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ORIGINAL ARTICLE

Emergency drills and exercises in healthcare organizations: Assessment of pediatric population involvement using after-action reports

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Abstract

Background: *Although the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requires healthcare organizations to demonstrate disaster preparedness through the use of disaster exercises, the evaluation of pediatric preparations is often lacking. Our investigation identified, described, and assessed pediatric victim involvement in healthcare organizations' disaster drills and exercises using data from after-action reports.*

Methods: *Following the IRB approval, the authors reviewed the after-action reports generated by healthcare organizations after a disaster drill and exercise, as a self-assessed reporting tool for JCAHO regulations. Forty-nine of these reports that were voluntarily supplied to the emergency medical services agency were collected. The authors analyzed the data using quantitative and qualitative analytic approaches.*

Results: *Only nine reports suggested pediatric involvement. Hospitals with large bed capacity (M = 465.6) tended to include children in exercises compared with smaller facilities (M = 350.8). Qualitative content analysis revealed themes such as lack of parent–child identification and family reunification systems, ineffective communication strategies, lack of pediatric resources and specific training, and unfamiliarity with altering standards of pediatric care during a disaster.*

Conclusions: *Although many organizations are performing disaster exercises, most are not including pediatric concerns. Further work is needed to understand the basis for this gap in emergency preparedness. Overall, pediatric emergency planning should be a high priority for this vulnerable population.*

Key words: pediatric population, drills, emergency, disaster preparedness, after-action reports

Introduction

Communities throughout the United States and abroad have experienced large-scale emergencies and disasters in the recent years including the terrorist attacks, hurricanes, and statewide power outages. These events have significantly impacted children who may require urgent medical and mental health attention.[1,2] Hospitals should be prepared to respond appropriately to children whose care requires skilled personnel, equipment, and algorithms specific to their needs. Young children are particularly vulnerable during disasters and terrorism because they have smaller bodies, increased respiratory rate, more permeable skin, and greater surface area-to-mass ratio.[3] They also lack the cognitive and physical ability to recognize threats and protect themselves in dangerous situations.[4]

Current knowledge on hospital-based pediatric disaster management suggests that infrastructure, planning, and implementation of disaster plans are inadequate. Only 13.3 percent of prehospital Emergency Medical Services (EMS) in the United States have written pediatric-specific emergency plans,[4] while only 6 percent of hospital emergency departments had all recommended pediatric supplies and equipments.[5] Hospitals in NY do not have adequate number of beds to accommodate a surge of 500

new pediatric victims for every one million population during mass casualty events.[6] Moreover, prehospital and hospital organizations (healthcare organizations) rarely incorporate pediatric victims in their emergency drills and exercises.[4,7,8]

In addition to these inadequacies in infrastructure, pediatric care competency in responding to children during disasters is a cause of concern. For instance, pediatricians in the tri-state area of NY, NJ, and CT perceived that their training had not prepared them for the environmental health and bioterrorism-related demands of the terrorist attack in NY City.[2] Physicians and nurses also reported significantly lower level of preparedness to care for children than for adults in terrorism-related mass casualties.[9] In a survey of pediatric surgeons, only 24 percent perceived "definitely" prepared to respond to a disaster and 74 percent stated that more training is needed.[10] Pediatric emergency staffs are also inadequately trained in specialized triage methods, stabilization and treatment of pediatric victims, and family reunification procedures.[7,8]

Hospital disaster planners typically test disaster management capabilities by using exercises, functional- and full-scale disaster scenarios, simulations, and tabletop exercises.[11] Planners use exercises to assess their ability to execute contingency plans; increase knowledge about disaster response procedures; train staff on disaster roles and responsibilities; test acquired knowledge and skills; and identify weaknesses and resource gaps—thereby improving emergency management systems.[11-13] However, hospitals rarely address pediatric needs during drills and simulations, despite recommendations to include the children.[3] Thus, the medical and emergency preparedness community lack knowledge of pediatric issues and challenges potentially encountered in exercises specific to the population, and the ability to identify needs and areas of improvement for pediatric care in disaster situations. We hypothesize that there is limited pediatric preparedness activities in an established regional disaster resource network. We will test this hypothesis by performing an exploratory study to assess pediatric emergency exercises in a large urban county and identify the characteristics of healthcare organizations that have involved pediatric population in their emergency operations plan. We will also determine the issues and concerns in dealing with children as illustrated in healthcare organizations emergency and disaster drills.

