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# CURRENT PEDIATRIC THERAPY

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# Bioterrorism

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## KEY CONCEPTS

- Possible biologic agents are classified according to availability, potential for morbidity and mortality, and ease of dissemination.
- The natural history and management of injuries and exposures depend on the agent and the route of exposure.
- Vaccines are available for anthrax and smallpox; antitoxins are available for botulism.

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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 not carefully monitored.

The release of chemical or biologic 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. Another example involves the unique respiratory physiology of children. Many of the agents used for both chemical and biologic attacks are aerosolized (e.g., sarin, chlorine, or anthrax). Because children have faster respiratory rates than adults, they are exposed to relatively greater dosages and would suffer the effects of these agents much more rapidly than adults. Many biologic and chemical agents are absorbed through the skin. Because children have more permeable skin and more surface area relative to body mass than adults, 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.

It is well known that children may exhibit different effects of biologic agents. Here are some examples:

- Smallpox: Lack of immunity in children, whereas some adults who were vaccinated as children may still possess some degree of immunity.
- Trichothecenes: The data show that children may be more susceptible.
- Measles: Children manifest unique parotitis.
- Anthrax: Recent and older data support the concept that children are less susceptible to the effects of anthrax.

In addition to the differences in clinical presentation of biologic agents, children also may present different incubation periods following exposure. For many agents, the incubation period is shorter for children. Consequently, surveillance systems based on symptoms in children may yield earlier detection, which can lead to earlier containment and mitigate the effects of a bioterrorism agent.

Lastly, there may be issues with the antibiotics of choice for bioterrorist agents. Many medications, although used in children, are not indicated for children by the U.S. Food and Drug Administration (FDA). Although this does not pose a problem for health care providers, several government programs, such as the Strategic National Stockpile, may only stock items for the FDA-approved indications. In addition, certain medications may have an absolute contraindication to use in children and others may have relative contraindications.

Biologic weapons are referred to as the "poor person'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. A range of biologic agents could be used as weapons of terror, 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, biologic agents are generally associated with a delay in the onset of illness, and therefore they may not be recognized in their initial stages. A covert release of a contagious biologic agent has the potential for large-scale spread before detection. For some infectious agents, secondary and tertiary transmission may continue for weeks or months after the initial attack. Both infected persons and the "worried well" would seek medical attention, with a corresponding need for medical supplies, diagnostic tests, and hospital beds. Simple devices such as crop-dusting airplanes or small perfume atomizers are effective delivery systems for biologic agents. The biologic agents that are considered likely candidates for weaponization include bacteria, viruses, rickettsia, fungi, and preformed toxins.

## Expert Opinion on Management Issues

The Centers for Disease Control and Prevention (CDC) separates bioterrorist agents into three categories (A, B, and C) in order of priority based on 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 biologic weapon, most would be difficult to weaponize and disseminate effectively. So, although those listed in [Table 1](#) are possible candidates for weaponization, the biologic 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).

### ANTHRAX

**Table 227-1. CDC Categories, Definitions, and Pathogens**

Category	CDC Definition	Pathogens
Category A	High-priority agents include organisms that pose a risk to national security because they have the following characteristics:	Anthrax ( <i>Bacillus anthracis</i> ) Botulism ( <i>Clostridium botulinum</i> toxin) Plague ( <i>Yersinia pestis</i> )
	Can be easily disseminated or transmitted from person to person	Smallpox (variola major) Tularemia ( <i>Francisella tularensis</i> )
	Result in high mortality rates and have the potential for major public health impact	Viral hemorrhagic fevers (Filoviruses [e.g., Ebola, Marburg] and Arenaviruses [e.g., Lassa, Machupo])
	Might cause public panic and social disruption	
	Require special action for public health preparedness.	
Category B	Second highest priority agents include those with the following characteristics: Are moderately easy to disseminate	Brucellosis ( <i>Brucella</i> species) Epsilon toxin of <i>Clostridium perfringens</i> Food safety threats (e.g., <i>Salmonella</i> species,

