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The Primary Care Sports and Exercise Medicine Physician: A Key Role in a Continuum Remodeling Medical Career

Felipe Hardt and Rafael Cristiano Geiss Santos

Abstract

The characteristics of the primary care sports and exercise medicine physicians (SEMP) have been evolving over the past decades. Nowadays, the sports medicine physician is a highly qualified professional, with a slightly different spectrum of training background according to which part of the globe he/she specialized. Uniquely trained to provide care along the continuum of injuries and illnesses, from the acute evaluation to return to sport, to manage complications and coexisting medical issues, the SEMP are in a critical position to provide a comprehensive management plan to optimize health and performance for the athletes and to develop healthy lifestyles by counseling on physical activity and exercise within the healthcare system. The objective of this chapter is to provide the readers a general overview of the SEMP training, the skills and abilities the primary care physician must pursue and qualify, and its role from recreational sports to elite level and as a healthy lifestyle promoter.

Keywords: primary care, sports and exercise medicine, health promotion, physical activity, athlete, performance

1. The primary care sports and exercise medicine physician: overview, characteristics, and particularities

In the past, sports medicine has been understood of as a medical field solely related to the elite, professional, or Olympic competitive athletes and not accessible for the regular person. Lately, sports medicine has grown from a special interest area in healthcare to an established profession in the medical career [1, 2].

Currently, sports medicine might be defined as the medical specialty concerned with the care and well-being of athletes and those engaged in physical activity, working as a health manager providing a comprehensive management plan to optimize health and performance for the athletes and to develop healthy lifestyles by counseling on physical activity and exercise within the healthcare system [1–4].

The specialty as a primary care field encompasses many different disciplines and areas of expertise, such as internal medicine, family medicine, orthopedics, exercise science, cardiology, neurology, pediatrics, and emergency medicine. Sports medicine physicians, with their focus on sports and exercise medicine, are uniquely trained to provide such expertise to patients and medical colleagues [3, 5].

As consultants, they can be of great help in evaluating and treating active patients by efficiently connecting the different medical fields. Primary care sports medicine physicians can facilitate early diagnosis and management, thus accelerating recovery and avoiding long-term disability, providing adequate management, and eliminating the need for further consultation.

Patients can be seen quickly and cost-effectively. Therefore, sports doctors can reduce long waiting lists, solve the shortage of other specialists, and reduce the rising costs of healthcare. There is clearly an important role for the knowledge of sports medicine in the integral care of patients [1, 6].

However, the specialist physician in sports medicine is not always well understood by fellow doctors, health workers, team managers, and politicians. It is very challenging to change the current paradigms based on existing diseases in the health systems and the beliefs of the population, where the pharmaceutical industry has significant financial and political influence.

A consistent, sustained, and coordinated effort by the wider medical community, aligned with a bold political vision to change health systems and society's culture to promote and support physical activity, is a crucial requirement.

2. A general overview of the SEMP training and medical background

2.1 Undergraduate training

As a general overview, medical students usually do not have many learning opportunities in sports medicine during regular medical programs. Previous publications evidenced that medical students would favor having more exposure to sports and exercise medicine and even suggest compulsory sports medicine education. Similarly, general practitioners feel inadequately trained to practice sports and exercise medicine [7–11].

Besides this hidden barrier, sports medicine is being more recognized as a potentially attractive career to be pursued by a growing number of young doctors all over the world. Sports and exercise medicine is a multidisciplinary specialty, which has the potential to provide a medical student with valuable learning opportunities at various stages of his/her training [1, 9, 12].

An increase in demand for sports medicine training would facilitate on understanding the specific field, its demands, and possible career pathways for the graduating physician. Program directors of the universities and medical schools should include sports and exercise medicine in their curricula and use the expertise of sports medicine physicians in their community. Lectures and clinical skill workshops on sports-related illness, injuries, and musculoskeletal examination should be included in the undergraduate years, complemented later by electives and rotations in sports medicine [7, 9].

2.2 Postgraduate training

The profession is moving firmly from the previous concept of “athlete’s medicine” toward a vision where the main concern of specialists is physical activity promotion. The current definition of sports and exercise medicine can be extended to public health, presenting greater impact on improving the overall health of the population and assisting the expansion of the specialty [1, 4, 12–14].

A high-quality structured education in the field of sports and exercise medicine should be the critical goal for practicing physicians. Primary care sports medicine fellowship programs are designed to provide comprehensive training in preventing

and treating musculoskeletal and non-musculoskeletal conditions in athletes and active individuals [3].