Materials and methods

After-action reports

The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) is a governing body that focuses on the "*provision of health care accreditation and related services that support performance improvement*" (*http://www.jointcommission.org/AboutUs/Fact_Sheets/joint_commission_facts.htm*). Emergency management systems in hospitals are part of their oversight. JCAHO requires healthcare organizations to develop and maintain emergency operations plan, and to test this plan at minimum twice per year using exercises and drills.[14] During these activities, healthcare organizations must monitor core components, including: event notification and communication strategies, resource mobilization and allocation, and patient management (see Table 1). These standards are evaluated, including strengths and weaknesses, areas of improvement and corrective action plans. Healthcare organizations document performance and outcomes in after-action reports (AARs), the primary data source for the current study.

The AARs collected in this study are completed by for-profit (investor) and not-for-profit (government, state university, non-profit) healthcare organizations in a large urban county, and are submitted via mail or electronic mail to the local emergency medical services agency. Without a formal evaluation process, the emergency medical services staff reviews the reports to gain insights on how healthcare organizations are conducting drills and exercises. When requested, the emergency medical services may also communicate recommendations based on the drill performance of healthcare organizations that submit AARs through an informal process. Submission of reports to emergency medical services is not mandatory.

Because there is no standardization to JCAHO reporting, healthcare organizations typically write

Table 1. JCAHO standards versus issues identified in AAR with pediatric involvement	
JCAHO emergency management standards	**Issues identified in AAR with pediatric involvement**
The hospital plans for managing the consequences of emergencies; and develops and maintains an Emergency Operations Plan.	Lack of protocol regarding mandating staff to stay at work; lack of plans and procedures on reunification and repatriation between pediatric patients and families.
The hospital establishes emergency notification and communication strategies	Ineffective event notification.
	Lack of primary communication system, i.e., telephone contact list.
	Ineffective communication between drill participants; and between patients and triage staff.
The hospital establishes resource mobilization and allocation.	Lack of supplies and equipment, including pediatric supply cache.
	Need for child-care provision for staff and tracking of staff dependents.
	Need for traffic control in NICU.
	Lack of "just in time" training for staff related to pediatric care.
	Lack of pediatric specialists.
The hospital establishes patient management strategies.	Lack of patient tracking.
	Need for mental health provisions for patients.
Others*	Lack of knowledge on disaster response protocol/altered standard of care.
*Not a specific JCAHO standard.	

evaluations in narrative form. When available, the following variables were identified from each report: healthcare organization's name, time and date of the drill, and type of drill. Reports between 2006 and 2007 were utilized for analysis. The following data were collected:

Type of drill: Drills may be classified as either tabletop exercise, functional, or full-scale drills.[15] A tabletop exercise is a discussion-based exercise, wherein participants address the issues in depth and make decisions in a slow-paced, problem-solving manner. In contrast, functional- and full-scale drills are operations-based exercises intended to test and evaluate an emergency response system.

Description of scenario: A description of the disaster scenario is also available in the AARs. Emergency and disaster types included natural (earthquake, pandemic flu), intentional (bioterrorism, improvised explosive device [IED]), unintentional (chemical spill), and multiple scenarios (a combination of natural, intentional, or unintentional).

Narrative description of problems and concerns: Reports described in open-ended text format gives the details of the problems and concerns encountered during the drill.

Hospital annual utilization data

To describe the characteristics of each organization, we collected data on hospital trauma designation, pediatric trauma designation, teaching hospital status (teaching or non-teaching), control type (for-profit or not-for-profit), total bed capacity, and pediatric bed capacity from the 2006 Hospital Annual Utilization Data from the Office of Statewide Health Planning and Development in the state of CA.[16] Prehospital agencies were tabulated under "Not applicable/Unspecified" because these agencies do not have the similar hospital characteristics.

