Comment on Cardiac Arrest Survival in Pediatric and General Emergency Departments

Pediatric readiness in emergency departments (EDs) has been a major focus over the last decade, but outcome data are lacking to justify the need for dedicated pediatric EDs. Michelson and colleagues[1] have made an important contribution to exploring the relationship between patient outcome and emergency care setting. However, we are concerned that there are significant unmeasured confounders in these data that affect the validity of the association between mortality and ED type, thus bringing the study's results into question.

Pediatric out-of-hospital cardiac arrest (OHCA) survival is known to be significantly affected by prehospital interventions, including bystander cardiopulmonary resuscitation (CPR),[2] automated external defibrillation,[3] and timely transportation to definitive care.[4] The National Emergency Department Sample was used for this study, and this database does not have variables representing prehospital interventions or transport time. In addition, the authors note that all of the pediatric EDs were in urban regions as compared with general EDs, which included both rural and urban hospitals. Rural status may be a surrogate for a longer transport time, thus decreasing the likelihood of survival. The authors should have considered a sensitivity analysis of pediatric and general EDs in urban regions to validate the finding that it was ED type and not transport time that related differences in survival.

A second concern is the assumption that all cardiac arrests in the ED were OHCA because the National Emergency Department Sample does not differentiate in-hospital cardiac arrest (IHCA) from OHCA. The authors cite the pediatric IHCA study from the National Registry of Cardiopulmonary Resuscitation by Nadkarni et al,[5] which revealed that 14% of IHCA occurred in an ED. This investigation excluded patients with OHCA, thus no comparison between the frequency of ED versus OHCA can be inferred from this study. Conversely, Nadkarni et al[5] indicate that >10% of ED IHCA may have been misclassified as OHCA by Michelson and colleagues.[1]

Finally, the authors note that there was a significantly higher rate of CPR documented in general EDs as compared with pediatric EDs. The difference in CPR rates between EDs indicates that there may have been a difference in baseline characteristics of children seen at each ED type. Children may have been in a peri-arrest versus arrest state in pediatric EDs; children who do not have CPR coded may not in fact meet the definition of OHCA or were a healthier population overall that did not require CPR. In addition, children may have been transported from general EDs to pediatric EDs after receiving CPR and stabilization.

Some of these points have been noted by Michelson and colleagues,[1] and despite our criticisms we applaud the authors for shedding light on an area of controversy. The findings of this study require further investigation and can be validated by using OHCA registries such as the Cardiac Arrest Registry to Enhance Survival or the Resuscitation Outcomes Consortium Epistry, with an emphasis not only in outcomes between pediatric and general EDs but also EDs in urban and rural regions.

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Authors' Response

We appreciate the opportunity to respond to Drs Wall and Naim's comments and criticisms. We agree that understanding of current OHCA outcomes is both important and incomplete.

Like Drs Wall and Naim, we also worried about residual confounding of the relationship between ED type and survival. To confound this association, a risk factor for survival in cardiac arrest would also have to be associated with ED type. We are not aware of evidence suggesting that prehospital interventions such as bystander CPR are associated with ED type, although this is theoretically possible. However, transport time is likely associated with ED type and would likely be a

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