

# Attitudes Towards Cardiopulmonary Resuscitation Situations and the Associations of Possible Affecting Factors – a Survey Among 3,602 in-hospital Healthcare Professionals

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## Original research

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# **Abstract**

## **Background**

Attitudes among in-hospital healthcare professionals (HCPs) towards cardiopulmonary resuscitation (CPR) are poorly understood. The aim of this study was therefore to evaluate attitudes among in-hospital HCPs towards CPR and furthermore to assess the associations of possible affecting factors.

## **Methods**

A questionnaire was distributed to n=6,055 HCPs. The associations of affecting factors were analysed using binary logistic regression.

## **Results**

The response rate was 59% (n=3,602). Fifty three percent of HCPs felt confident in their CPR knowledge, 80% would know what to do, and 52% would be able to take command if necessary in a cardiac arrest situation. A third of HCPs were worried about making mistakes/cause complications, 57% felt stressed, and 27% felt anxious in connection to the latest real-life CPR situation. A short time since the last real-life CPR performance and a high number of previous real-life CPR performances were associated with lower odds of a worry about making mistakes/cause complications, lower odds of feeling stressed or anxious, and higher odds of feeling calm. Despite previous real-life CPR experience, there were differences in attitudes between groups of profession, and between monitored and non-monitored wards. Time since last CPR training course was associated with anxiety.

## **Conclusions**

Despite overall positive attitudes towards performing CPR, feelings of stress and anxiety were common which could reflect possible stress overload. Many HCPs work in low-risk areas of cardiac arrest, therefore regular CPR training is important to maintain competence and reduce anxiety. The possible effect of attitudes on performing CPR needs to be studied further.

# **Introduction**

The competence and quality of skills of healthcare professionals (HCPs) regarding cardiopulmonary resuscitation (CPR) has previously been reported to be overestimated by HCPs and inadequate by observation [1–3]. Attitude is, together with knowledge and skills, seen as an essential component of competence [4]. The attitude among HCPs toward performing CPR is poorly understood, and it is furthermore unclear if there are factors possibly affecting attitudes.

The behaviour in a specific situation is affected by intention and perceived behavior control. Intention is determined by behavior beliefs, subjective norm (the perceived social pressure to perform), and by the degree of perceived behavioral control [5]. Attitude consists of positive or negative feelings, beliefs and

behavioural information about a specific object [6]. Attitude have been found to be the strongest predictor regarding the intention to perform CPR among college students [7]. A cardiac arrest situation can be associated with stress [8, 9], even in simulated situations [10]. Nurses have reported feelings of hesitation [11, 12], anxiety [11, 13] and fear of harming the patient [11]. Junior physicians have reported feeling stressed due to concerns that CPR felt inappropriate, a lack of CPR training, or to the situation itself [9]. CPR training have been proven to give a feeling of preparedness, decrease stress [8], increase positive attitude [14] and increase confidence [12]. After completion of a CPR training course, Swedish nurses and assistant nurses have shown decreased levels of anxiety and reduced fear of contracting an illness [15]. Advanced CPR training, attended by physicians and nurses on monitored wards, have shown to increase confidence [16]. Previous CPR experience in real life have been associated with positive attitudes towards CPR [14]. The attitude among HCPs toward CPR might affect their behavior in a cardiac arrest situation and attitudes are therefore important to evaluate. Performing CPR in a cardiac arrest situation is a team effort, and the attitude among all professions involved in the situation is important. Previous research has often derived from smaller samples and have often focused on specific professions. There is a lack of a large sample study among all in-hospital professions regarding the attitude towards CPR including an assessment regarding possible associated factors.

## Aim

The aim of this study was to evaluate attitudes among in-hospital healthcare professionals towards cardiopulmonary resuscitation and furthermore to assess the associations of possible affecting factors.

## Methods

### Design and data collection

This study was based on cross-sectional questionnaire surveys in two regions in Sweden [15, 17] at five secondary-care hospitals during the year 2008 and 2015-16. A total of  $n = 6,055$  active-duty HCPs involved in patient contact were invited to participate (Additional file 1, flowchart of participants). The HCPs consisted of physicians, nurses (including midwives and radiology nurses), nursing assistants (including caretakers and dental nurses) and other university-educated staff. Participation was voluntary, anonymous in one region and confidential in the other. HCPs were informed of the study at staff meetings or by e-mail. The questionnaires were distributed either at staff meetings or to mailboxes on the wards in one region and directly to participating individual in the other region. Reminders were sent by e-mail.

