

Football Quaterly 06/2024

Monica Duarte Munoz: Pre-participation medical evaluation in competitive athletes: the experience of an international multisport club

What did they do?

This study (Pre-participation medical evaluation in competitive athletes: the experience of an international multisport club) implemented a comprehensive medical examination protocol specifically designed to meet the needs of athletes involved in team sports with a focus on early detection and management of potential health issues. Between 2008 and 2018, a total of 2570 athletes from 12 to 35 years of age from 12 different team sports disciplines were evaluated by the PPME (Pre-participation Medical Evaluation) of FCB (Football Club Barcelona). The PPME included: medical history, anthropometric data, physical examination, baseline 12-lead ECG, a maximal stress test, a 2D-Doppler echocardiography and an extensive orthopedic evaluation. This PPME protocol considers different characteristics in order to be adaptable for different profiles in relation to age, sex, sport discipline, and level of competition. In 495 of the 2574 athletes (19.2%), the PPME identified pathologies that require a specific treatment or a close follow-up. The most frequent medical conditions documented in young athletes, 45 individuals (2.7%), were neurological, psychological and psychiatric disorders (Attention Deficit Hyperactivity Disorder, Epilepsy, Depression, Anorexia, Tourette syndrome) whereas in adults, 206 individuals (8%), the most prevalent were respiratory and immunological pathologies (Asthma and Bronchitis, Spontaneous Pneumothorax, Systemic immunological diseases). Two athletes were considered inadequate to compete due to severe cardiovascular diseases whereas seven required a specific treatment for their cardiovascular diseases in order to be considered eligible for sports competition (five inter-auricular communication (four of them in young), and two patent ductus arteriosus.)

Additionally, a large proportion of athletes, 958 individuals (37.2%), reported previous musculoskeletal sport-related injuries with bone fractures and joint injuries being the most frequent ones.

Why is it important?

This article has evaluated the ten-year results of PPME across 12 different team sports and various age groups and it has assessed a wide range of diseases within this group, not only cardiovascular evaluations but also assessments in psychology, respiratory health, orthopedic

tests, and more. Additionally, in this study The PPME protocol was annually revised and updated by adding new systems and technologies to improve detection efficiency and accuracy also The periodicity of the medical examinations were determined by considering the initial check-up upon entering the club, the volume and intensity of training and the sports category.

Things to consider?

This PPME protocol considers different characteristics in order to be adaptable for different profiles in relation to age, sex, sport discipline, and level of competition. As an example, for teen athletes who were still growing, a study of bone and sexual maturation was performed to issue a prognosis for final size using Tanner-Whitehouse tables, and Tanner's stages of sexual maturity were assessed.

Musculoskeletal sport-related injuries are common in young and adult competitive athletes and thus, they should be considered when performing the preparticipation medical evaluation.

Take home message?

Periodic Pre-participation medical evaluation in athletes, encompassing various domains such as musculoskeletal assessments, cardiovascular evaluations, body composition analysis and others, play a crucial role in enhancing athletes' health. Moreover, these assessments play a role in diagnosing various diseases, including cardiovascular diseases, which may lead to adverse events. For example, in this study, of the total study population, two athletes were considered inadequate for sports competition: one for sustained ventricular tachycardia and the other for severe pulmonary stenosis. In addition, seven athletes required specific treatment to be considered eligible for sports competition.

Why I chose this article?

This study reports the result of PPME at FCB for a period of 10 years in a large cohort of athletes from 12 different sports disciplines. Their comprehensive PPME protocol identified pathological conditions and musculoskeletal sport-related injuries in young and adult athletes enrolled in team sports. Out of a total of 2574 athletes, 1824 individuals (70.9%) are in good health, while 255 individuals (9.9%) have minor abnormal findings. Furthermore, 495 athletes (19.2%) have been diagnosed with pathological findings. This study result highlights the importance of conducting PPME, as it enabled clubs to identify latent diseases among athletes.

