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RESEARCH ARTICLE

Coaches Use of Team Timeouts in Handball: A Mixed Method Analysis

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Abstract: Coaches play a multifunctional key role in high-performance team sports. One of the coaches' responsibilities, in some sports, is to use team timeouts effectively. The sport science literature has however only given limited attention to the use of timeouts – this is especially the case in handball. This is somewhat surprising since timeouts can be used as a strategic intervention in the dynamic interplay on the field. This study examines why coaches' use team timeouts in handball and the efficiency of those timeouts. The study is built on a mixed method analysis; a) on interviews with six experienced handball coaches and; b) statistical analysis on all team timeouts during the 2014 Men´s European Handball Championship. The former method was used to establish hypotheses of why coaches use timeouts and the latter to test those hypotheses statistically. The findings from the interviews suggest that there are several reasons why coaches use timeouts in handball, most importantly to stop a negative flow in the game. Other reasons where to emphasize or change play strategy, to rest players, to slow the game down or to try to secure a goal. The statistical findings show support to the coaches' criteria of when they use timeouts. The results further showed that timeouts are efficient in stopping a negative flow in the game, but failed to show a significant relationship of the timeout leading to a goal in the following attack. Further research is needed to address various questions that arise from this study.

Keywords: Coaching, Handball, Team timeout calling.

INTRODUCTION

High-performance sports are based on a "win at all cost" ideology. There can be much at stake [1]. A single goal, a decisive decision and a fraction of a second can make a difference between winning and losing in sporting contest, but while the margins between winning and losing in sports are thin, the effects of the outcome of professional sport contests can be tremendous. In this context it has been a logical step for sports to turn, increasingly, to science for answers on how to improve performance. In turn, sports have become more systematic and professionalized where sport coaches and analysts turn up every stone trying to find ways to fulfill athletes and teams potential in order to gain, even the slightest, advantage on their opponents.

Sport coaching has increasingly been seen as the most important job in high-performance team sports [2]. The sport coach has been attributed for being responsible for team selection, being the creator of team atmosphere and implementing team strategy [2]. Coaches are supposed to take charge and lead the way to success and their performance is regularly valued by their team's win-loss ratio. In turn, successful sport coaches are highly regarded, celebrated and rewarded just like the most successful athletes, but coaching is a complex task and there are many skills a good coach brings to the job [2, 3]. One of these skills is to make good decisions in the heat of the game [4]. In this light, it is interesting to note that the sport science literature has only given limited attention to the use of team timeouts in sports [5]. This is somewhat surprising; especially since team timeouts are one of the few resources for coaches to use in direct strategic intervention in the dynamic interplay on the field [6, 7]. Most literature of team timeouts in sports comes from basketball [5 - 9] but research on team timeouts in other sports, such as handball, are practically nonexistent.

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Handball is a dynamic game and has sometimes been called "the most dynamic team sport in the world". The handball coach is usually solely responsible for his team time-outs, especially when to use them. Decision-making is therefore central in the coaches' job [4, 10]. The coach has to be a good "reader of the game" for the timeouts to be functional and effective. Debanne & Fontayne [10] have argued that the decision-making process of handball coaches is multifactorial where the coaches have to consider many interacting variables at any given moment, such as when and how to use timeouts efficiently.

Recent research on team handball has studied various key performance indicators [11 - 21] but they have mostly ignored the concept of team timeouts. Only one published study has focused especially on team timeouts in handball. Gomes, Volossovitch & Ferreira [22] analyzed when team timeouts were used in the Spanish Men´s National league. Their findings showed that team timeouts were used in even games, in later stages of games and when teams were facing a negative flow. They argued that team timeout calling was "influenced by the interactions of multiple factors that include contextual variables …as well as short-term performances of both teams" [22, p.108]. The existing research on team timeouts from basketball supports these findings where coaches tend to use timeouts when their team is struggling on the field [6, 23] and in critical game situations near the end of games [5, 6]. Psychosocial theories have argued that a break in the action, like intervals and timeout in sports, can interrupt positive flow [24]. Research from basketball show that team timeout calling can be an effective intervention for coaches to stop opponent's positive flow - which has in the literature also been labeled "behavioral momentum" [6]. Teams can use a timeout to stop a negative flow in the game and turn things around. This is relatively well documented in the literature on timeouts in basketball [5 - 9], but not in handball.

