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RUGBY UNION MOVEMENT PATTERNS: THE IMPACT OF FORWARD SUBSTITUTES

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Abstract

PURPOSE: Forwards are regularly substituted within the sport of rugby union. There is currently limited information on how this effects movement patterns in rugby union match play. This study investigated how the movement patterns and pacing strategies of forwards that play the whole game in contrast with forwards inserted as substitutes in the second half.

METHODS: Global positioning system (GPS) data were collected during professional rugby union match play. Second half data for 19 whole game (WG) players and 17 substitute (sub) players were compared in terms of relative total and high-intensity (>4 m.s\(^{-1}\)) distance, maximum speed (m.s\(^{-1}\)), sprint (>2.75 m.s\(^{-1}\)) and acceleration (>6 m.s\(^{-2}\)) frequency. Data were further divided into bout quartiles to compare the time-course of pacing strategies utilized by WG and sub players.

RESULTS: Both whole game and substitute forwards displayed increased high intensity running distance and sprint frequency in the second half of the game. Substitutes had higher acceleration and maximum speed than whole game forwards in the second half, but were not different in later quartiles. Conclusions: Whole game players adopted a "flat" pacing strategy in the second half, while substitutes adopted a "one bout, all-out" approach. The impact if substitutes on game movement patterns is meaningful, but short-lived.

Conclusions

The introduction of substitute forwards temporarily raises match intensity. This finding may have practical applications if coaches use data to optimise substitute forward timings.

Methods

PARTICIPANTS: Nineteen professional rugby union players (age 25.5 ± 2.4 years; body mass 81.5 ± 12.6 kg, stature 1.93 ± 0.07 m) volunteered to take part in the study and provided data 24 separate match data files from the 2013 rugby union Super 15 season. All consensus and ethical approval was granted by the University of Johannesburg Ethical Review Board.

PROCEDURES: GPS and accelerometer data (Spigno Pro- GPS, SportsTag, Australia) were collected during professional rugby union match play. Data were divided into second halves for 19 whole game (WG) players and 17 substitute (Sub) players. Data were further divided into quartiles to compare the time-course of pacing strategies utilized by WG and Sub players.

DATA ANALYSIS: Given the practical nature of this study, data were assessed using Cohen's effect size (ES) statistic to account for differences in total playing time. Data were further divided into quartiles to compare the time-course of pacing strategies utilized by WG and Sub players. Data are presented as mean ± SD. Likelihood of effect is expressed as likely small (ES < 0.2), likely medium (ES 0.2–0.6), likely large (ES 0.6–1.2), likely very large (ES 1.2–2.0) and very large (ES > 2.0) respectively. MBIs were assessed according to the following scale of likely meaningful differences between whole game players and substitutes.

**TABLE 1: Movement variables of Whole Game or Substitute forwards in the second half of professional rugby match play.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Whole Game</th>
<th>Substitute</th>
<th>MB</th>
<th>Effect Size</th>
</tr>
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<tbody>
<tr>
<td>Relative distance</td>
<td>65 ± 8</td>
<td>67 ± 10</td>
<td>Unclear</td>
<td>Small (0.22)</td>
</tr>
<tr>
<td>High-intensity distance</td>
<td>9 ± 4</td>
<td>12 ± 6</td>
<td>Likely (0.81)</td>
<td>Medium (0.80)</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>7.3 ± 1.3</td>
<td>7.1 ± 1.4</td>
<td>Unclear</td>
<td>Trivial (0.14)</td>
</tr>
<tr>
<td>Sprint frequency</td>
<td>1 every 20 ± 1</td>
<td>1 every 13</td>
<td>Likely</td>
<td>Medium (0.67)</td>
</tr>
<tr>
<td>Acceleration frequency</td>
<td>1 every 13</td>
<td>1 every 7</td>
<td>Likely (0.56)</td>
<td>Small (0.55)</td>
</tr>
</tbody>
</table>

Data presented as mean ± SD. Brackets indicate the chances that the true value has a positive/negative effect. Measurements include magnitude of effect differences between groups. Effect sizes indicate how regularly players exceeded respective intensity thresholds and impact time. Differences in movement variables were larger when substitutes were first introduced, but were not different in later quartiles.

Results

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**Results**

- Substitutes perform more high intensity running, and sprint and accelerate more frequently than whole game players in the second half of professional rugby union matches.

**Conclusions**

These higher-intensity exertions are not sustained throughout the playing bout, and by the end of the game there is no longer a difference in the physical output of whole game and substitute players. This indicates that substitutes adopt a "one-bout, all-out" pacing strategy.

**Practical Applications**

The introduction of substitute forwards temporarily raises match intensity. This finding may have tactical applications if coaches time the use of their substitutes to correspond with critical moments within the game.

**References**


