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Survival rates of kids suffering cardiac arrest improve with new training approach

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Researchers at the Stanford University School of Medicine and Lucile Packard Children's Hospital Stanford have found a new way to boost the survival of pediatric patients whose hearts stop while they are hospitalized.

The researchers developed a broader approach to resuscitation training to include everyone who responds to a pediatric "code" event, the emergency call broadcast through the hospital when a patient's heart stops.

Before the new training was implemented, about 40 percent of the hospital's "code" patients survived their cardiac arrest, a figure comparable to the national average for children's hospitals. After training, survival jumped to 60 percent.

"The study used in-situ simulation to train our staff—we recreated scenarios from actual cases," said Deborah Franzon, MD, medical director of the hospital's pediatric intensive care unit and a clinical associate professor of pediatrics at Stanford. "Kids did better because our team was better prepared and better trained. It was pretty exciting for us to have this finding."

Franzon is the senior author of a paper about the findings that appears online today in *Critical Care Medicine*.

In the past, researchers had studied only nurses' and resident physicians'

participation in training to respond to codes, said Lynda Knight, RN, MSN, the hospital's pediatric resuscitation program educator, who led the new research and is the lead author of the paper. Knight decided to broaden the training and assess any resulting differences.

"In the new study, we involved the entire code team, from attending physicians to security guards, to give everyone the practice they needed to be expert in their roles," Knight said. Actual pediatric cardiopulmonary arrests happen infrequently and are high-risk and stressful, she noted.

To train everyone, the research team staged mock codes in all areas of the hospital where the code team works. Staffers were paged as if there was a real code and did not know until they arrived that they were participating in a simulation. They resuscitated a medical mannequin whose condition could be programmed to improve or worsen depending on the effectiveness of their responses. The simulations were videotaped so that all members of the team could review and discuss their responses after the fact.

Although other researchers have studied the effect of simulations, few prior studies have tested a complete package of educational interventions for the entire code team in varied hospital settings. The simulations occurred both in locations where real codes are more common—such as the intensive care units—and those with few real codes, such as the radiology department.

One key goal of the training package was for one person to quickly assume the role of the code team leader, and for others to take on specific, pre-defined roles in the team's response. The roles were based on American Heart Association guidelines about best practices for resuscitation.

"It's sort of like an orchestra," Franzon said. "Everyone has a really important part to play." For instance, one physician or nurse stood at the code cart, distributing equipment. A social worker comforted the patient's parents. Security guards directed unnecessary foot traffic away from the area. A nursing supervisor made sure all essential roles were filled quickly.

After the training was implemented, the research team looked for changes in the success of real codes. The hospital's capacity expanded during the study, in part because of the opening of a new cardiovascular intensive care unit and a new cancer treatment center. The hospital's survival rate for code events improved during the study despite the influx of sicker patients using these new facilities. In addition to evaluating whether patients survived to hospital discharge, the team also tested survivors' neurologic outcomes for each code. Encouragingly, surviving patients had similar neurologic scores before and after the new training was implemented.

The simulations also provided risk-free opportunities to identify problems in hospital operations. For instance, during one simulation, the code team leaders found that their security badges did not give them access to the portion of the hospital where the simulation was staged.

"We'd hate to have that happen in a real scenario," Franzon said, adding that the problem was quickly corrected.

As a result of the new findings, Lucile Packard Children's Hospital Stanford has made the new training program a permanent part of its resuscitation education. The study's authors hope that other hospitals will make similar changes based on the success of their technique.

"With this training in place, responding to codes becomes muscle memory for the whole team," Knight said. "That's what's going to save

lives."

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