ORIGINAL RESEARCH

Survey of Emergency Management Professionals to Assess Ideal Characteristics of a Photographic-Based Family Reunification Tool

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ABSTRACT

Objective: A reunification tool that captures images of children at the time of the disaster would enable parents to locate their missing children, particularly if the children are unable to communicate their identity. This study assessed the ideal features and parameters of a photographic-based reunification tool.

Methods: A convenience sample of federal, state, and hospital-based emergency management professionals were surveyed to elicit their preferences regarding an image-based reunification algorithm, to assess the parents' level of difficulty in viewing images with facial trauma, and to determine the minimum percentage of successful reunifications needed to justify adoption of a reunification tool.

Results: Of 322 emergency management professionals surveyed, 129 (40%) responded. Only 18% favored a photographic-based tool that would display images in which only the categories of age, gender, and facial features (eye, hair, and skin color) would exactly match the parent's description of the child. However, 72% preferred a broader, less-rigid system in which the images displayed would match all or most features in the parents' description of the missing child, allowing parents to view more of the image database. Most (85%) preferred a tool showing unedited images of living children, allowing parents to view facial trauma. However, more respondents reported that parents would find viewing unedited images with facial trauma somewhat or very difficult emotionally compared with edited images for both living (77% vs 20%, $P<.001$) and deceased children (91% vs 70%, $P<.001$.) In a disaster involving 1000 children, a tool that reunites a minimum of 10% of families would be adopted by over 50% of the participants. Participants were willing to accept a lower percentage of reunifications in a disaster involving 1000 children compared with disasters involving 10 ($P<.001$) or 100 children. ($P<.001$).

Conclusions: Emergency management professionals identified desirable characteristics of a photographic-based reunification tool, including an algorithm displaying unedited photographs of missing children that loosely matches the parents' description, acknowledging the parents' emotional difficulty in viewing photographs with facial trauma. Participants were also willing to accept a lower percentage of successful reunifications as the scale of the disaster size increased.

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Key Words: family reunification, pediatrics, emergency management, disaster planning

During the past 10 years, earthquakes in China (2008, 2010) and Haiti (2010) and the 2004 tsunami in the Indian Ocean highlight the inevitability that disasters cause families to become separated.[1-3] Children are particularly vulnerable in these situations; they might not have the developmental or cognitive capacities to self-identify or name family members. Anatomically, they are at greater risk of sustaining injuries after a disaster and may be dependent on others for survival.[4,5] Children who are separated from their families are also at increased risk for abuse, abduction, and emotional trauma.[6,7] The most striking event in the United States remains Hurricane Katrina/Rita, which resulted in more than 5000 children being separated from their families. In many cases, these children were displaced to different states from their families, thus completely separating them from established networks and local family members.[8] Subsequently, multiple international and national organizations have advocated for expedient family reunification including the need to explore new technologies.[2,9-11]

In response, several systems have been created to facilitate reunification, each with advantages and limitations. During a federally declared disaster, the Federal Emergency Management Agency, with the assistance of the National Center for Missing and Exploited Children, will have two registries open: the National Emergency Family Registry and Locator System for families, and the National Emergency Child Locator Center for unaccompanied children.[12] Unfortunately these systems are not available during smaller local disasters. Non-

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governmental organizations such as the American Red Cross also have a registry available to assist with reunification. However, none of these registries for national disasters is currently linked with hospitals and, therefore, have incomplete information.[13] Social media platforms have also tried to fill the void by enabling families to post pictures or information about missing children on Internet sites.[14,15] An iPhone application also has been developed for the same purpose.[16] However, shortcomings of social media networks include the need for technologically intact infrastructure (possibly disrupted by the disaster), experienced personnel to access it (most likely not young children), and privacy concerns. While security companies have expertise in facial recognition,[17] there are limited peer-reviewed publications regarding the accuracy of such systems or their use in children.[18] To our knowledge, a standardized approach for family reunification currently does not exist at the local level.