Reference

Ramon Pi-Rusiñol, María Sanz-de la Garza, Gonzalo Grazioli, Manel García, Marta Sitges, Franchek Drobnic. Pre-participation medical evaluation in competitive athletes: the experience of an international multisport club. *Apunts Sports Medicine*, Volume 57, Issue 213, January–March 2022, 100369

<https://doi.org/10.1016/j.apunsm.2021.100369>

Edgar Schwarz: Core body temperature responses during competitive sporting events: A narrative review.

What did they do?

They performed a narrative review (because of the descriptive nature of the 49 studies summarized) comparing different sports, environmental conditions, and levels of competition regarding their observed peak core temperatures (T_c) and the occurrence of exertional heat-illness (EHI) symptoms. A total of 1450 athletes participating in six different intermittent (i.e., football, tennis) and seven endurance sports (i.e., running, triathlon) were included in the study. Environmental conditions were categorised according to ambient temperature (T_a), relative humidity (RH) and wet bulb globe temperature (WBGT) into: extreme risk (WBGT $\geq 30^\circ\text{C}$ or $T_a \geq 36^\circ\text{C}$; RH $> 30\%$), high-very high risk (WBGT $26\text{--}29^\circ\text{C}$ or $T_a 31\text{--}35^\circ\text{C}$; RH $> 50\%$), moderate-high risk (WBGT $21\text{--}25^\circ\text{C}$ or $T_a 26\text{--}29^\circ\text{C}$; RH $> 60\%$) and low-moderate risk (WBGT $< 20^\circ\text{C}$ or $T_a 21\text{--}25^\circ\text{C}$; RH $> 70\%$). Further, the competitive level was categorized into amateur/recreational, trained, and elite and lastly, there was a differentiation between able-bodied and para-athletes.

Why is it important?

This is a large collection of the occurrence of EHI-symptoms and peak T_c reached in various sporting events. While $T_c \geq 40^\circ\text{C}$ is reached in a variety of sports and even in low-moderate heat risk, EHI-symptoms were most prevalent in high-very high and extreme heat risk categories and were not linked to the observations of a $T_c \geq 40^\circ\text{C}$. Regarding the level of play, both trained and elite athletes reached $T_c \geq 40^\circ\text{C}$ more often, compared to amateur and youth athletes and symptoms of EHI were further limited to mostly occur in elite athletes. This could be due to elite athletes being able to reach higher levels of motivation and endure higher levels of exhaustion before quitting voluntarily, but also because of a better medical coverage and thus

reporting of incidences. Finally, it was shown that para-athletes are more prone to observe EHI symptoms. This is one of the first approaches to estimate EHI incidences amongst athletes, including a large collection of data. It shows that a $T_c \geq 40^\circ \text{C}$ is a regular observation in elite sports and does not automatically need to be classified as a health adversity. In football specifically around 6% of the observed participants reached such a $T_c \geq 40^\circ \text{C}$, but none of them displayed symptoms of EHI.

Things to consider.

While this study is good in giving an overview of T_c and EHI symptoms across sports, it needs to be considered that even in sports and categories with low prevalence, some individual athletes may develop symptoms of EHI. Exact risk factors for EHI are yet to be determined, but practitioners should be aware of EHI when symptoms occur in hot conditions, to enable a quick and potentially lifesaving treatment.

Take home message?

Athletes across a various of settings can reach $T_c \geq 40^\circ \text{C}$, but this is not necessarily linked to heat related health adversities. The specific and individual risk-factors for EHIs need further investigation in larger sample prospective monitoring studies, also including other factors next to T_c (i.e., cardiovascular responses, hydration status, concurrent infectious diseases, consecutive days of heat exposure) should also be considered when investigating heat illnesses.

Why did I choose this article?

This study shows that football players are amongst athletes reaching $T_c \geq 40^\circ \text{C}$ but in contrary to other sports they do not tend to develop EHI symptoms. Whether specific pacing strategies, physiological peculiarities, or heat-alleviating strategies (i.e., cooling, additional breaks) enable footballers to sustain high heat stress, without displaying EHI symptoms needs to be determined. The sports with the highest incidences of EHI were Cricket (protective gear and long matches) and Triathlon (long endurance exposure).

