

The importance of nontechnical skills in leading cardiopulmonary resuscitation teams

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Cardiopulmonary resuscitation (CPR) is one of the important clinical competencies for medical trainees. Since the introduction of the first guidelines for CPR in 1966, further research has resulted in more recent updates. The latest in the UK was published in 2015 by the resuscitation council. The multidisciplinary nature of the resuscitation team requires a designated leader, capable of directing the team's effort and making

decisions. There is evidence that leadership makes a difference in the performance of the resuscitation team and the outcome of patients. Research performed on leadership in emergency medicine highlighted the importance of the nontechnical skills displayed by CPR team leaders. Nontechnical skills refer to cognitive, behavioural and social skills that contribute to efficient team performance, such as task management, assertiveness, situational awareness, communication and decision-making. This review discusses the importance and applicability of nontechnical leadership skills in CPR based on current evidence in the literature and the clinical practice in UK hospitals.

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Introduction

Cardiac arrest is an important medical emergency and a major public health problem around the globe. Modern cardiopulmonary resuscitation (CPR) was established in late 1950s and early 1960s, with the aim of providing artificial ventilation and perfusion to cardiac arrest victims. In 1966, the first guidelines were published by the American Academy of Science.¹ Over time, there has been advancement in resuscitation medicine and related technologies.^{2–4} The overall survival rate of victims of out-of-hospital cardiac arrest ranges from 0.8% to 31% worldwide.^{2,3}

In the UK, CPR in an in-hospital setting is delivered by a multidisciplinary team, usually led by the medical registrar on call or a more experienced clinician, if present on the scene. Resuscitation quality depends on effective team coordination, good communication and leadership. It is, therefore, important to identify the team leader in every resuscitation event.⁵

Poor nontechnical skills are a major cause of avoidable errors in healthcare and it has been suggested that training in nontechnical skills can significantly reduce harm and improve patients' outcome.⁶

Leadership matters

The pivotal role of leadership in improving performance of CPR teams and, therefore, outcomes, is supported by

evidence from research. Yeung et al.,⁷ in the UK, studied the relationship between team-leadership skills and the quality of CPR, in addition to the factors affecting leadership skills in a simulated environment using videotapes.

The participants were scored using a cardiac arrest simulation test score and leadership behaviour description questionnaire for leadership skills. The study concluded a positive association between leadership and complex technical skills, i.e. teams led by advanced life support providers with higher leadership behaviour scores performed higher quality CPRs, as shown by better technical performance.

Another study based on simulated cardiac arrest due to ventricular fibrillation confirmed the same. Marsch et al.⁸ studied 16 emergency teams, each comprising three healthcare workers, and rated them according to leadership, task distribution, information transfer and conflicts. Only six teams were successful. Absence of leadership behaviour and explicit task distribution were associated with failing teams and poor resuscitation performance.

In a recent qualitative study, 158 individuals from nine top performing hospitals in the USA (according to in-hospital cardiac arrest survival to discharge rate) were interviewed to understand how these hospitals organise their resuscitation teams in order to achieve high survival rate for in-hospital cardiac arrest. Communication and leadership within teams

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was one of the main core elements of better outcomes in these hospitals.⁹

It could be argued that nontechnical skills are more important than technical skills for a better CPR performance, though the evidence for such argument is scarce. In a randomised controlled trial, medical students who received leadership and communication instructions performed better CPR in a simulated videotaped environment than did their peers who received technical instructions.¹⁰

Team preparation and role allocation

Team preparation and role allocation will ease the challenge of initiating resuscitation, while, at the same time, establishing a working group structure, as both tasks are under high time pressure. Hunziker et al.¹⁰ conducted a prospective randomised simulator-based trial where they compared the performance of preformed teams to teams formed ad hoc in simulated, videotaped cardiac arrest scenarios. The trial included 50 teams of three hospital physicians and 50 teams of general practitioners, both groups were randomised to either preformed teams, i.e. teams that had undergone their process of team building prior to the onset of a cardiac arrest, or ad hoc teams, where the arrest occurred in the presence of only one physician while the remaining two physicians were summoned to help. Teams forming ad hoc showed less hands-on time during the first 180 s of the arrest, delayed time to first defibrillation and made fewer leadership statements. During the study, ad hoc teams were having more difficulty establishing leadership, as evident by less specific commands and task allocation instructions compared to the preformed teams. The study concluded that early structuring of the team is vital for efficient delivery of CPR.¹¹

At the scene: running the show

Establishing leadership

In the UK, cardiac arrest is usually attended by anaesthetist or intensivist with experience in airway management. Additionally, many nurses, especially intensive care unit nurses, act as instructors on resuscitation training courses. Depending on the circumstances, there might be even more expertise available at the scene. Therefore, it is crucial for the medical registrar to introduce themselves as the team leader of the CPR as early as possible in order to coordinate and make the most of the available expertise.

