ecosystems remain scarce, particularly in Indonesia [26]-[29]. This represents a significant knowledge gap, especially given the increasing policy emphasis on sports science and medicine as essential components of elite performance systems [30], [31].

The urgency of this study lies in the need to understand how integrated sports medicine institutions function within resource-constrained and developing sport systems, and how such models contribute to athlete care and national sports performance. In many developing countries, the limited availability of coordinated sports medicine services creates challenges in injury prevention, rehabilitation management, and evidence-based decision-making for athletes. Addressing this gap is essential for informing policy development, strengthening institutional capacity, and improving the structural integration of sports medicine services within national sport systems.

The novelty of this study lies in presenting an institutional-level analysis of a multidisciplinary sports medicine centre in Indonesia, moving beyond conventional injury-focused research toward an examination of organisational structure, service integration, and its role within a national sports development ecosystem. Unlike previous studies that primarily evaluate clinical interventions or athlete outcomes, this study explores how a sports medicine institution functions as a coordinated system involving medical, rehabilitation, and performance-support services.

Accordingly, this study aims to provide an in-depth institutional case analysis of ISMC Jakarta with the following objectives: (1) to describe its institutional structure and governance model; (2) to examine its operational mechanisms and service delivery system; (3) to analyze its contribution to national athlete rehabilitation and sports performance; and (4) to identify systemic challenges and policy implications for the development of sports medicine infrastructure in Indonesia. This study contributes to the limited body of literature on sports medicine institutions in developing countries and provides practical insights for strengthening integrated sports medicine systems at both institutional and national levels.

2. RESEARCH METHOD

2.1 Research Design

This study employed a qualitative descriptive design using a single-institution case study approach, with the Indonesia Sport Medicine Centre (ISMC) Jakarta as the unit of analysis. A descriptive qualitative design was

selected because the research questions required a contextually grounded account, expressed in words rather than numerical measures Case study methodology is particularly appropriate when investigating contemporary phenomena within real-world contexts in which the boundaries between phenomenon and context are not clearly defined [32]-[36], of how the institution exists, how it is structured, and how it functions within the Indonesian sports medicine ecosystem. The case study method is particularly suited to investigating a contemporary phenomenon within its real-world context, where the boundaries between phenomenon and context are not clearly delineated, and ISMC was chosen purposively as the country's first integrated private sports medicine clinic. The overall design, data sources, triangulation strategy, and analytic workflow are summarised in Figure 1.

