American Academy of Pediatrics
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TECHNICAL REPORT

The Pediatrician and Disaster Preparedness

Background information to support Academy policy.

David Markenson, MD, Sally Reynolds, MD, Committee on Pediatric Emergency Medicine and Task Force on Terrorism

ABSTRACT

For decades, emergency planning for natural disasters, public health emergencies, workplace accidents, and other calamities has been the responsibility of government agencies on all levels and certain nongovernment organizations such as the American Red Cross. In the case of terrorism, however, entirely new approaches to emergency planning are under development for a variety of reasons. Terrorism preparedness is a highly specific component of general emergency preparedness. In addition to the unique pediatric issues involved in general emergency preparedness, terrorism preparedness must consider several additional issues, including the unique vulnerabilities of children to various agents as well as the limited availability of age- and weight-appropriate antidotes and treatments. Although children may respond more rapidly to therapeutic intervention, they are at the same time more susceptible to various agents and conditions and more likely to deteriorate if they are not monitored carefully.

This article is designed to provide an overview of key issues for the pediatrician with respect to disaster, terrorism, and public health emergency preparedness. It is not intended to be a complete compendium of didactic content but rather offers an approach to what pediatricians need to know and how pediatricians must lend their expertise to enhance preparedness in every community. To become fully and optimally prepared, pediatricians need to become familiar with these key areas of emergency preparedness: unique aspects of children related to terrorism and other disasters; terrorism preparedness; mental health vulnerabilities and development of resiliency; managing family concerns about terrorism and disaster preparedness; office-based preparedness; hospital preparedness; community, government, and public health preparedness; and advocating for children and families in preparedness planning.

See Policy Statement on page 560.

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Key Words
emergency preparedness, disasters, terrorism, bioterrorism

Abbreviations
FEMA—Federal Emergency Management Agency
DMAT—disaster medical assistant team
CDC—Centers for Disease Control and Prevention
SNS—Strategic National Stockpile
FDA—Food and Drug Administration
AAP—American Academy of Pediatrics
DHS—Department of Homeland Security
NRP—national response plan
ESF—emergency support function
HSPD-5—Homeland Security Presidential Directive 5
NIMS—national incident management system
VMI—vendor-managed inventory
HRSA—Health Resources and Services Administration
KI—potassium iodide

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INTRODUCTION

Recent natural disasters and events of terrorism and war have heightened society's recognition of the need for emergency preparedness. Moreover, the possibility of additional disasters, public health emergencies, and terrorism on US soil has become increasingly likely, so much so that billions of dollars have been allocated to investments in homeland security and public health readiness. Yet, the concept of preparing for disasters is not new. For decades, emergency planning for natural disasters, workplace accidents, and other calamities has been the responsibility of government agencies on all levels.

Because traditional disaster planning has encompassed, by and large, discrete

incidents and geographically circumscribed areas, the preparedness and recovery process usually depends on local resources, which are supplemented by state and federal support as needed. Furthermore, most emergency plans have to do with relatively familiar challenges (floods, hurricanes, industrial incidents, and the like) and straightforward consequences. In the case of terrorism, however, entirely new approaches to emergency planning are under development for a variety of reasons. First, the timing of potential terrorist attacks is erratic and entirely unpredictable. Unlike hurricanes, there is no season for an attack launched by a terrorist. Second, attacks can be of any size and occur in multiple areas simultaneously or sequentially (secondary attacks), severely taxing resources at every level. Third, the possibility as well as the reality of terrorism engenders substantial psychological trauma, and the entire population may experience deleterious consequences beyond the actual damage of the attack itself. Fourth, the actual weapons of terror are not generally familiar to the public, to medical and public health officials, or even to traditional disaster planners.

Although we traditionally have thought that children would be exposed to terrorism as secondary victims, in the area of the attack, they may also be the intended victims. In an effort to cause maximal terror, a terrorist may choose to create an event specifically targeted at children. Recent evidence has shown that targeting children is not only a possibility but a probability and is clearly on the minds of terrorists. In 2002, documents that were seized from senior al-Qaeda planner Suleiman Abu Gheith and translated read, "We have not reached parity with [the Americans]. We have the right to kill 4 million Americans—2 million of them children" (reported by CNN and confirmed by the US Department of Homeland Security). In addition, in 2003 the Singapore government foiled an al-Qaeda–connected plan to attack an American school (in Singapore) with 3000 American expatriate children.[1] Last, in 2004, terrorists in Russia specifically targeted a school. These 3 examples demonstrate that although traditional planning addressed children in proportion to their numbers in society, we now have to consider primary pediatric events. Such attacks would produce a number of pediatric victims that would be significantly larger than their proportion in the community-at-large, thus placing a unique stress on pediatric care in all aspects of response and recovery.

The challenge of dealing with emergency preparedness in the United States is daunting not only for disaster planners but also for our medical system and health professionals of all types, especially pediatricians. When considering terrorism, one must consider all the possible forms, including chemical, biological, radiologic, nuclear, and explosive. Pediatricians need to be able to answer concerns of patients or families, recognize signs of possible exposure to a weapon of terror, understand first-line response to such attacks, and sufficiently participate in disaster planning to ensure that the unique needs of children are addressed satisfactorily in the overall process. This message is one that needs to be incorporated into all aspects of preparedness and one that pediatricians must help publicize and explain to emergency planners from both governmental and nongovernmental agencies.

DISASTER TYPES, MAGNITUDE, PREPAREDNESS, AND MANAGEMENT

The World Association of Disaster Emergency Medicine and the Office of United States Foreign Disaster Assistance define a "disaster" as a situation or event that overwhelms local capacity, necessitating a request to the national or international level for external assistance, or an unforeseen and often sudden event that causes great damage, destruction, and human suffering. Disasters are usually described as natural (including earthquakes, hurricanes, tornadoes, and floods) or man-made (including fire, mass-transportation incidents, environmental toxins, and civil unrest). More narrowly defined and distinct are "mass-casualty incidents," which are events that cause large numbers of injuries but do not threaten or harm large segments of the community. The effects of each disaster are different. Considerations are given to the size of the area involved, the extent of damage, and the effect on community resources. The extent of damage includes the physical injury to persons and damage to property, especially destruction of infrastructure (roadways, bridges, and communication lines). The effects on community resources include the absence of electricity, gas, sanitation, and potable water; the necessity for portable shelters; and the potential for recurrence (eg, earthquakes with aftershocks).

The planning for and response to disasters traditionally have been the responsibilities of federal, state, and local governments. The Federal Emergency Management Agency (FEMA) is involved in declared national emergencies by providing disaster medical assistant teams (DMATs). DMATs are deployed under overall direction of the Department of Health and Human Services as part of a public health and medical response that coordinates assets of the Centers for Disease Control and Prevention (CDC), Strategic National Stockpile (SNS), Food and Drug Administration (FDA), National Institutes of Health, Department of Veterans Affairs, and other agencies or individuals with special expertise in weapons of mass destruction. Other federal agencies include the Department of Transportation, Department of Defense, Department of Housing and Urban Development, Environmental Protection Agency, and Federal Aviation Administration. On a regional level, state and local emergency-management authorities (often within the state or local department of health services) have

area-wide response plans. These authorities organize emergency operation centers, the duties of which include (1) hospital damage assessment, (2) allocation, designation, and distribution of casualty-collection points, (3) identification, prevention, and elimination of public health hazards, (4) coordination of activities with support departments, agencies, and public utilities, and (5) coordination of requests for mutual aid. Volunteer organizations such as the Red Cross and Salvation Army have key roles in disaster response. The Office of the Surgeon General and USA Freedom Corps support local voluntary Medical Reserve Corps units in more than 200 American communities (www.medicalreservecorps.gov). In addition, recent concepts have involved planning for disasters at the neighborhood, family, and personal levels.

Recent events in the United States, including hurricanes Katrina and Rita and the flooding that followed, will lead to analysis of our current emergency-preparedness system and may lead to changes in the way that we prepare and respond to disasters at the local, state, and federal levels.

COMMUNITY, GOVERNMENT, AND PUBLIC HEALTH PREPAREDNESS

Emergency preparedness is important at many levels (personal, family, community, regional, state, and federal), with the state and federal governments having pivotal roles. The federal government provides significant funding for disaster preparedness and response and also, to a large extent, establishes the framework that is then followed by states, regions, and communities. In disaster response, the funding and planning tend to be from the top down, whereas the response and use of resources tend to be from the bottom up. In other words, as resources are exhausted at the local level, assistance is requested from the next level, such as the state, which then requests federal assistance. Recent concepts of disaster and aftermath response and planning include the involvement of neighborhoods and families and even have begun to address needs at the individual level. A successful response to a disaster requires the interaction of personnel and resources from multiple agencies in an organized and coordinated manner according to a well-formulated plan. Although this planning has increased in recent times, the attention to the unique needs of children and the inclusion of pediatric expertise in the planning phases is still minimal or, in many cases, nonexistent.[2]

Community Response

Local governments are the first line of defense in emergencies and are primarily responsible for managing the response to most disasters. The primary responsibility for the protection of citizens belongs to local elected officials such as mayors, city council members, and boards of commissioners. When a local government receives a warning that an emergency could be imminent, its first priorities are to warn citizens and take whatever actions are needed to minimize damage and protect life and property. If necessary, an evacuation may be ordered. The emergency operations plan is at the center of comprehensive emergency planning. This plan spells out the scope of activities required for community response. It needs to be a living document that accurately describes what the community can realistically do. Unfortunately, these documents have rarely contained any pediatric consideration, and in only the rarest of cases have pediatricians been part of the planning process.

State Government

All states have laws that describe the responsibilities of the state government in emergencies and disasters. These laws provide governors and state agencies with the authority to plan for and carry out the necessary actions to respond to and recover from emergencies. State emergency-management legislation describes the duties and powers of the governor, whose authority includes the power to declare a state of emergency and decide when to terminate this declaration.