In 2007, Chung and Shannon described an image-based tool for family reunification, known as REUNITE.[19] The premise of the system is that photographs of unaccompanied children, taken immediately following a disaster, would be uploaded and stored in a central shared database. The technical capabilities of the tool include automated feature extraction (age, gender, and eye, skin, and hair color), indexing and retrieval capabilities, and the ability to mask facial trauma. The use of automated feature extraction could potentially decrease the work of the disaster relief personnel when resources are limited and simultaneously provide a method to index photographs to allow for faster family reunification. Theoretically, the tool can be used at the local level and would be able to communicate and transmit information to a state or national platform. This tool is currently under development by a multidisciplinary group of scientists in the fields of computer vision, emergency management, pediatric emergency medicine, and pediatric anthropology.

While systems for family reunification are advocated, there are no clear guidelines and only limited research on which characteristics should ideally be included in such systems. Emergency management professionals, who are responsible for planning and coordinating emergency responses and recovery efforts immediately following a disaster, may have the most experience and therefore the best understanding of the complexities of reunification after disasters. Emergency management professionals with pediatric expertise would be the most likely candidates to supervise the process of family reunification if the need and technology existed. Thus, the objectives of this investigation were to determine through a Web-based survey of emergency management professionals which characteristics would be most useful in a photograph-based family reunification tool and to identify the minimal number of successful family reunifications that would justify adoption of a photographically based reunification tool.

METHODS

From October 2008 to July 2009, a Web-based survey was administered to a national network of emergency management professionals. All activities were approved by the hospital institutional review board.

Study Population

Potential participants for the survey included emergency management personnel at federal and state levels, children's hospitals nationwide, and hospitals in an urban area. E-mail addresses of all the federal and state emergency management personnel were obtained via the federal and state Web sites. Each state's program director from the Emergency Medical Services for Children (EMSC) was contacted through the EMSC National Resource Center. Hospitals associated with the National Association of Children's Hospital and Related Institutions (NACHRI) were contacted, and e-mail addresses of those involved in emergency management were obtained. E-mail addresses from emergency management professionals involved with the Conference of Boston Teaching Hospitals (COBTH) were also obtained.

Survey Design and Administration

A pilot survey that focused on ideal features and parameters of a photographic-based family reunification tool was developed and pretested with a group of 25 subjects who were similar in characteristics to the participants of the main study.

In the first section of the survey, participants were asked how the tool should select photographs for evaluation after parents enter their child's characteristics such as age, gender, and facial features (color of eyes, skin, and hair) into the tool. At one extreme, the tool could show all pictures of children in the database, not attempting to match any characteristics; at the other extreme, the system could only show those pictures that match all characteristics provided, showing a smaller subset of photographs. In certain disaster scenarios, children separated from their parents could incur physical wounds. Given current technology, with an image-based system, facial wounds have the potential to be edited so that during the search parents could be spared from looking at children with facial injuries. Participants were asked how emotionally difficult it would be for parents to look at edited (masking facial trauma) and unedited photographs, on a scale from 1 (very easy) to 5 (very difficult) and their preference of edited vs unedited photographs in an image-based reunification tool.

The second section of the survey addressed the minimum number of successful reunifications required to warrant adopting a photographic-based reunification tool as the primary reunification tool, in three hypothetical disasters of different sizes ($n = 10, 100, 1000$). The final section of the survey included demographic characteristics (years practiced, state of practice, occupation, prior experience with children in disasters, and whether the participant was a parent of a child <18 years). After

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TABLE 1

Participant Characteristics

Characteristic (No. of Participants)	No. (%)[a]
Organization (N = 129)	
COBTH	18 (14)
NACHRI	51 (40)
State or federal government	8 (6)
EMSC	52 (40)
State (N = 116)	
California	17 (15)
Massachusetts	17 (15)
Other states[b]	82 (71)
Parent of child <18 y (N = 117)	47 (40)
Years worked in emergency management (N = 117)	
<1	5 (4)
1-4	16 (14)
5-9	24 (21)
10-19	31 (26)
20-29	26 (22)
≥ 30	10 (9)
Not working in disaster planning	5 (4)
Prior experience in disasters with children (N = 116)	42 (36)
Occupation[c] (N = 116)	
First-response professional	32 (28)
Registered nurse	24 (21)
Hospital emergency management	21 (18)
Physician (MD/DO)	20 (17)
Public health professional	19 (16)
Emergency management	15 (13)
Other	9 (8)
Nurse practitioner or physician assistant	3 (3)

Abbreviations: COBTH, Conference of Boston Teaching Hospitals; EMSC, Emergency Medical Services for Children; NACHRI, National Association of Children's Hospital and Related Institutions.

