

EDITORIAL COMMENT

Survival Disparities in Pediatric Out-of-Hospital Cardiac Arrest

Still a “Night and Day Difference”*



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Even in the current era, survival from pediatric out-of-hospital cardiac arrest (OHCA) remains extremely poor, with only ~10% of patients surviving to hospital discharge in the United States.^{1,2} In Japan, pediatric OHCA survival is also suboptimal, although the hospital discharge rates in Japan (up to 19%) seem more favorable,³ which is likely multifactorial. A prior report of pediatric OHCA survival rates in Japan from 2005 to 2011 reported that disparities existed in OHCA survival rates, favoring days as opposed to nights, and weekdays vs weekends.³ As a response to the study findings and other health care matters, the Japanese government instituted a number of policies to improve the delivery of pediatric emergency and critical care services throughout the country.

In this issue of *JACC: Asia*, Fukuda et al⁴ from Japan present results of an updated analysis on pediatric OHCA, with a particular focus on whether such governmental efforts had a positive impact on the previously observed survival disparities. The authors examined data from 2012 to 2017 using the government-initiated registry in Japan, identifying >7,000 pediatric-aged patients. Overall survival at 1 month after OHCA was ~17%. Importantly, the investigators performed adjustments for a number of potential confounders. Interestingly, the previously

reported 1-month survival disparity regarding the timing of OHCA (weekdays vs weekend) disappeared in the current era (16.9% vs 16.6%, respectively). However, a significant difference remained in 1-month survival after OHCA between days/evenings and nights (20.1% vs 7.6%), with an adjusted OR of 2.31. Secondary outcomes regarding return of spontaneous circulation before reaching the hospital and favorable neurologic status at 1 month after OHCA mirrored the findings of the primary outcome (with similar disparity).

The authors⁴ acknowledged that there were important differences in patients who experienced OHCA at night (eg, they were younger, had fewer witnessed events, received public-accessed defibrillation less often, more often had a presenting rhythm of asystole) compared with those experiencing OHCA during the daytime/evening. Despite performing statistical analysis to account for these and other potential confounding variables, disparities in survival 1 month after OHCA still existed, favoring those experiencing an OHCA during the day/evening. The data presented in this article provide a “bird’s-eye” view of the scope of the problem, addressing variables that can readily be assessed from the large government-led database. It is certainly possible that more granular factors, which may not be available for analysis,^{1,2,5} could also affect these differences in survival after pediatric OHCA, leaving the possibility of imperfect risk adjustment.

Although not specifically highlighted by Fukuda et al,⁴ it would be important to recognize the fact that the pediatric OHCA survival in Japan seems to be more favorable than in other countries, including the United States. What we could learn from this report would be that not only are clinicians’ efforts important but that involvement of the regulatory authority is the key to successfully improving clinical outcomes. The fundamental issue this report aims to address is the impact of public health policy

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implementation on addressing the specific disparities in pediatric OHCA outcomes that were previously noted. The authors point out that some of the policies of the Japanese government have resulted in improving the emergency medical system (EMS) and designation of specific emergency and critical care centers to cater to the needs of pediatric-aged patients, year-round and at all hours of the day and night. This update, while addressing the positive effects this expansion of services has resulted in (eg, eliminating disparities between weekday and weekend survival), also exposes limitations in simply relying on physical and systematic infrastructure rather than the number and quality of personnel that staff these highly sophisticated centers of care. Staffing models, particular with higher levels of expertise, are generally decreased during the nighttime in Japan, as with many other countries. Furthermore, although not specifically addressed by the authors, staffing of the EMS system at night may also be an important factor resulting in the disparity in outcomes of survival after pediatric OHCA between nights and days/evenings. Although the difference related to staffing is largely speculative, it is certainly plausible due to the strain that this places on individuals, who are already working in a stressful environment. An increase in specifically trained staff for pediatric emergency and critical care services and EMS may be the best way forward, particularly as duty hours are reduced overall. That being said, these components and other data must be examined in more detail to know which factors truly play a role in these persistent disparities.

Too often in the medical literature, readers are, on the one hand, left with important immediate findings and, on the other hand, statements indicating the need for further studies to completely understand the scope of a problem. Unfortunately, no such follow-up is ever provided or pursued even years later. To that end, Fukuda et al⁴ are to be congratulated on pursuing this important public health policy initiative and providing a much-needed update determining where the government-led policies implemented have made a difference. Moreover, the government of Japan is to be acknowledged for its policies that have made a dent in disparities of pediatric OHCA survival between weekends and weekdays. As the report clearly highlights, however, there remains a “night and day difference.” We all look forward to seeing a sequel to the current report to learn how the Japanese society addresses the outstanding issue of the nighttime disparities in pediatric OHCA outcomes.

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