Data analysis

Quantitative analysis. To test the differences between the characteristics of healthcare organizations with or without pediatric involvement in disaster exercises and drills, we conducted nonparametric statistics, Fisher's exact and Mann Whitney tests for categorical variables and continuous variables, respectively. For this analysis, prehospital agencies were excluded (n = 5) because the characteristics being compared applied only to the hospital agencies.

Qualitative analysis. The AARs were written in narrative form; thus, qualitative approach using content analysis was used to assess and evaluate issues pertaining to pediatric population in hospital drills. AARs were reviewed independently by two of the investigators. We coded themes according to JCAHO's core components to describe a logical comparison between the standards and the AARs. When new categories surfaced, the two raters discussed whether to add new or create subcategories. To measure inter rater reliability, 10 percent of the coded texts were randomly abstracted from the database and re-coded by each rater independently. The Cohen's Kappa was then calculated to be 0.76.

We entered qualitative data into an Excel database according to the themes identified, and organized by type of drill performed. Reports with pediatric population involvement were separated and organized into a separate database. In accordance with the focus of this study, only the pediatric-specific data are reported in the qualitative results.

Results

Quantitative data

There were 34 organizations that submitted one or more AARs between 2006 and 2007. Twenty-five were hospitals, five public health agencies (eg EMS, American Red Cross), and three unidentified organizations. Of these, only eight healthcare organizations included pediatric population in their exercises and drills (Table 2). The hospitals tended to have a significantly larger bed capacity (M = 465.6) compared with those that did not include children in their disaster drills (M = 350.8). Albeit statistically insignificant (p = 0.60), healthcare organizations including children in drills had more pediatric bed capacity than those who did not indicate pediatric involvement.

Forty-nine AARs were collected from the 33 reporting healthcare organizations. Only nine exercises and drills had pediatric involvement. Overall, functional drills (n = 23, 46.9 percent) were more commonly conducted followed by full-scale drills (n = 14, 28.6 percent) and tabletop exercises (n = 12, 24.5 percent). Natural disaster (n = 17, 36.2 percent) and intentional emergencies (n = 15, 30.6 percent) were commonly utilized scenarios in the exercises and drills examined in our series (Table 3).

Qualitative data

The following section reports the issues and concerns described in the nine pediatric AARs. Most of the AARs were generated by medical/surgical hospitals with only one emanating from a public health agency.

Emergency operations plan. It is essential that emergency plans comprehensively detail the approaches to emergencies in the hospital and in the surrounding community. Table 1 summarizes the corresponding issues and concerns reported by healthcare organizations and the JCAHO emergency management standards.

In a tabletop exercise that incorporated children-at-school as victims of a large-scale earthquake, the participants demonstrated a lack of awareness in dealing with the possibility that staff may want to leave work to check on their family members. They expressed that their agency did not have existing plan or policy that would require staff to stay at work when they wanted to leave in the event of an emergency or disaster.

Several other AARs revealed that written plans on reunification and repatriation of family members are missing. Two distinct tabletop exercises identified their hospitals' lack of plans for reunification and repatriation of pediatric patients and family members. In a multidisaster functional drill, one 12-year-old victim came to the hospital with missing parents. Although "attempts were being made to contact them