Despite substantial efforts from researchers in analyzing timeouts in basketball these studies are insufficient for practitioners of handball. There can be other dynamics at play in handball than in basketball. While the games of handball and basketball are based on some of the same principles, handball differs from basketball in many ways. Regardless of the obvious differences in the rules and structure of the two sports, handball is a faster game with fewer breaks and intervals per game than basketball. Handball coaches are further allocated fewer timeouts per game than basketball coaches, which puts even more pressure on the handball coaches to use their allocated timeouts wisely and effectively, because they have limited resources to influence game-play and they have no timeouts to spare. Also, while timeouts have been an integral part of basketball from early on, they are only recent additions to handball. Handball coaches are therefore not as experienced in their use of timeouts, due to the short history of the use of timeouts in the sport, compared to basketball coaches. Thus, specific handball analysis on the use of team timeouts in the sport is needed. Analyzing timeouts in handball further requires an understanding of the role of timeouts in handball specifically.

The main aim of this study is to make handball-specific analysis of the use of team timeouts. Since the coach is usually the single person responsible for the use of the team timeouts, this study pursues the coaches' perspective of timeouts. The specific aims of this study are therefore to explore team timeouts in handball on two levels. Firstly by establishing a criteria of why coaches take timeouts, based on interviews with six experienced Icelandic handball coaches; and secondly to measure and analyze the use and the efficiency of team timeouts at the EHF Men´s European Championship in handball in 2014, based on the aforementioned coaches' criteria.

METHODS

Since the literature of team timeouts has not been addressing handball to any extent and that timeouts are only a recent addition to the sport, it is important to get to some base on the function of team timeouts in handball. The analysis in this study is therefore based on a mixed method study of two kinds of data. On interviews with handball coaches and statistical analysis of team timeouts from the 2014 EHF Men´s European Championship in handball.

Participants

First, the author conducted semi-structured interviews with six experienced Icelandic handball coaches. The coaches are all male and the age range is from 35 years to 53. Two of the coaches are current national coaches (one participating as head coach in the 2014 Men´s European Championship and the other a national coach for a women´s team); one is a former national coach of a women´s team and three are club coaches with international experience. Second, the statistical data were collected from the Men´s EHF European Handball Championship, which was held in Denmark in January 2014.

Procedures

First, the interviews were conducted at various locations in Iceland in the spring of 2014 and lasted around 30 min each. The interviews were not intended to contribute to this study in detailed fashion, that is, to use direct quotes from the coaches, but rather to generate hypotheses from the interviews on why the coaches use team timeouts. The interviews were therefore explorative, meaning that the author did not have any presumptions of the findings beforehand but based his analytical approach on a grounded theory as proposed by Glaser and Strauss [25]. Grounded theory was used in order to develop an integrated set of concepts or hypotheses by the process of ongoing and constant comparison between the coaches' views on timeouts [25, 26]. Second, the statistical analysis was made on all team timeouts in the Men´s EHF European Handball Championship. The data was retrieved from the official website of the European Championship [27] where play-by-play descriptions were used to establish the relevant data.

Measurements

First, the data from the interviews were deductively analyzed into emerging themes based on their generalizability and also took note of other interesting insights from the coaches of their use of team timeouts. Thus, the interviews were not intended to serve as a complete analysis of the coaches' views of timeouts, but rather to establish some reference points that would allow the author to form hypotheses that could be tested in the statistical analysis of the study. Second, for the statistical analysis of the European Championship, each team is allowed up to three one-minute team timeouts during a single match, a maximum of two team-outs in each half and no more than one timeout in the last five minutes of regular playing time. A team also has to have possession of the ball when requesting a team timeout [28]. A total of 213 team timeouts were recorded in order to test the theories that emerged from the interviews. The statistical analysis was built on the following measures:

Pre-, and post timeout score: was intended to measure the use and efficiency of timeouts, by calculating game score statistics prior to and after timeouts. This was done in two ways. Firstly by game score difference on three different points in the game; five minutes prior to timeout, on timeout, and five minutes after timeout [see 26]. And secondly by calculating the game score change over the ten-minute period. By measuring game score in time intervals before and after timeouts, instead of counting ball possession [see 15] provides a macro view of the development of the games and how they are affected by the timeouts taken over a substantive period in the games. A regression to the mean effect will stabilize differences in ball possession over the whole tournament.