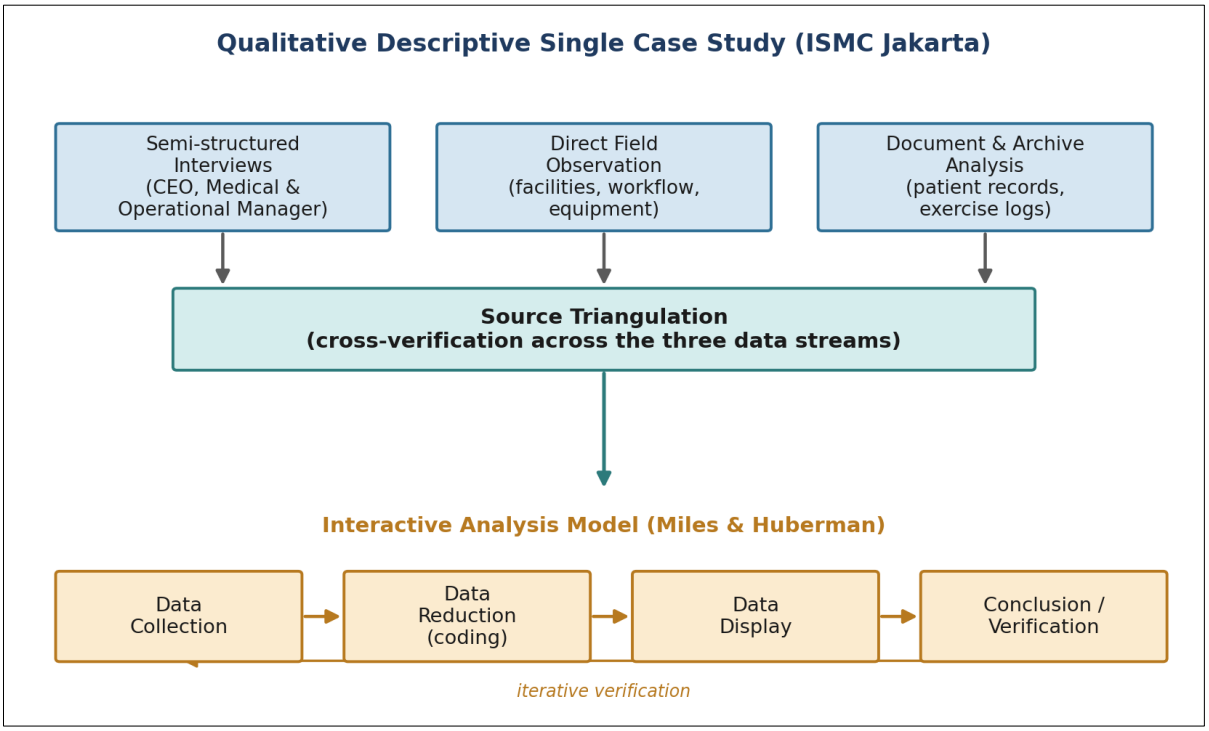


Figure 1. Research design and analytic workflow of the study

As illustrated in Figure 1, the study drew on three parallel streams of evidence that converged on a single point of cross-verification before analysis. Semi-structured interviews with the CEO, the Medical Manager, and the Operational Manager captured the institution's governance, clinical function, and service delivery from those with direct managerial knowledge. Direct field observation documented the physical infrastructure, equipment, and operational workflows as they occurred in practice, while document and archive analysis examined patient records, rehabilitation exercise logs, and organisational reports. Each stream was treated as an independent line of inquiry so that claims emerging from one source could be tested against the others.

These three streams fed into source triangulation, in which the interview, observational, and documentary data were systematically compared to confirm convergent findings and to flag any inconsistencies for further scrutiny. This step was central to establishing the credibility of the account, ensuring that conclusions rested on corroborated evidence rather than on any single informant or document.

The triangulated material was then analysed using the interactive analysis model of Miles and Huberman, which proceeds through four interrelated stages: data collection, data reduction through coding, data display, and conclusion drawing and verification. Crucially, these stages were not strictly linear but iterative; as the diagram indicates, the verification stage fed back into earlier stages, allowing emerging interpretations to be re-examined against the data and refined until the findings were internally consistent and stable. This cyclical movement between reduction, display, and verification continued until no substantively new insight emerged, providing the analytic basis for the results presented in the following section.

2.2 Research Setting and Subject

The research was conducted at ISMC, located at the Senayan Golf Driving Range, Gelora Bung Karno Sports Complex, Jl. Pintu V, Central Jakarta. The subject of the study was ISMC as an institution, examined in terms of its existence as a sports medicine centre, its organisational form, and the function and working mechanisms of the institution in supporting national sporting achievement.

2.3 Informants and Sampling

Informants were selected using purposive sampling combined with a snowball (respondent-driven) technique [37], in which initial key informants identified further individuals with direct knowledge of the institution's management and clinical operations. Sampling continued until data saturation, the point at which additional sources yielded no substantively new information. The principal data sources are listed in Table 1.

Table 1. Informants and primary data sources

Source	Role / Type	Information obtained
Chief Executive Officer	Sports medicine specialist; founder of ISMC	Institutional existence, vision, role in national achievement
Medical Manager	Sports medicine specialist	Clinical function, service programmes, working mechanisms
Operational Manager	Operations lead	Organisational form, governance, staffing
Institutional documents	Patient records, exercise logs, reports, brochures	Patient profile, partnerships, clinical workflow

As shown in Table 1, the three human informants were selected for their complementary vantage points strategic, clinical, and operational, so that the institution could be examined from leadership, medical, and managerial perspectives at once. The institutional documents served as a fourth, non-reactive source, allowing the informants' accounts to be checked against contemporaneous records. Together, these sources provided the breadth and corroboration needed to address the research questions, and the data drawn from them were gathered through the techniques described below.