Table 2. Characteristics of participating heathcare organizations			
	Agencies with no pediatric involvement in AARs (n = 26)	**Agencies with pediatric involvement in AARs (n = 8)**	**Total (N = 34)**
Trauma designation			
Level I or II	4 (15.4 percent)	2 (25.0 percent)	6 (17.6 percent)
None	15 (57.7 percent)	5 (62.5 percent)	20 (58.8 percent)
Not applicable/unspecified*	7 (26.9 percent)	1 (12.5 percent)	8 (23.6 percent)
Pediatric trauma designation			
Level I or II	2 (7.7 percent)	1 (12.5 percent)	3 (8.8 percent)
None	17 (65.4 percent)	6 (75.0 percent)	23 (67.6 percent)
Not applicable/Unspecified*	7 (26.9 percent)	1 (12.5 percent)	8 (23.6 percent)
Teaching hospital			
Yes	2 (7.7 percent)	1 (12.5 percent)	3 (8.8 percent)
No	17 (65.4 percent)	6 (75.0 percent)	23 (67.6 percent)
Not applicable/Unspecified*	7 (26.9 percent)	1 (12.5 percent)	8 (23.6 percent)
Control Type			
Not-for-profit	16 (61.6 percent)	7 (87.5 percent)	23 (67.6 percent)
For-profit	5 (19.2 percent)	1 (12.5 percent)	6 (17.6 percent)
Not applicable/Unspecified	5 (19.2 percent)	0 (0.0 percent)	5 (14.8 percent)
Hospital bed capacity†,‡			
Mean	350.8	465.6	381.7
Standard deviation	298.5	67.9	260.7
Range	64-1395	369-570	64-1395
Pediatric bed capacity†			
Mean	17.2	22.6	18.6
Standard deviation	34.4	13.4	29.9
Range	0-135	0-34	0-135

Reports with scores "Not applicable/Unspecified" were treated as missing values.
*Missing values not computed for Fisher's Exact Test.
†Mann Whitney Test.
‡$p < 0.05$.

Table 3. Characteristics of after-action reports (N = 49)			
	AAR with no pediatric involvement (n = 40)	**AAR with pediatric involvement (n = 9)**	**Total (n = 49)**
Exercise/Drill type			
Tabletop	9 (22.5 percent)	3 (33.3 percent)	12 (24.5 percent)
Functional	19 (47.5 percent)	4 (44.4 percent)	23 (46.9 percent)
Full scale	12 (30.0 percent)	2 (22.2 percent)	14 (28.6 percent)
Type of emergency			
Natural	13 (32.5 percent)	4 (44.4 percent)	17 (36.2 percent)
Intentional	11 (27.5 percent)	4 (44.4 percent)	15 (30.6 percent)
Unintentional	5 (12.5 percent)	0 (0.0 percent)	5 (10.2 percent)
Multiple	4 (10.0 percent)	0 (0.0 percent)	4 (8.2 percent)
Unspecified	7 (17.5 percent)	1 (11.1 percent)	8 (16.3 percent)

[family]," it was indicated that there was no written protocol to contact family members.

Notification and communication. Notification of the elements of the emergency and response measures is important. Likewise, communication systems must be efficient and operational. In one AAR, a hospital identified the need to coordinate patient transfer with the Neonatal Intensive Care Unit (NICU); however, communication involving the NICU appears to be inefficient for several reasons. One, the hospital's emergency incident command center discovered that the NICU failed to notify its bed availability. Two, when a call was made, it was found that the telephone extension lists were not available. Three, staff in the department were not available at the time of the contact and it was later discovered that personnel were not notified about the drill. Other ancillary staff such as the social worker was also unavailable to assist also due to lack of awareness of the drill.

Another agency also expressed communication concerns during an IED functional drill that included five children. Although the hospital reported adequate response in the aspect of decontaminating children, communication, and coordination in the triage area was reportedly disorganized.

> "Some staff stated that the triage seemed unorganized, with lack of direction, limited interaction between patients and triage team and between triage team members. Communication between these groups is an area of improvement."

Resource mobilization and allocation. Supplies and Equipment: Adult hospitals are expected to care for pediatric patients in disaster and emergency scenarios, and they should be equipped with some pediatric supplies. Participants of one tabletop exercise acknowledged that many adult patient hospitals may lack pediatric supply caches (eg, Broselow tapes). Some also commented that pediatric supplies for sheltering staff family members might also be required. Another report stated that children of hospital personnel may be housed in the pediatric care unit and therefore, they would need items such as games, diapers, pillows, and mats to lie on in the event of a major disaster.

Staff Support Activities: JCAHO stresses the importance of providing staff family support. Some reported a need for a child care and a tracking procedure for staff dependents in dependent care units.

Safety and Security: One out of the nine AARs with pediatric involvement addressed safety and security concerns. Just one agency identified the need to establish discharge parameters when discharging children. The report states that,

> "If there was a real [IED explosion], additional security to assist the traffic control is needed where [we will be] discharging NICU and nursery patients."

