



Treating Children Like Children

A Case for Simulating Pediatric Emergencies

Children are not just small adults. Some may say that's obvious. But, if you were to ask those in pediatrics, they might say that a lot can get missed in the obvious. To them, the phrase "children are not just small adults" is an understatement.

Pediatric visits to emergency departments (EDs) are on the rise. Over the past twenty years, EDs nationally have seen an increase in patients, and nearly 25 percent of these are children.¹ Experts worry that, because children are being brought primarily to facilities that do not specialize in pediatric care, children may not be receiving the specialized treatment they deserve.² Children, particularly infants less than one year old, have significant anatomical and physiological differences from adults, and the course of care necessary to diagnose and treat them is unique—unique and often missed.

There are common routine symptoms that cause a parent to take their child to the ED: a cough, a fever, vomiting with diarrhea, wheezing, or a head injury.³ But, intermingled are causes that providers accustomed to working with adults don't experience. Unintentional injury is one of the top five leading causes of infant death, with more than 9,000 children dying and more than 225,000 children hospitalized each year.⁴ For patients less than one year old, acute bronchitis, dehydration, and pneumonia lead to more than fifty percent of hospital admissions.⁵ Even the opioid epidemic has come to impact our littlest and most vulnerable patients.⁶

For critical care patients less than one year of age, there are many unique challenges. Young children have particularly unique anatomy and physiology, and they do not have the ability to express how they feel or share their health history. For these reasons, experts have recommended specific ways for healthcare providers to prepare to treat and care for pediatric patients. In this article, we discuss how simulation can be used to train for:

- Navigating Clinical Pathways
- Smaller Doses for Small Patients
- Interdisciplinary Team Training

In each of these instances, the child's condition can deteriorate quickly, parents on scene can panic, and the care team at the bedside is likely to experience degrees of stress. Due to the frequency that infants are brought to the ED and the sensitivity required in infant pediatric case, there is an urgent need to improve pediatric training—to ensure that when we say “children are not just small adults” we are not missing something.

In this article, we discuss the training emphasis that experts have put on determining the appropriate clinical pathway, administering medications, and working within an interdisciplinary team. Research suggests that training in these three areas can make a positive impact on pediatric patient outcomes.

Navigating Clinical Pathways

When an infant is brought in to the ED, the first steps taken are to gather patient information and perform a physical assessment. Because of the child's age, he or she won't be able to point out where it hurts, explain what happened, or raise concerns about prior procedures or complications. In these cases, it's critically important to listen to the parent, guardian, or social worker, because they will know the child's baseline. This is the start of the clinical pathway, or what some call the “blueprint for a plan of care”.⁷

With over 5,750 hospitals in the United States, only two-hundred and fifty specialize in pediatrics.⁹ This creates a disadvantage to children arriving at the ED with complex symptoms. In a pediatric cardiac emergency, for example, the child can show colic, sweating with feeds, hepatomegaly, and differences in four extremity blood pressures.¹⁰ In each of these instances, prompt recognition and an immediate sequence of interventions are key. Training to intervene in this case involves a level of complexity that providers who are accustomed to treating adults are often not used to.

Taking a cue from the American Academy of Pediatrics (AAP), which advocates for the use of simulation in pediatric training, many organizations have begun implementing full-scale pediatric simulation efforts. One such example is the Pediatric BASE Camp supported by Laerdal and hosted by Weill Cornell Medical College. This two-day, immersive simulation event, attended by approximately two hundred practicing nurses and physicians, focuses on fine-tuning and strengthening the clinical-pathway skills that providers use when faced with a pediatric emergency.¹¹

Other organizations are using sequential simulation (SqS) to bring the clinical pathway to the forefront. Rather than replicate an isolated clinical encounter, SqS prepares front-line staff to participate in integrated, or person-centered, care at various points on the patient journey.¹² This form of simulation focuses on important moments, such as hand-offs (i.e. from parent to physician, from ambulance to ED, etc.), information sharing, role assignments, and individual tasks. Each of these junctures are significant to the overall treatment of the patient, and impact the clinical pathway.

