PRE-PARTICIPATION SCREENING OF RUGBY PLAYERS BY COACHES, BASED ON INTERNATIONALLY ACCEPTED MEDICAL STANDARDS

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Providing coaches, referees, players, and administrators with the knowledge, skills, and leadership abilities to ensure that safety and best practice principles are incorporated into all aspects of contact rugby.

ABSTRACT

A comprehensive medical history forms a significant part of any medical assessment or screening. In the sports participant, pre-participation screens are aimed at determining those aspects of personal and family history that place the participant at greater risk of sudden death, serious illness, or musculoskeletal injury. In rugby, where the incidence of head and neck injuries is generally higher than in other sports, an emphasis needs to be placed on screening for potential risk factors for neurological injury. In a South African rugby environment, pre-season medical screening is not standard and, indeed, rarely practiced. In school and club settings, the rugby coach is often the person who has the most contact with players, and therefore in the best position to conduct an initial screen. This article serves to review the relevant literature pertinent to risk factors which need to be identified in a pre-participation assessment.

Key words: rugby, pre-participation screen, sudden death, concussion

INTRODUCTION

In any medical consultation, the patient's history serves as a very important initial assessment of their presenting complaint or condition. Pre-participation evaluations (PPEs) are designed largely for medically qualified personnel to screen for players who may be at risk of illness or injury.[2;4;11;15;19;22;26;28;30;32;33;36]. Much of the emphasis is on cardiovascular disease, as this is the largest cause of sudden death in young sports participants.[20] In South African rugby, particularly at school and club level, pre-participation screening is rarely conducted due to a lack of resources and skills. In designing a pre-participation screen for coaches, the challenge is to be able to "red flag" potentially serious cardiovascular risk factors, as well as musculoskeletal and neurological risks pertinent to a collision sport such as rugby. In particular, the assessment should contain easily understood questions that cast the screening net wide enough to determine who should be formally medically assessed. [18]

CARDIOVASCULAR SCREENING

Most athletes are healthy. Only 3 to 13 percent require further evaluation, and the disqualification rate for 10 million annual examinations is less than 1 percent.[32] The overall rate of sudden death in male sports participants younger than 35 years is quite low, approximately 0.75 sudden deaths per 100,000 participants per year.[20] Congenital cardiac anomalies account for most sudden deaths in these patients. The most common anomalies are hypertrophic cardiomyopathy and coronary artery anomalies.[1;20] The most common coronary abnormality is a left main coronary artery originating off the right sinus. Myocarditis, rupture of the aorta, arrhythmogenic right ventricular dysplasias, idiopathic left ventricular hypertrophy, aortic stenosis, and premature coronary artery disease account for most of the remaining

fatalities.[4] Leading causes of non-traumatic, non-cardiac sports death are exertional hyperthermia, followed by exertional rhabdomyolysis and status asthmaticus.[35]

Cardiovascular screening is regarded as the most important part of a PPE because of the potential for sudden death in athletes with undiagnosed heart disease. [6;23] Personal and family histories of cardiovascular disease have been shown to be more sensitive screens than a physical examination revealing 64-78% of conditions that could prohibit or alter sports participation.[19;36] Screening on the basis of cardiovascular symptoms is certainly not comprehensive and hypertrophic cardiomyopathy, the most common cause of death on the field among 12 to 32-year-old athletes, may not produce symptoms before sudden death.[25] Hypertrophic cardiomyopathy is a heterogeneous group of disorders acquired through autosomal dominant transmission with incomplete penetrance, and signs and symptoms may not become manifest until early adulthood.[21] Detecting persons with Marfan syndrome before they participate in sports is important because the defective aortic media can rupture during basketball, volleyball and, presumably, other sports activities – including rugby.[14] Where a layperson – such as a coach – is performing the screen, has limited experience in screening for potential risks such as Marfan syndrome, and does not have the benefit of an examination or ancillary studies (e.g. ECGs) to supplement the history, the risks may be greater. A summary of critical questions which should be asked as part of the pre-participation screening for cardiovascular conditions is shown in Table 1.

NEUROLOGIC

Head and neck injuries account for the largest proportion of catastrophic injuries in South African rugby [31] and should therefore be adequately screened for in any PPE.

