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POLICY FORUM

Ethical Issues in Pediatric Emergency Medicine's Preparation for and Response to Disasters

Armand H. Matheny Antommaria, MD, PhD, and Brent D. Kaziny, MD

Disasters—naturally occurring events like earthquakes and pandemics or manmade incidents such as terrorist attacks—possess the potential to overwhelm our health care system. The emergency medical system is particularly vulnerable [1, 2]. In general, the response to a disaster consists of three phases: conventional care, contingency care, and crisis care [3]. Ethical analysis of disaster response requires a shift in emphasis from individual patients' needs to the needs of the population in order to maximize the number of lives saved. Key questions include how much should society invest in planning and how should we allocate scarce resources.

During a disaster, children may be disproportionally affected due to their anatomical, physiological, developmental, and emotional differences from adults. For example, because they breathe more rapidly and breathe the air closer to the ground, children are more susceptible to injury in fires or biological or chemical attacks. Young children also lack the cognitive and motor skills to escape from certain dangers. In addition, they have distinct developmental needs that should be addressed. Because under normal circumstances most children are relatively healthy, there are disproportionately fewer hospital services for children than for adults [1]. There is therefore the potential for a significant mismatch between the demand for and supply of pediatric emergency care in a disaster.

Conventional and Contingency Care

The development of sufficient surge capacity to maintain a standard of care during disasters that is functionally equivalent to the conventional standard relies on adequate space, staff, supplies, and special resources [4]. Children's particular needs should be addressed in each of these areas.

Space must be adequate not only for treating children but also for permitting them to be paired with a parent or caretaker. Caring for children also requires equipment and supplies of different types and sizes or dosages. For example, children require a variety of sizes of endotracheal tubes. During disasters, pediatric decontamination units must be able to provide water at warmer temperatures, higher volume, and lower pressure. Those delivering emergency services should be trained to treat children. Pediatrics has traditionally been a small component of the educational requirements for emergency medical technicians. The Institute of Medicine recommends defining pediatric competencies and developing clinical practice guidelines for pediatric emergency care [1]. Special resources include treating older

children in adult facilities or treating parents who accompany children to pediatric facilities [4]. One of the key questions is how much should society invest in creating surge capacity as opposed to interventions to prevent disasters or programs to meet other societal needs.

Crisis Care

If surge capacity is insufficient, it may be necessary to employ an altered standard of care. The ethical criteria for allocating scarce resources in a disaster are need, benefit, resource conservation, and random allocation. Medical resources should only be provided to individuals who need them—those who are sick or injured. They should be withheld from those who will not benefit from them—those who will die even with treatment. It is better to save two people, if possible, with the resources usually allotted to one. Finally, if there is no ethically relevant way to distinguish among those who need and will benefit from treatment, resources should be distributed randomly. Queuing and lotteries, however, have limitations in practice: those with more resources may be able to get in line sooner, and some may object to leaving such important decisions up to chance. Patients should not be triaged based on ethically irrelevant criteria such as race, gender, ethnicity, religion, or ability to pay [5].

There is significant controversy about the use of age, independent of prognosis, as a triage criterion [6]. Persad, Wertheimer, and Emanuel, for example, have proposed a "complete lives system" that prioritizes individuals between 15 and 40 years of age. They argue that society has made greater investments in the lives of adolescents and young adults than in the lives of infants and that adolescents and young adults are more capable of forming and valuing long-term plans [7]. Opponents of this view argue that age is not an accurate proxy for either society's investment or a person's ability to plan.

Much more public engagement is needed in the development of triage criteria [3]. For example, in contrast to Persad, Wertheimer, and Emanuel's position, the majority of respondents surveyed agreed that, if resources were severely limited, children should be given priority over adults [8]. Deliberative processes can be used to educate the public and inform policy makers.

Triage algorithms should be evaluated in terms of which criteria they evaluate and the accuracy and precision of their evaluations. Most algorithms for primary triage (triage that occurs before the initial medical intervention [3, 4]) are based on expert opinion rather than derived from statistical analysis of patient outcomes. They use physiological and observational data to sort individuals into the following categories of priority for curative treatment: immediate, delayed, ambulatory, and deceased or expectant (i.e., likely to die even if given the available treatment) [9]. Expectant patients should receive palliative care [3].

Validation studies of triage algorithms have used a variety of outcomes [10]. The primary study of the pediatric algorithms prospectively compared them against

injury severity scores, which focus on need rather than benefit or resource conservation. The algorithms showed poor sensitivity (0.8-41.5 percent)—they did not identify a substantial number of children who, in fact, required immediate treatment [11]. The utility of these algorithms in incidents involving chemical, biological, radiological, or nuclear elements is unclear [9, 10].

In contrast, the Sacco Triage Method (STM) is a mathematical model that considers both the probability of survival and the availability of resources in prioritizing victims for treatment. It sometimes gives priority to patients other systems categorize as "delayed." In a variety of simulations, STM produced higher numbers of survivors than Simple Triage and Rapid Treatment (START). For optimal results, however, STM requires software support and communication with incident command, which may limit its feasibility and utility in actual disasters [12].

The development of validated, easily implemented triage algorithms, specifically for children, should be a high research priority. In the interim it is an open question whether expert opinion is an acceptable alternative [6]. Even experts may not be able to reliably distinguish between patients or may misestimate the severity of illness. Individual decision making also introduces the possibility of conscious or unconscious bias.

Ideally, a team of experienced clinicians who are not involved in direct patient care should triage patients to differentiate the roles and limit conflicts of interest. Mechanisms should be in place to provide transparency, consistency, proportionality, and accountability [3]. Because alterations in usual expectations are likely to be very stressful, clinicians should be adequately trained beforehand and provided with appropriate mental health services afterward.

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Armand H. Matheny Antommaria, MD, PhD, is the Lee Ault Carter Chair in Pediatric Ethics and the director of the Child Health Ethics Center at Cincinnati Children's Hospital Medical Center in Ohio. His research interests build on his work as an ethics committee chair and clinical ethics consultant. His work on disaster triage developed out of his participation in planning for the 2009 H1N1 influenza pandemic.

Brent D. Kaziny, MD, is an assistant professor at Baylor College of Medicine in Houston, Texas. His research interests include disaster preparedness, relief, and recovery, with particular focus on special needs patients and children with chronic illness in the setting of disaster preparedness. While completing his internship at Tulane University in New Orleans, Dr. Kaziny received the Hurricane Katrina Code Grey Hero Award for his work during and after Hurricane Katrina.

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