Timeout attacks: was intended to measure the efficiency of strategic timeouts where a timeout attack score was calculated. Timeout score refers to the percentage of goals scored in the attack, under which the timeout was taken. To fairly measure the efficiency of timeouts, awarded 7-meter free throws were included in the number of goals scored, even if they did not conclude to a goal. In comparison average goal efficiency for all attacks in the championship were calculated using statistics from the official website of the European Championship (excluding goals from fast breaks).

Game results: was intended to analyze the differences in the use and efficiency of timeouts in close games and uneven games. The variable was originally divided into; close results games, which ended with a 0-2-goal difference; fairly even games, which ended with a 3-5-goal difference; and uneven games, games that ended with a 6-goal difference or more. The variable was then recoded into close games = 0-2 goals and uneven games = 3 goals or more.

Time of timeout: was analyzed in order to evaluate if timing of timeout matters. This was especially done to test timeouts that were used in the last minutes of games. The game time was divided into: 0-14 min, 15-28 min, 29-30 min, 30-44 min, 45-58 min and 59-60 min.

Suspension timeouts: are all timeouts that were used when the timeout teams were a man short on the field at the exact time of timeout, due to two-minute suspensions. This was done to measure if timeouts were used strategically to slow the game down and to pass away the time.

Statistical Analysis

The statistical findings will not cover all aspects of team timeouts at the European Championship but they will focus on testing the theories driven from the interviews. They will report on the number of team timeouts during the tournament, when (in game-time) they were used and take note of other influential factors affecting the timing of timeouts. The findings will further reveal whether the timeouts were effective for team score, and especially under which conditions timeouts were effective.

The statistics were analyzed descriptively using SPSS statistics software. T-test was used to test for statistical difference and logistic regression was further used to calculate odds ratios for the efficiency of different uses of team timeouts. Each odds represent a ratio that is the multiplicative effect of a 1-unit change in the independent variable on the odds of the dependent variable. The p-value of 0.10 was used to test for statistical significance [1].

RESULTS

All the interviewed coaches stated that they were solely responsible for their use of team timeouts. The coaches further revealed that they had developed some kind of strategy for their use of timeouts, which was not based on any systematic evaluation of their effectiveness but based on the coaches' experience and intuition. The coaches generally believe in the effectiveness of their use of timeouts. They assume that the use of timeouts has potential advantages – compared to not using a timeout - and that they can use timeouts to significantly influence game-play.

The coaches see their timeouts as a valuable resource and are prudent on when to use their timeouts, because they only have three timeouts per match. Thus, they don´t want to waste their timeouts early if they should be needed for critical moments later in the game. More generally the coaches' do not use timeouts in the early phases of games except they feel it is absolutely necessary to do so.

The main general theme of the use of timeouts from the interviews with the coaches was that timeouts could be useful during a bad spell in the game and therefore to stop opponent's flow in the game. Thus, timeouts were considered a useful tool to interrupt opponent's behavioral momentum, if they were gaining advantage in a game, and therefore an opportunity to turn things around. Such use of timeouts is based on four major elements. Firstly, it serves a tactical purpose where the coaches use timeouts to emphasize their team strategy. Secondly, to tactically respond to the opponents play on such occasions and provide the players with other ways to respond to the opponents play. Thirdly, it serves as emotional break where players get a moments rest from play during the bad spell in the game. During timeout the players have the chance to catch their breath, refocus and reset for the coming play. And fourthly, it serves as collective team motivation where the whole team gather closely in physical contact, led by positive and encouraging statements that lead to collective support, increased optimism and hope after the timeout.

However, as some coaches stated, taking a timeout can also be viewed as a two-edged sword. The coaches felt that timeouts were an effective strategy to stop a negative flow in the game but some of them also realized that when they take a timeout the other team gets a timeout as well. The opponents can therefore make the same use of the timeout and possibly gain momentum and turn things around after the timeout, as themselves. Taking a timeout in a positive flow, when things are going well, can therefore be risky, because the timeout team is then giving the opposing team (which is experiencing a negative flow) an additional timeout at a critical point in the game - to try to turn things around. However, some of the coaches tended to use timeouts during a positive flow in order to emphasize team strategy.