	Result in moderate morbidity rates and low mortality rates	<i>Escherichia coli</i> O157:H7, <i>Shigella</i> )
	Require specific enhancements of the CDC's diagnostic capacity and enhanced disease surveillance.	Glanders ( <i>Burkholderia mallei</i> )
		Melioidosis ( <i>Burkholderia pseudomallei</i> )
		Psittacosis ( <i>Chlamydia psittaci</i> )
		Q fever ( <i>Coxiella burnetii</i> )
		Ricin toxin from <i>Ricinus communis</i> (castor beans)
		Staphylococcal enterotoxin B
		Typhus fever ( <i>Rickettsia prowazekii</i> )
		Viral encephalitis (Alphaviruses [e.g., Venezuelan equine encephalitis, eastern equine encephalitis, western equine encephalitis])
		Water safety threats (e.g., <i>Vibrio cholerae</i> , <i>Cryptosporidium parvum</i> )
Category C	Third highest priority agents include emerging pathogens that could be engineered for mass dissemination in the future because of these characteristics:	Emerging infectious diseases such as Nipah virus and Hantavirus
	Availability	
	Ease of production and dissemination	
	Potential for high morbidity and mortality rates and major health impact.	

CDC, Centers for Disease Control and Prevention.

Adapted from the table available from Centers for Disease Control and Prevention online. Available at [www.bt.cdc.gov](http://www.bt.cdc.gov)

Anthrax has been extensively developed as a biologic weapon and is considered the most likely candidate for a biologic release. Recent history in New York City, Connecticut, and Florida shows that the use of anthrax as a terrorism agent is not a theoretical possibility but a reality. The causative organism, *Bacillus anthracis*, is a gram-positive sporulating rod.

Anthrax cannot be transmitted person to person. Because the initial symptoms of anthrax are nonspecific and experience with the disease among physicians is uncommon, anthrax may be misdiagnosed. The first indication of an aerosol exposure may be groups of patients presenting with severe influenza-like disease with a high case-fatality rate. After a few hours or days, and possibly some improvement, the condition then progresses to fever, dyspnea, and eventually shock. A widened mediastinum consistent with lymphadenopathy or hemorrhagic mediastinitis is common. Usually, no evidence of bronchopneumonia exists. The symptoms (warning signs) of anthrax are different depending on the type of the disease:

- Cutaneous: The first symptom is a small sore that develops into a blister. The blister then develops into a skin ulcer with a black area in the center. The sore, blister, and ulcer do not hurt.
- Gastrointestinal: The first symptoms are nausea, loss of appetite, bloody diarrhea, and fever, followed by severe stomach pain.
- Inhalation: The first symptoms of inhalation anthrax resemble cold or flu symptoms and can include a sore throat, mild fever, and muscle aches. Later symptoms include cough, chest discomfort, shortness of breath, tiredness, and muscle aches.

## PLAGUE

Plague, caused by *Yersinia pestis*, is also considered a potential bacterial weapon. Unlike anthrax, pneumonic plague can be highly contagious, and if untreated, mortality can be as high as 100%. The pneumonic form of plague would be the primary form seen after purposeful aerosol dissemination of the organism. The bubonic form would be seen after purposeful dissemination through the release of infected fleas. The typical sign of the most common form of human plague is a swollen and very tender lymph gland, accompanied by pain. The swollen gland is called a *bubo*.

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**Table 227-2. Recommended Therapy and Prophylaxis of Anthrax in Children**