[a] Percentages may not total 100% due to rounding.

[b] 35 states represented including District of Columbia, with ≤8 participants each.

[c] Participants could choose more than one occupation.

each section, respondents had the opportunity to expand on their survey responses or include general comments.

After making minor modifications to improve clarity of questions, a link to the Web-based survey was sent out by e-mail to 322 emergency professionals across the United States, with the breakdown as follows: 172 NACHRI, 40 COBTH, 56 EMSC, and 54 state and federal agencies. The invitation e-mail was followed up by two reminder e-mails; however, the survey itself was anonymous.

The SAS version 9.2 (SAS Institute) was used for data analysis.[20] Comparisons of ordinal responses between independent groups were analyzed using a one degree of freedom Mantel-Haenszel χ^2 test with rank scores. To summarize the minimum number of reunifications required to make a photographic-based family reunification tool useful, responses for questions about disasters of different magnitudes were put on a common scale by expressing the number as a percent of the disaster size. Subsequently, the cumulative distribution for each size disaster was calculated, and responses for the different-sized disasters were compared with the signed-rank test. The signed-rank test was also used to compare responses to the questions about emotional difficulty of viewing masked and unmasked facial trauma. Participants who did not respond to a particular question were excluded from the analyses of that question.

RESULTS

Participant Characteristics

A total of 129 emergency management professionals responded to the survey. The overall response rate was 40%, although the response rate varied widely across the different groups: 15% state and federal agencies, 30% NACHRI, 45% COBTH, and 93% EMSC.

The characteristics of the participants are displayed in Table 1. While the survey has at least one participant from 37 US states, including Hawaii and the District of Columbia, a higher concentration of participants represented the states of California (15%) and Massachusetts (15%). Nearly 60% of the participants have worked 10 or more years as a professional in the field of emergency management. The largest group of participants worked between 10 and 19 years as a professional in this field (26%). Over one-third of participants have been involved in disasters with children (36%). Forty percent of participants had one or more children younger than age 18 years.

When asked about their occupation, participants were able to select multiple answers. Being a first responder was the most frequently chosen occupation (28%), followed by registered nurse (21%), hospital emergency management (18%), physician (17%), public health professional (16%), emergency management (nonhospital) (13%), other occupations (8%), and nurse practitioner/physician assistant (3%).

Ideal Reunification Tool Design Features

Only 18% preferred a photographic reunification tool that would show available images that exactly matched the parents' description of the child (age, gender, facial features). The majority (72%) preferred a "looser" match, thus having the reunification tool display images in which all or most of the characteristics match the parents' description. This strategy would allow parents to view a greater number of images. A minority (10%) did not recommend any matching strategy, instead allowing the parent to view all images regardless of disaster size (Table 2).

When asked what type of photographs, edited (to mask facial trauma) vs unedited, were most useful for the system, the majority of participants choose unedited photographs of the living; this majority was nearly equally divided on whether to use unedited or edited pictures of the deceased. A minority of participants (15%) preferred a system that showed only edited photographs of living and deceased children (Table 2).

In assessing parents' level of difficulty in viewing images with facial trauma, participants scored unedited photographs of deceased children the most difficult for parents to view (mean,

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4.63), followed by edited photographs of deceased children (mean, 3.80) and unedited photographs of living children (mean, 3.72). Edited photographs of living children were scored easiest to view (mean, 2.48). Seventy-seven percent of participants reported that parents would find viewing photographs of living children with visible wounds somewhat difficult or very difficult. In contrast, 20% of participants stated that living children with facial wounds that were edited would be somewhat difficult or very difficult for parents. Thus, participants indicated parents would find viewing unedited photographs of children with physical wounds significantly more emotionally difficult compared to edited pictures, both when viewing living ($P < .001$) or deceased children ($P < .001$)(Figure 1).

Responses did not differ significantly to the above questions based on participant's prior experience in disasters, years worked in emergency management, organization (pediatric vs general or hospital-based vs other), or whether the participant was a parent of a child.