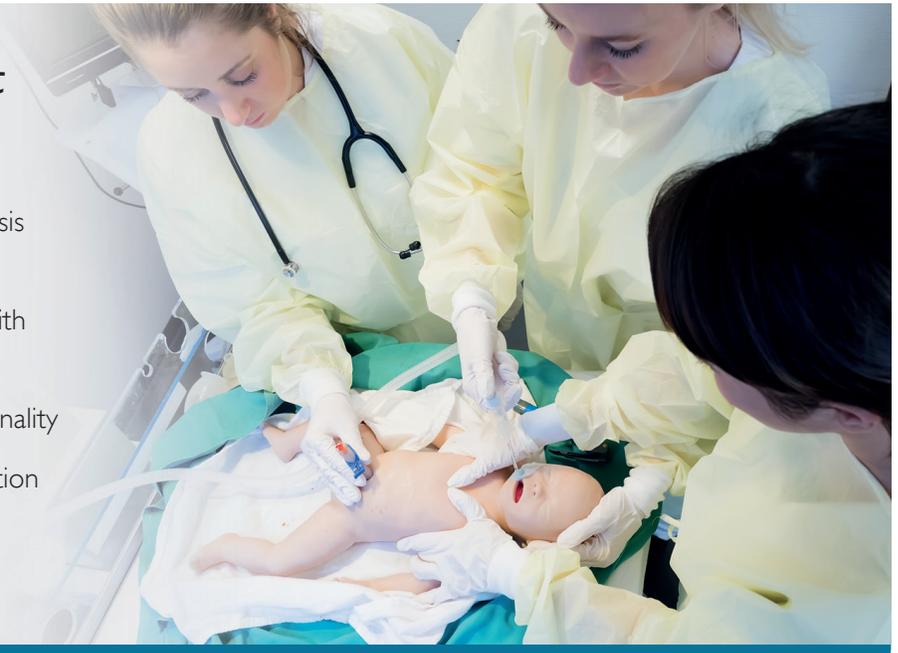
High-fidelity simulation is foundational to the success of the Pediatric BASE Camp and other training programs. Consider a typical Pediatric Advanced Life Support (PALS) scenario. For providers to train effectively in navigating the correct clinical pathway, the inclusion of a high fidelity simulator is essential. Being able to assess symptoms, measure physiological differences and improvements, and perform interventions will allow learners to suspend disbelief and move through the simulation without roadblocks.

“[Parents] have ‘expert’ knowledge of what is ‘normal’ or ‘abnormal’ behavior and it is vital that the clinical teams respect and listen to them, treating this parental knowledge with the same importance as test results and opinions of doctors and nurses.”

Louise Whittle, Parents' Association for Seriously Ill Children⁸

Does your Infant Pediatric Simulator have...?

- Life-like physiology, including cyanosis and a realistic fontanel
- An anatomically accurate airway with the ability to intubate
- Normal and difficult airway functionality
- Quality cardiopulmonary resuscitation feedback
- Vascular Access



Small Doses for Small Patients

Each year, medication errors affect approximately 1.3 million people annually in the United States alone.¹³ In pediatrics, incorrect dosing is the most commonly reported error.¹⁴ This may be caused, in part, by the fact that children vary greatly in weight, body surface area, and organ system maturity, which affects their ability to metabolize and excrete medications.¹⁵

The high stress involved when an infant is in critical condition can make each individual task more difficult. Research by the *Quality and Safety in Health Care* journal shows that in doses converted from milligrams to milliliters by nurses, fourteen percent were converted incorrectly and the maximum dose deviation reached four hundred percent.¹⁷

According to the American Academy of Pediatrics (AAP), the following are most important to include in pediatric patient safety programs:¹⁸

- Weight calculations
- Emotional and biological developmental issues, including communication ability
- Patient and family involvement

In order to significantly decrease medication errors, the AAP recommends trainings with participation by physicians, nurses, pharmacists, and laboratory staff.¹⁹

One study by the University of San Francisco observed nursing students before and after a simulation involving a complex pediatric patient case.²¹ Before the training, only twenty-two percent of students provided correct medication administration. After the simulations, ninety-six percent were successful in dilution techniques and eighty-eight percent were able to provide accurate IV pump rates (Ibid). Another study found that practicing calculations and medication preparation increased self-confidence and critical thinking skills.²²

Simulation training prepares nurses and physicians for the inevitable stress, noise, and chaos that will come with an infant in critical condition. Physically preparing medications and then administering them to a patient in the context of a case, where adverse reactions may occur, is a practice that promotes patient safety and better patient outcomes for children.

