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The Momentary Effect of Timeouts in National Basketball Association Games

CHEN, C., Cao, R., Cui, Y.

Beijing Sport University

INTRODUCTION:
During competitive basketball matches, coaches are expected to optimize the collective performance throughout effective decision-making, including calling timeouts, devising player rotation and rearranging tactics. Previous studies have demonstrated that teams usually presented better scoring performance after coaches' substitutions and their decisions were influenced by multifactorial competition constraints. In this vein, this study aimed to quantify the temporal effects of the timeouts during professional basketball matches, so as to evaluate the performance of coaches' decision-making and to provide insights into player management and match status anticipation.
METHODS:
Play-by-play and spatio-temporal data from 100 NBA games during the 2015-2016 season provided by STATS LLC were used, with 1155 timeouts being identified and extracted. The temporal effects that timeout may have on scoring performance were analysed using the points scored and received within the previous and post 5 ball possessions. The analysis included the following performance indicators: rebounds, fouls, turnovers, free throws, 2-point and 3-point field goals; contextual indicators: point difference, location, timeout type, and period; and spatio-temporal indicators: team run distance and average speed. For each category, the indicators were calculated as the difference between two teams. After normalizing the data, a stepwise multiple linear regression model was established to explore the relationship between the timeout effect and indicator variables, with the teams points difference as the dependent variable.
RESULTS:
After considering a total of 10 independent variables above, the model was obtained after 5 steps of modeling, 4 variables were excluded. The model obtained is y= -0.075+0.167*period+0.324*rebounds-0.316*turnovers+0.181*free throws+0.112*fouls-0.055*team run distance (adjusted R-squared: 0.200, $p<0.05$). During 5 ball possessions, team run distance showed significant negative effect for the timeout ($p=0.04$). For the dummy variable of period, the coefficient of the 4th period is 0.167 ($p=0.023$), while the other periods had no statistically significant effect for the timeout ($p>0.05$).
CONCLUSION:
The results showed that calling a timeout in the 4th period positively affects rebounds, free-throws, and fouls, possibly due to increased pressure and fatigue in this crucial period of the game. Also, it is important for teams to focus on minimizing turnovers in order to improve overall performance. Nevertheless, team run distance had a negative relationship of timeout effect in this model, which was probably due to the fact that coaches tend to call timeouts to modify team tactics. This could lead to a decrease in overall team run distance as players move deliberately to execute specific plays. In conclusion, the study provides novel insights for assessing timeout effectiveness and emphasizes the need to consider multiple factors when evaluating coaches decision-making performance.

Topic: Statistics and Analyses

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