Minimum Success Criteria for Adoption of a Photographic-Based Reunification Tool

A family reunification tool that reunites at least 10% of missing children with their families would be adopted by 40% to 58% of participants, depending on the size of the disaster. Responses to these questions did not differ significantly by the participant's characteristics. In a small-scale disaster involving 10 children, more than 50% of participants would adopt the reunification tool if 5 children were successfully reunited with their parents. In general, for large disasters (n = 1000 children), more participants were willing to accept a lower percentage of family reunifications compared with disasters involving 10 ($P < .001$) or 100 children ($P < .001$). Figure 2 shows the distribution of the minimum success rate required for the emergency management professionals to consider using a photographic-based reunification tool as their primary reunification tool.

Respondents' Comments

The survey also included opportunities for open-ended comments that allowed participants to elaborate on their survey choices. Most participants commented positively on the idea of a photographic-based reunification tool. One participant, for example, stated that "this will be a great system and especially helpful in large-scale disasters such as Katrina but also for localized disasters which can also cause family separation." Participants also saw the success of the tool as dependent on a number of criteria such as ease of use, efficiency, continued funding, and universal adoption. With regard to the indexing and retrieval functions, some participants stated that "the tool should start with the match of all characteristics and be able to show the other categories if a child is not identified." A number of participants who are parents, themselves, also expressed the wish to have "the opportunity to view all pictures if necessary to be sure my child was not in the database." It was also recognized that "social services need to be an integral part of this process." Concerns regarding the system included legal liabilities once reunification is taking place. Participants foresaw the need to ensure that children were reunited with the proper guardians to minimize criminal misuse.

COMMENT

Based on data from this national survey, our results reveal the preferred features and parameters of a photographically based reunification tool by emergency management professionals. Important findings include preference for a "loose" image-

TABLE 2

Preferred System Design Features

System Design Feature	No. (%)[a]
As an emergency management professional, which of the following REUNITE system designs would you favor most when attempting to reunite a lost child with his/her parents/guardians? (N = 129)	
Only show if all search characteristics match	23 (18)
Show if most characteristics match	70 (54)
Show if some characteristics match	23 (18)
Do not attempt matching; show all pictures	13 (10)
Editing pictures in the REUNITE system to mask physical wounds could alter facial characteristics of a child and might reduce the likelihood to match that picture in the database to the description of the child. Which of the following options do you, as an emergency management professional, think would make the REUNITE system most useful? (N = 127)	
Unedited pictures of living and deceased	58 (46)
Unedited pictures of living; edited of deceased	50 (39)
Edited pictures of living and deceased	19 (15)

[a] Percentages may not total 100% due to rounding.

FIGURE 1

Emotional Difficulty for Parents of Viewing Edited and Unedited Pictures of the Living and Deceased Children, as Described by the Emergency Management Professionals.

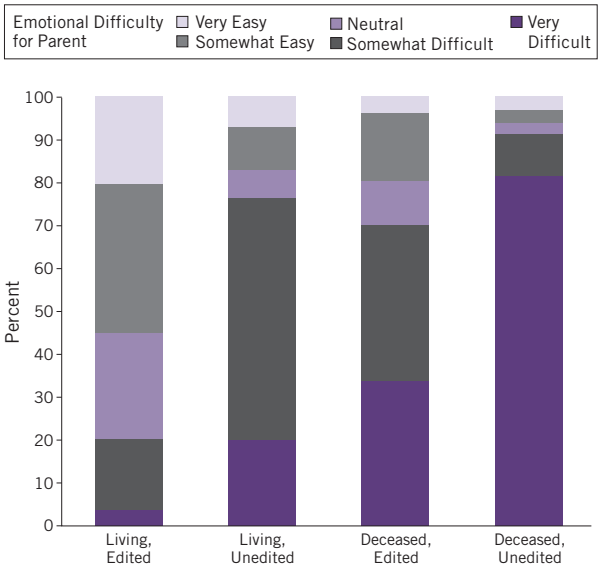

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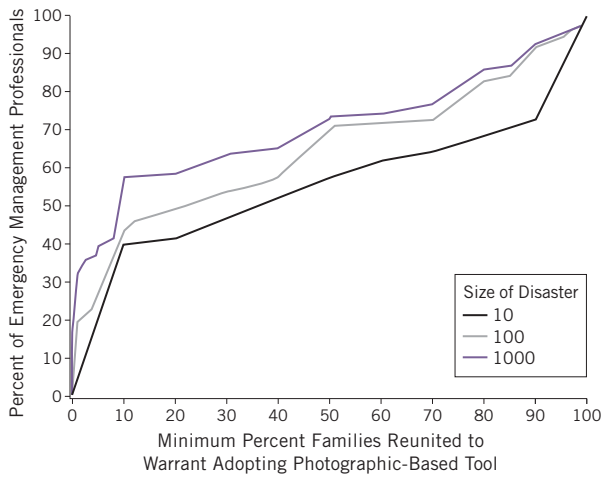
FIGURE 2

