Survival rates after pediatric out-of-hospital cardiac arrest (OHCA) are dismal; only about 10% of children survive. While there have been modest improvements in adult OHCA outcomes over time, this same trend has not been seen for children. In this issue of *JAMA Network Open*, Hansen et al\(^3\) used high-fidelity simulation to directly compare adult and pediatric resuscitation quality and investigate associations between resuscitation performance and teamwork, cognitive load, and knowledge. In this robust cross-sectional in situ simulation study, 39 emergency medical services (EMS) crews completed a total of 4 adult and pediatric cardiac arrest simulation scenarios. Data collected included technical components of resuscitation performance as well as knowledge, teamwork, and cognitive load assessments. The authors observed more errors during the pediatric scenarios, including fewer scenarios with defect-free care and more instances of delays to time-critical interventions, incorrect chest compression rate and/or depth, and medication and defibrillation dosing errors. Mental demand was higher in the pediatric scenarios compared with adult scenarios (mean \([SD]\) National Aeronautics and Space Administration task load index [NASA-TLX] mental demand subscore for children: 59.1 \([20.7]\) vs adults: 51.4 \([21.1]\); \(P = .01\)).

The difference in the trend of OHCA outcomes between adults and children is likely multifactorial, including patient and care-related factors: after all, children are not just small adults. Adults are more likely to present with cardiac arrests secondary to acute coronary syndromes, including with shockable rhythms for which rapid defibrillation can be very effective. By contrast, pediatric OHCA are more likely to be secondary to etiologies associated with worse survival outcomes, including asphyxial arrests (eg, drowning) and trauma.\(^4\) However, in this comparison of adult and pediatric resuscitation, Hansen and colleagues\(^3\) have highlighted differences in care quality as an important—and modifiable—contributory factor.

Providing cardiac arrest care that adheres to expert consensus guidelines, including chest compressions of appropriate depth and rate, timely epinephrine, and timely defibrillation when indicated, is associated with patient survival. During these high-risk and relatively low frequency out-of-hospital events, providing exceptional life support is the most important thing that bystanders and EMS responders can do. Despite an increased focus on the importance of high-quality cardiopulmonary resuscitation (CPR) in the American Heart Association guidelines since 2010, multiple studies have shown that resuscitation teams are often unable to provide cardiac arrest care that consistently adheres with guidelines. In this study, Hansen and colleagues\(^3\) reported that even experienced EMS professionals (participants had a mean of 10 years of experience) in a metropolitan area with higher rates of cardiac arrest survival (ie, Portland, Oregon) deviated from guidelines during simulated cardiac arrest scenarios, and these deviations occurred more frequently during pediatric cardiac arrest scenarios.

In the study by Hansen et al,\(^3\) a realistic simulation was used to examine otherwise difficult to obtain high-quality data. The authors should be commended on striving for high fidelity (realism) of simulation by using actual EMS crews dispatched on radio to the simulation location and using a simulated participant (actor) for the family member role. Although their repeated performance assessment with a total of 4 scenarios might bias the study results toward higher quality than actual clinical performance due to the learning effect, they did not have issues identifying performance gaps. It is also nearly impossible to obtain self-reported cognitive task load data or standardized

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teamwork assessment during clinical care, where there is large variability in clinical context and reliable measurements are logistically challenging.

Previous work has shown that clinical complexity and acuity are associated with higher cognitive task load measured by the NASA-TLX.6 High mental and temporary demand exceeding the capability of clinicians may lead to poor performance. Based on their findings, Hansen et al3 speculate that increased mental demand is a contributory mechanism to lower resuscitation quality in pediatric cases in clinicians who care for both pediatric and adult patients.7 They further discuss several unique attributes of pediatric cardiac arrest care that could result in increased mental demand, including weight-based medication and defibrillator energy dosing, pediatric-specific guidelines, small and/or varied patient and equipment size, and increased emotional stress. This mechanism and these factors are very plausible. Coupled with the low frequency of pediatric cardiac arrests that any single clinician will participate in, it is not surprising that these events could result in higher mental demand and higher rates of deviations from optimal CPR performance.

Moving forward, it is imperative to identify innovative ways to improve resuscitation quality, particularly for children with OHCA and especially for processes of care that have been associated with survival. The increased mental demand placed on clinicians during pediatric OHCAs is an excellent target for further investigation. Using the framework of the Utstein formula of survival, this is an opportunity to enhance local implementation of expert consensus medical science. Rigorous high-quality simulation studies, such as the one performed by Hansen et al,3 should continue to form part of the scaffold of evidence to support new practices that can improve team quality of care.

ARTICLE INFORMATION


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REFERENCES