Previous research showed even in teams with established hierarchy, it is not guaranteed that the most qualified members will adequately take over the lead.^{12,13} This issue of 'insufficient leadership' was addressed in further studies in psychology. A meta-analysis by Judge et al.¹⁴ showed that emerging leadership in the initial phase of medical emergencies depends on personality, with extraversion and conscientiousness the strongest predictors of leadership emergence. Other studies highlighted other factors, such as gender, height and general abilities rather than knowledge

or experience.¹⁵⁻¹⁷ However, these studies did not address the issue of ethnicity and cultural background, which could be relevant.

Task management and team work

The main responsibility of the team leader is to direct the team and have an overall view of the situation in order to synchronise the resuscitation efforts, communicate with colleagues, make appropriate decisions and carry out reasonable actions. This requires the leader to step back and minimise hands on involvement, for example chest compressions, that can be delegated to other members of the team. The relationship between leadership behaviour and team dynamics was examined in an observational study using video recordings of 20 resuscitation attempts. Cooper and Wakelam¹² showed a significant correlation between the degree to which the leader built a structure within the team and the team dynamics and the task performance. In their study, leaders who participated 'hands on' were less likely to build a structured team, the teams were less dynamic and the tasks of resuscitation were performed less effectively. Though the study did not show that advanced life support (ALS) training enhances leadership, interestingly leaders who had recent ALS training were more likely not to demonstrate 'hands on' participation.

This directive pattern of leadership is most crucial in the first few minutes of the resuscitation effort as it enhances performance, as shown by simulator studies.^{13,18}

It is important to emphasise that directive leadership should not be performed in an overtly authoritarian way as this can have a negative effect on the team, with other members refraining from sharing their thoughts and views.^{19,20}

Communication and maintaining a global perspective

Making sure an appropriate CPR is taking place is crucial. It is not uncommon for the basics of practice, such as a do not attempt CPR order in place, to be missed or forgotten, as well as keeping track of the time and the cycles of CPR and recording administered drugs on a piece of paper.

A simulated study highlighted this problem, with team members often failing to remember at least 18% of information accurately, such as counts of cycles and defibrillation.²¹ A helpful technique is updating the team with the overall progress and mentioning loudly what has so far been done, as if you were talking to yourself.^{22,23}

A study showed that team members who think loudly in emergency scenarios are more likely to reach the correct diagnosis and avoid errors.²³ The importance of continuous verbalisation as a method of coordination between team members was also concluded in a systematic review that demonstrated verbalisation's positive effect on several CPR performance markers.²⁴

Additionally, it can be a good stress-relieving technique. A randomised controlled trial from Switzerland on 124 medical

Box 1 Leadership tasks for cardiopulmonary resuscitation

Pre-event:

- Prepare your team (establish individual level of experience, role allocation)

Event:

- Establish leadership promptly
- Minimise hands on (task management)
- Maintain a global perspective (keep track of what is happening by talking loudly)
- Remain calm and confident (stress management)
- Situational awareness (adapt quickly to changing circumstances)
- Recognise how far to go

Post-event:

- Team debriefing

students showed significant decrease of stress levels during simulated CPR in the intervention group. The intervention group received 10-min instruction to cope with stress by loudly asking two focusing questions 'what is the patient's condition?', 'what immediate action is needed?' when feeling overwhelmed by stress.²⁵

This can also help the team leader to minimise interruptions of chest compressions. Interruptions usually happen when team members shift their attention away from their allocated task to perform secondary activities, such as long checks of vital signs.

Stress management

CPR is a significant stressful event for all staff involved. This may create significant anxiety and increase distractibility resulting in poor judgements of priorities and compromised CPR performance, which may further increase the stress through a negative cycle. Stress will adversely affect cognitive functions, such as attention, working memory and decision-making. Therefore, it is vital that the team leader maintains a confident and calm tone of voice and body language, giving clear instructions to the team members.