Successful Reunification Criteria for Adopting a Photographic-Based Tool as the Primary Tool.



matching algorithm, the use of unedited photographs, while acknowledging that the majority of parents would find viewing photographs with facial trauma emotionally difficult, and the low percentage of reunifications needed to adopt such a tool as the primary reunification tool. Although the overall response rate from the Web-based survey is low (40%), the response rate is higher than most Web-based surveys[21] and varied widely from 15% to 93%, with participation from 36 states and the District of Columbia. Additional comments from participants uniformly support an image-based reunification tool but echo concerns of the needs for additional resources and validation to ensure that missing children would be reunited with the proper family.

While tracking and family reunification systems currently exist, these systems have limitations. Both federal and private tracking and family reunification tools rely mainly on text-based search inquiries. During a disaster, resources available to enter accurate information and data for each missing person may be scarce, as all personnel may be needed for the immediate care of disaster victims. In addition, these tracking and family reunification tools may have limited utility in groups that have difficulty identifying themselves, such as young children, children with developmental disabilities, and those who are severely injured or deceased. A photo-based reunification tool may be a potential solution for such groups, allowing definitive identification at the time of the search.

In disaster situations, victims, including children separated from their families, will present to hospitals for care. Family reunification presents a challenge for hospitals. In the United States, hospitals must uphold the federal Health Insurance Portability and Accountability Act of 1996 (HIPAA) Privacy Rule, which protects individually identifiable health information.[22] During a declared disaster, HIPAA permits (but does not require) the disclosure of certain protected health information to other "covered entities" (eg, hospitals and other public health agencies) without the individual's authorization. This disclosure may include sharing identifiable information about unaccompanied minors without parental consent. However, information sharing between "covered entities" requires preauthorized data-use agreements.[23] The type of information shared must be the "minimum necessary," and specific elements (eg, photographs, demographic information, the length of time information will be stored, and potential future uses of the information beyond immediate family reunification) need to be clearly delineated and agreed on prior to the disaster event. Preauthorization transfer of information from hospitals and public health agencies to local, state, and federal emergency management agencies also needs to be established. In short, a delicate balance lies between information and privacy: while hospitals and public health agencies need to reveal confidential information to the general public to facilitate family reunification, the identities of disaster victims—especially children—need to be protected from unscrupulous individuals.

With regard to an image-based reunification algorithm, our results showed that 54% of emergency management professionals prefer a system in which photographs shown matched most but not all of the characteristics provided by the parents. This preference probably reflects the recognition that any tool will have a degree of error, and those surveyed would tolerate parents viewing additional photographs to ensure thoroughness and accuracy in family reunification. Interestingly, 10% of the participants preferred to have no matching strategy, thus allowing parents to view all photographs. This approach may be challenging to implement in a large-scale disaster, if each family is given unlimited time to view large numbers of images while other families are waiting. In addition, it is unknown if parents who are already stressed have the tolerance and focus to accurately view large numbers of images. Given the chaos that happens during a disaster and the possibility that the child the parent is searching for is not in the database, an image-based reunification algorithm that prioritizes available images in the database based on parent input may allow parents to view images in a more efficient manner.

Any type of disaster may involve children who present to the health care system with injuries.[24] While it is not surprising that unedited images (revealing facial trauma) can be more emotionally difficult for parents, as compared to edited images in living and deceased children, this study also quantified the degree of emotional difficulty for parents, as assessed by emergency management professionals. We found that 77% of participants responded that parents would find viewing images with facial trauma somewhat or very emotionally difficult in living children and 91% of participants indicated similar difficulty for parents with regard to unedited images of deceased children. Having the option of editing or masking physical wounds would

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seem preferable in minimizing the initial psychological trauma of parents looking for their child. However, a majority of emergency management professionals reported that unedited images of living children would be more useful in an image-based reunification tool. Participants indicated that the authenticity of unedited photographs outweighed the anticipated emotional difficulty for parents. If unedited images are displayed, mitigating psychological strategies may need to be in place to reduce the emotional difficulty for parents. Conversely, if edited images are used, it will be necessary that the parents be fully informed of the extent of their child's injuries (preferably in a private setting and by a trained professional) before reunification can proceed.