The coaches further tend to use timeouts on occasions when the feel the really need a goal. They therefore sometimes set up specific team play during the timeout and try to use timeouts to try to secure a single goal. They generally feel that taking a timeout increases the chances of scoring in the following attack. This is especially the case during crunch time, like timeouts used in the last minutes of games when a single goal can be decisive. Such timeouts also function to avoid panics among the players. When there is much at stake and the arousal level is high on the field the coaches feel that they must take charge, give specific instructions and instill composure and confidence in the players with the hope of securing an important goal.

The coaches further claim that they sometimes use timeouts to slow the game down – that is to pass the time away. This is mostly done on two occasions. Firstly when the team is a man short on the field, due to a two-minute suspension, taking timeout alters the flow of the game and passes the time away. The intention of such timeouts is to try to keep ball possession - "hang on to the ball" - until the suspension time is over. And secondly when the team has the upper hand during the last minutes or seconds of games and wants to let the games fade out, because slowing the game down can help the team secure a victory.

To sum up, the decision-making process of handball coaches in relation to using timeouts is multifactorial [4, 10, 22] and it highlights the coach as strategist of team play. There is no one reason for coaches to use a timeout in handball. They base their decision, whether to take a timeout, on many interacting elements during different situations in a game. It is not in the realm of this study to analyze them all due to the limits of the data, but the data provides the

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[1] Due to the small number of timeouts, after they had been split into subgroups, the p-value were set at the 0.10 mark.

opportunity to test some of the main criteria's the Icelandic coaches use for taking team timeouts. Thus, the general findings from the coaches' interviews lead to proposing of the following eight hypotheses:

(i) team timeouts are valuable resources for coaches who tend to use their allocated timeouts.

(ii) team timeouts are used to stop a negative flow in the game.

(iii) team timeouts are efficient in stopping a negative flow in the game.

(iv) team timeouts are rather used in later stages of games than in former.

(v) team timeouts are even used when the timeout team is a man short due to a 2-minute suspension of a player.

(vi) team timeouts are rather used in close games than in uneven games.

(vii) team timeouts taken in the last 2 minutes of games are more frequent than in other phases of games.

(viii) teams that take timeouts are more likely to score in the attack following a timeout compared to attacks on average not following a timeout.

These hypothesis will be tested by analyzing data from the EHF 2014 Men´s European Championship in part II.

The statistics from the 2014 Men´s European Championship in handball show that 213 timeouts were used in the 47 games played during the tournament (see Table **1**). On average 4.53 timeouts were used per game which translates to 75.5% of all potential timeouts were used during the championship (4.53/6.0). More timeouts were used during second half compared to the first half whereas over 40% of all the timeouts were used during the last quarter of games. Around 11% of timeouts were used during the last two minutes of games and 14% were used during a two-minute suspension period of the timeout team. The table further reveals that around 54% of timeouts were used in close games compared to 46% in uneven games, and up to 74% of timeouts were used by teams that had a negative score in the last five minutes leading to the timeout.

**Table 1. The use of timeouts in the EHF Men´s European Championship 2014.**

Main variables		% (N)
Number of games		(47)
Number of timeouts		(213)
First half timeouts		44.6 (95)
	0-14 min.	10.8 (23)
	14-28 min.	29.6 (63)
	28-30 min.	4.2 (9)
Second half timeouts		55.4 (118)
	30-44 min.	13.1 (28)
	44-58 min	31.5 (67)
	58-60 min.	10.8 (23)
Timeouts during 2 min. suspensions		13.6 (29)
Timeouts in close matches (+/- 2 goals final score)		53.5 (114)
Timeouts in uneven matches (+3 goals final score)		46.5 (99)
Timeouts for teams with minus 3-5 goals in the last 5 min.		18.8 (40)
Timeouts for teams with minus 1-2 goals in the last 5 min.		54.9 (117)
Timeouts for teams with even score to plus 4 goals in the last 5 min.		26.3 (56)
Mean timeouts per game		4.53