### The questionnaire

Twenty questions were selected from a validated questionnaire [15, 18]. Participants in both surveys in 2008 and 2015-16 responded to six questions concerning attitude towards being required to perform CPR, (Table 1), together with three questions concerning professional occupation, number of years in profession, and time since last CPR training course. In addition, participants responding to the survey in

2008 also responded to additional three questions regarding previous real-life CPR experience: experience of performing CPR in a cardiac arrest situation [yes/no], number of previous real-life CPR performances [one time to more than 30 times] and time since the last real-life CPR performance (last month to 24 months ago or more). Participants who reported having previous real-life CPR experience responded to eight additional questions concerning attitude in connection to their latest cardiac arrest situation (Table 2). Participant's workplaces were noted during collection of the questionnaires. All questions were constructed as multiple-choice questions.

Table 1

Attitude towards being required to perform cardiopulmonary resuscitation in a cardiac arrest situation.

	Physicians n = 491	Nurses n = 1560	Assistant nurses n = 1169	Other univ. educ. staff  n = 378	Total (% of total)  n = 3598*	Missing n	p
<i>I would feel unsure of my reaction</i>	103 (21)	382 (25)	285 (24)	213 (56)	983 (27)	63	< 0.001
<i>I would feel nervous</i>	266 (54)	606 (39)	362 (31)	218 (58)	1407 (39)	68	< 0.001
<i>I would feel confident in my CPR knowledge</i>	266 (54)	919 (59)	616 (53)	93 (25)	1894 (53)	72	< 0.001
<i>I would know what to do in the event of a cardiac arrest</i>	422 (86)	1329 (85)	912 (78)	217 (57)	2880 (80)	72	< 0.001
<i>I would feel anxious</i>	127 (26)	390 (25)	262 (22)	169 (45)	948 (26)	81	< 0.001
<i>I would take command of the situation if necessary</i>	400 (81)	955 (61)	394 (34)	123 (33)	1872 (52)	63	< 0.001

\* Missing n = 4. Numbers are presented as frequencies n (% within group)

Table 2  
Attitude towards cardiopulmonary resuscitation in connection to the latest cardiac arrest situation.

	<b>Physicians</b> <b>n = 208</b>	<b>Nurses</b> <b>n = 545</b>	<b>Assistant nurses</b> <b>n = 197</b>	<b>Other univ. educ. staff</b> <b>n = 15</b>	<b>Total</b> <b>(% of total)</b>	<b>Missing</b> <b>n</b>	<b>p</b>
<b>During the latest cardiac arrest situation</b>							
Were you worried to contract an illness?	16 (7)	24 (4)	14 (7)	0 (0)	54 (5)	43	0.08
Were you worried about making mistakes or to cause complications?	74 (36)	157 (29)	52 (26)	8 (53)	299 (31)	46	0.03
Did you feel any discomfort in initiating CPR?	30 (14)	56 (10)	14 (7)	2 (13)	102 (11)	72	0.17
<b>After the latest cardiac arrest situation</b>							
Did you feel stressed?	94 (45)	336 (62)	113 (57)	10 (66)	553 (57)	45	0.01
Did you feel anxious?	55 (26)	144 (26)	59 (30)	8 (53)	262 (27)	49	0.02
Did you feel calm?	98 (47)	288 (53)	109 (55)	3 (20)	498 (52)	53	0.01
Did you feel like a failure?	29 (14)	58 (11)	16 (8)	4 (27)	107 (11)	48	0.03
Did you feel pleased?	75 (36)	273 (50)	105 (53)	7 (47)	470 (49)	50	< 0.001

\* Missing n = 2. Numbers are presented as frequencies n (% within group)

## Statistics

The results from the attitude questions are presented descriptively. Differences regarding attitudes between groups of profession were analysed using Pearson's chi squared test, and Fischer's exact test were used when expected counts in one cell were  $\leq 5$ . The associations of possible affecting factors on attitudes were analysed using binary logistic regression. Each of the eight questions concerning attitude in connection to the latest cardiac arrest situation (yes/no) served as a dependent variable, where odds ratio for the response "yes" were estimated. Independent variables were number of previous real-life CPR performances (1–3 times, 4–10 times and more than 10 times), time since last real-life CPR performance

(24 months ago or more, 4–23 months ago and 1–3 months ago), workplace (monitored versus non-monitored ward), profession (physicians, nurses, assistant nurses, and other university educated staff), time since last CPR training course (0–6 months ago, 7–11 months ago and 12 months ago or more), and number of years in profession (from 0–46 years). Each independent variable was regressed with the dependent variables in a crude model, one at a time, and only independent variables which were found associated ( $p < 0.1$ ) were included in a multiple model. Again, in the multiple models, independent variables that were considered not to be associated ( $p > 0.1$ ) were excluded. In the final multiple model, independent variables that were considered to be associated with the dependent variable at a level of  $p < 0.05$  were considered statistically significant. Data were analysed using IBM Statistical Package for the Social Sciences 27.