Staff Functions: Staff at adult hospitals may require on-site training for pediatric patients. One agency reported that there is neither a plan for a "just in time" training for staff related to pediatric care nor a plan to alter staffing ratios in the event that additional pediatric clinicians are needed. Another hospital reported that the lack of training among staff was apparent and many sites including established alternate care sites. In a functional drill involving children injured from a detonated bomb:

> "Some staff, particularly the newly hired (staff) were uncertain of the command post location and responded to three different areas, instead. There was also confusion as to who should respond."

In addition, some reports indicated a concern regarding pediatric specialists' shortage. One report documented staffing needs. Tabletop exercise participants expressed that there is a shortage of pediatric general surgeons countywide and there is a need to identify various pediatric specialists such as emergency physicians, pediatricians, pediatric anesthetists, orthopedists, and otolaryngologists. The report further stated that:

> "It will be important to know whether adult general surgeons will be willing to operate on pediatric patients, if the need arises, perhaps statewide altered standards of care policy will give some legal protection for adult surgeons to care for patients who are not within their usual scope of practice."

Patient management. Optimal patient care and support activities are the goal and critical elements of care include: attention to special population such as children, mental health services, mortuary services, and patient tracking. However, only patient tracking and mental health were identified in our review.

Reports from two hospital drills indicated the lack of patient tracking procedures. In an earthquake scenario involving a large volume of pediatric victims, one hospital reported having no existing patient tracking system plan. This hospital did, however, identify initial steps to address this issue, photographing each pediatric patient. Additionally, one hospital conducting a full-scale earthquake scenario drill reported no clear plan for tracking some pediatric victims in the triage area. The report stated:

> "Triage nurses wanted to send minor care patients to treatment area without registering at triage. They wanted the registering done in that area to allow for triaging of more acute patients."

In two earthquake-scenario tabletop exercises, participants discussed mental health provisions as part of their exercises. Participants from one center identified the need for mental health support after the disaster, yet there was no clear indication in the recorded dialogue and notes that a particular mental health system response was in place. One consideration raised in the other tabletop exercise was the provision of pediatric mental health services during and after a natural disaster. The group discussed how mental health issues for victims would be handled as well as what mental health services were currently available. The responses were:

> "Let them [children] express themselves, play, and let [them] know what is happening and that everything will be fine."

"Pediatric staff, social workers and pastoral services can be used for victims."

Other concerns: ethical standards. After review of transcripts, it was apparent that tabletop participants lack understanding of the practical and ethical standards regarding whether or not adult general surgeons were capable and allowed to operate on pediatric patients, if the need arises. In another functional drill scenario, a pediatric patient was discharged, but later decompensated and died. The family claimed that the patient was not stable enough to go home but was forced to leave due to the impact of the earthquake to the hospital operations. On the basis of the after-action report, the participants showed lack of adequate response as to how standards of care can be altered, as to who makes the decisions, and if the hospital's legal department should be involved. Although the participants acknowledged the need for the legal department's involvement in the case, their response to the other issues was, *"These issues need to be looked into."*

Discussion

In this report we hypothesized that there is limited pediatric preparedness activities in healthcare organizations in an established regional disaster resource network. We described the issues and challenges in emergency and disaster exercises involving children. Given the unique needs of children in mass casualty events, it is concerning that very few hospitals include children in their disaster preparations, thus, missing an opportunity to learn about resource and response limitations in their respective facilities. Emergency planning for children is a high priority since recent evaluations of existing systems suggest that pediatric resources and specialties may become overloaded.[5,17] Therefore, adult practitioners at adult-only facilities may need to care for children during emergencies and disasters.[3,5]

Written emergency and disaster plans are an important aspect of an organization's emergency preparedness; planners and disaster response coordinators should train to standard and ensure that training scenarios at minimum reflect the communities that they serve.[18] The inclusion of pediatric issues in agencies' preparedness must take place in the form of written plans, which guide training and drill exercises. Algorithms exist that can guide coordinators in adult facilities that do not routinely care for children.[19] Our findings suggest that healthcare organizations are not prepared to respond to children who are separated from their parents or guardians because pediatric-related plans are not in place.