Reference

Singh G, Bennett KJM, Taylor L, Stevens CJ. Core body temperature responses during competitive sporting events: a narrative review. *Biol Sport*. 2023;40(4): 1003–1017.

Benedict Gondwe: Can off-field “brains” provide a competitive advantage in professional football?

What did they do:

The editorial commentary expands on the integration of "working-fast" and "working-slow" concepts in high-performance sports, particularly football. "Working-fast" refers to the intuitive actions of practitioners on the ground, while "working-slow" involves deliberate research behind the scenes. This integration aims to improve outcomes by embedding research and development (R&D) practices within football teams.

Why is it important:

Integrating "working-fast" and "working-slow" allows for the combination of data and expertise to inform decisions making on individual players. This integration expands on the challenge of interpreting data accurately and identifying meaningful changes amidst noise (week to week variation), ensuring evidence-based decision-making. Moreover, it helps teams evaluate new technologies and methods effectively, promoting a culture of continuous improvement while minimising risks and maximising performance.

Things to consider:

- Given the multitude of measurements from athletes (i.e. injury screening, recovery/monitoring), the significance of changes in player measurements must be determined through statistical analysis considering week-to-week variation and the smallest worthwhile change.
- The legitimacy and value of new technologies and methods must be investigated, considering scientific evidence and expert opinion to make graded recommendations.
- Effective communication of relevant data with practical meaning is crucial, bridging the gap between researchers and decision-makers in a fast-paced environment.

Take home message: Embedding R&D within football teams optimises decision-making by providing an ethical, valid, and financially practical approach to innovation and improvement. It ensures evidence-based practices, minimises risks, and maximises performance. Effective delivery of information to team management is essential for successful implementation.

Why I chose this article: Insights into the working processes of practitioners working in professional football are of importance as may provide guidelines for practitioners and teams playing in lower divisions to have a reference point on how to integrate "working-fast" and "working-slow" in their environment. This article provides insight on how elite football clubs can derive learnings from other organisations that instil R&D to increase productivity and accelerate efficiency. Within an elite football environment, it is crucial to convey important information in a meaningful manner and R&D should provide translation of data from complex analyses into easily understandable messages to guide decision making.

Reference:

Mccall A, Davison M, Carling C, Buckthorpe M, Coutts AJ, Dupont G. Can off-field “brains” provide a competitive advantage in professional football? Vol. 50, British Journal of Sports Medicine. BMJ Publishing Group; 2016. p. 710–2.

Rilind Obertinca: The 11+ injury prevention programme decreases rate of hamstring strain injuries in male collegiate soccer players

What did they do?

The objective of this study was to investigate the efficacy of the FIFA11+ injury prevention program in reducing the risk of hamstring injuries and recovery time, and to determine whether compliance with the 11+ affected hamstring injury risk. This study was a secondary analysis from a prospective cluster randomised controlled trial (cRCT) among National Collegiate Athletic Association (NCAA) division I and II men’s football teams.

Why is it important?

Findings from this study indicate that the 11+ program reduced the risk of hamstring injury by 63% but recovery time was not improved. Moreover, achieving high to moderate compliance was crucial as it enhances the program's efficacy in reducing hamstring injuries.

Things to consider

Even though this study reported satisfactory data on the efficacy of the 11+ one limitation is that it entails a secondary analysis of relatively outdated data, collected in 2012, with the main study being published in 2015. The sample size was appropriate to address the research

question, however, the follow up was shorter (August-December) than usual practice on the large-scale RCTs. Interestingly, despite the well-known fact on the hamstring injuries being as one of the most frequent football-related injuries the proportion of the overall incidence rate (IR) and hamstring IR differed substantially (intervention group: overall/hamstring IR 15.04/1.24 and control group: overall/hamstring IR 8.09/0.45). This difference is larger compared to the vast majority of published incidence data.