The specific pathways and entrance criteria for the specialty might be slightly different depending on the country and medical boards. Although most of the programs have their organization and structure, there are no universal criteria established to describe benchmarks for quality improvement or standards of excellence. Every program has its specific strengths [5, 12, 15].

For instance, primary care sports medicine physicians in Canada and the United States follow a 1-year specialized fellowship training program. Practitioners can enter these programs via many routes, including other specialties, such as internal medicine, pediatrics, emergency medicine, physical medicine, and rehabilitation [3, 5].

On the other hand, New Zealand, Australia, and Brazil have similar training criteria, as do many European nations. In those countries, physicians can pursue the sports medicine residency as a 3–4-year program, immediately after graduating from medical school [5, 12, 15].

The sports medicine programs must provide specific areas of knowledge to properly qualify the sports medicine physician, as quality education should be the goal of all fellowship/residency programs. All sports medicine physicians must have comprehensive training in preventing and treating musculoskeletal and non-musculoskeletal conditions in athletes and active individuals [3, 5, 12].

Fellowships and residencies usually include training areas of internal medicine, pediatrics, clinical emergencies across the lifespan, rehabilitation, physiatry, orthopedics, exercise physiology, cardiology, pulmonology, rheumatology, and sports nutrition and practical training in events, clubs, specific sports, general exercise, and sports medicine care. Programs must also include theoretical education, including organizing/leading discussions, seminars, and clinical case reviews and attending lectures and medical ethics courses [3, 5, 12].

3. Sports and exercise medicine physician-specific training, skills, and abilities

This section does not intend to determine the specific contents of the sports medicine programs. Its purpose is to demonstrate some of the core competencies of the sports medicine training and to provide additional information for the physician with interest in the specific field of practice [3, 5, 12].

4. Essential competencies

4.1 Patient care and medical knowledge

The primary care sports and exercise medicine fellow/resident must be trained inpatient care to be able to diagnose and provide treatment of medical illnesses and injuries related to sports and exercise and proficiently perform all procedures essential to the practice of sports medicine. Medical development must include also biomedical, epidemiological, and social/behavioral sciences and its application to patient care [3, 5, 12].

The training doctor must be exposed to a different setting and clinical situations, with broad clinical experience, high patient load, and follow-ups, including different age groups, sports, genders, socioeconomic levels, types of sports, and levels of participation.

4.2 Event coverage

Fellows/residents should be exposed to event coverage in a variety of settings during their training year(s). These include covering youth or senior/professional sports teams; participating in elite-level Olympic sports, such as athletics, swimming, and gymnastics; and coverage of mass events, such as marathon or triathlon major events.

It is extremely important to participate in a variety of sports to become accustomed to the athletic environment and potential injuries that could be sustained during the events, possibly including coverage to contact sports to be exposed to concussion and other contact injuries.

4.3 Pre-participation examination (PPE)

Programs of excellence will have training doctors to perform pre-participation examinations for a variety of athletes and disciplines, including team sports, individual sports, elite, and young athletes.

4.4 Specialty and orthopedics rotations

Residents/fellows rotate with subspecialists; including sports cardiology; musculoskeletal radiology; rehabilitation; physical/occupational therapy; exercise physiology and performance; neurology; rheumatology; nutrition; psychology; orthopedic surgeons of shoulder, elbow, wrist/hand, hip, knee, and foot/ankle; and pediatric surgeons.

4.5 Acute injury and fracture management

This provides exposure to acute fracture and dislocation management including assessment and diagnosis, splinting and casting.

4.6 ECG interpretation and exercise testing

These include training about the specific adaptations in the athlete's heart, normal changes and pathological abnormalities. These perform and interpret the exams, provide proper care, and identify the need for continued investigations and referrals as needed.

4.7 Exercise prescription

Training on exercise prescription in the different population, their requirements, and specific needs.

4.8 Sports medicine procedures and sports ultrasound

Regarding this specific topic, there might be differences between programs and learning experiences, according to the country and expected field of work. In our understanding, these procedures are an integral component of most sports medicine practices and will be mentioned here.

Injections and other procedures to consider for general exposure include dry needling, autologous blood injections, platelet-rich plasma injections, and prolotherapy. Procedural training should include education in didactic theoretical and practical sessions, including mentored clinical experience and continuing education options to determine proficiency for all procedures.