Due to the high impact and low frequency of disasters, quantifiable objective measures of performance to evaluate disaster response are limited.[25-28] Most medical literature in disaster response focuses primarily on descriptions of the events and the impact on the disaster victims.[24,29] Data are also limited on the performance characteristics of existing reunification tools. With this survey, we sought to obtain objective measures in evaluating a reunification tool, namely, the minimum number of reunifications needed to adopt a visually based reunification tool as the primary reunification tool. Our results indicate that participants were willing to accept a low percentage of family reunifications, with approximately one-half reporting that they would want to adopt a system that only reunites 10% of families seeking a lost child. Larger hypothetical disasters corresponded to lower thresholds for warranting adoption of the system. At present, minimal infrastructure and standardized protocols for reunification exist at the local and community levels. Consequently, it appears that emergency management professionals would even adopt an image-based reunification tool that yields only a comparatively small number of successful family reunifications.

LIMITATIONS

There are limitations inherent in this study. The survey was sent to emergency management professionals, with an emphasis on those in pediatric settings; the results of the survey may not be representative of all emergency management professionals. While representation was sought across the United States, there was an overrepresentation of participants from Massachusetts and California. Those who replied may be more comfortable with online surveys and perhaps generally more receptive of a technology-based system such as REUNITE. While 40% of the respondents were parents with children younger than age 18 years, the respondents' answers to questions about emotional difficulty for parents may not accurately reflect the typical parents' opinion. In addition, use of the system would entail effort on the part of the emergency management professionals. They would have to take pictures of the children at their facility, upload them into the system along with other identifying information about the child, and at the same time assist the possibly upset and impatient parents with entering characteristics about their own child and with the search process itself. Depending on the number of Web-accessible computers available and the number of parents present, the emergency management professionals may also have to prioritize access to the system. Although the survey pointed out some of these "costs" associated with the system, it is possible that they were not fully appreciated by participants when answering the question about adopting the system as their primary reunification system, especially for the hypothetical small disaster involving 10 children. Nevertheless, this survey of experienced emergency management professionals indicates that even a system that is not always successful would be adopted widely, and represents one of the first studies to examine useful characteristics in a tool for reuniting children with their families.

CONCLUSIONS

In this national survey, emergency management professionals, many with pediatric expertise, identified desirable characteristics of a photographic-based reunification tool to include an algorithm that displays unedited photographs of missing children that loosely matches the parents' description while acknowledging the emotional difficulty for parents in viewing photographs with facial trauma. Those surveyed were willing to adopt a photo-based reunification tool, even when the percentage of successful family reunifications was low, and allowed lower thresholds for adoption the greater the disaster size. Further evaluation of the usability and performance of REUNITE, the family reunification tool, is under way.

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REFERENCES

1. Balsari S, Lemery J, Williams TP, Nelson BD. Protecting the children of Haiti. *N Engl J Med*. 2010;362(9):e25.
2. World Health Organization National Commission on Children and Disasters Interim Report October 2009. Unaccompanied and Separated Children in the Tsunami-affected Countries Guiding Principles. http://www.who.org.mv/EN/Section40/Section41_56.htm. Accessed July 20, 2010.
3. Watts J. China earthquake "biggest disaster for children in seven years." *The Guardian*. 2008. http://www.guardian.co.uk/world/2008/may/22/china. Accessed December 1, 2010.
4. Markenson D, Reynolds S; American Academy of Pediatrics Committee on Pediatric Emergency Medicine; Task Force on Terrorism. The pedia-

https://doi.org/10.1001/dmp.2012.29 Published online by Cambridge University Press