Performing and maintaining the provisions of emergency-management legislation is generally the responsibility of the state emergency-management offices (some municipalities also have offices of emergency management). These offices are organized in a number of ways and have different names. Emergency managers are responsible for preparing for emergencies and coordinating the activation and use of resources controlled by the state government when they are needed to help local governments respond to and recover from emergencies and disasters. In its coordinating role, the state emergency-management office is involved in virtually all serious emergencies, terrorism, or disasters. Using procedures specified in the state emergency operations plan, the state emergency-management organization coordinates deployment of personnel and resources to the affected areas. Pediatric concerns are rarely considered. In a recent FEMA study, it was found that none of the states' emergency operations plans contained child-specific guidelines.[3] Pediatricians will need to be involved in state emergency planning committees to ensure that pediatric considerations are included in state plans and that these pediatric considerations become part of each state agency's plans and part of funding for disaster and terrorism preparation. This involvement can be accomplished through both grassroots efforts and involvement in state chapters of the American Academy of Pediatrics (AAP).

Federal Government

The recent creation of the US Department of Homeland Security (DHS) has added an additional layer and focus

to emergency preparedness. One of the functions of this new agency is to foster a closer connection between prevention of terrorist attacks and preparedness for events and response after an event. In addition, the DHS was charged with reviewing the current federal response plan and the federal concept-of-operations plan, along with many of the incident-specific plans and annexes. This review led to the creation of the new national response plan (NRP), which incorporated the former federal response plan, the concept-of-operations plan, and many of the annexes in addition to a new section that addresses integration with other elements of homeland security. The role of the DHS in relationship to other agencies involved in emergency response is clarified further in the recently released NRP.

Traditionally, the authority for federal involvement in disasters is based on provisions of the Stafford Act.[4] This act establishes the presidential declaration process for major disasters and emergencies, provides for the implementation of disaster assistance, and sets forth the various disaster-assistance programs. The role of FEMA is to coordinate the delivery of federal assistance by managing its own programs and coordinating disaster assistance from other federal departments and agencies. FEMA coordinates these activities by using the interagency federal response system, the NRP (formerly called the federal response plan). The NRP describes the basic mechanisms and structures by which the federal government mobilizes resources and conducts activities to augment state and local response efforts. To facilitate the provision of federal assistance, the NRP uses a functional approach to group the types of federal assistance that a state is most likely to need according to 15 emergency support functions (ESFs) (under the former federal response plan, there were 12 ESFs). Each ESF is headed by a primary agency that has authority over and resources and capabilities in a particular functional area. Other agencies have been designated as support agencies for 1 or more ESFs on the basis of their resources and capabilities to support a functional area. In addition to the ESFs, the NRP also includes incident-specific and support annexes. The NRP is also important in that the structure and some content of most state emergency operations plans are based on it. Then, in turn, local emergency operations plans are based on these state plans.

ESFs

- ESF 1: transportation
- ESF 2: telecommunications and information technology
- ESF 3: public works and engineering
- ESF 4: fire fighting
- ESF 5: emergency management
- ESF 6: mass care, housing, and human services
- ESF 7: resource support
- ESF 8: public health and medical services
- ESF 9: urban search and rescue
- ESF 10: oil and hazardous materials response
- ESF 11: agriculture and natural resources
- ESF 12: energy
- ESF 13: public safety and security
- ESF 14: community recovery, mitigation, and economic stabilization
- ESF 15: emergency public information and external communications

Incident-Specific Annexes

- Biological incident annex
- Catastrophic incident annex
- Cyber incident annex
- Food and agriculture incident annex
- Nuclear/radiologic incident annex
- Oil and hazardous materials incident annex
- Terrorism law enforcement and investigation annex

Support Annexes

- Financial management
- Insular affairs
- International coordination
- Logistics management
- Private-sector coordination
- Public affairs
- Science and technology
- Tribal relations
- Volunteer and donations management
- Worker safety and health

One of the major functions with which physicians will be involved and should become familiar is ESF 8, public health and medical services. The public health and medical services ESF provides assistance to supplement state and local resources for public health and medical care needs during a disaster. In a federally declared disaster, the Department of Health and Human Services forms a Secretary's emergency-response team and activates an array of federal assets and specialized competencies (such as the National Disaster Medical System) as dictated by circumstances to provide health and medical care assistance. A DMAT is a deployable unit of 35 physicians, nurses, technicians, equipment,

and supplies for austere medical care. A management support unit manages field health and medical resources of deployed DMATs. A disaster mortuary assistance team provides a temporary morgue facility, victim identification, processing, and preparation and disposal of remains. A metro medical strike team provides assistance in the medical treatment/management of chemical, biological, or radiologic incidents resulting from deliberate or accidental acts. In select cities, metropolitan medical response teams exist to provide additional medical response capability. The parent agency of all of these groups is the US Public Health Service, with assistance from the DHS.

In addition to the NRP, on February 28, 2003, President Bush issued Homeland Security Presidential Directive 5 (HSPD-5), Management of Domestic Incidents, which directs the Secretary of Homeland Security to develop and administer a national incident management system (NIMS). The NIMS was officially released in March 2004. The NIMS is a system mandated by HSPD-5 and provides a consistent nationwide approach for federal, state, local, and tribal governments; the private sector; and nongovernmental organizations to work effectively and efficiently together to prepare for, respond to, and recover from domestic incidents regardless of cause, size, or complexity. To provide for interoperability and compatibility among all involved agencies and organizations, the NIMS includes a core set of concepts, principles, and terminology, which HSPD-5 identifies as the incident command system; multiagency coordination systems; training; identification and management of resources (including systems for classifying types of resources); qualification and certification; and the collection, tracking, and reporting of incident information and incident resources. The NIMS represents a core set of doctrines, concepts, principles, terminology, and organizational processes to enable effective, efficient, and collaborative incident management at all levels.

In addition to their role in securing our borders and coordinating the federal response to disasters, terrorism, and public health emergencies, the DHS also supports the emergency-preparedness efforts of states, regions, and communities. In many cases, this support is provided through grants to the states to improve emergency-response training and acquire the necessary equipment for response. Another method of providing local support is by providing model programs that, although federally developed and supported, are administered locally. An example of this type of program is the USA Freedom Corps. A component of USA Freedom Corps, Citizen Corps, is the nationwide movement of the DHS to actively involve all Americans in making communities better prepared for all hazards. Citizen participation is coordinated by the nearly 1300 county, local, and tribal Citizen Corps councils, which bring together the expertise of emergency responders with the energy and spirit of volunteers, the private sector, and other community stakeholders. Additional information regarding Citizen Corps can be found on the program's Web site (www.citizencorps.gov).

Another major component of the federal preparedness program that is important to all who are involved in health care preparedness is the SNS, which was created by Congress in 1999. The mission is to provide a resupply of large quantities of essential medical material to states and communities during an emergency within 12 hours of the federal decision to deploy.

The SNS program works with governmental and nongovernmental partners to upgrade the nation's public health capacity to respond to a national emergency. Critical to the success of this initiative is ensuring that capacity is developed at federal, state, and local levels to receive, stage, and dispense SNS assets.

The SNS is a national repository of antimicrobial agents, chemical antidotes, antitoxins, life-support medications, intravenous administration and airway-maintenance supplies, and medical/surgical items. The SNS is designed to supplement and resupply state and local public health agencies in the event of a national emergency anywhere and at any time within the United States or its territories. The SNS is organized for flexible response. The first line of support lies within the immediate-response 12-hour push packages, which are caches of pharmaceuticals, antidotes, and medical supplies that are designed to provide rapid delivery of a broad spectrum of assets for an ill-defined threat in the early hours of an event. These push packages are positioned in strategically located, secure warehouses ready for immediate deployment to a designated site within 12 hours of the federal decision to deploy SNS assets. If the incident requires additional pharmaceuticals and/or medical supplies, follow-up vendor-managed inventory (VMI) supplies will be shipped to arrive within 24 to 36 hours. If the agent is well defined, VMI supplies can be tailored to provide pharmaceuticals, supplies, and/or products specific to the suspected or confirmed agent(s). In this case, VMI supplies could act as the first option for immediate response from the SNS. In the past, the SNS had limited pediatric capability, but in recent years, more pediatric-specific items have been added. Although still not optimal for pediatric care, the SNS has made major improvements in its pediatric capabilities and does address most key pediatric needs. One of the key barriers to pediatric inclusion in the SNS is the restriction that the SNS may stock only FDA-licensed items and only for their FDA-approved indications. With regard to antimicrobial and other therapeutic agents in children, FDA indications are often lacking. In terms of terrorism-related items, this is an even larger issue. As a result, although the SNS does contain many items for children, such as equipment and certain pharmaceuticals, including the recent addition of medications in suspension preparations, the stockpile

does not contain therapeutic agents for all indications for children. One solution is to allow the SNS to include items for indications that may not be FDA-approved for children if the medical expertise or literature supports their use. It is imperative that existing agents and those developed in the future have the scientific research conducted to allow for pediatric indications or development of agents appropriate for use in children.

Public Health Preparedness

On a larger scale, we also must recognize the need for public health preparedness, which ensures coordination of individual responding facilities and local communities with the broader response mounted at the district, state, and regional level. This requires the presence of a strong public health system. To allow for rapid and efficient response, it requires both central organization, as specified by federal planning and state implementation, and decentralization of some resources such as diagnostic capabilities.

Pediatricians must understand the importance of public health and their relationship to departments of health. This includes their role in public health, reporting requirements and mechanisms, and mechanisms for receiving and soliciting information from departments of health.

At the local level, the agency that will have the responsibility for the overall coordination during a disaster or terrorism event will be the local office of emergency management or, in its absence, may be a county or state office. The specific role of coordination and preplanning for the health care needs of the community will be coordinated by the office of emergency management but assigned to the local department of public health.

With regard to public health preparedness for children, a National Advisory Committee on Children and Terrorism was convened in 2003. The committee based its framework and many content areas on the previous work done by the Program for Pediatric Preparedness of the National Center for Disaster Preparedness at Columbia University Mailman School of Public Health, which, through an evidence-based consensus process, developed the first set of national guidelines and recommendations for pediatric disaster and terrorism preparedness[5] (see the Web sites of the CDC and the National Center for Disaster Preparedness, listed in "Suggested Resources For Additional Information").

The National Advisory Committee on Children and Terrorism issued a final report[6] to the Secretary of Health and Human Services regarding improving pediatric preparedness. This report, although addressed to the federal Department of Health and Human Services, also can serve as an outline of the steps that state, county, and local departments of health can take to improve their pediatric preparedness. The report provided specific recommendations in the following areas:

1. federal responsibilities;
2. schools and other child congregate settings;
3. mental health and psychosocial support;
4. primary care pediatric providers;
5. prehospital and hospital care;
6. community involvement;
7. training;
8. health intelligence;
9. risk communication and public education;
10. emergency medical service systems and protocols; and
11. SNS.