## Results

The response rate was 59% ( $n = 3,602$ ). Mean work experience was 18.5 (SD 11.2) years and 39% ( $n = 1,392$ ) of HCPs had attended CPR training during the last year. Twenty-two percent ( $n = 777$ ) worked on monitored wards. A total of 45% ( $n = 967/2154$ ) of the participants in one region had previous real-life CPR experience, with a higher proportion found on monitored wards (44% vs. 22%). Forty-two percent ( $n = 401/967$ ) of those with previous experience had performed CPR up to three times and 47% ( $n = 457/967$ ) had performed CPR more than two years ago (Table 3).

Table 3  
Professional occupation, workplace and previous real-life experience of performing cardiopulmonary resuscitation.

	Physicians	Nurses	Assistant nurses	Other univ. educ. Staff	Total (% of total)
	<i>n</i> = 491	<i>n</i> = 1560	<i>n</i> = 1169	<i>n</i> = 378	3598 <sup>1</sup>
<b>Years in profession<sup>2</sup></b>					
<i>Mean (SD)</i>	16.4 (11.4)	17.0 (11.8)	21.6 (12.6)	17.8 (11.4)	18.5 (11.2)
CPR* training ≤ 11 months <sup>3</sup>	129 (26)	654 (42)	467 (40)	142 (38)	1392 (39)
<b>Workplace</b>					
<i>Monitored ward</i>	39 (8)	489 (31)	249 (21)	0 (0)	777 (22)
<i>Non-monitored ward</i>	452 (92)	1071 (69)	920 (79)	378 (100)	2821 (78)
<b>Experience of real-life CPR performance<sup>4</sup></b>					
<i>Monitored ward</i>	208 (22)	545 (56)	197 (20)	15 (2)	965 (45)
<i>Non-monitored ward</i>	26 (12)	241 (44)	72 (36)	0 (0)	339 (44)
<i>Non-monitored ward</i>	182 (88)	304 (56)	125 (64)	15 (100)	626 (22)
<b>No of real-life CPR-performances<sup>5</sup></b>					
1–3	46 (23)	230 (43)	113 (64)	12 (79)	401 (42)
4–10	73 (36)	153 (29)	44 (22)	2 (13)	272 (28)
> 10	84 (42)	144 (28)	26 (14)	1 (6)	255 (26)
<b>Time since last real-life CPR-performance<sup>6</sup></b>					

\*Cardiopulmonary resuscitation. Numbers are presented as frequencies *n* (% within group). <sup>1</sup> missing *n* = 4, <sup>2</sup> missing *n* = 25, <sup>3</sup> missing *n* = 25,

<sup>4</sup> out of a total *n* = 2154 in one region, missing *n* = 2, <sup>5</sup> missing *n* = 37, <sup>6</sup> missing *n* = 35.

	Physicians	Nurses	Assistant nurses	Other univ. educ. Staff	Total (% of total)
<i>0–3 months</i>	52 (24)	141 (26)	24 (13)	0 (0)	217 (22)
<i>4–23 months</i>	32 (15)	155 (29)	69 (37)	2 (14)	258 (27)
<i>≥ 24 months</i>	122 (59)	230 (44)	92 (50)	13 (87)	457 (47)

\*Cardiopulmonary resuscitation. Numbers are presented as frequencies *n* (% within group). <sup>1</sup> missing *n* = 4, <sup>2</sup> missing *n* = 25, <sup>3</sup> missing *n* = 25,  
<sup>4</sup> out of a total *n* = 2154 in one region, missing *n* = 2, <sup>5</sup> missing *n* = 37, <sup>6</sup> missing *n* = 35.

## Attitudes towards cardiopulmonary resuscitation

Table 1 displays the attitude among HCPs toward being required to perform CPR in a cardiac arrest situation. A majority of HCPs would feel confident in their CPR knowledge (53%), would know what to do (80%) and would be able to take command if necessary (52%) in the event of a cardiac arrest. At the same time, 39% of HCPs would feel nervous and 26% anxious.