Form of Anthrax	Category of Treatment (Therapy or Prophylaxis)	Agent and Dosage
Inhalational	Therapy <sup>a</sup> Patients who are clinically stable after 14 days can be switched to a single oral agent (ciprofloxacin or <a href="#">doxycycline</a> <sup>H,c</sup> ) to complete a 60-day course <sup>b</sup> of therapy.	Ciprofloxacin <sup>c</sup> 10-15mg/kg IV q12h (max 400 mg/dose) <i>or</i> <a href="#">Doxycycline</a> <sup>H,c</sup> 2.2 mg/kg IV (max 100 mg) q12h <i>and</i> <a href="#">Clindamycin</a> <sup>R,d</sup> 10-15mg/kg IV q8h <i>and</i> Penicillin C <sup>e</sup> 400-600 U/kg/day IV div q4h
Inhalational	Post-exposure prophylaxis (60-day course <sup>b</sup> )	Ciprofloxacin <sup>f</sup> 10-25 mg/kg PO (max 500 mg/dose) q12h <i>or</i> <a href="#">Doxycycline</a> <sup>R</sup> 2.2 mg/kg (max 100 mg) PO q12h
Cutaneous, endemic	Therapy <sup>g</sup>	Penicillin V 40-80 mg/kg/day PO div q6h <i>or</i>
		<a href="#">Amoxicillin</a> <sup>P</sup> 40-80 mg/kg/day PO div q8h <i>or</i>

		Ciprofloxacin 10-15 mg/kg PO (max 1 g/day) q12h <i>or</i>
		<a href="#">Doxycycline</a> <sup>Rx</sup> 2.2 mg/kg PO (max 100 mg) q12h
Cutaneous (in setting of terrorism)	Therapy <sup>g</sup>	Ciprofloxacin 10-15 mg/kg PO (max 1 g/day) q12h <i>or</i>
		<a href="#">Doxycycline</a> <sup>Rx</sup> 2.2 mg/kg PO (max 100 mg) q12h
Gastrointestinal	Therapy <sup>g</sup>	Ciprofloxacin <sup>f</sup> 10-25 mg/kg PO (max 500 mg/dose) q12h <i>or</i>
		<a href="#">Doxycycline</a> <sup>Rx</sup> 2.2 mg/kg (max 100 mg) PO q12h

<sup>a</sup>In a mass casualty setting, in which resources are severely limited, oral therapy may need to be substituted for the preferred parenteral option. This may be most acceptable for ciprofloxacin because it is rapidly and well absorbed from the gastrointestinal tract with no substantial loss from first-pass effect.

<sup>b</sup>Children may be switched to oral [amoxicillin](#)<sup>Rx</sup> (40-80 mg/kg/day divided q8h) to complete a 60-day course (assuming the organism is sensitive). We recommend that the first 14 days of therapy or postexposure prophylaxis, however, include ciprofloxacin and/or [doxycycline](#)<sup>Rx</sup> regardless of age. A three-dose series of vaccine may permit shortening of the antibiotic course to 30 days.

<sup>c</sup>[Levofloxacin](#)<sup>Rx</sup> or [ofloxacin](#)<sup>Rx</sup> may be acceptable alternatives to ciprofloxacin.

<sup>d</sup>[Rifampin](#)<sup>Rx</sup> or [clarithromycin](#)<sup>Rx</sup> may be acceptable alternatives to [clindamycin](#)<sup>Rx</sup> as drugs that target bacterial protein synthesis. If ciprofloxacin or another quinolone is used, [doxycycline](#)<sup>Rx</sup> may be used as a second agent because it also targets protein synthesis.

<sup>e</sup>[Ampicillin](#)<sup>Rx</sup>, imipenem, [meropenem](#)<sup>Rx</sup>, or [chloramphenicol](#)<sup>Rx</sup> may be acceptable alternatives to penicillin as drugs with good CNS penetration.

<sup>f</sup>According to most experts, ciprofloxacin is the preferred agent for PO prophylaxis.

<sup>g</sup>Ten days of therapy may be adequate for endemic cutaneous disease. However, a full 60-day course is recommended in the setting of terrorism because of the possibility of concomitant inhalational exposure.

CNS, central nervous system; div, divided; PO, by mouth; q<sub>x</sub>h, every x hours.

This table was created from recommendations developed by the Columbia University Mailman School of Public Health National Center for Disaster Preparedness at the Pediatric Disaster and Terrorism National Consensus Conference, and in part it is based on reviewed reference materials from the American Academy of Pediatrics, Centers for Disease Control and Prevention, Food and Drug Administration, and the Infectious Disease Society of America and published as Markenson D, [Redlener](#) I: Pediatric Disaster and Terrorism National Consensus Conference: Executive Summary. National Center for Disaster Preparedness, 2003.