2.4 Data Collection Techniques

Three complementary techniques were used to enable methodological and source triangulation. First, in-depth semi-structured interviews were conducted with the key informants using an open-ended, conversational format guided by a pre-prepared instrument; sessions were audio-recorded with consent and transcribed verbatim, supplemented by field notes. Second, direct field observation was undertaken across multiple visits to document the physical infrastructure, rehabilitation equipment, clinical workflows, and operational processes [38]. Third, document and archive analysis was performed on patient records, rehabilitation exercise logs, service brochures, and records of partnerships with sports federations. To strengthen the validity of the findings, data-source triangulation was applied, cross-verifying information obtained from interviews, observation, and documents [39].

2.5 Data Analysis

Data were analyzed using the interactive analysis model of Miles and Huberman, comprising four iterative stages: data collection, data reduction, data display, and conclusion drawing and verification [40]-[42]. During data reduction, raw material from interviews, observation, and documents was coded according to a classification scheme aligned with the research questions and then categorized to build coherent thematic units. The reduced data were organized into structured descriptive displays to facilitate pattern identification, and conclusions were drawn progressively and verified through triangulation across the multiple data sources, ensuring the internal consistency and credibility of the findings.

3. RESULTS AND DISCUSSION

3.1 Institutional Profile and Governance

ISMC was established in 2011–2012 as a private sports medicine clinic operating under PT Indonesia Sport Venture (ISV), a subsidiary of the Mahaka Group. Within this ecosystem, ISV also oversees the Satria Muda Pertamina basketball club, Indonesia Warriors, and the Indonesia Basketball Camp, so that ISMC is institutionally embedded within a larger sports conglomerate. This configuration provides the clinic with a stable operational base and direct access to elite athlete populations that are not commonly available to stand-alone facilities. The clinic occupies a 400 m² facility within Jakarta's principal sports district and is led by a CEO who is a sports medicine specialist, supported by a multidisciplinary team of sports medicine specialists, licensed physiotherapists, and sports science graduates. The governance and team structure are presented in Figure 2.