Sports ultrasound might also be included in the training programs and is seen as an important skill to be performed. Current endorsements for recommended sports ultrasound curriculum for sports and exercise medicine physicians can be found in published journals and sports medicine associations [16].

4.9 Interpersonal skills and communication

Ability to work in a multidisciplinary team and to communicate efficiently are extremely important for the proper patient care not only in a team environment as a team doctor but also for best of care in the outpatient care directing proper multi-professional and teamwork for the patients.

5. The sports and exercise medicine physician medical role: from elite sports and events to healthy lifestyle promoter

The broad and specific knowledge of SEMP, when following a proper training program, allows him/her to provide comprehensive care of patients, being able to handle most of the illnesses and injuries, from the pre-participation assessment to the return-to-play decision.

The primary care sports medicine physicians can facilitate early diagnosis and management, thereby speeding recovery and preventing long-term disability. The appropriate case management, either with physiotherapy, bracing, and orthotics, injections, can optimize treatment pathways, eliminate the need for further consultation, and save time and healthcare costs.

The role of the specialist sports medicine physician is not always well-understood by medical colleagues, team managers, healthcare directors, and politicians. We here describe some of the characteristics of the sports doctor in the elite athlete care approach, event coverage, and healthy lifestyle promotion, including some interprofessional relationships needed in this field, which are usually different from regular working relations and organization found in the more traditional medical specialties.

5.1 Sports and exercise medicine in the elite level

The team physician's education, training, and experience uniquely qualify to provide the best medical care for the athlete. Team physicians have the leadership role in the organization, management, and provision of care of athletes in individual, team, and mass participation sporting events.

The team physician should possess, be responsible for, and/or understand not only clinical illness and injuries, but also medical and administrative duties, ethical matters, medicolegal problems. This role must be developed to provide a foundation for best practices in the medical care of athletes and teams. The most important responsibility is the medical care of athletes at all ages and all levels of participation [17].

The team physician should be proficient in the prevention and care of musculoskeletal injuries and medical conditions encountered in sports. The team physician integrates medical expertise with medical consultants, strength and conditioning coaches, and other allied healthcare professionals. The team physician also is responsible for educating athletes, coaches, parents, and administrators. The team physician is ultimately responsible for the clearance to participate and the return-to-play decision [17, 18].

Expected requirements for the team physician are clinical training and experience including medical specialty board certification, residency/fellowship training

in sports medicine, significant clinical practice focused on sports medicine, strong ethical values, proper management of confidentiality issues, informed consent, conflict of interest, influence of third parties, doping, drugs, sports products, and technology [17, 18].

The primary role of the sports medicine physician in competitive sports is the comprehensive health management of the athlete to optimize performance. Sports medicine physicians should focus on providing continuous clinical services with excellence, always in conjunct work with the coach and other members of the sports medicine and science team [13].

In this role, the sports medicine physician is involved in the rehabilitation of acute and chronic injuries as well as developing measures to reduce the risk of injury and illness occurrence or severity. To fulfill this role of comprehensive health management and athletes' performance, the sports medicine physician must understand the demands and requirements of the athlete's sports thoroughly.

An important part of elite sports physician role is the periodic health evaluation, which is the systematic evaluation of the health status of the athlete, seeking the best healthcare but also finding opportunities to optimize the athlete's performance. These must be managed as a health assessment plan, based on initial assessments, follow-ups, and continued care, including cardiovascular screening, general health, clinical laboratory investigation (pertinent lab tests according to sports or discipline), and previous health information [13, 17–19].

The sports physician is the best person from medical staff to coordinate and manage a comprehensive illness and injury plan for elite athletes following that. The combination of excellence in clinical skills, sports-specific knowledge, and a thorough understanding of the athlete's goal will make the sports medicine physician a trusted and respected member of the athlete support team.

The physician work environment might be different from the regular clinical office in the hospital as seen during the medical school. It might vary from a sports medicine institute to a training venue, sideline stretcher, or even a hotel room. It is important to be organized and to be able to record all medical information for proper medical care. Be fully aware that not always there will be a computer or a proper way to document the medical information. Improvisation is a key ability for the sports physician.

Therefore, appropriate clinical communication strategies will facilitate these situations. Multidisciplinary and integrated healthcare is a must for the elite athlete. Efficient and direct communication involving the athlete, coach, and members of the healthcare team are key elements to succeed in this environment [2, 20, 21].