Currently, the 2 major programs that provide direct funding support to departments of health to assist their fulfillment of this expectation for coordinating the health care system for terrorism preparedness are the Bioterrorism Hospital Preparedness program of the Health Resources and Services Administration (HRSA) and the Public Health Preparedness and Response for Bioterrorism program of the CDC. The funding is provided to the departments of health in all 50 states, the District of Columbia, the nation's 3 largest municipalities (New York City, Chicago, and Los Angeles County), the commonwealths of Puerto Rico and the Northern Marianas Islands, the territories of American Samoa, Guam, and the US Virgin Islands, the Federated States of Micronesia, and the Republics of Palau and the Marshall Islands.

The CDC-funded initiative is concerned primarily with improving the public health departments' ability to address public health emergency preparedness, whereas the HRSA effort is to allow public health departments to provide training, guidance, and funding to hospitals to improve their preparedness. Both of these programs now specifically mention pediatric considerations in their guidance, but unfortunately in many states, the pediatric activities have been minimal and plans may be without pediatric involvement. It is important for pediatricians to become familiar with activities of these programs and ensure pediatric involvement. Information on these programs can be found on state public health departments' Web sites in addition to the HRSA and CDC Web sites (see "Suggested Resources For Additional Information").

The Office of the Surgeon General and USA Freedom Corps support local voluntary Medical Reserve Corps units in more than 200 American communities (www.medicalreservecorps.gov). These volunteer units provide a mechanism for health care professionals to volunteer their services during times of disaster as part of the organized response in a community. By joining the Medical Reserve Corps or another governmentally sponsored

or recognized volunteer program, physicians will be provided with mechanisms for identification during times of emergencies. Because the Medical Reserve Corps does not have pediatric capability as a requirement for their units, it is important that pediatricians join these teams to ensure that pediatric considerations are met.

Some state health departments have begun to coordinate and link the activities of the Medical Reserve Corps units in their states. In addition, most state health departments and many large local health departments are establishing notification systems based on requirements in HRSA and CDC grant programs. The purpose of these systems is to ensure that physicians and other health care professionals have timely access to needed information about the existence of an event (disaster, terrorism, or public health emergency), are provided with information on what their role should be, and know whom to contact with problems or for additional information. It is important that all physicians register for these notification systems so that in a time of emergency, they are notified and informed of their role. Information on these programs can be obtained from state health departments.

Pediatricians should inquire about the emergency-preparedness plans at all the hospitals at which they work or admit patients. In times of emergency, there may be a need for transfers or discharges based on different clinical criteria or altered hospital admission policies. To assist hospitals in these functions and to be able to care for their patients, pediatricians must understand how each hospital has planned to handle these events.

COMMUNICATION AND INFORMATION TECHNOLOGY ISSUES

Two key elements cited in all evaluations of disaster, terrorism, and public health emergency events are communication and information technology systems. Telecommunications, including telephone, radio, 2-way radio, video, facsimile, and digital imaging via satellite transmission, have been used in response to disasters. Telemedicine is one technology that can be used not only during the disaster phase but also before and after as a way to educate the community, institute prevention programs, and establish emergency assistance, public health measures, and sanitation services. The use of the Internet and e-mail can also prove effective.

UNIQUE ASPECTS OF CHILDREN RELATED TO TERRORISM AND DISASTERS

The special needs of children have only recently begun to be considered and understood in disaster planning and terrorism preparedness. Planning must consider children who are at home, in school and child care, or in transit as well as children who cannot be reunited with their families. Children with special health care needs are particularly vulnerable, especially if their survival depends on technological means.

Children are uniquely vulnerable to disasters and terrorism events because of anatomic, physiologic, and clinical factors as well as developmental and psychological concerns.[2,7] Although children may respond more rapidly to therapeutic intervention, they are more susceptible to various agents and conditions and more likely to deteriorate if not monitored carefully.

The release of chemical or biological toxins would disproportionately affect children through several mechanisms. For example, because children become dehydrated easily and possess minimal reserve, they are at greater risk than adults when exposed to agents that may cause diarrhea or vomiting. Agents that might cause only mild symptoms in an adult could lead to hypovolemic shock in an infant.

Children have a unique respiratory physiology. Many of the agents used for chemical and biological attacks are aerosolized (eg, sarin, chlorine, or anthrax). Because children have faster respiratory rates than adults, they are exposed to relatively greater dosages and will suffer the effects of these agents much more rapidly than adults. Children will also potentially absorb more of the substance before it is cleared or diffuses from the respiratory tissues. Many chemical agents, including certain gases such as sarin and chlorine, have a high vapor density and are heavier than air, which means that they "settle" close to the ground, in the air space used by children for breathing.

Many biological and chemical agents are absorbed through the skin. Because children have more surface area relative to body mass than adults and because young children, especially those younger than 6 months, have more permeable skin, they receive proportionally higher doses of agents that either affect the skin or are absorbed through the skin. In addition, because the skin of children is poorly keratinized, vesicants and corrosives result in greater injury to children than to adults. Another concern in children, because of their relatively large surface area in relation to body mass, is that they lose heat quickly when showered. Consequently, skin decontamination with water may result in hypothermia unless heating lamps and other warming equipment are used.

Children are also more vulnerable to radiologic exposures than adults. Children have a disproportionately higher minute ventilation, which leads to greater internal exposure to radioactive gases. Nuclear fallout quickly settles to the ground, resulting in a higher concentration of radioactive material in the space in which children live and breathe. Children have a significantly greater risk of developing cancer even when they are exposed to radiation in utero.

Children are particularly vulnerable because of physical developmental limitations. Infants, toddlers, and young children do not have the motor skills to escape from the site of a biological or chemical incident. Even if

able to walk, they may not have the cognitive ability to understand the presence of risk based on a terrorist event and therefore may not seek an escape or be able to decide in which direction to flee. Even worse, children may actually migrate toward the event out of curiosity to see the gas, colored agent, or other effects.

MENTAL HEALTH VULNERABILITIES AND DEVELOPMENT OF RESILIENCY

Disasters, and especially terrorist attacks, are frightening for adults and can be equally or even more traumatic for children. Feelings of anxiety, sadness, confusion, and fear are all normal reactions. However, if children are anxious, frightened, or confused for long periods of time, it can have devastating long-term emotional effects on their well-being. All children are at risk of psychological injury (such as anxiety and posttraumatic stress reactions and disorders) from experiencing or living under the threat of chemical or biological terrorism. In addition, their emotional responses are heightened by seeing their parents anxious or overwhelmed. Because children often cannot understand what is happening or the steps being taken to mitigate the event, they will often be even more fearful of the event and also of the potential for future events. In a mass-casualty incident, children experience or witness injuries and deaths, possibly of their parents, family, and friends, which can produce both short- and long-term psychological trauma.

How children understand and react to traumatic events such as sudden death, violence, or terrorism is related to their developmental abilities, which vary depending on age. For example, a 6-year-old may react by refusing to separate from parents to attend school. On the other hand, an adolescent may attempt to hide his or her concern but start to argue more with parents, become more irritable, or show a decline in school performance.

Long-Term Effects

Most people experience a traumatic event at some time, yet not everyone develops acute stress disorder or posttraumatic stress disorder. These terms are applied broadly to the development of multiple maladaptive and impairing thoughts, feelings, and behaviors in response to traumatic life experiences. When most or all of these symptoms present within the first 4 weeks after a traumatic event and cause impairment in functioning, the term "acute stress disorder" is applied. When they continue for a longer period of time or present later than 1 month after an event, it is called "posttraumatic stress disorder." These symptoms can begin almost immediately or may have a delayed onset after a traumatic event, not showing up until months later. In addition to experiencing posttraumatic stress reactions, children may also demonstrate persistent anxiety or concerns about safety of themselves and significant others, symptoms of depression, or bereavement if deaths of significant others resulted from the event.

When should we start to worry about the expected reactions to these events becoming problems that can lead to long-term effects of trauma? Usually, a child's emotional response to trauma does not last long. It is normal and expected to see children show the responses that are described above during the first few weeks after trauma. However, some reactions may not appear immediately or may recur weeks after the trauma. Concern is warranted when emotional responses persist for long periods of time or are accompanied by significant functional impairment. In deciding whether to seek professional help, consider the degree to which the observed behaviors represent a change subsequent to the traumatic event.

Developing Resiliency

With the appropriate support and guidance, children can develop the skills and resiliency needed to deal with, overcome, and possibly even grow from traumatic experiences. Children have the inherent potential for being wonderfully resilient if given adequate support and counseling. Therefore, it is extremely important to strengthen the child's communication and coping skills and to help mobilize people and other resources around the child. Efforts should be made to foster closeness, accessibility, and emotional availability. Having fun, reading to small children, and continuing the usual work, school, and social activities are important steps.

Returning to the family's routine as soon as possible is important and something that parents can control. Children of all ages thrive on structure and routine (as do most adults); familiar things and routines are reassuring and comforting. Children of all ages need a lot of reassurance. Parents should tell their children that they love them and will take care of them. Although none of us have all the answers, a calm demeanor helps provide a sense of safety.

Children should be allowed to express their feelings about the recent disaster and be reassured that it is normal to feel upset. Giving more attention to children during the days after a disaster is helpful not only for talks related to the disaster but also for other conversation or just for spending time together.

Children can regain their sense of power and security if they feel that they can help in some way. This can by accomplished by encouraging youngsters to participate in or organize a community-response effort such as sending cards, organizing food drives, or collecting clothing and other items.

Additional information addressing the mental health issues related to disasters and terrorism can be found in the AAP policy statement "Psychosocial Implications of Disaster or Terrorism on Children: A Guide for the Pediatrician"[8] and on the AAP Web site, which includes

policy statements, information pieces for families and children, and resource documents for pediatricians.

THE ROLE OF THE PEDIATRICIAN

The pediatrician has a multitude of roles in disaster preparedness, including personal preparedness through anticipatory guidance to families and roles in the community. This multitude of roles in emergency preparedness is not limited to general pediatricians but also applies to pediatric medical subspecialists and pediatric surgical specialists, whose involvement may range from giving advice to families and children to being subject-matter experts for preparedness and critical resources in their communities. To fulfill these roles, it is essential that all pediatricians become educated regarding emergency preparedness. The sections that follow provide information on the actions that pediatricians can take.