Timeouts seem to be more used during bad spells in games. Fig. (**1**) shows the game score difference when measured at five minute intervals around timeouts. Mean score difference for the timeout team goes from 0.56 goals in their favor, five minutes before the timeout, to -0.69 goals in favor of the opposing team at the point in time when the timeout is taken. The relationship is significant (t= 5.0501, df= 212, p = .000). The timeout interval seems to stop a negative trend in game score for the timeout team. For up to five minutes following a timeout the game score difference slightly improves for the timeout team, from -0.69 when the timeout was called, to -0.58. This relationship is however not significant (t= -0.3828, df= 212, p = .649).
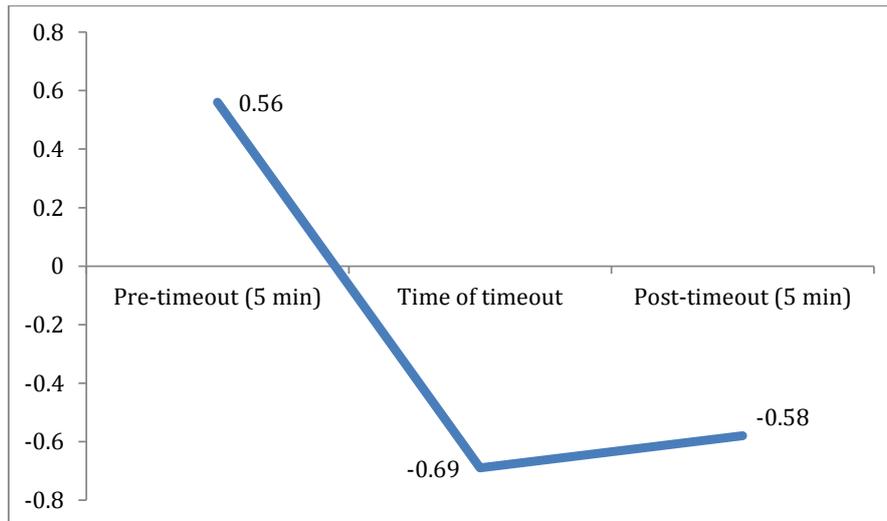
Fig. (1). The effects of timeouts on game score.

Fig. (**2**) shows this relationship further where we observe the cumulative effects of timeouts on game score, over a ten-minute game period. While the timeout team lost the last five minutes leading to the timeout by 1.29 goals they win the next five minutes after the timeout interval by 0.12 goals. Using timeout therefore seems to count for a significant total goal score change of 1.41 in favor to the timeout team (t= -16.025, df= 212, p = .000).
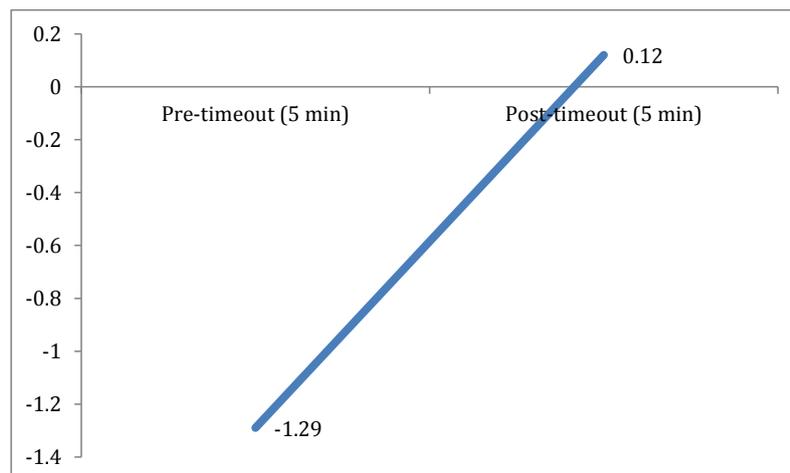
Fig. (2). Cumulative effects of timeouts on game score.

However, Table **2** shows statistics for goals in attacks following a timeout. Around 47% of attacks following a timeout ended with a goal compared to 46% of average attacks in the competition (excluding fast break attacks). The table showed a significant difference for goals scored in close games compared to uneven games (t= -2.082, df= 211, p = .039) where teams were more likely to score following a timeout in uneven games. The table further showed that teams that had a bad spell in the last 5 minutes leading to the timeout score in about 50% of their timeout attacks compared to around 39% for teams that took timeout without having a bad spell in game score. However, the difference was not significant (t=. 1.338, df= 211, p = .182). We further see that the percentage of goals scored in attacks following a timeout is lowest in the last two minutes of each half. The difference is however not significant (t=. 1.160, df= 211, p = .243). Finally, we see that up to 38% of attacks following a timeout during a two-minute suspension ended with a goal.