Take home message

This study showed high preventive efficacy of the 11+ program in reducing the risk of hamstring injuries. Additionally, it emphasizes the importance of good compliance for greater efficacy.

Why I chose this article

This study presents a detailed and valuable analysis regarding the efficacy of a generic program in reducing the injury risk of a specific body region. Considering the high frequency of hamstring injuries, the efficacy of the 11+ in reducing the risk of this type of injury is highlighted.

Reference

Silvers-Granelli H, Silverman R, Bizzini M, et al. The 11+ injury prevention programme decreases rate of hamstring strain injuries in male collegiate soccer players. *British Journal of Sports Medicine* Published Online First: 10 April 2024. doi: 10.1136/bjsports-2023-107323

Guangze Zhang: Few training sessions between return to play and first match appearance are associated with an increased propensity for injury: a prospective cohort study of male professional football players during 16 consecutive seasons

What did they do?

A prospective cohort study was conducted during 16 consecutive football seasons to investigate whether the number of training sessions between return to play (RTP) and the first following match appearance influences the injury risk after returning from moderate to severe injuries. Due to limited impact of less-than-8-day injuries on players' fitness for match playing, only

injuries with longer than 8 days absence were considered. Injury rates in the first match after RTP were compared across completing one to ten training sessions between RTP and first match appearance.

Why is it important?

When players are given clearance by medical staff to fully participate in team training and match play, the risk of subsequent injury remains high. This study provided the progression of injury rates (in discrete intervals) as the number of training sessions after RTP increased, which can inform of player (match) load management after RTP, reducing occurrence of subsequent injuries, and inform return-to-competition decisions.

Things to consider

As is known, the physiological and mental demands during professional football matches are much higher than during training. A plausible deterioration of player's fitness level during injury absence, followed by a sudden increase in workload associated with the first match appearance, could potentially contribute to a surging injury risk. Given this, gradually increasing on-pitch training load to the match level could better prepare players for competition after absence.

Take home message

Significantly increased injury risk was found in first match appearance after RTP compared to the average seasonal match injury risk for 1) general, 2) muscle, and 3) non-muscle injuries. Each additional training session between RTP and first match appearance resulted in a 7% and 14 % of risk reduction for general and muscle injury, respectively. When players are urgently needed for match squad, six trainings sessions (i.e., preparation) are necessary to ensure the injury risk returning to baseline and a "relatively safe" return-to-competition.

Why I chose this article

Based on extensive injury data, the findings, for the first time, highlighted the number of training sessions that players returning from absence need to adapt to competition with a low injury risk, which can be used by practitioners as a reference in considering players' readiness for competition. Nonetheless, future investigation on subsequent injury risk should consider the nature of different injuries (e.g., ACL rupture vs. ankle sprain).

Reference

Bengtsson, H., Ekstrand, J., Waldén, M. and Häggglund, M., 2020. Few training sessions between return to play and first match appearance are associated with an increased propensity for injury: a prospective cohort study of male professional football players during 16 consecutive seasons. *British journal of sports medicine*, 54(7), pp.427-432. Link: https://www.researchgate.net/publication/335481474_Few_training_sessions_between_return_to_play_and_first_match_appearance_are_associated_with_an_increased_propensity_for_injury_A_prospective_cohort_study_of_male_professional_football_players_during_16_consecutive_seasons

Rina Meha: Deliberate soccer practice modulates attentional functioning in children

What did they do?

The objective of this study was to evaluate the relationship between regular engagement in open-skill sports, like football, and executive control, as well as other attentional functions like alerting and orienting, during preadolescence. A total of 131 participants were involved, consisting of 70 non-athletes and 61 football players, aged 10–12 years old. Cognitive performance was assessed using the Attentional Network Test—Interactions (ANT-I) task. The reliability and validity of this test has been reported previously. Football players demonstrated quicker responses overall and exhibited enhanced executive control, including reduced interference from distractors, compared to non-athletes.