The importance of a calm team leader was demonstrated in a simulation-based randomised crossover study in the Netherlands, comparing the technical performance of resuscitation teams and its correlation with the nontechnical skills of the team leaders in two different environments, using special scores. One environment had external stressors (radio noise and a distractive scripted family member) and the other had no external stressors as a control. A significant correlation between nontechnical and technical performance scores was observed when external stressors were present, while no evidence for such a relationship was observed under control conditions.²⁶ In other words, the nontechnical skills of the team leader become even more effective in enhancing CPR performance in stressful conditions.

Situational awareness

Each cardiac arrest is a different scenario, with different circumstances and staffing availability (day vs night time), therefore, the ability of the team leader to adapt to situational changes is crucial. Shetty and colleagues²⁷ studied the cognitive basis of effective team performance in simulated cardiac arrest scenarios, in order to explore factors that result in bad and good outcomes.

They studied team adherence to resuscitation guidelines using a checklist and team behaviour using a validated teamwork coding system. Interestingly, successful teams deviated more from the resuscitation protocol, but it was flexible leadership and adaptability that decided the outcome.

The importance of situational awareness and its correlation with technical skills was also studied in operating theatres. McCulloch et al.²⁸ investigated the influence of nontechnical skills on surgical outcomes and technical performance. Their results showed positive correlation between technical and nontechnical skills by reducing procedural errors. It was noted that improving situation awareness, in particular, led to a reduced procedural error rate.

Another study, involving surgical teams during elective laparoscopic cholecystectomies, demonstrated that technical errors were negatively correlated with the surgeons' situational awareness scores.²⁹

A relevant example of situational awareness is to be mindful of fatigue among individuals performing chest compressions, and to change them frequently.

Decision-making and recognising how far to go

Perhaps one of the most challenging aspects of CPR leadership is decision-making. There has never been a detailed guideline on when and how to stop the resuscitation effort and the decision is almost left to an individual clinician's judgment. However, there are always some pieces of good practice that can be extracted from the published literature, for example, it is acceptable to stop resuscitation after 20 min of a nonshockable rhythm and to continue as long as VF persists.³⁰

Patients' comorbidities are important prognostic factors to be considered when making the decision, as those with pneumonia, metastatic cancer, hypotension, renal failure, hepatic insufficiency and poor functional status are unlikely to benefit from prolonged CPR.

It is also agreed that advanced age and frailty indicate poor prognosis. One systematic review carried out on people aged 70 years and above showed the chance of survival to hospital discharge for in-hospital CPR is low to moderate (11.6–18.7%) and decreases with age.³¹

There have been attempts to provide an objective assessment tool that can predict who are likely to benefit from resuscitation, for example the Go-FAR score.³²

It is important to communicate with team members important decisions as clearly as possible. Continuing CPR for a prolonged time could be a reasonable course of action in certain circumstances, such as hypothermia. Therefore, a clear discussion with team members regarding continuing or terminating CPR has to be provided with good reasons in support of the decision, articulated loudly at the scene. This will avoid disagreement between the leader and the team members, as lack of communicating this information can lead to some team members feeling uncomfortable regarding the course of action decided by the leader.

Post event


The resuscitation council recommends debriefing after cardiac arrests, for training purposes and to improve patient outcomes. Despite its obvious benefits, debriefing post cardiac arrest is not practiced in all UK hospitals. This variation in practice undermines training, as feedback is important for reflection and development of both technical and nontechnical skills. A recent survey, carried out at Lister Hospital, Stevenage, completed by 100 cardiac arrest team members, showed that 72% of the participants had never participated in debriefing before.³³ We strongly recommend utilising debriefing as an opportunity to improve both individual skills and overall team performance. The positive

effect of debriefing post cardiac arrest has been shown in cohort studies, with both verbal debriefing in groups and individual written feedback associated with an improvement in overall performance.³⁴

A systematic review and meta-analysis of 27 studies resulted in 20 studies that supported the use of debriefing. Debriefing was viewed positively, improved learning, enhanced nontechnical and technical performance, and improved patient outcomes.³⁵

Box 1 summarises the nontechnical skills discussed above and their applicability in a CPR scenario.

Conclusion

Cardiac arrest is an important medical emergency with challenging aspects that require significant nontechnical skills in addition to the technical skills. Leadership in CPR is crucial to improve team performance and the patient's outcome. Good CPR leaders are usually distinguished by their nontechnical skills, rather than plain knowledge. Therefore, training CPR leaders is vital and can be carried out via simulation courses and debriefing post cardiac arrest to help develop leadership behaviour combined with clinical experience and skills. 

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