MANAGING FAMILY CONCERNS ABOUT TERRORISM AND DISASTER PREPAREDNESS

The pediatrician plays a central role in disaster and terrorism preparedness with families and children. Families view pediatricians as their expert resource, and most of them expect the pediatrician to be knowledgeable in areas of concern. Providing expert guidance entails both educating families in anticipation of events and responding to questions during and after actual events. It is essential that pediatricians educate themselves regarding these issues of emergency preparedness. The AAP has an extensive set of resources for pediatricians, and most can be found on the AAP Web site (www.aap.org/terrorism). In addition, there are many other resources for pediatricians regarding preparedness, which can be found in "Suggested Resources For Additional Information."

In many areas of the country, the threat of natural disasters is ongoing. Guiding and educating families on home disaster preparedness can be done in the pediatrician's office or as a community focus. Family preparedness may include training in cardiopulmonary resuscitation, having rendezvous points, and keeping a list of emergency telephone numbers, including an out-of-state friend or relative whom all family members can contact after the event to report their whereabouts and conditions. Home preparedness (such as installing storm shutters or earthquake-proofing the home) should be covered. Parents should maintain emergency supplies of food, water, medicine, a first aid kit, and clothing. Family members should know the safest place in the home in which to take shelter, make special provisions, know community resources, and have a plan to reunite. Medications for chronic illness and resources for children who depend on technological means for survival should be included in the plan. Should the parent not be able to return at scheduled times, issues regarding alternate care of the children should be discussed. This may involve plans for child care with neighbors, family, friends, or relatives.

Answering Questions During Events

During any event, children and families will receive good and bad information from a multitude of sources including friends, media, and public officials. The problems caused by panic, overreaction, and overwhelming of the health care system with the "worried well" cannot be overstated. A well-educated and available pediatrician who can respond appropriately to numerous and varied questions can be of great service.

Approaching Psychological Challenges of Disasters, Public Health Emergencies, and Terrorism: Talking to Children

Although adults can actively seek help, children cannot; they depend on the adults in their lives to get them the assistance that they need. With the appropriate support and guidance, children can develop the skills and resiliency needed to deal with, overcome, and possibly even grow from these traumatic experiences. The approaches to helping children cope and build resiliency must take into account developmentally appropriate approaches.

Children are generally aware of their parents' worries and are particularly sensitive during a crisis. It is often appropriate and reasonable for parents to share their own concerns with their children but at the same time stress their ability to cope and, most importantly, to protect.

Many adults and children have questions after disaster and terrorism events. Children may ask why these events occur, whether similar tragedies will happen again, and whether their families are safe. Adults want to know how to best explain to children what took place, how to handle their scared child, and how to promote a sense of security within the family. Depending on the age and developmental and emotional states of children, parents may want to eliminate or severely limit exposure to frightening images or reports in the media, particularly broadcast television. Efforts should be made to sustain positive family routines and foster closeness, accessibility, and emotional availability as needed.

Questions and concerns often continue long after an event has occurred. How do we better prepare ourselves for future events and know how to respond when they occur? How do we answer the tough questions that both adults and children ask when trying to deal with tragedy? How can we best help children cope with stressful times? When do we advise parents to seek mental health care for their child?

Pediatricians should ask parents about their child's awareness of previous or potential disasters and future terrorist attacks, their degree of exposure (including television) to these issues, and their previous and current reactions. Such queries may provide an opportunity to advise parents about how best to discuss disasters and

terrorist attacks with the child. Pediatricians should encourage parents to present information to children honestly, using language appropriate to the child's developmental level and cognitive abilities. Parents can be encouraged to talk with their children about a specific plan that includes things to do in case of a terrorist incident, whom to go to for help, safe places to seek, and other concrete steps that can be taken at home, at school, and in the community. The approach may be similar to that taken to prepare children for other potential threats such as fire or approach by a stranger. The goal of these discussions should be to help the child feel potentially in control of a threatening situation and also to convey that the parents are in control, with specific plans to ensure safety.

Parents should be available, let their children ask questions, and try to answer them honestly, simply, and to the best of their ability. It may be tempting to say that everything is going to be fine, but children may find this somewhat dismissive, because it does not help address their specific concerns.

Using play with children who are too young to ask questions or express their feelings is important, because it allows children to express their feelings, develop a sense of mastery, and minimize their anxiety about the traumatic event. This is similar to an adult retelling his or her experiences. Drawing pictures; playing with puppets, dolls, or other action figures; or engaging the child in other structured activities works well.

Contributing to the healing process of those who have been affected can go a long way toward making children feel better. Children should be given the opportunity to identify how they themselves might help others.

If parents are faced with a question that they cannot answer, they can acknowledge that they do not know but reassure their children that they are doing everything possible to keep the family safe. Parents can tell children that it is the job of "grown-ups" to protect everyone and that a lot of other people are thinking about safety and working really hard to protect the children from harm.

Children should be allowed to express their feelings about the recent disaster and be reassured that it is normal to feel upset. Giving more attention to children during the days after a disaster, not only for talks related to the disaster but for other conversation, or just spending time together is helpful.

Parents can help children and adolescents process whatever news they receive of a disaster. Young people may believe that "nothing like that" would ever happen to them. Such ideas should be explored in a supportive way that also gently reminds a young person that certain kinds of disasters can touch any of us. Conversely, a young person may feel extremely vulnerable after hearing about a disaster that has occurred far away. These children should be encouraged to express their fears and then gently but firmly be reminded that most people survive disasters and that they themselves are safe.

Children's and parents' reactions to a disaster may continue for a long time after the event itself, and the event may be upsetting even years later. Obtaining counseling for a child or adolescent soon after a disaster may reduce long-term negative effects.

Children With Special Health Care Needs

In addition to handling the needs of all their patients and discussing family emergency planning, pediatricians also need to address the unique needs of children with special health care needs. Pediatricians should provide guidance to families of children with special health care needs regarding:

- notification of utility companies to provide emergency support during a disaster as well as helping to create contingency plans should the utility company not be able to provide alternative power in the event of power loss;
- maintenance of medications and equipment should supply be disrupted during a disaster;
- knowledge of how to obtain additional medications and equipment during times of disaster;
- training for family members to assume the role of in-home health care providers who may not be available during a disaster; and
- keeping an up-to-date emergency information form to provide health care workers with the patient's medical information should the regular care provider be unavailable (additional information on the emergency information form can be found on the AAP Web site and in a policy statement from the Committee on Pediatric Emergency Medicine[9]).

REPORTING A DISASTER, TERRORISM, OR PUBLIC HEALTH EMERGENCY

It is important that health care professionals be knowledgeable in the mechanism and appropriate contacts to report any event regardless of whether it is a disaster, terrorist event, or public health emergency. In case of any emergency, health care professionals should activate their local emergency system, which in most areas can be done be calling 911. Any suspicious or confirmed disaster situation should be reported immediately to the local 911 emergency-response number.

If a pediatrician believes that someone has been exposed deliberately to a biological, chemical, or radioactive agent or if a pediatrician believes an intentional terrorist threat will occur or is occurring, he or she should immediately involve the public health authorities, which can be done by contacting the local health department, the local police or other law enforcement agency, or the 24-hour CDC hotline at 770-488-7100.

Any incident related to terrorism or possible terrorist activity also requires notification to local law enforcement and the National Response Center at 800-424-8802.

OFFICE AND COMMUNITY-BASED PREPAREDNESS

After a disaster, offices or clinics may become sites for care if area hospitals are unable to provide services. Even if local offices are unusable, alternative sites for primary care must be identified. If necessary, medical care may be provided in schools, public buildings, malls, and/or makeshift facilities, such as tents, using limited power and water sources. Pediatricians should prepare, regularly update, and practice an office disaster plan that addresses response and recovery issues. It is essential when creating an office disaster plan to take into account the local hospital and community emergency-management plans. Office training programs in emergency procedures should be a routine part of the office's overall emergency preparedness and include training in first aid, cardiopulmonary resuscitation, evacuation, search and rescue (where appropriate), the use of fire extinguishers, and participation in community disaster drills. It may be advisable for pediatricians to consult local building codes to ensure that their office buildings meet current structural safety standards. Emergency preparations should include plans for storage of temperature-sensitive vaccines, medications, and supplies during extended periods of limited power supply. Agreements with vendors may need to be obtained for operations after the disaster. Emergency kits should be assembled and contain water, first aid supplies, radios, flashlights, batteries, heavy-duty gloves, food, and sanitation supplies.

The length of the recovery period depends on the nature of the disaster. Pediatricians should be prepared to deal with continued disruptions of services that will affect their ability to care for patients and should have plans to provide on-site emergency and primary health care at emergency shelters. Issues to be addressed include inpatient and outpatient treatment, infectious disease control, alternatives for lost services/utilities, logistics and resupply, physical rehabilitation, psychological support, and efforts to promote mental health recovery.

During the aftermath, changes in practice location, a lack of refrigeration for medications and vaccines, continued disruption of communications, power outages, and lack of sanitation will force changes in practice standards and require inventiveness and flexibility. Assisting families coping with the emotional toll of the disaster may be an ongoing responsibility of the pediatrician.

Pediatricians in the community can assist in both triage and treatment of patients. Important questions to ask before a disaster occurs include:

1. Where should the pediatrician go during the disaster?
2. How should pediatricians who are needed to respond to disaster be notified?
3. How should hospital physicians be preidentified and notified to go to the scene to attend to victims of the disaster as part of an organized response system?
4. How should transfers of pediatric patients in the hospital and discharges be handled to make room for the surge of patients expected to arrive?

Answers to these questions can be obtained from the local public health department and hospitals with which pediatricians are affiliated.

Alternatives need to be considered in the event of a loss of power and conventional telephone use. Backup systems, such as cellular telephones, direct telephone lines that are not part of the regular telephone system, 2-way radios, beepers, and ham radios should be considered. In areas where pediatricians cover several hospitals, pools should be initiated through the county medical or pediatric society to provide uniform pediatric coverage of area hospitals. Pediatricians can aid schools, child care centers, and other child congregate facilities to develop disaster plans. For example, in California, state law requires each state-licensed child care facility and all schools to develop and maintain a disaster and mass-casualty plan.