Table 2 displays the attitude among HCPs with previous real-life CPR experience in connection to their latest cardiac arrest situation. During the latest cardiac arrest situation, 31% of HCPs were worried about making mistakes or to cause complications, few were worried to contract an illness (5%) or felt discomfort in initiating CPR (11%). After the latest cardiac arrest situation 57% of HCPs reported feeling stressed, feeling anxious (27%), feeling calm (52%), feeling pleased (49%), or felt like a failure (11%).

## Associations of affecting factors

Among other university-educated staff, only *n* = 15 had previous real-life CPR experience and were found to be outliers in the multiple models. The following results are therefore only applicable on physicians, nurses and assistant nurses.

Additional file 2 associations of affecting factors, displays the results from the binary logistic regression models. A time of 0–3 months since last real-life CPR performance and more than 10 previous real-life CPR performances were associated with lower odds of being worried about making mistakes or to cause complications (OR 0.41 CI 0.24, 0.70 and OR 0.10 CI 0.05, 0.21), lower odds of feeling stressed (OR 0.24 CI 0.15, 0.38 and OR 0.32 CI 0.21, 0.50) or anxious (OR 0.26 CI 0.15, 0.47 and for four CPR performances or more OR 0.24 CI 0.17, 0.34), and higher odds of feeling calm (OR 5.11 CI 2.94, 8.89 and OR 2.72 CI 1.63, 4.53). Regardless of amount of previous real-life CPR experience, there were associations regarding professional occupation and attitudes. Physicians showed increased odds of a worry about making

mistakes or to cause complications compared to nurses as reference (OR 2.14 CI 1.34, 3.42). The odds of feeling stressed were lower among physicians (OR 0.31 CI 0.19, 0.50) and among assistant nurses (OR 0.44, CI 0.28, 0.69) compared to nurses. The odds of feeling pleased were lower among physicians (OR 0.48 CI 0.33, 0.70) and higher among assistant nurses (OR 2.10 CI 1.37, 3.23) compared to nurses. Assistant nurses showed higher odds of feeling calm (OR 2.06 CI 1.30, 3.26) compared to nurses. Regardless of previous real-life CPR experience or professional occupation, workplace (monitored or non-monitored ward) was a significant factor regarding being worried about making mistakes or to cause complications and regarding feeling stressed, were HCPs working on non-monitored wards showed higher odds (OR 1.55 CI 1.04, 2.30 and OR 1.76 CI 1.19, 2.61). Regardless of above factors, number of years in profession was associated with being worried about making mistakes or to cause complications, were each year meant lower odds (OR 0.97 CI 0.95, 0.99). Time since last CPR training course was only associated with feeling anxious, were CPR training 12 months ago or more/never was associated with increased odds (OR 1.90 CI 1.15, 3.15) despite of previous real-life CPR experience.

A worry to contract an illness during CPR, feelings of discomfort in initiating CPR and feelings of failure after CPR performance were not possible to analyse in multiple models due to few observations after exclusion of outliers. However, in a crude model, there was an association regarding time since last CPR training course and a worry to contract an illness, where CPR training 7–11 months ago was associated with higher odds compared to 0–6 months ago. Also, in a crude model, ≥ 4 months since last real-life CPR performance and ≥ 4 previous real-life CPR performances were associated with lower odds of feeling discomfort in initiating CPR and working on a non-monitored ward meant higher odds. Furthermore, crude models showed higher odds regarding feelings of failure among HCPs working in non-monitored wards, and lower odds regarding feelings of failure with increased real-life CPR experience.

## Discussion

The main findings in this study showed that a majority of HCPs felt confident in their CPR knowledge, would know what to do and would be able to take command if necessary in a cardiac arrest situation. A third of HCPs reported being worried about making mistakes or to cause complications. Stress and anxiety were common in connection to the latest cardiac arrest situation. A short time since the last real-life CPR performance and a high number of previous real-life CPR performances were associated with lower odds of a worry about making mistakes/cause complications, lower odds of feeling stressed or anxious, and higher odds of feeling calm. Despite previous real-life CPR experience, there were differences in attitudes between groups of profession, and between monitored and non-monitored wards. Time since last CPR training course was associated with anxiety.

The associations regarding previous real-life CPR experience and attitudes remained significant in all applicable multiple models. A positive effect of real-life CPR experience on attitudes [14] and confidence [16] have been seen previously. Exposure to a certain object can create a more positive attitude toward the object. This means that the more familiar one is with an object the more likely it is to have a positive attitude towards it [6]. Also, previous experience with a behavior affects behavioral control and perceived

behavioral control can mediate planned behavior [5]. Considering this, it seems that increased experience of real-life CPR performance in cardiac arrest situations would increase positive attitudes towards CPR and increase perceived behavioral control of performing CPR.