Table **3** further shows the odds ratios of teams scoring a goal in the attack after a timeout taken, at different points in the game. Only one significant relationship was found. The statistics show that teams that took timeouts were 1.3 times more likely to score in uneven games than in close games (OR=1.344*). Although further findings in Table **3** were not

significant, they indicate that teams were more likely to score after a timeout, which is used in the regular stages of games rather than in the last minutes of games (OR=1.369); and were more likely to score with full team on the court then a man short due to a two-minute suspension (OR=1.418).

Table 2. The relationship between timeout taken and if it leads to a goal scored in the following attack.

	% (N)
Timeout attacks	46.9 (100)
During 2 min. suspensions	37.9 (11)
First half	49.5 (47)
0-14 min.	43.5 (10)
14-28 min.	54 (34)
28-30 min.	33.3 (3)
Second half	44.9 (53)
30-44 min.	50.0 (14)
44-58 min	44.8 (30)
58-60 min.	39.1 (9)
Close matches (+/- 2 goals final score)	40.4 (46)
Uneven matches (+3 goals final score)	54.5 (54)
For teams with minus 3-5 goals in the last 5 min.	50.0 (20)
For teams with minus 1-2 goals in the last 5 min.	49.6 (58)
For teams with from even score to plus 4 goals in the last 5 min.	39.3 (22)

Average goals scored in competition attacks (fast breaks excluded)
46.0

Table 3. Logistic regression model for timeout goal by selected variables (odds ratios and 90% confidence intervals).

	OR	(90% CI)
Tournament stage (group; semifinals; finals)	1.112	.790-1.565
Time of timeout (last minute; other)	1.369	.703-2.667
Final score difference (close; not close)	1.344*	1.033-1.748
Last five minutes before timeout (neutral or positive; negative)	1.009	.504-2.022
Time of timeout (neutral or positive; negative)	1.198	.614-2.339
Two minute timeout (yes; no)	1.418	.703-2.859

*Significant at $p < 0.10$ level; p-values were from Wald t-tests, df = 1

DISCUSSION

The aim of the study was to explore coaches' use of and the efficiency of team timeouts in handball. This was done on two levels. Firstly, by qualitative examination of coaches' perspectives of team timeouts - in order to generate hypotheses of why they use timeouts; and secondly to test these hypotheses quantitatively.

The findings from the interviews suggest that there are many motives for coaches to use timeouts in handball. The main findings from the interviews led to the testing of the following hypotheses:

(i) team timeouts are valuable resources for coaches who tend to use their allocated timeouts - was supported. Around 76% of all potential timeouts were used in the 2014 European championship. Team timeouts are one of the limited resources that are available for coaches to have direct intervention on the emerging play on the field. The coaches seem to appreciate their allocated timeouts and see them as valuable resources for multi-purpose use in influencing game development. However, around a quarter of all potential timeouts were not used in the tournament where teams that had a positive or neutral game score were less likely to use their timeouts, than teams with a negative game score.

(2) team timeouts are used to stop a negative flow in the game - was supported. The coaches' most frequent use of team timeouts was intervention in the games, especially when the teams were facing a negative flow. Three quarters of all timeout were used when the timeout team had a negative game score in the five minutes leading up to the timeout, going from positive to negative game score. The relationship was significant. These findings are in line with the results from Gomes, Volossovitch & Ferreira [22] analyzes on Spanish handball. On the other hand timeouts were less likely to

be used during a positive flow. Around one quarter of all timeouts were used by teams with even score or a positive score in the last five minutes leading to the timeout. This is also in line with the results from Gomes, Volossovitch & Ferreira [22]. Though the coaches sometimes use timeouts on such occasions, for various reasons, they realize that by taking a timeout in a good spell in the game they give their opponents an additional timeout as well - and an opportunity to try to turn things around.