The 2 major programs that fulfill the role of coordinating the health care system for terrorism preparedness are the HRSA Bioterrorism Hospital Preparedness program and the CDC Public Health Preparedness and Response for Bioterrorism program. It is important for pediatricians to become familiar with activities of these programs and to ensure pediatric involvement. The local and state departments of health are responsible for organizing the Medical Reserve Corps, which provides a mechanism for health care providers to volunteer their services during times of disaster as part of the organized response in a community. It is essential that all physicians register for their local public health notification system so that in a time of emergency, they are notified and informed of their role.

Pediatricians should inquire about the emergency-preparedness plans at all of the hospitals in which they work or admit patients. In times of emergencies, there may be a need for transfers, discharges based on different criteria, or altered admission policies. To assist hospitals with these functions and provide better care for their patients, pediatricians must understand how each hospital has planned to handle these events.

Pediatricians can serve as a resource in their communities to schools and other child congregate facilities such as child care centers and summer camps. These facilities in the past have been left out of community disaster planning. Only recently has attention been focused on the importance of their preparedness for disas-

ters, terrorism, and public health emergencies. Pediatricians, as experts on the needs of children, can serve as resources to these facilities in their emergency planning, including addressing the needs of children with special health care needs. When pediatricians discuss emergency preparedness with families, it is important that they educate them of the importance in knowing the emergency plans of their children's schools, child care centers, after-school programs, or other child congregate facilities, including explaining to them issues such as communications, "lock-down" procedures, "shelter in place," and reunification.

TERRORISM PREPAREDNESS

Terrorism preparedness is a specific type of preparedness that is a component of general emergency preparedness. In addition to the unique pediatric issues involved in general emergency preparedness, terrorism preparedness must consider several additional issues including the unique vulnerabilities of children to various agents as well as the limited availability of age- and weight-appropriate antidotes and treatments.

Pediatricians must understand (1) the classification and qualities of possible biological agents, (2) the natural history and management of biological, chemical, and radiologic injuries and exposures, (3) chemical agents that may be used and their properties, (4) different types of radiologic terrorism, (5) decontamination procedures, and (6) availability of antidotes and other therapeutics.

Biological Terrorism

Biological weapons are referred to as the "poor man's nuclear bomb," because they are easy to manufacture, can be deployed without sophisticated delivery systems, and have the ability to kill or injure hundreds of thousands of people.

Various biological agents could be used as weapons, and the actual clinical syndrome will vary depending on the type of agent, its virulence, route of the exposure, and susceptibility of the victim to infection. In contrast to chemical, conventional, and nuclear weapons that generate immediate effects, biological agents are generally associated with a delay in the onset of illness and, therefore, may not be recognized in their initial stages. A covert release of a contagious biological agent has the potential for large-scale spread before detection (which depends on traditional disease-surveillance methods). For some infectious agents, secondary and tertiary transmission may continue for weeks or months after the initial attack. In an epidemic, overwhelming numbers of critically ill patients will require acute and follow-up medical care. Both infected persons and the "worried well" would seek medical attention with a corresponding need for medical supplies, diagnostic tests, and hospital beds. Devices such as crop-dusting airplanes or small perfume atomizers are potential delivery systems for biological agents.

Biological weapon releases on civilian populations have occurred in the recent past. In 1984 in Oregon, approximately 750 people experienced salmonellosis after bacteria were spread on salad bars in an effort to disrupt local elections. An inadvertent release of anthrax in April 1979 by a military facility in Sverdlovsk, in the former USSR, produced mass infection as distant as 50 km, with 66 documented deaths.

As a weapon, biological infectious agents possess a marked diversity in the type of injury produced, with toxic effects ranging from incapacitation to death. The biological agents listed in Table 1 are considered to be likely candidates for weaponization. These agents may be classified as bacteria, viruses, rickettsia, fungi, and preformed toxins.

The CDC separates bioterrorist agents into 3 categories[10] (A, B, and C, in order of priority) on the basis of the combined factors of availability, potential for morbidity and mortality, and ease of dissemination (Table 1).

Although virtually any microorganism has the potential to be used as a biological weapon, most would be difficult to weaponize and disseminate effectively. Thus, although those listed in Table 1 are possible candidates for weaponization, the biological agents most likely to be used as possible terrorist agents are *Bacillus anthracis* (anthrax), *Brucella* species (brucellosis), *Clostridium botulinum* (botulism), *Francisella tularensis* (tularemia), *Yersinia pestis* (plague), Ebola virus, variola (smallpox), the hemorrhagic fever viruses, and *Coxiella burnetii* (Q fever).

Chemical Agents

Although most pediatricians will not likely be involved in the front-line care of victims of a chemical attack, the possibility does exist. Several patients presenting with the same symptoms should alert physicians and hospital staff to the possibility of a chemical attack. If an attack occurs, most victims will likely arrive at the hospital within a short time period. This situation differentiates a chemical attack from a biological attack that involves infectious microorganisms. Toxic chemical agents have a high potential for secondary contamination from victims to responders.

Health care professionals must first protect themselves (eg, by using protective suits, respiratory protection, and chemical-resistant gloves), because secondary contamination with even small amounts of these substances (particularly nerve agents, such as VX) can be lethal. Medical treatment facilities must have clearly defined procedures for handling contaminated casualties, many of whom will transport themselves to the facility. Precautions must be used until thorough decontamination has been performed or the specific chemical agent is identified.

Classes of chemical agents that have been used or are

TABLE 1 **Biological Weapons: CDC Categories, Definitions, and Pathogens**[11]

Category	CDC Definition	Pathogens
A	High-priority agents include organisms that pose a risk to national security because they	Anthrax (*Bacillus anthracis*)
	• can be easily disseminated or transmitted from person to person;	Botulism (*Clostridium botulinum* toxin)
	• result in high mortality rates and have the potential for major public health impact;	Plague (*Yersinia pestis*)
	• might cause public panic and social disruption; and	Smallpox (variola major)
	• require special action for public health preparedness.	Tularemia (*Francisella tularensis*)
		Viral hemorrhagic fevers (filoviruses [eg, Ebola, Marburg] and arenaviruses [eg, Lassa, Machupo])
B	Second-highest–priority agents include those that	Brucellosis (*Brucella* species)
	• are moderately easy to disseminate;	Epsilon toxin of *Clostridium perfringens*
	• result in moderate morbidity rates and low mortality rates; and	Food-safety threats (eg, *Salmonella* species, *Escherichia coli* O157:H7, *Shigella* species)
	• require specific enhancements of the CDC's diagnostic capacity and enhanced disease surveillance.	Glanders (*Burkholderia mallei*)
		Melioidosis (*Burkholderia pseudomallei*)
		Psittacosis (*Chlamydia psittaci*)
		Q fever (*Coxiella burnetii*)
		Ricin toxin from *Ricinus communis* (castor beans)
		Staphylococcal enterotoxin B
		Typhus fever (*Rickettsia prowazekii*)
		Viral encephalitis (alphaviruses [eg, Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis])
		Water-safety threats (eg, *Vibrio cholerae*, *Cryptosporidium parvum*)
C	Third-highest–priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of	Emerging infectious diseases such as Nipah virus and hantavirus
	• availability;	
	• ease of production and dissemination; and	
	• potential for high morbidity and mortality rates and major health impact.	

considered to be likely candidates for use in a chemical release are listed in Table 2 with examples of each class and possible antidotes if available.

Chemical agents are relatively easy to synthesize; do not require sophisticated missiles, bombs, or other delivery devices for dispersion through populations; and, unlike most biological agents, are capable of producing illness rapidly. Many of these agents could be stolen from industry or transport vehicles rather than manufactured by terrorists. Various chemical agents could be used as covert weapons, and the clinical syndrome will vary depending on the type, amount, concentration, and route of exposure to the chemical agent.

Nerve agents are highly toxic; as little as 1 mg can be lethal to an adult.[12–14] Most nerve agents are highly volatile and are designed to produce gas clouds that are inhaled by victims. Sarin, in addition to being volatile, has a vapor density 4.86 times that of water, which means that it is concentrated closer to the ground and, therefore, in the area where children breathe. Sarin has been made infamous by 2 recent, large-scale acts of civilian terrorism in June 1994 and March 1995, when a terrorist group in Japan released it into the subway system.

Because nerve agents are well absorbed through intact skin, treatment begins with safe, topical decontamination. Protection of health care personnel is key. Standard precautionary equipment such as surgical masks and gloves does not provide protection from nerve agents; health care workers must wear full protective gear and self-contained breathing apparatus. Solutions such as soap and water or diluted bleach are recommended to remove these chemicals from skin. Additional management includes supportive care and, in severe cases, administration of atropine and pralidoxime, which may be in the form of autoinjectors called Mark-1 kits (Meridian Medical Technologies, Bristol, TN). These kits are approved for use only in adults but could be used in older children. Recommendations for use of Mark-1 kits in children 3 years and older is given in Table 3. These recommendations were based on established use of antidotes for cholinergic toxicity and were felt to be both safe and supported by the literature. It was felt also that, although not within the published dosage range for cholinergic toxicity, if a Mark-1 kit was the only source of atropine and pralidoxime available after a bona fide exposure, even children younger than 3 years should be treated. Earlier this year, a pediatric formulation (Atro-Pen; Meridian Medical Technologies) was approved by the FDA. Although this device in a pediatric dosage was approved, it is not equivalent to the Mark-1 kit in that it does not contain pralidoxime. Until a truly pediatric equivalent device is approved by the FDA, pediatricians should continue to advocate for equivalent pediatric

TABLE 2 Recommended Treatment and Management of Chemical Agents Used in Terrorism

