Back to school

CE
2.0
ANCC
CONTACT HOURS

Pediatric disaster planning

Although emergency preparedness has been a major focus in the United States in recent years, children aren't usually included in drills. Are nonpediatric healthcare facilities and schools prepared?

By Angela Durry, MSN, RN

Children are often included in the general population or the generic "special needs" group as we plan for disasters. However, children are a distinctive group, at a distinct stage of development, with unique physical, psychological, and communication needs. Even within the subset of pediatrics, there are various considerations and needs based on age, ranging from infants to adolescents. In a 2010 study, children had significantly higher mortality in disasters compared with adults, which increases in children less than age 5. Although there are many factors that contribute to this, our lack of sufficient preparation for children in disasters may also play a part.

Important differences

Why are children so susceptible to the physiologic effects of disasters? Their organs are proportionally larger and not as well protected by their abdominal musculature and the rib cage as in adults. Toxic agents can cause vomiting and diarrhea, which dehydrates children more rapidly than adults because children have smaller reserves. The airway is also different; the potential for obstruction of a poorly controlled airway is created because a child's tongue is relatively large in comparison with the oropharynx. And remember that children typically experience respiratory problems rather than cardiac issues as in adults.

Children also have faster respiratory and heart rates, putting them at higher risk for airborne chemical and biological agents because their bodies absorb toxins at a much faster rate. One of the important facts about toxic agent molecules is that they're closer to the ground where children are more likely to inhale them. Kids also have a proportionally greater body surface area, which causes them to take in toxins more rapidly. And due to their higher metabolic rate, they have a different response to both the toxins and the medications you may use to reverse the effects.

Children are more prone to head injury because their heads are proportionally larger than their bodies. The head is also supported by a short neck, which makes them more susceptible to trauma injuries due to immature musculature. Because the child's skeleton is incompletely calcified, the body is more pliable. This, too, makes them more susceptible to injury.

More than just the physical differences, children also have different mental and psychological needs, especially in a disaster setting. They have fewer coping skills than most adults, don't always understand what's happening and—as anyone with children knows—don't always follow directions well. They lack a sense of self-preservation and don't have the cognitive skills or physical ability to react appropriately to signs of danger or instructions for help. Despite all of that, children have great potential for resiliency when treated appropriately.

Hospital triage concerns

All hospitals should institute drills to ensure that personnel are prepared to care for children in the event of a disaster or terrorist act. Additionally, all EDs should conduct drills that include certain considerations for the pediatric patient (see *ED considerations for the pediatric population*). Keep in mind

ED considerations for the pediatric population

- Are nursing and medical staff members current with training in the care of children?
- Is there a biological/chemical surveillance and agent identification process? If exposure is suspected, are there treatment guidelines in place?
- Have dosing regimens for the pediatric population been appropriately determined and are they readily available?
- Are there sufficient pediatric supplies, medications, vaccinations, and ventilators to treat pediatric patients for at least 12 hours immediately following an incident?
- Is there an adequate supply of personal protective equipment?
- How do we determine if decontamination is necessary? What's the process or protocol for decontamination?
- Who will assess the condition of healthcare personnel for related exposure or symptoms?
- What's the bed availability for pediatric patients in area facilities and what's the placement process?
- Where are the closest trauma centers and tertiary care facilities for pediatric patients?
- Is there a process in place for consultation with a pediatrician or pediatric specialist, if needed, at facilities that may be closer but don't usually serve the pediatric population?
- Is it actually possible to keep families together or is there a tracking process to reunite families as soon as possible?
- What staff rotation plan is in place to provide adequate ED coverage with backup relief and rest?
- Is there a process in place to meet the routine care and concerns of children with special healthcare needs?
- Is there a process in place to meet routine care concerns for delivery of newborns?
- Is there a centralized patient locator system in place?
- Is there a designated person who will interface with the families of children affected?
- Where will decease children be housed safely until identified?

that many children don't carry identification and may become separated from their parents or primary caregivers.

