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ORIGINAL ARTICLE

Development and evaluation of an observational system for goalball match analysis

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KEYWORDS

Performance indicators;
Sport performance;
Paralympic team sports;
Visual impairment

Abstract Our purpose was to develop and evaluate an observational system for goalball match analysis. We used a non-participant systematic game observation method including eight elite games, video recorded, and randomly chosen. Observational categories and performance indicators were determined for each offensive (i.e., ball control, attack preparation, and throwing) and defensive principles (i.e., defensive balance, throw reading, and blocking). The comprehensive method of development and the ideal reliability levels (kappa coefficient of 0.81–1.00) of this protocol ensure the generation of quantitative and qualitative information for players and coaches and the rigor required for scientific use.

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PALAVRAS-CHAVE

Indicadores de performance;
Desempenho esportivo;
Esporte coletivo paralímpico;
Deficiência visual

Desenvolvimento e avaliação de um sistema de observação para análise do jogo de goalball

Resumo Nosso objetivo foi desenvolver e avaliar um sistema de observação para análise do jogo no goalball. Foi usado um método de observação sistemática não participante, incluindo vídeos de oito jogos de elite escolhidos aleatoriamente. Categorias de observação e indicadores de desempenho foram determinadas para cada princípio ofensivo (i.e., controle de bola, preparação do ataque e efetivação do arremesso) e defensivo (i.e., balanço defensivo, leitura da trajetória e interceptação do arremesso). O abrangente método de desenvolvimento

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PALABRAS CLAVE

Indicadores de
rendimiento;
Rendimiento
deportivo;
Deporte de equipo
paralímpico;
Deficiencia visual

e os níveis de confiabilidade ideais (coeficiente kappa de 0,81-1,00) desse protocolo asseguram a geração de informações quantitativas e qualitativas para jogadores e treinadores e o rigor necessário para uso científico.

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Desarrollo y evaluación de un sistema de observación para el análisis del juego del *goalball*

Resumen Nuestro objetivo fue desarrollar y evaluar un sistema de observación para el análisis del juego del *goalball*. Se utilizó un método de observación sistemática no participante, que incluía vídeos de ocho juegos de élite elegidos al azar. Se determinaron las categorías de observación y los indicadores de rendimiento de cada principio ofensivo (p.ej., control del balón, preparación del ataque y lanzamiento) y defensivo (p.ej., equilibrio defensivo, lectura de la trayectoria e interceptación del lanzamiento). El método completo del desarrollo y los niveles de fiabilidad ideales (coeficiente kappa de 0,81 a 1,00) del presente protocolo aseguran la generación de información cuantitativa y cualitativa para jugadores y entrenadores, y el rigor necesario para el uso científico.

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Introduction

In the context of team sports, researchers have assumed its inherent complexity and instability, acknowledging them as systems and broadened the research focus to the logic of the game and its patterns (Bar-Yam, 2003; McGarry et al., 2002; Reed and Hughes, 2006; Travassos et al., 2013). This trend presupposes the creation of models able to characterize: the relation between the quantities and qualities of the game actions, the organization of the game, the types of sequences that generate positive or negative results, the scenarios or geometry of the game in the evolution of teams in space and time, the interactions or co-adaptation between attackers and defenders (Barris and Button, 2008; Duarte et al., 2012; McGarry, 2009; Passos et al., 2013; Vilar et al., 2012).

Research regarding Paralympic team sports, still in its embryonic stage, has not consistently addressed this trend of match analysis to adapted sports, such as wheelchair basketball (Gómez et al., 2014; Wang et al., 2005), ice sledge hockey (Molik et al., 2012), and also goalball (Amorim et al., 2010; Mora, 1993). Goalball is a non-territorial invasion team sport created exclusively for people with visual impairment, which is based on hearing (ball with bells inside) and tactile (raised lines) clues. In this sport, two team with three athletes each stay positioned in the opposite end sides of a court with dimension similar to a volleyball court (18 m × 9 m), divided into two halves by a center line. From a restricted area, the attacking team throws a ball along the floor toward the opponent's goal. The defending team, positioned in an area with tactile markings, tries to block the thrown ball, usually by sliding on the floor (Gulick and Malone, 2011).

Assuming the complexity of team sports, Morato et al. (2012) identified the self-organizing cycle of goalball teams by using systematic video observation of an elite competition. These authors presented three principles each in the offensive (ball control, attack preparation and throwing) and defensive (defensive balance, throw reading and blocking) dimensions. While Team 1 attempts to control the ball after intercepting the throw by Team 2, the latter assumes a defensive balance, that is, the team returns to its tactical system and is attracted by the origin of the opponent throw to reconfigure itself, while moving as a block to rationally occupy the court (Fig. 1). As Team 1 controls the ball, it continues preparing its attack in order to throw the ball. Team 2 is still focusing on the defensive balance principle, changing the focus to read the throw as soon as the Team 1 thrower starts the run-up to throw the ball. When the attacker releases the ball, Team 2 will interpret the throw, defining its trajectory and categorizing it under time pressure in order to intercept it effectively. After intercepting the throw, Team 2 controls the ball and prepares the next attack while Team 1 moves from the offensive to the defensive dimension, focusing on the defensive principles until the thrown ball is recovered (see Video 1).

Thus, a game sequence includes one team's configuration to comply with the offensive principles, the configuration of the opponent team to comply with the defensive principles in response to the other team's attack, and the outcome of this interaction. The set of game sequences represents the goalball game, meaning the history of relations between the teams' opposite dimensions (Morato et al., 2012).

Based on the offensive and defensive principles of goalball, our purpose was to develop and evaluate an observational system for goalball match analysis.

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