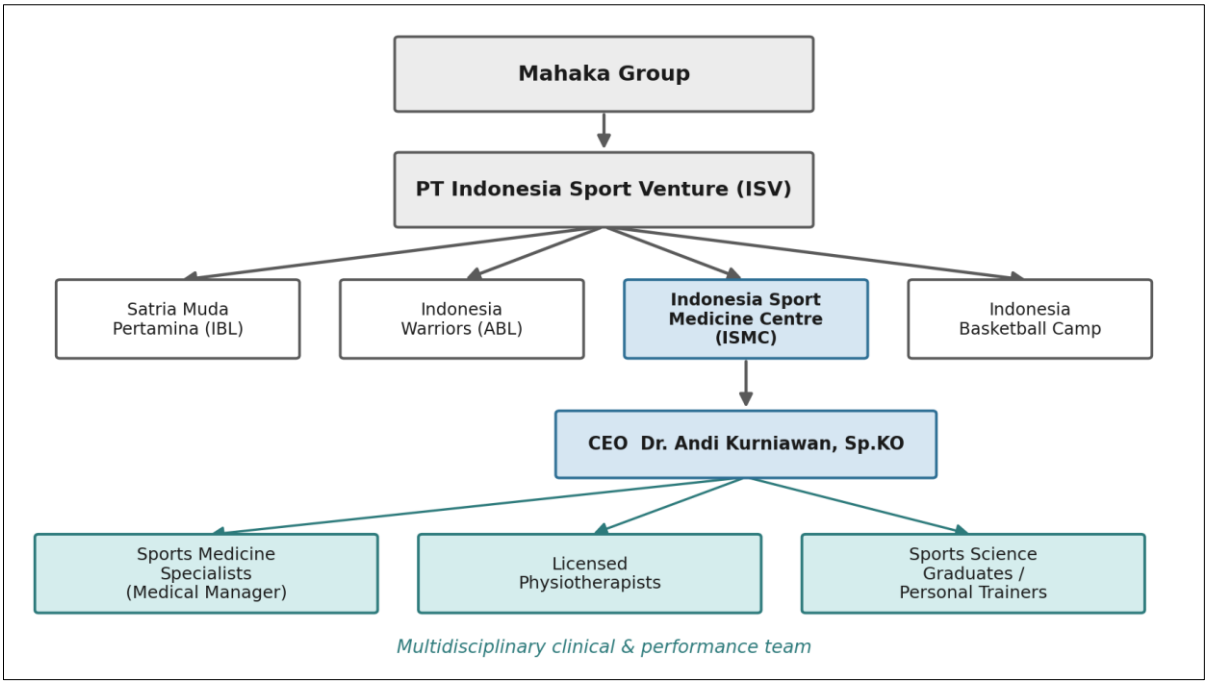


Figure 2. Institutional governance and multidisciplinary team structure of ISMC

This organizational configuration represents a unique governance approach in which sports medicine services are positioned as an integral component of athlete development, rather than as a standalone clinical support function. The integration of medical specialists, physiotherapists, and sports science professionals within a single institutional structure allows for more coordinated decision-making, ongoing monitoring, and a more comprehensive approach to athlete health management. This model reflects contemporary trends in elite sports medicine, where multidisciplinary collaboration is increasingly recognized as essential for injury prevention, rehabilitation optimization, and long-term performance development.

3.2 Facilities and Service Programmes

ISMC delivers six categories of integrated sports medicine services, supported by both conventional physiotherapy modalities and advanced diagnostic technologies. The facility was designed to accommodate the continuum of athlete care, ranging from injury assessment and rehabilitation to preventive screening and performance optimisation. The infrastructure includes a purpose-built 20 m shock-absorbing jogging track, two physician examination rooms, an eight-bed therapy and sports-massage room equipped with therapeutic ultrasound, TENS, and short-wave diathermy, as well as a strength and conditioning area containing treadmills, static cycles, and resistance machines. These facilities allow medical, rehabilitation, and performance-related services to be conducted within a coordinated environment. The service portfolio and supporting technologies available at ISMC are summarised in Table 2.

Table 2. Service programmes and supporting technology at ISMC

Service programme	Description	Key technology
Sports injury management	Diagnosis, therapeutic modalities, functional rehabilitation and return-to-sport programming	Ultrasound, TENS, SWD
Medical fitness programme	Exercise-based health programmes under the "Exercise is Medicine" framework	Fitness assessment
Corporate wellness programme	Workplace health and fitness services	—
Supplementary examination & treatment	Platelet-rich plasma (PRP), isometric muscle-strength testing	DIERS Myoline
Direct VO_2max testing	Direct cardiorespiratory performance assessment	H/P Cosmos treadmill; Cortex software
Foot scan & postural analysis	Three-dimensional optical stereographic spinal and postural measurement	DIERS Formetric 4D

The service portfolio demonstrates ISMC's integrated approach to sports medicine by combining injury management, preventive screening, rehabilitation, and performance assessment within a single institutional framework. The availability of advanced technologies, including DIERS Formetric 4D postural analysis and direct

VO_2max testing, represents a notable advantage in the Indonesian context by supporting more accurate injury-risk identification, functional assessment, and individualised rehabilitation planning. This integration enables ISMC to move beyond conventional treatment-based services toward a preventive and performance-oriented model, reflecting contemporary multidisciplinary approaches in elite sports medicine.

3.3 Clinical Operations and Injury-Management Pathway

The injury-management protocol at ISMC follows a structured, evidence-based clinical pathway. Care begins with anamnesis and physical examination, proceeds through supporting diagnostics where indicated (MRI or X-ray, laboratory tests, and fitness or functional movement screening), and leads to a formal injury diagnosis. An individualised therapy programme is then formulated, combining physiotherapy modalities with a functional rehabilitation programme built on kinetic-chain exercise, core stabilisation, neuromuscular efficiency, and integrated movement. Progress is monitored through a documented exercise log that records each therapy session under physician supervision, providing a traceable record and a transparent mechanism of physician–physiotherapist coordination. Return-to-sport decisions are made on the basis of clinical readiness testing. This pathway is depicted in Figure 3.