NECK INJURIES

A report of burning pain, weakness, numbness or tingling in all four or only the upper extremities raises concerns of cervical spine impingement. Possible etiologies for this condition would include atlantoaxial instability, congenital fusions and disk herniations.[20]

NERVE INJURIES

'Burners' or 'stingers' are usually secondary to a brachial plexus stretch or cervical root irritation. The player should be free of any neck or radicular pain, and have full range of motion and strength in all movements of the cervical spine before returning to the rugby field.[9] Recurrent episodes require referral for cervical radiographic studies before clearance.

CONCUSSION

Pre-participation examinations for neurological problems such as concussion are extremely difficult, as most concussions recover fully and leave no residual indicators. In addition, concussions sustained in contact and collision sports may simply reflect an athlete's level of exposure to the sport rather than an underlying intrinsic risk factor.[11]

The definition of concussion has been broadened to include any trauma-induced alteration in mental state (Table 2) and does not necessarily include a loss of consciousness or amnesia as in previous definitions.[5;7;9;17] The range of symptoms possibly associated with concussion should be made clear to players, many of whom may not have recognised or appreciated their significance.

Risks of playing with prolonged concussion include exacerbation or prolongation of symptoms of the post-concussion syndrome. This is of particular significance to young players exposed to a learning environment. The second-impact syndrome is a less common but far more catastrophic consequence of unrecognised or poorly-managed concussion. A second blow (even a relatively mild impact) to a brain that has not yet recovered from a previous blow may result in loss of autoregulation.[8;13] Any player that is still symptomatic from a concussive blow should not be exercising and definitely not playing rugby. [5;16;17] Finally, there is evidence of the cumulative effect of concussions, particularly where these injuries may not have been recognised or managed appropriately.[10] Coaches detecting any symptoms, recent history of concussion or multiple concussions in a player should ensure that the player seek appropriate medical advice.

In order to help mitigate the difficulties in detecting concussion risk in rugby, it is recommended that an additional and more extensive baseline screening of symptoms, previous episodes and co-morbid neurological and psychological risk factors be conducted.[28] In addition, the emergence of computerised neuropsychological testing, where accessible, provides the player with an assessment that may give insight into cognitive compromise related to previous injuries, and serve as a baseline measure against which the consequences of further concussions may be measured. [5;16;17]

CONVULSIVE DISORDERS

Guidelines from the American Academy of Pediatrics 3 clear young athletes with well-controlled convulsive disorders for participation in conventional school-sponsored sports. However, in a sport with a higher risk, including rugby, neurological consultation should be considered. Players with poorly controlled seizures should be prevented from playing rugby.[20]

MUSCULOSKELETAL INJURIES

Most studies have shown that musculoskeletal findings are the major category of abnormalities leading to restriction from sports activities.[33] The most common musculoskeletal injury to restrict an athlete from activity is a knee injury, followed by an ankle injury.[15] In musculoskeletal injuries, the chance of re-injury is high without proper rehabilitation.[1] Specific examples include patella and shoulder dislocations. [33] However, this category of injury is unlikely to be catastrophic and therefore, in the interests of efficiency, should receive no more than a mention in a coach's PPE.

CURRENT INFECTIONS

Conditions such as influenza or gastroenteritis affecting the player at the time of questioning should preclude him or her from training and appropriate medical care should be sought to avoid the risk of myocarditis and pericarditis.[20;30;33]

EXERCISE-INDUCED ASTHMA

Status asthmaticus is one of the non-traumatic causes of death in high school and university athletes. However, the incidence in survey populations is only four deaths in 30 million athletes. [35] Evidence of exercise-induced asthma is sought in the pre-participation examination so that medical prophylaxis (typically with a beta agonist) can be implemented, not to disqualify the athlete.

HEAT-RELATED ILLNESS

Physicians can screen for a tendency toward exertional hyperthermia by asking about a previous history of heat-related illness. Athletes with this condition are usually allowed to participate in sports, but temperature extremes must be avoided and appropriate means of cooling such as breaks in play and iced towel-downs should be followed.[33]

SICKLE CELL TRAIT

The American Academy of Pediatrics and the National Collegiate Athletic Association recommend that persons with sickle cell trait be allowed to participate in sports without any restrictions.[3] There is evidence that persons with sickle cell trait have increased susceptibility to exertional rhabdomyolysis, with the potential for renal failure and death. Patients with sickle cell trait should be counselled about appropriate hydration and acclimatisation to reduce risks.