The results in the present study showed differences regarding attitude between professions and between HCPs on monitored and non-monitored wards, despite of previous real-life CPR experience. This could be due to predefined roles and responsibilities in the cardiac arrest situation and due to different levels of CPR training. Physicians and nurses on monitored wards attend advanced CPR training and working in high-risk areas of IHCA have been shown to be associated with increased confidence in performing CPR skills and in being a part of a resuscitation team [16]. In this study, differences in attitude were seen between HCPs on monitored wards and non-monitored wards regardless of previous real-life CPR experience which suggests that the level of CPR training might affect attitude.

A majority of HCPs thought they would be able to take command if necessary in a cardiac arrest situation. Previous results have shown that only 7% of Swedish HCPs agreed with the ability to lead a cardiac arrest team [17]. The importance of perceived behavior control increases in situations where deliberate choice to perform a specific behavior decreases [5]. During teamwork, team members tend to anticipate task ability based on outer factors such as profession or sex, not necessarily associated with competence [19]. Considering this, in the absence of a more competent leader, a majority of HCPs in the present study would try to take command of the situation if necessary although the self-assessed ability to lead among HCPs have previously been shown to be low.

In this study, anxiety was reported among 26% of HCPs when being required to perform CPR, and among 27% after the latest real-life CPR performance. It has been reported that only a third of first responders manage to treat a cardiac arrest correctly in simulated situations and that many teams initially fail in building a team structure [20]. Perceived stress has been proven to delay initiation of CPR in simulated situations [21]. Simulated cardiac arrest situations have been shown to increase negative emotions [10] and anxiety is the most common emotion during stress overload [22]. An overload of stress often has a negative impact on the individual and happens when the resources are insufficient to the demands of the situation. Stress overload could affect attention, memory and decision-making and therefore have a negative effect on managing a sudden cardiac arrest [22].

The present study showed that the compliance to recommended CPR training intervals, every six months or at least once a year, was low among all groups of profession. Furthermore, many HCPs work in low-risk areas of cardiac arrest, which means a lack of real-life CPR experience. It has previously been shown that CPR training increase positive attitudes towards CPR [14, 15]. The results in the present study indicates that 12 months or more since CPR training is associated with increased odds of anxiety despite of previous real-life experience. This shows the importance of refresher-training to maintain the knowledge and skills necessary to manage the situation, which seems to reduce stress overload and anxiety. CPR training need to be prioritized among all in-hospital HCPs.

# **Limitations**

There are limitations in this study. Higher response rates were found in one of the two regions, probably due to differences in how the questionnaires were distributed. Equal response rates among professions, but lower on monitored wards compared to non-monitored wards, were observed in one region. In the other region, the response rate was higher on monitored wards than non-monitored wards, but the profession of the non-responders were not known and therefore cannot be analysed. Experience in real-life cardiac arrest situations was only requested in one region, due to differences in focus of the surveys. There was a time difference regarding data collection in the two regions. However, the attitude among HCPs toward performing CPR is not considered to be affected by this time difference.

# **Conclusion**

Despite overall positive attitudes towards performing CPR, feelings of stress and anxiety were common which could reflect possible stress overload. Many HCPs work in low-risk areas of cardiac arrest, therefore regular CPR training is important to maintain competence and reduce anxiety. The possible effect of attitudes on performing CPR needs to be studied further.

# **Abbreviations**

CPR  
Cardiopulmonary resuscitation  
HCPs  
Healthcare professionals

# **Declarations**

## **Ethics approval and consent to participate**

This study was given an additional amendment by the ethical review authority in Uppsala, (Dnr 2006/201/2) and was registered at ClinicalTrials.gov (ID nr NCT04321213). The study was performed according to the principles of the declaration of Helsinki [23]. HCPs gave consent to participation by responding to the questionnaire.

## **Consent for publication**

Not applicable

## **Availability of data and materials**

The datasets used and/or analysed during this study are available from the corresponding author on reasonable request.

## **Competing interests**

The authors declare that they have no competing interests.

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## **Authors' contributions**

M-LSK developed and validated the questionnaire. JS and M-LSK were major contributors in data collection. JS was a major contributor to the analysis of the data. All authors contributed to planning, interpretation of results and in writing of the manuscript. All authors read and approved the final manuscript.

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## Supplementary Files

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