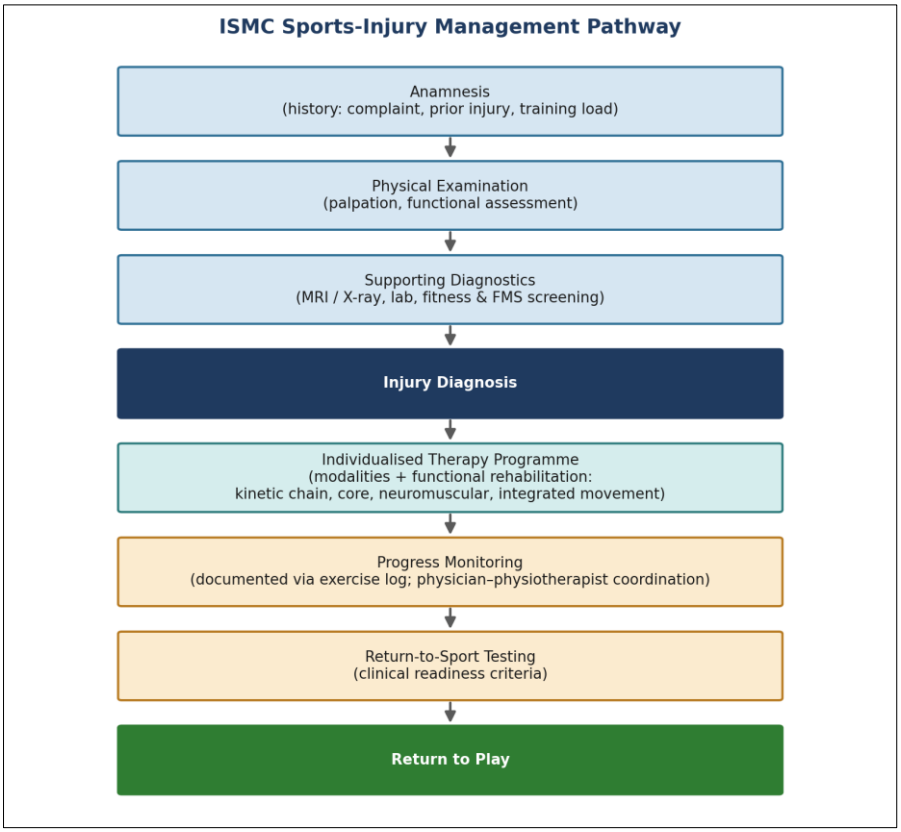


Figure 3. Clinical sports-injury management pathway at ISMC, from intake to return to play

A central feature of ISMC's injury-management pathway is the integration of clinical treatment, functional rehabilitation, and continuous monitoring rather than focusing solely on symptom reduction. The exercise-log system provides structured documentation that supports communication between physicians and physiotherapists, ensuring continuity and consistency throughout the rehabilitation process. This approach reflects contemporary athlete-centred sports medicine practice, where evidence-based assessment, interdisciplinary coordination, and functional readiness are essential components of safe return-to-sport decision-making.

3.4 Patient Profile and National Athlete Rehabilitation

Between June 2012 and June 2015, ISMC treated a total of 1,484 patients, encompassing both elite athletes and the general sports-active population. Among these, 29 national-level athletes were documented across eight sports. To preserve patient confidentiality, individual identities and case-level diagnoses are not reproduced; instead, the documented national-athlete cases are summarised in aggregate by sport in Figure 4 and by anatomical region of injury in Table 3.