With the exception of bed capacity, there is generally no significant correlation between hospital characteristics and hospitals' pediatric involvement in emergency exercises and drills. Of the hospitals included in this study, there is no association between overall bed-capacity and pediatric bed-capacity. Nevertheless, hospitals with large bed-capacity (M = 465.6) tended to include pediatric victims in AARs than those with smaller capacity (M = 350.8). The bed capacity trend, although insignificant, is similar to pediatric bed capacity relationships between facilities. Hence, efforts should be made to assist these smaller community hospitals in addressing children in their disaster management activities.

As previously established, poor communication systems remain a common concern in disaster preparedness efforts[20-22] as well as a challenge in an actual response.[23] However, what is alarming in our study is the fact that neonatal intensive care units were not clearly integrated into functional drills and worse, the department's telephone information was not available in the emergency system. Hospitals must address this concern by making sure that all departments, particularly pediatric units are well-informed about drill activities and develop communication schemes as part of the emergency response system. Hospitals, regardless of service type or pediatric bed capacity, need to ensure enough resources because it is likely that their facilities may be inundated with children during an emergency or a disaster event.[3] Our study demonstrates that managers and clinicians in hospitals must be cognizant of pediatric-specific supplies and equipment for the pediatric patients. In fact, our study suggests a need for pediatric-specific materials for children of healthcare workers when sheltering them in the hospital during

a disaster response. A plan for child care in the hospital should also be in place while healthcare workers are responding to emergency and disaster events. We found that personal family safety and being with family members during an emergency are deemed important to nurse responders.[24]

We identified other inadequacies such as a lack of system in maintaining security and safety for pediatric victims, inadequate training for pediatric care, limited pediatric specialty participation during disaster drills, and a paucity of mental health services. These problems are fairly critical since hospitals should consider including children in their emergency operations plan. It is imperative that facilities conduct exercises and drills including children. Otherwise, the staff is poorly trained and will potentially provide inadequate and improper pediatric care during actual emergencies and disaster.

Finally, many hospital staff may encounter challenges regarding altered standards of care in response to disasters. The present study suggests that alternative care standards are not widely known. It is also apparent that there is insufficient sharing and dissemination of hospital policies. The United States Department of Health and Human Services acknowledges that standards of care might be compromised in a mass casualty incident. In collaboration with experts in other fields such as bioethics and emergency medicine, the department established the provision for altered standard of care. Hospital administrators are encouraged to review and disseminate this information to their organization's community to increase their awareness and stimulate discussion regarding ethical considerations during the times of emergencies and disasters.[25]

One limitation of the study is the exclusion of drill performance strengths because the analysis was focused primarily on deficiencies and areas of improvement. Additionally, the qualitative methods were used to study a relatively unexplored area, and qualitative findings are not meant to be generalizable. Consequently, there is limited room to extrapolate these findings to other hospitals in the County, since we do not know if the hospitals have similar, different, or additional issues pertaining to children. Despite these limitations, our findings suggest that further investigation is warranted. We suggest that planners arrange for evaluators to observe pediatric disaster preparedness during actual drills. Evaluators making direct observations will determine in real time the strengths and weaknesses of a Center's approach and capture an overall picture of a healthcare organization's disaster preparedness status.

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References

1. Garrett AL, Grant R, Madrid P, et al.: Children and megadisasters: Lessons learned in the new millennium. *Adv Pediatr.* 2007; 54: 189-214.
2. Hu YY, Adams RE, Boscarino JA, et al.: Training needs of pediatricians facing the environmental health and bioterrorism consequences of September 11th. *Mt Sinai J Med.* 2006; 73: 1156-1164.
3. Markenson D, Redlener I: Pediatric preparedness for disasters and terrorism. *A National Consensus Conference*, Washington, DC; 2003: 1-45.
4. Shirm S, Liggin R, Dick R, et al.: Prehospital preparedness for pediatric mass-casualty events. *Pediatrics.* 2007; 120: e756-e761.
5. Gausche-Hill M, Schmitz C, Lewis RJ: Pediatric preparedness of US emergency departments: A 2003 survey. *Pediatrics.* 2007; 120: 1229-1237.
6. Kanter RK, Moran JR: Pediatric hospital and intensive care unit capacity in regional disasters: Expanding capacity by altering standards of care. *Pediatrics.* 2007; 119: 94-100.
7. Kaji A, Freeman C: *Disaster Pediatric Survey Results and Recommendations.* Los Angeles, CA: Emergency Medical Services Authority, 2006.