In pediatrics, the incidence of errors with medication can be as high as 1 in every 6 orders.¹⁶

A Team of Experts or an Expert Team

More and more, healthcare is talking about interdisciplinary team training. Doctors, nurses, anesthesiologists, respiratory technicians - they all graduate from different programs, have different chains of responsibility, and often work different shifts. When an infant is brought to the ED, it's quite possible that a team can form that has little familiarity with each other and yet has to perform like they do. So, why not give them that training opportunity?

Research by the Cincinnati Children's Hospital Medical Center asserts high-fidelity simulation as an effective method of enhancing and evaluating interdisciplinary team training in the context of pediatric trauma patients.²³ This same study concluded that improved team performance directly correlated with more efficient care and fewer errors. Individual team members are likely to change; however, those equipped with team training experience will provide safe care regardless.

Emergency Medical Services (EMS) are an added dynamic, as approximately seven to thirteen percent of all EMS calls involve pediatric patients.²⁴ In cases when EMS is involved, there is an additional hand-off and an additional source to gather patient history. In both of these areas, errors can occur. Training to incorporate all possible care-givers can lead to a more effective team dynamic, and certainly a more accurate clinical pathway.

As part of any training focused on teamwork, exercises in closed-loop communication can be especially beneficial to learners. In time-sensitive pediatric cases, clear and effective verbal communication has greatly reduced the amount of time to complete tasks.²⁶ Some evidence shows that orders utilizing a closed-loop, in which the receiver repeats the message back to the sender, were completed nearly four times sooner than orders with an open-loop.²⁷ Emphasizing closed-loop communication techniques in simulations can not only help to reduce the risk of error, but also increase the speed and efficiency when treating a pediatric patient in crisis.

Simulation provides learners with the chance to find their voice, reinforcing how to initiate and acknowledge a course of action. The designated team leader can practice giving periodic "recaps" of the care administered thus far, while giving additional direction to other team members. With each order, the team is encouraged to demonstrate closed-loop communication and raise any concerns they might have.

Root Causes of Pediatric Errors:²⁰

- Impaired calculation ability under stress
- Inaccurate weight estimate
- Faulty recall of doses
- Unaided calculations
- Wrong milligram/kilogram dose for the route of administration
- Errors converting the dose in milligrams to volume administered in milliliters
- Volume measured from the wrong end of prefilled syringe



Furthermore, effective team behaviors are successfully transferred from one environment to another, indicating that simulations focused on teamwork have countless applications.²⁸ The skills acquired from simulation training help the individual learners to gain situational awareness and the confidence to speak up.

In a pediatric critical care setting, where an infant's life may be at stake, a single error can have reverberating repercussions. Affording healthcare providers the chance to practice using simulation allows them to set expectations and exercise effective team communication skills before encountering a real patient.

“Enhanced teamwork counters the ‘silo effect’ by enhancing communication between the different levels of health-care workers and thus reduces adverse events while improving patient and healthcare worker satisfaction.”

*Nancy E. Epstein, MD
Winthrop University Hospital²⁵*

Summary: How You Can Prepare for Pediatric Emergencies

With visits to the ED increasing each year, and with pediatric patients comprising almost a quarter of these visits, there has been a call for more advanced training in pediatric critical care. Optimal outcomes for children are dependent on rapid diagnosis as well as appropriate and effective therapy.²⁹

Of the nine million children under the age of five that die each year, it is estimated that seventy percent of these are due to conditions that can be prevented or treated if diagnosed correctly.³⁰ Experts recommend concentrating pediatric training efforts on the decision-making process in a clinical pathway, practicing administering medication in small doses required for children, and training with interdisciplinary teams to improve overall communication.

Simulation is an effective method of training that can incorporate each of these skills. Following a patient case from start to end, with the many ups and downs that a real patient would experience, can enhance existing pediatric training curricula by increasing skills and clinical expertise.³¹

If you feel that it's time to switch the focus of your pediatric emergency training, please let us know. We are here to help.



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