Different triage and treatment protocols are indicated in children. "Walk to the sound of my voice" won't work in preambulatory kids or those with special needs. Children with special healthcare needs are especially at risk if their survival depends on medications or ventilators. It will likely take you longer to assess these children, even if you ultimately end up triaging them as green, requiring minimal care. Also, receiving a medical history from children depends on their age and level of cognitive development.

The JumpSTART Pediatric Multicasualty Incident (MCI) Triage tool is an objective triage system that addresses the needs of children. The JumpSTART system is similar to the Simple Triage and Rapid Treatment, or START, system, but it takes into account the developmental and physiologic differences in children.

Studies show that the physiologic indicators specified for START aren't generally applicable to the pediatric patient. START requires a neurologic assessment for scoring. Because it's more difficult to assess neurologic status in the pediatric population, START was thought to be less than optimal for assessment in the pediatric population during a disaster. For example, part of the START assessment is "obeys simple commands". This criterion isn't applicable to young children who lack the developmental ability to respond appropriately to commands. In addition, healthy, aware school-age children often don't follow simple commands. If simple commands can't be followed, there's no way to perform a full assessment according to the START protocol.

The JumpSTART triage system is designed for triaging infants and young children. Using it to determine appropriate management in the preadolescent and young teen population can be challenging.

The current recommendation is that if a victim appears to be a child, use JumpSTART; if a victim appears to be a young adult, use START.

The JumpSTART Pediatric MCI Triage algorithm calls for a few rescue breaths in children who have a pulse but aren't breathing; if the rescue breaths restore spontaneous respirations, the child gets triaged to the urgent or red category, rather than the expectant (black) category.

It will be extremely impractical to intubate every child in an emergency; consider planning for a nasopharyngeal or oropharyngeal airway, or laryngeal mask placement, and position young patients on their left side with a leg bent to keep them from rolling over. These are quick ways to secure the airway and assist with breathing.

You may need to place an intraosseous device for vascular access rather than spending the time starting an I.V. using a child's tiny veins. Drugs are dosed differently for children than adults. Consider adding a quick-reference card to your pediatric kits to ensure rapid calculation of key pediatric dosages on scene.

Consider the following supplies:
- pediatric laryngoscope handles
- bag valve masks for infants and children

• infant and child size nonrebreather face masks
• infant and child size nasal cannulas
• endotracheal tubes size 2.5 mm to 6.5 mm
• tracheostomy tubes size 00 to 6
• oral airways size 00 cm to 06 cm
• pediatric size nasopharyngeal airways
• suction catheters sizes 5Fr and 8Fr
• I.V. catheters 20, 22, and 24 G
• intraosseous needles
• urinary catheters sizes 8Fr, 10Fr, and 12Fr
• infant/child arm boards
• pediatric restraining boards
• cervical spine collars (semirigid) for neonates, toddlers, and children.

Psychological components

Pay attention to children's emotional state; a calm child is much more cooperative than a screaming one. Remember that children won't always be with their parents/caregivers when disaster strikes. You may need to take a few extra seconds to calm a child to get him or her to cooperate, but this will pay off in the long run because the child will be more cooperative afterward.

The stress hormones released during a disaster can have a profound impact on both the child's immediate health and long-term development; the psychological impact may also have long-lasting implications. Mental health is a major factor during all phases of an emergency, but especially during the recovery phase. Children are extremely sensitive to the psychological state and attitude of the adults around them. If the adults are fearful and upset, most children will be, too, which just serves to make the adults even more upset. Get children out of detrimental environments and back to normal as quickly as possible by establishing some kind of routine for regular meals and sleeping time. The structure will be beneficial to the children and, thus, the whole community.

Feeding children during a disaster, especially infectious disease attacks, is a particular challenge. Babies can't eat the same kinds of ready-to-eat meals and other food adults may turn to during a disaster. And children continue to be susceptible to environmental problems after a disaster, such as contaminated water, respiratory disease, malnutrition, and dehydration. Children are more susceptible to various illnesses because their immune system isn't fully developed and more prone to serious effects of dehydrating food-borne illnesses such as vomiting and diarrhea. However, the majority of secondary deaths in children under age 5 are preventable.