Agent	Toxicity	Clinical Findings	Onset	Decontamination[a]	Management
Nerve agents					
Tabun, sarin, soman, VX	Anticholinesterase: muscarinic, nicotinic, and CNS effects	Vapor: miosis, rhinorrhea, dyspnea	Vapor: seconds	Vapor: fresh air, remove clothes, wash hair	Airway, breathing, circulatory support
		Liquid: diaphoresis, vomiting	Liquid: minutes to hours	Liquid: remove clothes, wash skin and hair copiously with soap and water, irrigate eyes	Atropine 0.05–0.1 mg/kg IV[b], IM[c] (min: 0.1 mg; max: 5 mg), repeat every 2–5 min prn for marked secretions, bronchospasm, hypoxia, respiratory compromise, apnea, cardiopulmonary arrest
		Both: coma, paralysis, seizures, apnea			Pralidoxime 25–50 mg/kg IV, IM[d] (max: 1 g IV; 2 g IM), may repeat within 30–60 min prn, then again every 1 h for 1 or 2 doses prn for persistent weakness, high atropine requirement
					Diazepam 0.05–0.3 mg/kg (max: 10 mg) IV, lorazepam 0.1 mg/kg IV or IM (max: 4 mg), midazolam 0.1–0.2 mg/kg (max: 10 mg) IM prn for seizures or severe exposure
Vesicants					
Mustard	Alkylation	Skin: erythema, vesicles Eye: inflammation Respiratory tract: inflammation, respiratory distress, acute respiratory distress syndrome	Hours	Skin: soap and water Eyes: irrigation (water) Both: major impact only if done within minutes of exposure	Symptomatic care
Lewisite	Arsenical	Same as for mustard	Immediate pain	Same as for mustard	Possibly British anti–lewisite 3 mg/kg IM every 4–6 h for systemic effects of lewisite in severe cases
Pulmonary agents					
Chlorine, phosgene	Liberate HCl, alkylation	Eyes, nose, throat: irritation (especially chlorine)	Minutes	Fresh air	Symptomatic care
		Bronchospasm, pulmonary edema (especially phosgene)	Bronchospasm: minutes	Skin: water	
			Pulmonary edema: hours		
Cyanide	Cytochrome oxidase inhibition cellular anoxia, lactic acidosis	Tachypnea, coma, seizures, apnea	Seconds	Fresh air	Airway, breathing, circulatory support; 100% oxygen
				Skin: soap and water	Sodium bicarbonate prn for metabolic acidosis Sodium nitrite (3%) dosage (estimated hemoglobin for average child): 0.27 mL/kg (10 g/dL), 0.33 mL/kg (12 g/dL), 0.39 mL/kg (14 g/dL); max: 10 mL Sodium thiosulfate (25%) 1.65 mL/kg (max: 50 mL)
CS, CN (Mace), Capsaicin (pepper spray)	Neuropeptide substance P release, alkylation	Eye: tearing, pain, blepharospasm Nose and throat: irritation Pulmonary failure (rare)	Seconds	Fresh air Eye: irrigation (water)	Topical ophthalmics, symptomatic care

CNS indicates central nervous system; IV, intravenous; IM, intramuscular; prn, as needed.

[a] Decontamination, especially for patients with significant exposure to nerve agents or vesicants, should be performed by health care providers dressed in adequate personal protective equipment. For emergency department staff, this consists of a nonencapsulated, chemically resistant body suit, boots, and gloves with a full-face air purifier mask/hood.

[b] Intraosseous route is likely equivalent to intravenous.

[c] Atropine might have some benefit via endotracheal tube or inhalation, as might aerosolized ipratropium.

[d] Pralidoxime is reconstituted to 50 mg/mL (1 g in 20 mL of water) for intravenous administration, and the total dose is infused over 30 minutes, or it may be given by continuous infusion (loading dose: 25 mg/kg over 30 minutes, then 10 mg/kg per hour). For intramuscular use, it might be diluted to a concentration of 300 mg/mL (1 g added to 3 mL of water— by analogy to the Mark 1 autoinjector concentration) to effect a reasonable volume for injection.

Reprinted with permission from Markenson D, Redlener I. *Pediatric Preparedness for Disaster and Terrorism: A National Consensus Conference—Executive Summary*. New York, NY: Columbia University Mailman School of Public Health, National Center for Disaster Preparedness; 2003.

TABLE 3 **Autoinjector Usage**

Approximate Age, y	Approximate Weight, kg	No. of Autoinjectors (Each Type)	Atropine Dosage Range, mg/kg	Pralidoxime Dosage Range, mg/kg
3–7	13–25	1	0.08–0.13	24–46
8–14	26–50	2	0.08–0.13	24–46
>14	>51	3	≤0.11	≤35

Each Mark-1 kit contains 2 autoinjectors (0.8-inch needle-insertion depth), 1 each of atropine 2 mg (0.7 mL) and pralidoxime 600 mg (2 mL); although not approved for pediatric use, they should be used as initial treatment in circumstances for children with severe, life-threatening nerve agent toxicity for whom intravenous treatment is not possible or available or for whom more precise intramuscular (mg/kg) dosing would be logistically impossible. Suggested dosing guidelines are offered; note potential excess of initial atropine and pralidoxime dosage for age/weight, although within general guidelines for recommended total over the first 60 to 90 minutes of therapy for severe exposures. This table lists usage of the Mark-1 kit only down to age 3 based on adherence to recommended dosages for atropine and pralidoxime. However, if an adult Mark-1 kit is the only available source of atropine and pralidoxime after a nerve agent exposure, it should be used for even the youngest child. In such a situation, one should follow weight-based dosing guidelines.

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treatment using the existing Mark-1 kit based on the dosages listed above.

Vesicants and irritants/corrosives such as mustard gas, ammonia, and chlorine are corrosive chemicals that may be used in a terrorist incident. They affect the skin, eyes, and nasal mucosa, producing severe pain and incapacitation. If these chemicals are inhaled, life-threatening pneumonitis may also occur. The mainstay of therapy is skin decontamination by thorough showering. Pulmonary support, including intubation and mechanical ventilation, may be necessary for those with severe pulmonary injury.

Other chemical agents are designed to incapacitate rather than kill. However, in victims with significant chronic illness, they can result in life-threatening toxicity.

The availability of adequate antidotes and treatments for children is also problematic. Most treatments and antidotes were developed for military personnel (ie, adults) who might be victims. Most of these agents have never been tested on children, and some are contraindicated in children. In general, pediatric dosages and medications in preparations that can be administered to children are lacking or absent. Although there is ongoing development of new and improved antidotes and treatments to better protect our military and adult population, there is no parallel process in place for developing appropriate agents for use in children.

Radiologic Terrorism

The likelihood that most physicians will ever have to treat radiation casualties may seem remote but is nonetheless real. A radiation emergency involves the release of potentially dangerous radioactive materials into the environment. Such incidents can occur anywhere that radioactive isotopes are used, stored, or transported. Radiologic threats can be unintentional or intentional. Unintentional threats include power-plant disasters (eg, Chernobyl and Three Mile Island). Intentional acts could be the result of military conflict or terrorism. Although the likelihood of a thermonuclear war is low, the possibility of either a single nuclear detonation or an incident involving accidental or deliberate radiologic contamination has increased.

There are 3 major types of radiation disaster threats:

1. detonation of a nuclear weapon (possible but considered an unlikely terrorist action because of the sophistication and supply requirements to build such devices);
2. damage of a facility that contains nuclear material (eg, a nuclear waste–reprocessing facility, medical facility with storage of nuclear material, food-irradiation plant, or nuclear power plant); and
3. dispersal of nuclear material, either by detonation of a conventional explosive (a radioactive dispersal device or "dirty bomb") or the release of nuclear materials in transit via a dispersion device (radioactive dispersal devices are designed to use radioactive material obtained from relatively accessible sources such as university research laboratories or hospital radiation therapy centers).

Scenario 3 is considered to be the most likely.[15]

Radiation provokes a special fear, but with appropriate understanding and preparation, effective medical care can be provided to exposed victims. To decrease morbidity and mortality from a radiation disaster or terrorist attack, pediatricians should have a basic understanding of radiation illness and treatment principles.

Health care professionals should wear protective gloves, protective clothing, and radiation dosimeters. Respirators or protective masks can prevent inhalation of radioactive particles. Removal of clothing and washing with soap and copious amounts of water are sufficient to remove most external radiation contamination.

The optimal management of the child who has sustained significant radiation exposure depends on:

- knowledge of the type and dose of radiation received as well as the presence of concomitant injuries;
- recognition of the manifestations of radiation sickness;
- use of standard medical care;
- decontamination; and

- decorporation techniques (removal of contaminated areas).

Principles of disaster management, including containment, decontamination, prehospital care, and field triage, are fully applicable.[15] The first phase of managing pediatric radiation victims is to determine if topical decontamination is warranted. Simple removal of clothing is responsible for more than 90% of effective decontamination after a chemical or radiation exposure.[16] Initial medical management includes careful assessment of airway, breathing, and circulation, particularly when there is the potential for blast or thermal injury. It is important to remember that most injuries caused by radiologic terrorism will be associated with a blast. Although decontamination is key, most initial therapy will be that of standard trauma management. If warranted, surgical intervention should be performed as soon as possible, ideally within 48 hours of irradiation, before wound healing and immunity become impaired.

Although commonly discussed in the setting of radiologic terrorism, the only indication for the use of potassium iodide (KI) is the prevention of thyroid cancer in children after exposure to iodine 131 (I^{131}).[17] Therefore, not all radiologic events necessitate KI administration. Radioactive dispersal devices generally do not contain radioiodines, so administering KI after detonation of a radioactive dispersal device would be inappropriate. Release of I^{131} is much more likely to be an issue after a nuclear power-plant catastrophe. KI is also recommended for pregnant women to protect both themselves and the fetus.[16] Because of the potential risks, KI is given only once to pregnant women and newborn infants unless other protective measures (evacuation, sheltering, and control of the food supply) are unavailable.

With regard to pediatric administration, KI is currently available in 130-mg and 65-mg tablets. The tablet can be crushed and mixed in almost any liquid and then administered in a dose appropriate for the child's weight and age. Although it can be mixed in almost any liquid, the preferred agents based on their ability to disguise the taste are[18]:

- low-fat chocolate milk;
- orange juice;
- flat soft drinks (eg, cola); and
- raspberry syrup.

Most experts agree that KI mixed with any of the recommended beverages (those listed above, water, and low-fat milk) will keep for up to 7 days in the refrigerator.[19] Until recently, the only liquid preparation available was KI drops are available and can be administered if necessary. Unfortunately, at their extreme concentration of 1000 mg/mL, accurate dose titration for children is virtually impossible. However, this year the FDA approved an oral preparation that comes as 65 mg/mL (ThyroShield). In addition, this oral solution has a longer shelf life than the 7 days for diluting tablets into a liquid as described previously.