In this perspective, another key point is to develop a clear risk decision-making strategy for the difficult situations involving the athlete's health, specific clinical conditions (illness or injuries), competitions, and the athlete's career. The role of the sports medicine physician is to present clear and precise information to the coach, pertinent staff, and athlete regarding the nature of the injury, possible interventions, the expected rehabilitation course and the timeframe to return to play, and, more importantly, the consequences of continuing to train or compete while injured [20, 21].

Having good relationships and proper understanding of the sports and integration within the team, the sports medicine physician can guide an appropriate path in these challenging circumstances. When working within clubs and organizations, it is ideal if the chief sports medicine physician and the head coach are also aligned with the performance team and the board of directors [2, 22].

Life-threatening emergency situations or conditions in which the athlete is not capable of taking decisions properly do not fit in this process. In these cases, the final decision must be clearly medical to guarantee the physical integrity and life of the athlete.

Besides, the role of sports medicine physicians in optimizing health and performance must be clearly defined and set apart from the malicious practice of doping in sports. It is a fundamental part of the job to educate the athletes, coaches, and managers about clean sports practice, the need for continued surveillance and health and career implications of doping medications and methods.

The sports medicine field demands effective collaboration between the respective disciplines and professions. It requires cooperation between different practitioners (physicians, physiotherapists, athletic trainers) to provide the care required by top-level performing athletes [2, 22].

The essential multidisciplinary nature of the field makes it difficult to define a medical specialty niche. There is a frequent overlapping nature of these professionals and disciplines, making difficult to define the identity of the sports physician. Thus, clear communication policies must be established and followed to avoid problematic issues between contribution and professional boundaries [2].

Unlike conventional health services, where physicians have a very visible professional status, in sports medicine, this status must be granted by relevant athletic experience. Also, some resistance to collaboration may come from a combination of doubt from a professional who comes from outside the sports networks established long ago in the team and an immediate assumption from the doctor that he or she will be effortlessly integrated into it [2].

While there are inevitably tensions surrounding traditional hierarchies, a system that encourages regular professional contact, as well as interprofessional learning opportunities, can gradually reverse these perceptions.

The team doctor role is based on clinical competencies, including pre-participation in health evaluations, integrated medical records, health and performance-focused risk decision-making, integration of communication, and implementation strategies within the specific sport. All of these are applied in a very close relation to the athlete, coach, and staff in a collaborative, balanced, evidence, and preference-based, individualized approach.

5.2 Sports events direction and coordination

The sports medicine physician has an exclusive and important role in the major sports events, such as Olympic Games, Youth Olympic Games, The Fédération Internationale de Football Association (FIFA) World Cup, and world-level competitions. The unique know-how of the daily needs of the athletes, coaches, and specific disciplines or sports, in addition to the people management skills required by the daily sports medicine routine, makes the experienced sports medicine physician a key role in the successful organization and leadership of the major sports events.

The role includes organizing and planning medical care for players, team officials, event officials, and staff; doping control; management of healthcare issues; coordination with local organizing medical services; and injury assessment. The role requires exhaustive programming to preserve the athlete's health and to optimize all collaborative work with individual sports governing bodies. It is part of the sports medicine physician responsibility to create plans for medical emergency responses, staff education, staff selection, background checks, medical equipment, and medication requirements for the specific event [13, 18, 23, 24].

5.3 The sports and exercise medicine physician as healthy lifestyle promoter

Physical inactivity is a huge contributor to global health and a persistent public health problem associated with cardiovascular disease (CVD) and another

noncommunicable disease. The World Health Organization ranks it as the fourth leading risk factor for overall morbidity and mortality worldwide [1, 25–27].

Inadequate physical activity is related to a considerable economic burden, and reports indicate that one third of the global population fails to meet physical activity (PA) guidelines and that 9% of the overall global premature mortality, 5.3 million deaths, is directly attributable to physical inactivity [4, 6, 25–28].

As a result, there has been a significant growing global campaign on sports and exercise as key elements to address this pandemic by organizations such as the World Health Organization, International Olympic Committee, and Sports and Exercise Medical Societies promoting physical activity programs in the population [4, 6, 14, 25–29].

The health and economic burden related to the sedentary lifestyle urges the importance of combating physical inactivity. There is substantial evidence to support the benefits of exercise and the cost-effectiveness of exercise prescription in primary care [1, 6, 27, 30–32].