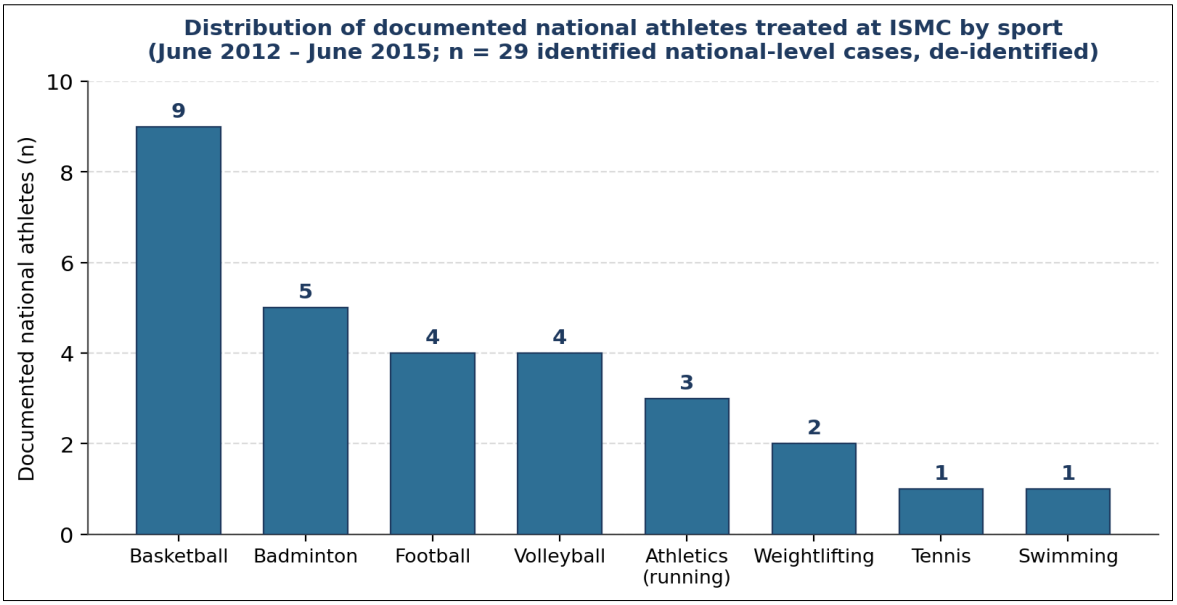


Figure 4. Distribution of documented national-level athletes treated at ISMC

Table 3. Distribution of documented national-athlete cases by anatomical region of injury (de-identified; n = 29)

Anatomical region	Cases (n)	Share (%)
Knee (ACL, meniscus, cartilage, PFPS, OA, jumper's knee, MCL/LCL)	14	48.3
Hip / groin	4	13.8
Ankle	3	10.3
Foot (plantar fascia, metatarsal)	2	6.9
Shoulder	2	6.9
Wrist	2	6.9
Lower leg (tibial stress fracture)	1	3.4
Lumbar spine	1	3.4
Total	29	100.0

The distribution of documented cases indicates that knee injuries represent the dominant injury category, accounting for almost half of the national-athlete cases managed at ISMC. This pattern reflects the high vulnerability of the lower extremities in sports involving jumping, sprinting, rapid acceleration, and directional changes. The finding also highlights the important role of ISMC in managing complex knee rehabilitation cases, including post-surgical anterior cruciate ligament reconstruction, among elite athletes.

3.5 Institutional Partnerships and Contribution to National Achievement

ISMC's contribution to national sporting achievement is operationalised through formal partnerships with national federations and elite clubs, each taking a different form along a preventive–curative–rehabilitative continuum, as summarised in Table 4.

Table 4. Institutional partnerships and modes of collaboration.

Partner	Sport	Mode of collaboration
PB PABSI	Weightlifting	Primary injury-management referral; support in preparation for the 2016 Rio Olympics
PRSI	Swimming	Injury-risk screening and prevention programmes for developing athletes
PB Djarum	Badminton	Injury management for club athletes referred to ISMC
PERSIB Bandung	Football	Pre-contract health and injury-risk screening, including foreign recruits
Satria Muda / Indonesia Warriors	Basketball	Ongoing integrated team athlete-health management

These partnerships demonstrate a functioning continuum of care: preventive screening for federations such as PRSI and PERSIB, curative and rehabilitative management for PABSI and PB Djarum, and continuous in-house athlete-health management for the affiliated basketball clubs. Collectively they illustrate how a single

multidisciplinary institution can be integrated into the national sports ecosystem to support athlete availability and competitive readiness.

