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Editorial

Putting it all together: Important links between team performance and CPR quality



Chest compression quality directly impacts patient outcomes from cardiac arrest; thus, ensuring high quality delivery is a crucial component of code team management.¹ While evidence-based resuscitation guidelines emphasize CPR quality and health professionals are broadly trained in these skills, performance gaps persist in actual practice, including long pauses in compression delivery.^{2,3} Teamwork and care coordination during cardiac arrest also has been demonstrated to have an influence on CPR quality.⁴ Improvement in guideline compliance with resuscitation quality goals may be dependent not only on knowledge and technical skills but also on teamwork and culture within individual hospitals or emergency medical systems.⁵ The mechanisms by which teamwork specifically impacts CPR quality remains poorly understood.

In the current issue of *Resuscitation*, O'Connell et al. evaluated CPR quality and team performance at two tertiary pediatric Emergency Departments (EDs) using video recording to explore factors affecting compression pause duration.⁶ This observational study was conducted over a 30-month period from 2014 to 2016 and included pediatric patients receiving CPR in the ED; resuscitations at these two hospitals were video recorded for quality review purposes. Analysis of 81 cardiac arrests in 64 patients was conducted specifically evaluating adherence to resuscitation guidelines, pause duration and related team coordination of resuscitation care. A total of 900 compression pauses during CPR delivery were identified and evaluated; 22% of these pauses were not compliant with guidelines-recommended pause duration of <10 s. Additionally, compression rate was faster than the recommended rate (>120 per min) in 75% of chest compression segments.

Pause duration was influenced by the associated performance of resuscitation tasks at the same time. Pauses were significantly shorter when utilizing one pulse check site compared to multiple sites ($p < 0.001$). Similarly having fingers ready on the pulse measurement site compared to not ready was associated with shorter pauses ($p = 0.001$). These findings highlight the importance of communication and teamwork on pulse checks and other coordinated ancillary tasks.

The use of video recording was crucial in the conduct of this investigation. Videography in clinical care has been used most widely in trauma management and neonatal resuscitation, and it has been increasingly integrated into pediatric and medical cardiac arrest care protocols as well.^{7,8} Communication, teamwork, and adherence to guidelines can all be assessed via review of these recordings.^{8,9} Despite the value of videography in assessing and reviewing clinical resuscitation events, important potential barriers exist, such as patient

privacy concerns, costs, technology challenges, and influence on provider behavior. Evolving technologies such as augmented reality may prove to be a valuable resource to overcome these challenges; for example, wearable recording devices have been studied as a way to assess CPR performance.¹⁰ Augmented reality techniques have also been tested to enhance CPR training.¹¹ Given that inpatient cardiac arrests often occur in unpredictable locations without video recording infrastructure in place, integrating portable video capture through such devices may allow for more broad capture of these data.

In addition to assessment purposes as demonstrated in the current study, video review offers an important opportunity to integrate interprofessional members of the resuscitation team and can be a valuable way to promote a culture of safety and quality improvement.¹² Trauma video review (TVR) was first described in the literature over 30 years ago as a weekly review of actual clinical footage creating an opportunity for peer evaluation and critique. Implementing this review process decreased time delays to definitive care during subsequent trauma resuscitation events and improved adherence to assigned responsibilities.¹³ While provider anxiety regarding TVR exists,¹⁴ as simulation and video recording of performance is integrated in medical education younger health professionals will likely be more accustomed to this methodology.

Video recording also affords an opportunity for real-time debriefing. Video-assisted debriefing has been described as a useful tool following time-sensitive clinical events, however this can be challenging to implement.¹⁵ Surgical investigations have evaluated self-debriefing models with video capture highlighting video-based teaching and self-assessment.¹⁶ Development of these approaches, with refinement for specific applications, will be required; the growth and increasing sophistication of high-fidelity simulation laboratories may well facilitate such work. Motivating individual behavior change may best be achieved through both individual and team-based feedback. The authors of the current study highlight integrating audio-visual CPR monitoring as a quality improvement effort to improve adherence with guidelines; self-debriefing using device feedback following events represents another important opportunity for future study.

In summary, the literature on CPR quality indicates additional efforts are required to improve adherence to guidelines and coordination of care among resuscitation team members. While video recording of resuscitation events has the potential to serve as a valuable resource in assessing adherence to guidelines, insights into human factors and the effect on team performance will be critical.

Video presents two-dimensional images for evaluation. Yet the data it provides are multi-dimensional and move us beyond simply *what* outcomes we measure within guidelines. Video allows us to explore hypotheses regarding *why* processes result in such outcomes. Understudied aspects of cardiac arrest resuscitation including care coordination, communication and culture may then move from the shadows into plain sight.

Conflicts of interest

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