Sports medicine physicians play an important role in the dissemination of exercise recommendations to a great segment of the population. Due to the specialization in restoring function, combined with the background of team-based care in sports medicine, sports physicians are in a unique position to expand their scope of practice to use the expertise in promoting exercise in the community. It is the sports physician role to be proactive in counseling patients for prevention and treatment of such a sedentary lifestyle and its related diseases [1, 4].

Improving and maintaining recommended levels of physical activity lead to reductions in metabolic, hemodynamic, body composition, and risk factors that contribute strongly to the development of many of the major noncommunicable diseases. Therefore, exercise has a significant role, in many cases comparable or superior to drug interventions, in its prevention and management [1, 4, 30, 33].

Similarly, studies show that exercise interventions might be more effective than drug treatment among patients with stroke and as effective as medications for the prevention of diabetes and secondary treatment of cardiovascular disease. Physical activity can be as effective as medications for the treatment of depression and cognitive function in patients with Alzheimer disease [27].

Several high-level systematic reviews have also identified risk reductions of 25–50% or more in most major chronic diseases for individuals who achieve 150 min of moderate to vigorous physical activity per week. Although this target of 150 min may seem out of reach for many who are sedentary, studies have shown significant benefits for those who complete even small amounts of physical activity [27, 30, 34].

The sports and exercise medicine physician should have a key role in the promotion, integration, and facilitation of exercise as medicine within the healthcare system. Sports medicine physicians, with their focus on sports and exercise medicine, are uniquely trained to provide such expertise to patients, learners, and other physicians [1].

Helping patients to move from being sedentary to engaging in moderate levels of physical activity significantly reduces the risk of mortality. The medical specialist closest to the integration of exercise and health are sports and exercise medicine physicians, promoting comprehensive lifestyle interventions to patients for the prevention and management of chronic disease, along with expertise in the evaluation and management of medical conditions affecting activity and sports.

Evidence supporting the health benefits of physical activity is undeniable, and there is strong evidence that physicians can influence patients to significantly improve their health through proactive recommendations on the positive impacts of exercise on health during an office visit. Simple actions such as written exercise prescription, counseling and telephone support, or having the patient to wear a

pedometer have a significant influence on engaging patients to be more active and healthy [1, 29, 35–37].

However, the sports medicine physician must be aware of barriers to overcome toward the healthy lifestyle promotion. These include the absence of structured systems to offer to counsel, including the limited staff, insufficient time to provide proper counseling services, and patient care primarily focused on acute care or problem-based care, rather than on preventive care or health promotion. Ameliorating population levels of physical activity require comprehensive efforts under a coordinated multilevel approach [1, 6, 26, 29].

Different strategies might be necessary to overcome the current barriers and provide efficient patient care as a general health manager. The sports physician must assess individual needs; address individual motivation, habits, preferences, and barriers; establish clear and realistic goals; promote behavioral change approaches; and establish follow-up, self-monitoring, and social support. Wearable technology and mobile apps for exercise monitoring might be also a very helpful strategy [33, 36].

Longitudinal follow-up is crucial to determine the patient's progress, address specific problems, identify needs, and even adjust goals. Doctors should assess the physical activity level at each office visit. Also, establishing networks for exercise programs to standardize exercise interventions for different clinical subpopulations and to accommodate the continuum of primordial to tertiary prevention programs are very important. Studies have shown that physician counseling and exercise referral systems promote improvements in patients' physical activity levels for up to 12 months.

6. Conclusion

Primary care sports medicine is a growing field in which the physician is trained exclusively to provide care throughout the continuum of injuries and illnesses, from acute assessment to return to sport, to managing complications and coexisting medical problems.

Sports medicine physicians are in a critical position to provide a comprehensive management plan to optimize athletes' health and performance and to develop healthy lifestyles by advising them on physical activities and exercises in the health system.

The broad and specific knowledge provides comprehensive assistance to patients, being able to deal with most illnesses and injuries, from the pre-participation evaluation to the return-to-play decision. Sports physicians can facilitate early diagnosis and management of illness and injuries, accelerate recovery and avoid long-term disability, provide adequate management, and eliminate the need for further consultation.

The field of sports medicine requires effective collaboration between their respective disciplines and professions, whether as a team physician, event coordinator, or as a health manager promoting a healthy lifestyle.