3.6 Discussion

ISMC Jakarta represents an integrated sports medicine institution embedded within a structured sports business ecosystem under PT Indonesia Sport Venture (ISV), a subsidiary of the Mahaka Group. Established in 2012 in Jakarta's central sports district, the clinic operates through a multidisciplinary governance structure involving sports medicine physicians, physiotherapists, and sports science professionals. This configuration reflects an integrated performance health management model widely recommended in elite sport systems, where medical and performance services are coordinated within a unified framework to optimize athlete care, rehabilitation, and return-to-sport processes [43], [44]. Its positioning within a broader sports conglomerate further strengthens institutional capacity by enabling direct access to elite athlete populations that are typically unavailable to independent clinical facilities [45], [46].

The service model implemented at ISMC demonstrates a comprehensive and evidence-based approach to sports medicine, integrating injury management, rehabilitation, performance monitoring, and preventive health services. Clinical care follows a structured pathway beginning with anamnesis, physical examination, and diagnostic imaging where necessary, followed by individualized rehabilitation programming. Rehabilitation is grounded in functional movement principles, including kinetic chain training, core stabilization, neuromuscular control, and sport-specific movement integration. Continuous documentation through structured exercise logs ensures transparency and interprofessional coordination, aligning with contemporary standards in athlete health management [47], [48]. Beyond injury care, ISMC also provides medical fitness programs, corporate wellness services, and advanced diagnostic modalities such as platelet-rich plasma therapy, direct VO_2max testing, isometric strength analysis using DIERS Myoline, and three-dimensional postural assessment using DIERS Formetric 4D systems [49], [50].

The integration of advanced diagnostic technologies represents a significant development in the Indonesian sports medicine context, particularly in improving diagnostic precision and rehabilitation planning. Evidence from high-performance sport systems indicates that biomechanical and physiological assessment tools play a critical role in identifying injury risk factors and optimizing individualized recovery strategies [51], [52]. However, despite this technological advancement, access remains geographically concentrated in Jakarta, highlighting persistent inequalities in sports medicine distribution across regions in Indonesia [53], [54].

Between 2012 and 2015, ISMC treated 1,484 patients, including 29 national-level athletes across multiple sports. The dominance of lower-limb injuries, particularly knee-related pathology, reflects established epidemiological patterns in high-intensity sports involving jumping, sprinting, and cutting movements. These cases illustrate ISMC's central role in managing complex sports injuries, including post-operative rehabilitation and return-to-competition preparation for elite athletes, thereby contributing to national athlete availability and performance continuity.

ISMC also functions as a strategic node within Indonesia's elite sport ecosystem through formal collaborations with national federations and professional clubs. These partnerships span preventive screening (e.g., swimming and football), curative rehabilitation (e.g., weightlifting and badminton), and integrated athlete health management (basketball clubs). This continuum of care reflects modern sports medicine systems in which prevention, treatment, and rehabilitation are structurally integrated to support long-term athlete development and competitive readiness [55], [56].

Although previous sports medicine research has extensively examined injury epidemiology, rehabilitation interventions, and athlete outcomes, limited attention has been directed toward understanding how sports medicine institutions are structured, governed, and operationalized within developing sport systems. This research gap is particularly relevant in countries where sports medicine infrastructure is still developing and where institutional models capable of integrating medical, rehabilitation, and performance services remain insufficiently documented. The present study addresses this gap by providing an institutional-level analysis of ISMC Jakarta as a real-world example of integrated sports medicine implementation in Indonesia.

The novelty of this study lies in its examination of sports medicine not merely as a clinical service but as an institutional system involving governance, multidisciplinary collaboration, technological integration, and athlete-care pathways. Unlike previous studies that primarily focus on specific treatment techniques or injury outcomes, this study provides insight into how an integrated sports medicine centre operates within a national sports ecosystem. The findings demonstrate that the effectiveness of sports medicine services depends not only on clinical expertise but also on organizational structure, coordination mechanisms, and strategic partnerships between healthcare providers and sports organizations.

A critical finding of this study is that ISMC represents a functional model for addressing structural limitations within Indonesia's sports healthcare system. Its multidisciplinary configuration aligns with international best practices emphasizing collaboration between medical, therapeutic, and performance science professionals to optimize athlete health outcomes [57], [58]. The institution also reflects a biopsychosocial

understanding of sports injury management by recognizing that successful rehabilitation requires interaction between physical recovery, psychological readiness, and social support systems.

