New study reveals gaps in out-of-hospital emergency care for cardiac arrest in kids

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Researchers at Oregon Health & Science University have found that quality of care for pediatric patients who experience cardiac arrest outside of the hospital is lower compared with adults, prompting an urgent call to action to improve care delivery for the potentially deadly event.

The study, published Friday in *JAMA Network Open*, found that 60% of pediatric patients who received care for out-of-hospital cardiac arrest had at least one adverse safety event, known as an ASE, that had the potential to cause severe or permanent harm, including death. Of those patients, nearly one-third had two more ASEs. The youngest patients, those under 12 months, were at highest risk of ASEs.

Pediatric out-of-hospital cardiac arrest is a devastating condition affecting up to 25,000 children per year, with a dismal survival rate of only 8%. While adult rates have improved in recent years, children's survival rates remain poor. Researchers found that quality-of-care and systems issues within emergency medical services, or EMS, may contribute to this disparity in outcomes.

"In order for children to have the best outcomes, they need to have great care all along the spectrum. However, people tend to focus on what happens in the hospital or emergency room, and EMS care is often overlooked," said Carl Eriksson, M.D., M.P.H., OHSU Doernbecher Children's Hospital medical capacity officer and lead author of the study. "EMS workers are highly skilled and dedicated. These gaps are not a reflection of the quality of our paramedics and emergency medical technicians; rather, they're a product of the inherent challenges that come with caring for kids.

"Our goal for this work is to figure out how we can make their jobs easier and ultimately improve health outcomes for the kids in our community."

Children's safety initiative

Previous studies have shown the mental demands for EMS workers can be much higher when faced with emergency situations involving a child, versus those involving an adult. There can be a significant emotional toll

when caring for a child, especially if they are a small child or infant. This emotional toll can be further exacerbated when interfacing with a distraught family member or guardian.

Additionally, there are technical challenges when caring for kids, including different medical equipment, weight-based medication and differences in anatomy and physiology. For example, inserting a breathing tube or intravenous catheter in a child requires much smaller equipment, and successfully performing these procedures in children can be very challenging for health care professionals.

"A child in cardiac arrest is an incredibly difficult and dire situation. Not only are you trying to make the right medical decisions, but you're also trying to manage your emotions in a high-stakes environment," Eriksson said. "And because these situations are rare, it might be the first case of pediatric cardiac arrest an EMS worker has ever treated."

Eriksson says education and training are key to addressing this issue. It's critical for both medical providers and EMS workers to understanding what's going well and what could use improvement so education can be tailored to provide the greatest impact.

"Our partnership with EMS is critical to improving outcomes," Eriksson said. "We want to support EMS teams as best we can, so everyone throughout the continuum of care feels comfortable and confident handling these really challenging situations."

This work is just one component of the ongoing efforts by the national research group named Child Safety Initiative—EMS for Children, or CSI-EMSC, which includes pediatric and emergency medicine experts from across the country. For nearly a decade, CSI-EMSC has partnered with EMS agencies to conduct research on pediatric emergency care and provide hands-on education and training opportunities. Many of the

team's research studies involve performing high-fidelity simulation of pediatric emergencies with EMS teams, providing the EMS team with valuable hands-on experience, while helping the research team expand their understanding of high-stakes pediatric EMS care.

"This work is important because at the end of the day, it's saving children's lives," said Matt Hansen, M.D., associate professor of emergency medicine in the OHSU School of Medicine and co-author of the study. "The survival rate for cardiac arrest among children is incredibly low, so every small improvement could mean a child's life is saved from this terrible disease."

OHSU plans to continue and expand these efforts. Next, researchers plan to develop and pilot test new tools, including a digital cognitive aid, to reduce the mental demands associated with treating pediatric out-of-hospital cardiac arrest. Additionally, researchers will investigate the gaps in emergency care in rural areas throughout Oregon, especially those that face barriers to receiving timely EMS care.

"In general, children can be overlooked in science and medicine," Hansen said. "We invest a lot of time and resources to study diseases affecting mostly adults, such as heart disease and cancer, but children also need people who are advocating for them and are trying to improve their health and lives."

More information: Carl O. Eriksson et al, Adverse Safety Events in Emergency Medical Services Care of Children With Out-of-Hospital Cardiac Arrest, *JAMA Network Open* (2024). DOI: 10.1001/jamanetworkopen.2023.51535

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