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References

- [1] Joy E, Blair SN, McBride P, Sallis R. Physical activity counselling in sports medicine: A call to action. *British Journal of Sports Medicine*. 2013;**47**(1):49-53. DOI: 10.1136/bjsports-2012-091620
- [2] Fletcher S, Breitbach AP, Reeves S. Interprofessional collaboration in sports medicine: Findings from a scoping review. *Health & Interprofessional Practice*. 2017;**3**:eP1128. DOI: 10.7710/2159-1253.1128
- [3] Asif IM, Stovak M, Ray T, Weiss-Kelly A. The primary care sports medicine fellowship: American Medical Society for Sports Medicine proposed standards of excellence. *British Journal of Sports Medicine*. 2017;**51**(18):1328-1337. DOI: 10.1136/bjsports-2016-097428
- [4] Thornton JS, Frémont P, Khan K, Poirier P, Fowles J, Wells GD, et al. Physical activity prescription. A critical opportunity to address a modifiable risk factor for the prevention and management of chronic disease: A position statement by the Canadian Academy of Sport and Exercise Medicine. *Clinical Journal of Sport Medicine*. 2016;**26**(4):259-265. DOI: 10.1097/JSM.0000000000000363
- [5] Pigozzi F. Specialisation in sports medicine: The state of the Sport Medicine Specialty Training Core Curriculum in the European Union. *British Journal of Sports Medicine*. 2009;**43**(14):1085-1087. DOI: 10.1136/bjsm.2008.055350
- [6] Orrow G, Kinmonth AL, Sanderson S, et al. Effectiveness of physical activity promotion based in primary care: Systematic review and metaanalysis of randomised controlled trials. *BMJ*. 2012;**344**:e1389. DOI: 10.1136/bmj.e1389 (Published 26 March 2012)
- [7] Jaques R, Loosemore M. Sports and exercise medicine in undergraduate training. *Lancet*. 2012;**380**(9836):4-5. DOI: 10.1016/S0140-6736(12)60992-1
- [8] Cullen M, McNally O, Neill SO, et al. Sport and exercise medicine in undergraduate medical schools in the United Kingdom and Ireland. *British Journal of Sports Medicine*. 2000;**34**(4):244-245. DOI: 10.1136/bjsm.34.4.244
- [9] Pandya T, Marino K. Embedding sports and exercise medicine into the medical curriculum; a call for inclusion. *BMC Medical Education*. 2018;**18**(306). DOI: 10.1186/s12909-018-1422-9
- [10] Buckler DGW. General practitioners' training for, interest in, and knowledge of sports medicine and its organisations. *British Journal of Sports Medicine*. 1999;**33**:360-363. DOI: 10.1136/bjsm.33.5.360
- [11] Baby B. What is sports medicine? Medical students don't know. *British Journal of Sports Medicine*. 2000;**34**. DOI: 10.1136/bjsm.34.1.73-a
- [12] Hardt F. State of primary care sports and exercise medicine in Brazil. *British Journal of Sports Medicine*. July 2018;**52**(14). DOI: 10.1136/bjsports-2015-095826
- [13] Dijkstra HP. The role of the specialist sports medicine physician in elite sport. *Aspetar Sports Medicine Journal*. February. 2014;**3**(1):24-31
- [14] Lobelo F et al. Routine assessment and promotion of physical activity in healthcare settings. A scientific statement from the American Heart Association. *Circulation*. 2018;**137**(18):e495-e522. DOI: 10.1161/CIR.0000000000000559
- [15] Macleod DAD. Intercollegiate board for sport and exercise medicine.

British Journal of Sports Medicine. 2000;**34**(4):235. DOI: 10.1136/bjism.34.4.235

[16] Recommended Curriculum Guidelines for Family Medicine Residents Musculoskeletal and Sports Medicine. AAFP Reprint No. 265

[17] Finnoff JT, Hall MM, Adams E, et al. American Medical Society for Sports Medicine (AMSSM) position statement: Interventional musculoskeletal ultrasound in sports medicine. British Journal of Sports Medicine. 2015;**49**:151. DOI: 10.1136/bjsports-2014-094219

[18] Team Physician Definition, Qualifications, and Responsibilities: Consensus Statement. Statement, I. 2014. American Academy of Orthopedic Surgeons

[19] Pohl DJ et al. Olympic games: Special considerations—Medical care for Olympians. In: Rocha Piedade S, Imhoff A, Clatworthy M, Cohen M, Espregueira-Mendes J, editors. The Sports Medicine Physician. Springer, Cham; 2019. DOI: https://doi.org/10.1007/978-3-030-10433-7_45