The FDA has also recently released guidelines for home preparation of KI for infants and children (Table 4).[20] Because of its poor taste when put in solution, KI should be diluted in a solution with an attractive taste for children. If possible, the dose of KI should be based on age. However, if graded dosing is logistically impractical, because the risk of a higher dosage is far outweighed by the benefits of KI administration, KI may be given to children at a single dosage. Because this dosage may be higher than normally indicated, thyroid function should be monitored.

A 24-hour emergency-response program at the US Department of Energy's Oak Ridge Institute for Science and Education, the Radiation Emergency Assistance Center/Training Site, is available to assist physicians and others in the response to all types of radiation accidents and incidents. For expert medical consultation and advice in the event of a radiation emergency, contact the Radiation Emergency Assistance Center/Training Site at 865-576-3131 or the 24-hour emergency number at 865-576-1005.

Additional information on radiologic terrorism and management can be found in the AAP policy statement "Radiation Disasters and Children."[21]

Surveillance

One of the key elements in emergency preparedness is early detection of any possible terrorism event or public health emergency. The most likely scenario involves exposure in a community, which may manifest with subtle signs and symptoms and unusual patient presentations in terms of numbers of diseases. The role of the pediatrician is key. Pediatricians must constantly function as part of a surveillance system to provide for early detection of any bioterrorism agent. This requires pediatricians to become familiar with the types of agents that

TABLE 4 **Guidelines for KI Dose Administration[5]**

Patient or Age	Exposure, Gy (rad)	KI Dose, mg[a]
>40 y	>5 (500)	130
18–40 y	0.1 (10)	130
12–17 y	0.05 (5)	65
4–11 y	0.05 (5)	65
1 mo to 3 y	0.05 (5)	32
Birth to 1 mo	0.05 (5)	16
Pregnant or lactating women	0.05 (5)	130

This table was created from recommendations developed at the consensus conference and is based in part on reviewed reference materials from the AAP, CDC, and FDA.

[a] Children/adolescents weighing >70 kg should receive the adult dose (130 mg).

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may be involved, as well as referral procedures and when to report to the local health department. Health department reporting is based on local requirements but should be considered for all unusual cases, any cases suspicious for being a terrorist agent, or an unusual number of patients, either absolute or for the season, presenting with similar symptoms.

Biological Terrorism

To enhance detection and treatment capabilities, pediatricians should be familiar with the clinical manifestations, diagnostic techniques, isolation precautions, treatment, and prophylaxis for likely causative agents. For some of these agents, delay in medical response could result in a potentially devastating number of casualties. Pediatricians must have an increased level of suspicion regarding the possible intentional use of biological agents as well as an increased sensitivity to reporting those suspicions to public health authorities. Clinicians should report noticeable increases in unusual illnesses, symptom complexes, or disease patterns (even without definitive diagnosis) to public health authorities.

Important clues that may signal a biological emergency include (sources: American Medical Association and CDC):

- a single suspected case of an uncommon disease;
- single or multiple cases of a suspected common disease or syndrome that does not respond to treatment as expected;
- clusters of a similar illness occurring in the same time frame in different locales;
- unusual clinical, geographic, seasonal, or temporal presentation of a disease and/or unusual transmission route;
- unexplained increase in incidence of an endemic disease;
- unusual illness that affects a large disparate population or is unusual for a population or age group;
- unusual pattern of illness or death among animals or humans; and
- Sudden increase in pneumonia, influenza-like illness, or fever with atypical features, including:
  - bleeding disorders;
  - unexplained rashes and mucosal or skin irritation, particularly in adults;
  - neuromuscular illness, such as muscle weakness and paralysis; and
  - diarrhea.

Chemical Terrorism

Primary detection of exposure to chemical agents is based on the signs and symptoms of the potential victim. A covert release of a chemical agent may be difficult to identify easily.

- Symptoms of exposure to some chemical agents can be similar to those of common diseases (eg, gastroenteritis).
- Immediate symptoms of certain chemical exposures might be nonexistent or mild despite the risk of long-term effects.
- Exposure to contaminated food, water, or consumer products can result in reports of illness to health care professionals over an extended period of time and in various geographic locations.
- Persons who are exposed to 2 or more agents might have symptoms that are not suggestive of any one chemical agent (ie, a mixed clinical presentation).
- Health care professionals might be less familiar with clinical presentations that suggest exposure to chemical agents than with illnesses that they treat more frequently.
- Clinical effects from exposure to chemical agents will vary depending on the:
  - type of agent;
  - route of exposure (eg, dermal, inhaled, ingested);
  - amount and concentration of agent;
  - duration of exposure; and
  - preexisting medical conditions (cardiac, pulmonary, neuromuscular).

Epidemiologic clues that suggest a covert chemical release[22] include:

- an unusual increase in the number of patients seeking care for a rapid onset of symptoms after an exposure to a potentially contaminated medium (eg, paresthesias and vomiting within minutes of eating a meal);
- unexplained illness or death among young or previously healthy persons;
- presence of an unexplained odor, low-level clouds, or vapors at the scene;
- emission of unexplained odors by patients;
- clusters of illness in persons who have common characteristics such as drinking water from the same source;
- unexplained death of plants, fish, or animals (domestic or wild); and
- a syndrome that suggests a disease associated commonly with a known chemical exposure, including:
  - sudden unexplained weakness, collapse, apnea, or convulsions in previously healthy persons;
  - dimmed or blurred vision;

- hypersecretion syndromes (eg, tearing, drooling, diarrhea);
- inhalation syndromes (eye, nose, throat, chest irritation; shortness of breath); and
- burn-like syndromes (redness, blistering, itching, sloughing).

HOSPITAL PREPAREDNESS

The health care facilities that are responsible for treating pediatric victims in a biological, radiologic, nuclear, chemical, or explosive event could be strained or overwhelmed. Medical facilities can become inundated with patients if large numbers of victims appear without ambulance transport and pre-entry notification. This situation differs markedly from existing hospital disaster-alert systems in which victims are triaged in the field and carefully distributed among available resources to prevent any single facility from being overwhelmed. Along similar lines, victims who appear without full hospital preparation could thwart attempts to isolate contaminated victims from other patients and hospital staff. Large-scale biological, chemical, nuclear, radiologic, or explosive incidents may necessitate the use of alternative health care sites (eg, auditoriums and arenas), which requires pediatric health care resources to be dispersed to areas in which victims may not receive optimal care.

Children are difficult to care for by persons wearing protective equipment, which is essential in the management of biological or chemical events. Protective clothing is bulky and cumbersome; it impedes the ability of persons to perform procedures such as venipuncture on small children. It is imperative that hospitals and the health care community develop protocols and equipment that allow for treatment of children while taking into account the restrictions of operating in protective clothing. Examples might include use of intraosseous access and intramuscular injections when appropriate, knowing that intravenous access in restrictive clothing would not be feasible.

Hospitals must ensure that they have adequate plans to handle both disasters and terrorism and that these approaches conform to an all-hazards approach to ensure preparedness for any possible event. These plans must also include an effective incident command system that incorporates those who are capable of making decisions for the care of pediatric patients.

It is important that hospitals consider the needs of children in all aspects of emergency preparedness and all hazards plans. This will include, but is not limited to, appropriate types and numbers of pediatric-trained staff, equipment, medications, and decontamination equipment, including the ability to handle nonambulatory children. Hospitals must be prepared to handle situations in which patients will be cared for as a family unit and children will not be able to be separated from adults, such as in a quarantine situation. This will require all hospitals to have the capability to handle children, and all children's hospitals must possess the ability to care for adult patients who will be staying with their children.

PUBLIC HEALTH PREPAREDNESS

An important aspect of general emergency preparedness is that of public health preparedness. In recent years, there has been an important increase in both attention to the importance of public health in preparedness and in available funding. The primary funding is from the CDC to state health departments and certain local health departments in the largest urban cities. Among the many goals of this program are transformation of health departments into emergency responders and increasing their capabilities for training, coordination, and surveillance. Initially, the grant guidance for this program addressed general issues, but in recent guidance the needs of special populations are beginning to be addressed. It is essential that pediatricians be involved in all levels of health department–preparedness activities and that children be considered in all aspects of planning, including education, outreach, equipment, supplies, and pharmaceuticals.

As a component of public health–preparedness activities, many departments are establishing volunteer programs for health care professionals. Many departments are using the Medical Reserve Corps component of Citizen Corps as a mechanism to address these medical volunteers. It is important that pediatricians ensure that these programs include adequate numbers of pediatric-trained health care professionals and that pediatricians participate in these programs.

Another key element of the activities of public health in preparedness is the creation of surge-capacity programs for the health care system. It is essential that pediatricians and children's hospitals be involved in these programs to ensure that all surge-capacity programs are equipped for surge numbers of children or for a uniquely pediatric event.

PEDIATRICIANS' ACTIONS DURING A DISASTER

During a disaster, pediatricians may need to serve in a variety of functions, including routine disaster actions for themselves and their families, providing medical care and answering questions from their patients, and providing medical care to meet the needs of their community and the hospitals in their community. Medical responders will need to be able to function unassisted until outside resources arrive at least 6 to 8 hours after the onset. Hospitals and clinics will be flooded with affected patients and the "worried well."

To fulfill these roles during a disaster, all pediatricians need to:

- institute office and home disaster plans;
- participate in the community or hospital disaster plan, exercises, and drills;
- provide medical assistance via established disaster medical delivery systems;
- provide guidance to patients and their families;
- make every effort to work in concert with the lead organization coordinating disaster relief when volunteering to assist during or after a disaster; and
- serve a key role in identifying sentinel cases of illness after a chemical, biological, or radiologic release.

In addition to important functions during the actual event, pediatricians' assistance will be needed after the event throughout the recovery period. The role of the pediatrician is to help patients who have been affected return to normal functioning and to assist with community efforts at return to normal activity. During the recovery period, all pediatricians need to:

- be prepared to deal with continued disruption of services, which may include medical services in the community, supplies for their patients, their office, and hospitals, limited availability of pharmacy services, and altered utilities such as telephone and water;
- continue providing care as part of their office emergency plan and as needed in community disaster medical programs;
- continue to provide surveillance for the effects of chemical, biological, or radiologic release but also during any disaster provide surveillance for unusual rates of infectious disease that may occur; and
- ensure that the mental health needs of children and their families are being addressed and, when needed, provide appropriate referral for mental health services.