Why is it important?

This study adds to the growing body of knowledge regarding the relationship between physical activity and cognitive function by examining how engagement in predominantly open-skill sports like football, impacts executive functioning, acknowledging that the direction of causality remains debated.

Things to consider

The cross-sectional design of the study limits the ability to establish causality in the association between deliberate sports practice and executive functioning.

Take home message

Practicing sports, particularly open-skill sports like football, may be associated with improved executive functioning in children aged 10 to 12. However, the cross-sectional design of the study limits the ability to confirm a direct cause-and-effect relationship. Future research using longitudinal or experimental designs is needed to further explore the potential benefits of sports participation on cognitive development in children.

Why I chose this article

This study adds to the existing literature the potential relationship between practicing sports like football and cognitive functioning in children, while the debates for that causality remains open.

Reference

Moratal, C., Lupiáñez, J., Ballester, R., & Huertas, F. (2020). Deliberate soccer practice modulates attentional functioning in children. *Frontiers in Psychology, 11*. <https://doi.org/10.3389/fpsyg.2020.00761>

Ana Ukaj: Sudden Cardiac Arrest in Basketball and Soccer Stadiums, the Role of Automated External Defibrillators: A Review. For the BELTRAN Study (Basketball and soccer stadiums: Registry on Automatic external defibrillators)

What did they do?

Summary:

The aim of the review is to analyse studies conducted in the area of risk and incidence of sudden cardiac arrest (SCA) in football and basketball stadiums worldwide as well as the availability and usage of automated external defibrillators (AED) in football and basketball stadiums worldwide.

Methodology: Studies focusing on SCA in football and basketball stadiums, the availability and use of AEDs and emergency action plans (EAPs) were included in the review. These inclusion criteria were based on the fact that football and basketball are popular sports worldwide. In addition, there is a significant number of spectators in professional football and basketball stadiums, which must be taken into account in the risk assessment of SCA.

Conversely, studies focussing on implantable cardioverter defibrillators, pacemakers and amateur stadiums were excluded.

Results:

The incidence of SCA varies depending on the study and is 1-3/100,000 athletes per year in professional football and 9.09/100,000 athletes per year in basketball. There are also regional differences in survival rates: In the USA, the survival rate for college athletes is 50%, with basketball players predominating, while in football it is 23% worldwide. In addition, the results of various studies conducted on the use of AEDs in football and basketball stadiums were compared. Early defibrillation led to a positive neurological outcome in up to 62% of cases. However, the studies included were from European countries and North America. There is a lack of information on the use of AEDs in other parts of the world. EAP, which needs to be strategically designed in order to increase the chances of survival due to SCA, was found in 82% of English football stadiums. Over 50% of basketball coaches and staff report that they do not have an associated medical director or athletic trainer.

Why is it important?

This review compares the incidence and response to SCA between studies addressing this issue in football and basketball stadiums. In addition, this review shows that most studies were conducted in Europe and North America.

Things to consider:

Availability of AEDs and training in the use of these devices have a positive impact on the chances of survival.

Take home message:

Since SCA survival rates and neurological outcomes improve when an AED is used on site, an appropriate EAP is required for football and basketball stadiums. Furthermore, sports stadiums such as football and basketball stadiums should develop a financial strategy for the purchase and maintenance of an AED. In addition, every sports stadium should have people who are regularly trained in cardiopulmonary resuscitation and in the use of the AED.

Why I chose this article:

This article was chosen because it gives a clear overview of the organisation of secondary prevention in football and basketball stadiums, which helped me to understand more about this topic and improve my PhD project, which addressed a similar issue.

Reference:

Bassi MD, Farina JM, Bombau J, et al. Sudden cardiac arrest in basketball and soccer stadiums, the role of automated external defibrillators: A review. For the BELTRAN study (Basketball and soccer stadiums: Registry on Automatic external defibrillators). *Arrhythm Electrophysiol Rev.* 2023;12:e03. doi:10.15420/aer.2022.30