trician and disaster preparedness. *Pediatrics*. 2006;117(2):e340-e362.
5. Chung S, Shannon M. Hospital planning for acts of terrorism and other public health emergencies involving children. *Arch Dis Child*. 2005;90(12):1300-1307.
6. Brandenburg MA, Watkins SM, Brandenburg KL, Schieche C. Operation Child-ID: reunifying children with their legal guardians after Hurricane Katrina. *Disasters*. 2007;31(3):277-287.
7. Nager AL. Family reunification–concepts and challenges. *Clin Pediatr Emerg Med*. 2009;10:195-207.
8. Broughton DD, Allen EE, Hannemann RE, Petrikin JE. Getting 5000 families back together: reuniting fractured families after a disaster: the role of the National Center for Missing & Exploited Children. *Pediatrics*. 2006;117(5, pt 3):S442-S445.
9. Institute of Medicine, National Academy of Sciences. *Emergency Care for Children–Growing Pains*. 500 Fifth St NW, Washington, DC 20001. National Academy Press; June 13, 2006.
10. Blake N, Stevenson K. Reunification: keeping families together in crisis. *J Trauma*. 2009;67(2)(suppl):S147-S151.
11. US Department of Health and Human Services. National Commission of Children and Disasters Interim Report. http://www.childrenanddisasters.acf.hhs.gov/20091014_508IR_partII.pdf. Accessed March 1, 2010.
12. US Department of Homeland Security. Federal Emergency Management Agency. National Emergency Family Registry and Locator System. 2009. http://www.fema.gov/media/fact_sheets/nefrls.shtm. Accessed July 1, 2010.
13. Mace SE, Sharieff G, Bern A, et al. Pediatric issues in disaster management, part 2: evacuation centers and family separation/reunification. *Am J Disaster Med*. 2010;5(3):149-161.
14. Haiti earthquake–what we're hearing. CNN, 2010. http://www.cnn.com/2010/TECH/01/12/haiti.social.media/index.html. Accessed July 1, 2010.
15. Haiti Quake People Finder. 2010. http://www.archmediaproject.org/2010/04/connections-basic-communications/.
16. ReUnite. 2010 http://itunes.apple.com/us/app/reunite/id368052994?mt=8#. Accessed July 1, 2010.
17. Child Identification program to use face biometrics. *Biometric Technology Today*. 2010;1:12.
18. Recording children's biometrics is far from child's play. *Biometrics Technology Today*. 2010;2010(1):12.
19. Chung S, Shannon M. Reuniting children with their families during disasters: a proposed plan for greater success. *Am J Disaster Med*. 2007;2(3):113-117.
20. SAS Institute. 2011. *SAS/STAT® User's Guide*. Vols. 1-3. Cary, North Carolina: SAS Institute Inc.
21. Kaplowitz M, Hadlock T, Levine R. A comparsion of Web and mail survey response rates. *Public Opin Q*. 2004;68:94-101.
22. US Department of Health and Human Services. Health Information Privacy. HHS.gov. http://www.hhs.gov/ocr/privacy/hipaa/understanding/index.html. Accessed April 10, 2011.
23. US Department of Health and Human Services Health Information Privacy - Disclosures for Emergency Preparedness—A Decision Tool. HHS.gov. http://www.hhs.gov/ocr/privacy/hipaa/understanding/special/emergency/decisiontoolintro.html. Accessed April 10, 2011.
24. Xiang B, Cheng W, Liu J, Huang L, Li Y, Liu L. Triage of pediatric injuries after the 2008 Wen-Chuan earthquake in China. *J Pediatr Surg*. 2009;44(12):2273-2277.
25. McCarthy ML, Brewster P, Hsu EB, Macintyre AG, Kelen GD. Consensus and tools needed to measure health care emergency management capabilities. *Disaster Med Public Health Prep*. 2009;3(2)(suppl):S45-S51.
26. Markenson D, Krug S. Developing pediatric emergency preparedness performance measures. *Clin Pediatr Emerg Med*. 2009;10:229-239.
27. Nelson CD, Beckjord EB, Dausey DJ, Chan E, Lotstein D, Lurie N. How can we strengthen the evidence base in public health preparedness? *Disaster Med Public Health Prep*. 2008;2(4):247-250.
28. Nelson C, Chan E, Chandra A, et al. Developing national standards for public health emergency preparedness with a limited evidence base. *Disaster Med Public Health Prep*. 2010;4(4):285-290.
29. Auerbach PS, Norris RL, Menon AS, et al. Civil-military collaboration in the initial medical response to the earthquake in Haiti. *N Engl J Med*. 2010;362(10):e32.

https://doi.org/10.1001/dmp.2012.29 Published online by Cambridge University Press