As much as possible, try to create a sense of safety and well-being. For younger children, provide simple explanations for what happened and avoid excess details. Older kids will usually benefit from a slightly more detailed explanation, perhaps emphasizing everything groups are doing to help fix the situation and prevent further damage.

In addition, try to limit children's exposure to the media; watching the events play out repeatedly can be confusing and stressful. Research has shown that reestablishing familiar routines may be beneficial in helping children cope with psychological stress. Fortunately, children usually respond well to an open, honest, and

Unique pediatric factors

cheat sheet

- Cognitive and developmental levels insufficient to escape danger
- Higher respiratory rates (greater exposure risk to aerosolized agents)
- Permeable skin and large skin surface to mass ratio (greater exposure risk to many toxic agents)
- Special vulnerabilities to dehydration and shock
- Increased susceptibility to the effects of radiation exposure
- Specific psychological vulnerabilities

reassuring approach and rarely require more intensive interventions.

School considerations

Schools are generally considered to be safe havens for millions of children. However, the increasing risk of natural disasters, such as hurricanes, and a seemingly growing occurrence of man-made disasters, such as school shootings, has shown the need for schools to have disaster plans that are designed uniquely for the school culture and interface with the larger community. Clear guidelines are only part of the process; schools must also have the expertise and resources to implement plans for disaster. These are all concerns that have to be addressed before preparedness can filter down to separate communities.

The school district plays an important part in the hazard or crisis situation. There are approximately 55 million American children enrolled in kindergarten through 12th grade, attending 17,000 public schools and 29,000 private schools. So whether a large-scale crisis occurs during school hours, before or after school, or off the school campus, the school district must be prepared.

There are no federal laws requiring all school districts to have emergency management plans. Thirty-two states report having laws or other policies that do require plans. An estimated 95% of school districts reported that they have a generic plan. However, each district is different and each school has a unique set of parameters that affect disaster planning. There's no one ideal school crisis plan.

Each school needs to know what types of disasters are common in their area and plan for those disasters. The enormous variability in disaster type and venue makes planning a daunting challenge, even for experienced professionals. Each district should have an NP or pediatrician who's pediatric advanced life support certified to perform as the team leader until someone from the Federal Emergency Management Agency can arrive to assist with the care of the students.

Definitions

cheat sheet

Lockdown is a procedure to isolate individuals from certain types of emergencies/catastrophic events that may affect the safety of a small part of the campus or the overall safety of the entire campus community. During a lockdown, the doors are locked and not opened under any circumstances.

Evacuation is the immediate and urgent movement of individuals away from the threat or actual occurrence of a hazard.

Relocation is the emergency removal of individuals from one location to another to avoid an external threat.

Some of the key challenges for school districts relate to lockdowns, evacuations, and relocations. Issues to be addressed include responding to various scenarios, developing plans to transport children when there aren't enough buses, and having a mechanism to track where children are placed. Also, there must be a system that ensures children are kept safe during evacuation and relocated to a place that's appropriate for children until they're released to the most appropriate family member.

One of the most important aspects of disaster preparedness is addressing parental understanding of the emergency plan and the reunification process. Each classroom should contain "jump-and-go" folders that contain emergency contact information, student healthcare plans, student name tags, and other critical information for all students, mainly the students between ages 4 and 10. The teacher will take these packets with him or her if there's an evacuation. Parents should be informed annually and packets should be updated. There should also be emergency consent protocols in place, which are reviewed for relevance and appropriateness to large-scale emergencies.

Parents should be given a copy of the school's emergency plans. They should

key points

Nursing considerations

- Be prepared to care for the pediatric population, from neonate to adolescent.
- Confirm the identification of all children arriving at the hospital, listing information available from verbal children (name, age, parent name, address/phone, and possibly allergies) and identifying characteristics and intake source (where did they come from and who brought them) of nonverbal children.