[20] Sweden LA et al. The International Olympic Committee (IOC) consensus statement on periodic health evaluation of elite athletes. Clinical Journal of Sport Medicine. 2009;**19**(5):347-365. DOI: 10.1097/JSM.0b013e3181b7332c

[21] Shrier I. Strategic Assessment of Risk and Risk Tolerance (StARRT) framework for return-to-play decision-making. British Journal of Sports Medicine. 2015;**49**(20):1311-1315. DOI: 10.1136/bjsports-2014-094569

[22] Dijkstra HP, Pollock N, Chakraverty R, et al. Return to play in elite sport: A shared decision-making process. British Journal of Sports Medicine. 2017;**51**:419-420. DOI: 10.1136/bjsports-2016-096209

[23] Dijkstra HP, Pollock N, Chakraverty R, et al. Managing the health of the elite athlete: A new integrated performance health management and coaching model. British Journal of Sports Medicine. 2014;**48**:523-531. DOI: 10.1136/bjsports-2013-093222

[24] Budgett R. Healthcare challenges at an Olympic Games. British Journal of Sports Medicine. 2013;**47**:401. DOI: 10.1136/bjsports-2013-092364

[25] Budgett R. Emergency care at the Olympic Games. In: McDonagh D, Zideman D, editors. The IOC Manual of Emergency Sports Medicine. Chichester, UK: John Wiley & Sons, Ltd; 2015. DOI: 10.1002/9781118914717.ch1

[26] World Health Organization. WHO Global Recommendations on Physical Activity for Health. Geneva, Switzerland: World Health Organization; 2010

[27] Trost SG, Blair SN, Khan KM. Physical inactivity remains the greatest public health problem of the 21st century: Evidence, improved methods and solutions using the “7 investments that work” as a framework. British Journal of Sports Medicine. 2014;**48**:169-170. DOI: 10.1136/bjsports-2013-093372

[28] Pedersen BK, Saltin B. Exercise as medicine—Evidence for prescribing exercise as therapy in 26 different chronic diseases. Scandinavian Journal of Medicine & Science in Sports. 2015;**25**(suppl 3):1-72. DOI: 10.1111/sms.12581

[29] Sallis R. Developing healthcare systems to support exercise: Exercise as the fifth vital sign. British Journal of Sports Medicine. 2010;**45**:473-474. DOI: 10.1136/bjism.2010.083469

[30] MacAuley D, Bauman A, Frémont P. Not a miraculous cure—Just good medicine. BMJ. 2015;**350**:h1416. DOI: 10.1136/bmj.h1416

[31] Hupin D, Roche F, Gremeaux V, et al. Even a low-dose of moderate-to vigorous physical activity reduces mortality by 22% in adults aged ≥ 60 years: A systematic review and meta-analysis. *British Journal of Sports Medicine*. 2015;**49**(19):1262-1267. DOI: 10.1136/bjsports-2014-094306

[32] Garrett S, Elley CR, Rose SB, et al. Are physical activity interventions in primary care and the community cost-effective? A systematic review of the evidence. *The British Journal of General Practice*. 2011;**61**:e125-e133. DOI: 10.3399/bjgp11X561249

[33] Anokye NK, Lord J, Fox-Rushby J. Is brief advice in primary care a cost-effective way to promote physical activity? *British Journal of Sports Medicine*. 2014;**48**:202-206. DOI: 10.1136/bjsports-2013-092897

[34] Khan KM, Weiler R, Blair SN. Prescribing exercise in primary care. *BMJ (Online)*. 2011;**343**(7828):10-11. DOI: 10.1136/bmj.d4141

[35] Jefferis BJ et al. Objectively measured physical activity, sedentary behaviour and all-cause mortality in older men: Does volume of activity matter more than pattern of accumulation? *British Journal of Sports Medicine*. 2008;**0**:1-8. DOI: 10.1136/bjsports-2017-098733

[36] Marcus BH, Ciccolo JT, Sciamanna CN. Using electronic/computer interventions to promote physical activity. *British Journal of Sports Medicine*. 2009;**43**:102-105. DOI: 10.1136/bjism.2008.053744

[37] Elley CR, Kerse N, Arroll B, et al. Effectiveness of counselling patients on physical activity in general practice: Cluster randomised controlled trial. *BMJ*. 2003;**326**:793. DOI: 10.1136/bmj.326.7393.793