Nevertheless, the implementation of integrated sports medicine systems faces important challenges. One major issue is the pressure placed on medical teams to approve premature return-to-sport decisions due to competitive schedules rather than objective clinical readiness criteria [59], [60]. This reflects a broader ethical challenge in elite sport, where athlete health protection responsibilities may conflict with competitive demands [61], [62]. Furthermore, the absence of standardized outcome monitoring systems, including reinjury rates, rehabilitation duration, and return-to-sport success indicators, limits the ability to evaluate institutional effectiveness and strengthen evidence-based decision-making.

The findings have several practical and policy implications. At the clinical level, ISMC demonstrates that multidisciplinary collaboration can improve continuity, efficiency, and individualization of athlete care. At the institutional level, the integration of advanced diagnostic technologies and structured rehabilitation pathways provides a potential framework for developing comprehensive sports medicine services. At the policy level, the findings suggest that sports medicine infrastructure should be considered an essential component of national athlete development systems rather than merely a supporting service. Expanding similar models beyond major urban centres may contribute to reducing disparities in access to specialized sports healthcare across Indonesia.

Several limitations must be acknowledged. As a single-case study conducted in one institution in Jakarta, the findings are context-specific and cannot be broadly generalized, although they may be transferable to similar high-performance sport settings [63]. The retrospective nature of the data (2012–2015) limits the ability to capture recent institutional developments, including governance changes or external disruptions such as the COVID-19 pandemic. Furthermore, the limited number of key informants restricts the diversity of stakeholder perspectives, particularly from frontline clinicians, athletes, and federation administrators. In addition, the absence of standardized quantitative outcome measures limits the ability to evaluate clinical effectiveness in measurable terms. Future research should adopt mixed-methods and multi-site designs incorporating standardized performance and rehabilitation outcome indicators to strengthen evidence-based evaluation of integrated sports medicine systems.

4. CONCLUSION

This study provides an institutional analysis of ISMC Jakarta as Indonesia's pioneer integrated private sports medicine clinic. The findings demonstrate that ISMC has developed a multidisciplinary sports medicine model integrating injury rehabilitation, biomechanical assessment, performance testing, and athlete health management through collaboration with national sports organizations. The institutional structure, clinical pathways, and professional integration of sports medicine specialists, physiotherapists, and sports science professionals support comprehensive athlete care and return-to-sport preparation. The study highlights that ISMC contributes to strengthening Indonesia's sports healthcare system by establishing a preventive, curative, and rehabilitative continuum of care. However, challenges remain, particularly related to premature return-to-sport decisions influenced by competitive demands and the limited availability of standardized clinical outcome data for institutional evaluation. These limitations indicate the need for stronger monitoring systems and evidence-based decision-making frameworks within sports medicine services.

Based on these findings, several recommendations are proposed. Sports organizations should integrate sports medicine teams as permanent components of athlete development systems rather than relying on temporary consultation models. National sports policymakers should encourage the development of integrated sports medicine centres through sustainable public–private partnerships to improve access beyond major urban areas. Educational institutions should strengthen interdisciplinary training pathways combining sports medicine, physiotherapy, and sports science. Future research should employ longitudinal and multi-centre approaches to evaluate rehabilitation outcomes, athlete experiences, and the long-term effectiveness of integrated sports medicine models in Indonesia.

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AUTHOR CONTRIBUTIONS

Conceptualization, A.N.W.; Methodology, A.N.W. and U.C.B.; Investigation, A.N.W., M.M.K., Z.M.N., and U.C.B.; Data Curation, A.N.W. and M.M.K.; Formal Analysis, A.N.W.; Literature Review and Synthesis, A.N.W., M.M.K., Z.M.N., and U.C.B.; Writing – Original Draft Preparation, A.N.W.; Writing – Review &

Editing, A.N.W., M.M.K., Z.M.N., and U.C.B.; Visualization, M.M.K. and Z.M.N.; Project Administration, A.N.W.; Supervision, A.N.W.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

Not applicable.

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