Rugby players should note that high exertion and contact or collision sports are generally contraindicated in patients with sickle cell disease, even if appropriate hydration can be ensured.

SOLITARY ORGANS

Whether athletes, with only one of a paired organ, especially one kidney, should participate in sport, particularly collision sports such as rugby, is a topic of controversy. All such patients need to understand the risks so they can make an informed decision. Patients with a single kidney which is polycystic or abnormally located should be advise to avoid contact or collision sports.[2]

When an athlete has only one functional eye (with less than 20/40 corrected visual acuity), further evaluation by an ophthalmologist is recommended.[34] These athletes can participate only in sports that permit the use of protective eyewear (such as swimming, track and field, and gymnastics) and do not involve projected objects. Wrestling, boxing and martial arts are contraindicated sports and by inference, rugby must also be regarded as high risk for these individuals.

The only modification for an athlete with one testicle is the use of a protective cup or "box" during contact sports. The chance of injury and the subsequent possibility of loss of fertility should be mentioned in counselling.[2]

OTHER BENEFITS OF SCREENING

Enquiries about medication use may have several benefits. Firstly, medications may have a direct influence on performance, e.g. antihistamines may cause drowsiness. Secondly, medications may require Therapeutic Use Exemption clearance to prevent the player from failing a drug test. This should be brought to the player's attention. Thirdly, it may serve as a means of determining a medical condition that the player did not feel was worth mentioning because it is such an inherent part of his or her life, e.g. attention deficit disorder, asthma, diabetes or hypertension. Finally, the athlete may mention additional supplements (legal and illegal) that are being consumed.[20;37]

A further benefit of the PPE is the opportunity it affords the coach to gain some insight into a player on a one-to-one basis. Although not specifically targeted in most PPE questionnaires, issues not directly related to sport but affecting the player's lifestyle such as smoking, alcohol and drug use may emerge during the questioning, affording counselling, formal or informal, to be given in these areas.[2]

ETHICAL CONSIDERATIONS

The coach, as a lay person, should not necessarily be privy to medical information that the player may regard as confidential. Hence, an option should be included in the survey that allows the player to share this information with a medical practitioner in private, particularly if this information, for example HIV infection, has implications for the player and others' participation in exercise.

FITNESS ASSESSMENT

Although the coach does not have the advantage of getting information from a physical examination to complement the history, he or she is afforded the benefit of seeing the athlete under conditions of physical stress when training. This can be utilised as a screening tool in itself and a sort of field 'stress test'. In particular, players who fail to cope with exercise that their peers find reasonable, those who show a marked decrease from previous levels of performance, who describe symptoms during or following exercise, or who appear hindered by injury should be referred for medical evaluation.[20;30;33]

CONCLUSION

In an amateur sporting environment where pre-participation screening is sparingly utilised, the use of a screening tool administered by rugby coaches could significantly and positively impact on the detection and reduction of potentially catastrophic illness and injury. A review of relevant literature shows the player's medical and family history to be the most important part of the screen and is therefore within the parameters of such a questionnaire. In particular, this would aim at detecting a higher risk for cardiac-related sudden death, concussion and other neurological injuries.

AUTHOR BIOGRAPHY:

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TABLE 1: CARDIOVASCULAR SCREENING HISTORY FOR PRE-PARTICIPATION EXAMINATIONS: CRITICAL QUESTIONS [20]

Exertional chest pain or discomfort, or shortness of breath?
Exertional syncope or near-syncope, or unexpected fatigue?
Past detection of cardiac murmur or systemic hypertension?
Known family history of hypertrophic cardiomyopathy, other cardiomyopathies, long QT syndrome, Marfan syndrome, significant dysrhythmias?
Family history of premature death or known disabling cardiovascular disease in a first- or second-order relative younger than 50 years? (More concern if younger than 40 years.)

TABLE 2. SYMPTOMS AND SIGNS OF CONCUSSION [13]

Physical	*Cognitive*	*Emotional*	*Sleep*
Headache	Poor concentration	Depression	Drowsiness
Photophobia		Irritability	Insomnia
Dizziness	Problems remembering	Mood swings	Sleeping more
Phonophobia		Aggressiveness	Difficulty getting to sleep
Nausea	Feeling 'foggy'		
Numbness/tingling	Feeling 'slowed down'		
Vomiting			
Fatigue			
Visual changes			
Balance problems			