PEDIATRICIANS' ACTIONS DURING A TERRORIST ATTACK

In the event of a terrorist attack, most actions by pediatricians will be general emergency-management actions. These actions were described in the previous section as using an all-hazards approach to both preparedness and response. Although the majority of actions during a terrorist attack will be the same as the role of a pediatrician during a disaster, there are some additional considerations. A major role of the pediatrician in all terrorism attacks will be to address the issues raised by their patients and their families, because they will often be the most trusted health official by families. Pediatricians have the potential to help minimize the effects of the "worried well" on the health care and public health systems.

The following section provides specific information regarding the role of pediatricians in terrorist attacks in addition to their actions in any emergency.

During a terrorist attack, pediatricians should:

- understand that they may be the first to recognize a public health emergency and will be responsible for reporting to appropriate authorities;
- protect themselves by having a general knowledge of personal protective equipment (if they plan to or will be in a position to treat patients who have been exposed to a terrorist attack and have not been decontaminated, they should be trained and prepared to use appropriate personal protective equipment);
- be ready and willing to deal with casualties;
- know decontamination procedures and the unique needs of children and be prepared to assist with the decontamination of children;
- address immediate critical care needs (eg, traumatic injuries, burns);
- be a source of reliable information to parents and families and serve as an information conduit for public health messages to the public; and
- be available to participate in officially sanctioned and organized mass prophylaxis and points of distribution plans.

In the event of a biological emergency, pediatricians should also:

- be aware of infection-control procedures to protect themselves and others from harm;
- be knowledgeable of infectious-disease diagnosis and treatment protocols; and
- avoid dispensing antimicrobials or administering immunizations that are not part of a public health program. The inappropriate dispensing of antimicrobials or administration of vaccines can lead to:
  - shortages of needed pharmaceuticals and vaccines;
  - increased fear and panic in the public, leading to increased numbers of and effect on the "worried well";
  - promotion of antibiotic resistance; and/or
  - increased incidence of adverse effects from these agents.

In the event of a chemical emergency, pediatricians should also:

- protect themselves (eg, by using protective suits, respiratory protection, and chemical-resistant gloves), because secondary contamination with even small amounts of these substances (particularly nerve agents such as VX) can be lethal; and

- treat exposed persons by clinical syndrome rather than by specific agent.

In the event of a radiologic emergency, pediatricians should also:

- at a minimum when caring for any patient and based on the situation wear protective gloves, protective clothing, and radiation dosimeters (respirators or protective masks can prevent inhalation of radioactive particles);
- use techniques to prevent contamination and radiation exposure of other health care workers;
- be aware that removal of clothing and washing with soap and copious amounts of water are sufficient to remove most external radiation contamination;
- remember that radiation treatment, other than decontamination, is a secondary concern (most deaths from radiation occur as a result of bone marrow damage and secondary infection) (persons being examined for potential radiation exposure may not exhibit significant symptoms when first examined, even if they received a considerable radiation dose, because of the characteristic delayed onset of symptoms after exposure);
- ensure follow-up examination for patients over the ensuing hours and days to establish the true nature and extent of radiation exposure (any externally contaminated casualty without respiratory protection should be evaluated for internal contamination; eg, anyone who gets radioactive material on their person or is exposed to radioactive gases without respiratory protection needs to be evaluated to ensure that there is no internal contamination); and
- when concerned about a known or suspected exposure to radioactive iodine (eg, nuclear power-plant incident), facilitate KI administration as a thyroid-blocking agent to children, on the basis of either consultation with emergency-management and public health agencies or preexisting plans.

PEDIATRICIANS' LIABILITY DURING DISASTERS

Physicians have often volunteered their services during and after disasters. During a disaster, public health emergency, or terrorism event, health care professionals may be called on to respond to community needs for assistance and treat victims at the scene, casualty-collection points, hospitals (where they may not have privileges), and shelters. Whenever possible, these services should be coordinated through the local disaster plan or emergency medical services agencies. After a disaster or terrorism event, offices or clinics may become sites for emergency care if area hospitals cannot provide adequate services. Local offices may be unusable, and alternate sites for primary care may need to be identified. Recent experiences have demonstrated that health care may be administered in parking lots, malls, and tents. Pediatricians may need to provide urgent and routine care to their practice-based patients outside of the usual practice location(s).

In the past, many physicians have provided care without affiliation with recognized government or volunteer agencies. It is important that when providing medical service during a disaster, public health emergency, or terrorism event, health care professionals be a part of an organized program; otherwise, they may be providing service that is not in concert with the organized response and be placed in a position without professional liability insurance coverage. Most malpractice coverage is limited to the health care professional's usual scope of practice and practice setting. Good Samaritan statutes provide some liability protection when rendering medical care at the scene of an emergency to one who would not otherwise receive it. Good Samaritan statutes cover physicians at the scene of acute incidents but vary among states and may not provide liability protection during or after disasters or a terrorism event. In many states, for health care professionals to be covered for liability in a disaster, they must practice under the umbrella of an official disaster agency such as FEMA, the US Department of Health and Human Services, state or local health department, state or local office of emergency management, the local emergency medical services authority, or other recognized government or volunteer agency.

In some states, individual malpractice insurance policies do not cover out-of-office care or the expanded scope of practice that may be required during a disaster. Good Samaritan laws do not cover a physician if there is any payment for services or if there is an accusation of gross negligence.

INTERNATIONAL DISASTER RESPONSE

Pediatricians have a long history of offering assistance in times of international disasters, including natural events such as an earthquake, and humanitarian aid, such as in a forced-migration refugee situation.

Participating on a team to assist in an international response is not an easy task. Determining the real needs of the affected area, gathering the proper equipment, and getting ready rapidly mandate a great effort and coordination. For example, US pediatricians may not be familiar with the organization of a country's health care system and the way that health care services are delivered at the local level. Moreover, these countries may not have the advanced medical technology and pediatric-sized equipment that is available in the United States. Other barriers, such as language and cultural norms, may impede the effectiveness of US pediatricians in providing culturally effective and appropriate care to patients during emergencies and disasters abroad. Because

the issues surrounding international disaster response are so complex, one should only participate in such a response as part of an organized and sanctioned agency conducting this assistance. On the basis of its experience, the US team that participated in the international response to the Armenian earthquake of 1988 suggested the following recommendations for a team that responds to an international disaster[23]:

- Work closely with the medical officer at the site to assess needs.
- Be self-sufficient in food, shelter, water, and electricity.
- Keep publicity at a minimum.
- Train your local partners in the work to ensure collaborative practice.
- Try to have at least 50% of the team proficient in the local language.
- Remember that technical and support personnel, such as biomedical engineers, pharmacists, and respiratory therapists, are often more important than additional physicians.
- Have batteries for all equipment and ensure that equipment is adaptable to local lines and voltage.
- Rapidly translate treatment protocols, including medication dosages, and duplicate them for local usage. A large supply of simple drugs is better than a huge variety.
- Retain focus and remain together except to transport severely ill patients into your assigned facility.

All the elements and considerations when participating in and planning an international emergency response are beyond the scope of this technical report. Additional information on international disaster and humanitarian response can be obtained from the AAP, the World Health Organization, and the World Association for Disaster Emergency Medicine.

ADVOCATING FOR CHILDREN AND FAMILIES IN PREPAREDNESS PLANNING

As all pediatricians know, children are often not considered in government and community activities for a multitude of reasons. Properly informed and motivated pediatricians are essential advocates for children. This role can take several forms. Grassroots advocacy can include efforts to ensure legislation and funding to support an emphasis on children in disaster planning at every level. Pediatricians can also serve as expert advisors to local, state, and federal agencies and committees. Most often, this can be through involvement in professional organizations such as the AAP and its chapters, committees, sections, and task forces. By advocating for all children to be connected with a medical home, many of the items for child and family disaster planning, including anticipatory guidance, medical planning for emergencies, and access to pediatricians to address family questions and concerns, can be ensured.

CONCLUSIONS

One of the first steps to address emergency preparedness for children is to reinforce the legitimate need for pediatricians to become involved and informed about relevant issues. Pediatric training programs need to consider formalizing a curriculum that is focused on these issues: emergency preparedness, including issues related to disasters, terrorist events, and public health emergencies, and the role of the pediatrician in disaster management. There are enormous gaps in the understanding of how weapons of terror affect children medically and psychologically. A clear research agenda is being developed to examine these and other crucial areas of concern. The fact is that reliable data on children are scant, and pediatricians must often rely on clinical experience and extrapolation from adult studies, both of which have significant limitations. Although testing of new medications and therapeutics is rarely performed in children, it has not been done at all for antidotes or preventive agents for terrorist attacks. Funding is needed to conduct research involving children that addresses vaccines, resistance, antidotes, pediatric dosing recommendations, resiliency, and mental health considerations. Disaster and terrorism preparedness must become an integral part of the scope of academic pediatric activities, including both education and research.

It should be pointed out that there is significant potential for inequitable distribution of information and resources with respect to preparedness for disasters, terrorist events, and public health emergencies. Just as traditional health and public health resources are often relatively unavailable or inaccessible in underserved communities, it would not be unreasonable to expect the same patterns in the distribution of resources for these new challenges. Pediatricians need to be prepared for such possibilities and be vigilant in advocating appropriately for underserved communities as well as for children in general.

As a result of the everyday threat of all types of disaster and terrorist attacks, everyone must consider emergency preparedness. In addition to their traditional roles of child expert, advocate for children, community provider, family resource, and a force behind new research, pediatricians now must take on new roles regarding disaster and terrorism preparedness. Information, education, and participation are important initial steps for all child health professionals.

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SUGGESTED RESOURCES FOR ADDITIONAL INFORMATION

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American Association of Poison Control Centers (www.aapcc.org)

American College of Emergency Physicians (www.acep.org)

American Hospital Association (www.aha.org)

American Red Cross (www.redcross.org)

Centers for Disease Control and Prevention (www.bt.cdc.gov/children)

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Emergency Medical Services for Children National Resource Center (www.ems-c.org)

Federal Emergency Management Agency (www.fema.gov)

Health Resources and Services Administration (www.hrsa.gov/bioterrorism)

Infectious Diseases Society of America (www.idsociety.org)

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The Pediatrician and Disaster Preparedness

David Markenson and Sally Reynolds

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