(3) team timeouts are efficient in stopping a negative flow in the game - was supported. The findings reveal that timeouts were an efficient strategy in stopping a negative flow in the game with a total score change of 1.41 goals - in the 10-minute period around the timeout - for the timeout team. These findings show support to the coaches trust in using timeouts to stop a negative flow in the game, and support earlier findings from basketball on the efficiency of using timeouts on such occasions [5 - 9]. Timeouts don´t turn games around but they seem to stop the negative momentum that has built up in the minutes leading to the timeout and balance the game again.

(4) team timeouts are rather used in later stages of games than in former - was supported where up to 40% of all timeouts in the competition were used in the last quarter of games. These findings are in correspondence with former research on handball [22]. Coaches see timeouts as a limited resource and therefore tend to be cautions on using their timeouts because they may be needed for critical moments later in games.

(5) team timeouts are even used when the timeout team is a man short due to a 2-minute suspension of a player - was somewhat supported. Almost 14% of timeouts were used when teams were undermanned on the field, due to two-minute suspensions. Using a timeout for strategic intervention or to try to secure a goal while being a man short on the field isn´t logical in handball but according to the coaches they tend to use such timeouts with the intention to pass away the time and rest players. The use of two-minute suspension timeouts has not been addressed in the literature to date.

(6) team timeouts are rather used in close games than in uneven games - was somewhat supported. According to the coaches they tend to use their timeouts in close games, and especially in critical situations in such games. The statistics support this claim up to a point where around 54% of the timeouts were used in close games that had a final score up to a maximum of 2-goal difference. These results resemble the findings from former handball research [22].

(7) team timeouts taken in the last 2 minutes of games are more frequent than in other phases of games, was supported. Up to 11% of all timeouts in the tournament were used during the last two minutes of games, which is proportionally very high compared to other stages of the games. These findings correspond with former handball research [22]. Coaches tend to use their timeouts towards the end for strategic purposes and they also use their timeouts at such late stages in games because their unused timeouts would otherwise go to waste.

(8) teams that take timeouts are more likely to score in the attack following a timeout compared to attacks on average not following a timeout - was not supported. The difference between the timeout team scoring in the timeout-attack is not significantly greater than for any team to score a goal in an average attack in the tournament. The findings however show a significant relationship in the case of teams that took timeouts were 1.3x more likely to score in the timeout attack in uneven games than in close games. Other relationships from the logistic regression were not significant. They however give indication of some interesting trends. They suggest that teams that took timeouts in the regular phases of games were 1.4x more likely to score in the timeout attack than teams that took timeouts in the last two minutes; and teams that took timeouts with a full team on the court where 1.4x more likely to score in the timeout attack compared to teams that were a man short due to a two-minute suspension. According to Debanne, Angel, & Fontayne [10] this makes sense since handball coaches emphasize a more sound defensive strategy in the later stages of matches. The findings further indicate that using timeouts in positive flow of games can have counter effects. Teams that used timeouts after neutral or positive game score, in the five minutes leading to timeout, were less likely to score in their next attack compared to both mean goal efficiency in the tournament, and mean timeout attack score. This relationship was however not significant. Thus, the analysis suggests that there are many factors, such as differences in match situation, that have to be taken into consideration in whether timeouts lead to goals or not.

Although the study gives indication to some interesting statistical relationships, only a few of them were significant. This could be due to that fact that the available cases in the championship were too few for a thorough statistical analysis. This is especially relevant on rare cases of timeouts such as two-minute suspension timeouts and positive-flow timeouts. A larger set of data would provide more accurate findings in this respect. It could on the other hand be argued that the analysis of all timeouts in a single championship functions as a population study, not a sample study, since all

items are included in the analysis. The relationships found in this study were relevant for the 2014 European Championship – and should be treated as such.

CONCLUSION

This study functions as one of the starting points of systematic analysis of team timeouts in handball, but it does not provide a holistic account of the subject. The findings show support to the existing literature on team timeouts but further adds the analysis of the coaches' perspective. This is important because coaches are the key persons responsible for the uses and efficiency of team timeouts. The absence of significant relationship on some of the statistical findings affects the generalizability of the study. So further interpretations based on the findings should be cautious. The findings are however important for future studies that should take interactive and contextual variables into account in evaluating the uses and efficiency of team timeouts in handball. These issues are relevant for both academics as well as sport practitioners who work in the field of handball as well as in sport in general.

CONFLICT OF INTEREST

The authors confirm that they have no conflict of interest to declare for this publication.

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