8. Martin SD, Bush AC, Lynch JA: A national survey of terrorism preparedness training among pediatric, family practice, and emergency medicine programs. *Pediatrics.* 2006; 118: e620-e626.
9. Rassin M, Avraham M, Nasi-Bashari A, et al. Emergency department staff preparedness for mass casualty events involving children. *Disaster Manag Response.* 2007; 5: 36-44.
10. Chokshi NK, Behar S, Nager AL, et al.: Disaster management among pediatric surgeons: Preparedness, training and involvement. *Am J Disaster Med.* 2008; 3: 5-14.
11. Federal Emergency Management Agency: NIMS implementation activities for hospitals and healthcare systems. Available at *www.fema.gov/pdf/emergency/nims/imp_hos.pdf*. Accessed January 7, 2008.
12. Hsu EB, Jenckes MW, Catlett CL, et al.: Effectiveness of hospital staff mass-casualty incident training methods: A systematic literature review. *Prehosp Disaster Med.* 2004; 19: 191-199.
13. Klein KR, Brandenburg DC, Atas JG, et al.: The use of trained observers as an evaluation tool for a multi-hospital bioterrorism exercise. *Prehosp Disaster Med.* 2005; 20: 159-163.
14. Joint Commission on Accreditation of Healthcare Organizations: *Comprehensive Accreditation Manual for Hospitals: The Official Handbook*. Oakbrook Terrace, Illinois: Joint Commission Resources, 2007.
15. Center for Health Policy Columbia University: *Health Emergency Exercise Toolkit*. New York, NY: Columbia University School of Nursing, 2007: 1-79.
16. California Office of Statewide Health Planning and Development: Data and reports. Available at *http://oshpd.ca.gov/HID/DataFlow/index.html*. Accessed January 7, 2008.
17. Institute of Medicine, Committee on Pediatric Emergency Medical Services: *Emergency Medical Services for Children*. Washington, DC: National Academy Press, 1993.
18. Perry RW, Lindell MK: Preparedness for emergency response: Guidelines for the emergency planning process. *Disasters.* 2003; 27: 336-350.
19. Ballow S, Behar S, Claudius I, et al.: Hospital-based disaster preparedness for pediatric patients: How to design a realistic set of drill victims. *Am J Disaster Med.* 2008; 3: 1-10.
20. Braun BI, Darcy L, Divi C, et al.: Hospital bioterrorism preparedness linkages with the community: Improvements over time. *Am J Infect Control.* 2004; 32: 317-326.
21. Gildea JR, Etengoff S: Vertical evacuation simulation of critically ill patients in a hospital. *Prehosp Disaster Med.* 2005; 20: 243-248.
22. Gilmore GD, Schwan WR, McLaughlin MK: An assessment of emergency preparedness in western Wisconsin. *WMJ.* 2007; 106: 71-77.
23. Sexton KH, Alperin LM, Stobo JD: Lessons from Hurricane Rita: The University of Texas Medical Branch Hospital's evacuation. *Acad Med.* 2007; 82: 792-796.
24. French ED, Sole ML, Byers JF: A comparison of nurses' needs/concerns and hospital disaster plans following Florida's Hurricane Floyd. *J Emerg Nurs.* 2002; 28: 111-117.
25. Altered Standards of Care in Mass Casualty Events: Prepared by Health Systems Research Inc. under Contract No. 290-04-0010. AHRQ Publication No. 05-0043. Rockville, MD: Agency for Healthcare Research and Quality. Available at *www.ahrq.gov/research/altstand/altstand.pdf*. Accessed April 2005.