

Mock CPR drills in kids show many residents fail in key skills

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Research from the Johns Hopkins Children's Center exposes alarming gaps in training hospital residents in "first response" emergency treatment of staged cardiorespiratory arrests in children, while at the same time offering a potent recipe for fixing the problem.

The research was conducted just before the release of the 2005 American Heart Association's practice guidelines focusing on strengthening first-response skills, which suggests that at least some of the findings in the study may paint a grimmer picture than current reality, researchers say. And changes already made to the Hopkins resident training program beginning in 2005 have resulted significant improvement, they add.

The Hopkins study, now available online and to be published in the July print issue of the journal *Resuscitation*, revealed critical mistakes during life-saving maneuvers like chest compressions and defibrillations in children undergoing arrests or "codes," as they are medically known.

Staging mock cardio-pulmonary arrests with life-size dummies, researchers observed that of the 70 residents participating in the drills, one-third (24) never started chest compressions, while two-thirds (46) did so with a delay of over one minute, the critical cutoff time to initiate compressions in a child without a pulse. Nearly half of the residents (46 percent) failed to restore heart rhythm using a defibrillator within the recommended three minutes. Timely resuscitation of a child whose breathing or heart beat has stopped is, of course, critical to prevent

permanent [brain damage](#) and death.

Because most arrests in children are caused by respiratory rather than cardiac problems, pediatric life-support training in most teaching hospitals traditionally has emphasized airway rather than heart maneuvers to resuscitate a lifeless child. But in a patient without a pulse, airway maneuvers will only work if used together with chest compressions to circulate the blood, investigators say. Therefore the Hopkins team calls for a shift in focus that would equally emphasize cardiac maneuvers along with airway ventilation.

The findings, even though not necessarily applicable to other teaching hospitals, suggest the need for an honest examination of the way academic programs across the country train pediatric residents to deliver life support during cardiopulmonary arrests.

"We're firm believers in the idea that only by identifying our weaknesses can we know exactly how and when we can improve care," says lead investigator Elizabeth Hunt, M.D. M.P.H., Ph.D., a critical-care specialist at Hopkins Children's.

"This has been a sobering experience," she says, noting that no one likes to have problems exposed, but without the courage to gather evidence about what really is working and what is not, change won't happen.

Hunt says the solution to the problem has so far proven relatively simple: Practice, practice, practice with simulated arrests, and strict measurement of results to increase skills and speed of response.

Hands-on training including monthly mock drills on pediatric units and simulations with child mannequins—like those staged by the Hopkins researchers—appear to dramatically improve fledging doctors' performance, according to preliminary and not-yet published reports.

While length of residency training (first, second or third year) did not make much difference in performance in the study, experience in performing resuscitation did. The results show that residents who had even once used a defibrillator—either during a drill or in a real patient—were 87 percent more likely to successfully restore heart-beat during the exercise than those who had never used the life-saving device. Making the residents practice all the steps required to defibrillate rather than just watching a training video of someone else doing so, was the key to success.

"There's no substitute for practice," says Hunt, who is also the director of the Johns Hopkins Medicine Simulation Center.

The study also demonstrates the importance of monitoring performance, the investigators say.

"Simply taking a course is likely not enough to ensure adequate performance, says senior investigator Peter Pronovost, M.D., Ph.D., a critical care specialist at Hopkins and an internationally renowned expert on patient safety. "We must couple hands-on training with monitoring — after all patients lives depend on it."

Past research shows that 14 percent of all arrests in hospitalized children are cardiac in origin, and many respiratory arrests quickly evolve into cardiac arrests. More than one quarter of all arrests in children involve heart rhythm abnormalities that require use of a defibrillator to shock the heart into normal rhythm.

"The prevailing wisdom of focusing on ventilation rather than circulation during pediatric arrests is well founded, but it may have caused the pendulum to swing too far," Pronovost says. "We must restore the balance and start paying attention to circulation and heart rhythm maneuvers and teach future pediatricians these are equally important."

The Hopkins curriculum has already augmented its basic life-support courses and advanced life-support courses required for all residents with:

- monthly mock codes on pediatric units
- monthly resuscitation training sessions with simulator life-size dummies providing hands-on resuscitation experience and helping residents learn how to communicate during a crisis

Previous studies have shown that only 14 percent to 36 percent of children who suffer an arrest in the hospital survive. Even though the absolute number of deaths is quite small, the few deaths that do occur can be averted by strengthening first-responder instincts in residents, as well as in other hospital staff.

Source: Johns Hopkins Medical Institutions

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