School personnel considerations

- Be prepared to ensure that the system can handle an external threat/disaster.
- Develop a disaster plan and conduct crisis drills.
- Practice with students what to do during a crisis; clearly emphasize the need for students to follow the directives of an adult with no questions asked.
- Become CPR certified.
- Create jump-and-go folders for each child.
- Have a plan for how to contact parents in the event of a crisis.

be educated on the differences between lockdown, shelter-in-place, evacuation, and relocation. Parents need to understand that well-meaning attempts to approach a school in crisis may direct resources away from children, undermine emergency efforts, and increase risk to students. There should be multiple communication outlets in place, such as text messaging and e-mailing, to accurately inform parents, including those with English as a second language. There should also be a detailed plan to reunite parents with their children after the crisis is over. This information needs to be communicated to parents before a crisis occurs.

Each school should conduct a drill with local fire and emergency medical services (EMS) personnel. Planning and practicing drills for the most common disasters in the area will help prepare students and teachers as much as possible. Many disaster plans are approximately 50 to 100 pages long, so in addition to drills and exercises, schools should have a plan with 10 to 25 important steps to follow if a disaster occurs.

Barriers to success

Beyond preparedness at a micro level, there are three major barriers to true disaster preparedness for the pediatric population: monetary support, time and availability of the professionals responsible for providing this level of care, and the actual organization of these professionals to be able to react at a moment's notice.

Monetary support can come from three areas: county taxes, state taxes or allocations in the budget at the state level, and federal government grants or allocation from Medicaid funding. There can also be a combination of the three sources with an allocation based on the more populated areas of the state.

Time and organization go hand-in-hand. Communicating with the multiple groups that will be involved such as transport agencies, schools, and hospitals is sometimes difficult. Pediatricians, pediatric nurses, pediatric psychologists, and EMS personnel must organize, train, and drill to be prepared. Who are the responsible individuals? How are these professionals compensated or is participation voluntary?

Ready for the unthinkable

As important as pediatric disaster preparedness is, it usually isn't addressed until tragedy strikes. Of course, then it's too late. Pediatric healthcare professionals need to lobby for more attention to this area via their county commissioners and local, state, and federal representatives. As if a disaster scenario isn't already chaotic enough, there

are numerous special concerns to remember when children are involved. That's why nonpediatric hospitals and schools must be prepared for a mass-casualty event, even though this is an event that no one ever wants to happen. ■

REFERENCES

Abraham H. Preparing for pediatrics. Planning for children in disasters. *JEMS*. 2014;39(9):38-42.

American Academy of Pediatrics. Disaster planning for schools. http://pediatrics.aappublications.org/content/122/4/895.full.

American Academy of Pediatrics. Medical emergencies occurring at school. http://pediatrics.aappublications.org/content/122/4/887.full.

American Academy of Pediatrics. The youngest victims: disaster preparedness to meet children's needs. https://www.aap.org/en-us/Documents/disasters_youngest_victims_disaster_preparedness.pdf.

Emergency Medical Services Authority. EMSC pediatric disaster preparedness guidelines: LEMSAs. http://www.emsa.ca.gov/media/default/pdf/emsa197.pdf.

Jaffe DH, Peleg K, Israel Trauma Group. Terror explosive injuries: a comparison of children, adolescents, and adults. *Ann Surg*. 2010;251(1):138-143.

National Commission on Children and Disasters. 2010 report to the president and congress. http://archive.ahrq.gov/prep/nccdreport/nccdreport.pdf.

Romig L. JumpSTART pediatric MCI triage. http://www.jumpstarttriage.com/The_JumpSTART_algorithm.php.

Shriver MK, Leslie S. *Children and Disasters: How Can States Meet Their Unique Needs*? Philadelphia, PA: National Conference of State Legislatures; 2009.

Angela Durry is a Pediatric Clinical Assistant Professor at Towson University in Towson, Md.

The author and planners have disclosed no potential conflicts of interest, financial or otherwise.

DOI-10.1097/01.NME.0000470082.48219.01