Bubonic plague should be suspected when a person develops a swollen gland, fever, chills, headache, and extreme exhaustion and has a history of possible exposure to infected rodents, rabbits, or fleas. A person usually becomes ill with bubonic plague 2 to 6 days after being infected. When bubonic plague is left untreated, plague bacteria invade the blood stream. As the plague bacteria multiply in the blood stream, they spread rapidly throughout the body and cause a severe and often fatal condition. Infection of the lungs with the plague bacterium causes the pneumonic form of plague, a severe respiratory illness. The infected person may experience high fever, chills, cough, and breathing difficulty and may expel bloody sputum. If plague patients are not given specific antibiotic therapy, the disease can progress rapidly to death. Recovery from the disease may be followed by temporary immunity. The organism probably remains viable in water and in moist meals and grains for several weeks.

## SMALLPOX

There are two clinical forms of smallpox. Variola major is the severe and most common form, with a more extensive rash and higher fever. The four types of variola major smallpox are ordinary (the most frequent type, accounting for 90% or more of cases), modified (mild and occurring in previously vaccinated persons), flat, and hemorrhagic (the last two are rare and very severe). Historically, variola major has an overall fatality rate of approximately 30%; however, flat and hemorrhagic smallpox usually are fatal. Variola minor is a less common presentation of smallpox and a much less severe disease, with death rates historically of 1% or less. A person with smallpox is sometimes contagious with onset of fever (prodrome phase), but the person becomes most contagious with the onset of rash. The infected person is contagious until the last smallpox scab falls off. Generally, direct and fairly prolonged face-to-face contact is required to spread smallpox from one person to another. Smallpox also can be spread through direct contact with infected bodily fluids or contaminated objects such as bedding or clothing. Rarely, smallpox is spread by virus carried in the air in enclosed settings such as buildings, buses, and trains. Humans are the only natural hosts of variola. Smallpox is not known to be transmitted by insects or animals.

**Table 227-3. Recommended Therapy and Prophylaxis in Children for Additional Select Diseases Associated with Bioterrorism**

Disease	Therapy or Prophylaxis	Treatment, Agent, and Dosage <sup>a</sup>
Smallpox	Therapy	Supportive care
	Prophylaxis	Vaccination may be effective if given within the first several days after exposure
Plague	Therapy	Gentamicin 2.5 mg/kg IV q8h <i>or</i>
		Streptomycin 15 mg/kg IM q12h (max 2 g/day; only available for compassionate use and in limited supply, but preferred agent) <i>or</i>
		<a href="#">Doxycycline</a> <sup>Rx</sup> 2.2 mg/kg IV q12h (max 200 mg/day) <i>or</i>
		Ciprofloxacin 15 mg/kg IV q12h <i>or</i>
		<a href="#">Chloramphenicol</a> <sup>Rx, b</sup> 25 mg/kg q6h (max 4 g/day)
		<a href="#">Doxycycline</a> <sup>Rx</sup> 2.2 mg/kg IV q12h <i>or</i>
	Ciprofloxacin <sup>c</sup> 20 mg/kg PO q12h	
Tularemia	Therapy	Same as for plague
Botulism	Therapy	Supportive care; antitoxin may halt progression of symptoms but is unlikely to reverse them
Viral hemorrhagic fevers	Therapy	Supportive care; <a href="#">ribavirin</a> <sup>Rx</sup> may be beneficial in select cases <sup>d</sup>
Brucellosis	Therapy <sup>e</sup>	TMP/SMX 30 mg/kg PO q12h <i>and</i>

		Rifampin <sup>Rx</sup> 15 mg/kg q24h or
		Gentamicin 7.5 mg/kg IM qd x5

<sup>a</sup>In a mass casualty setting, parenteral therapy might not be possible. In such cases, oral therapy (with analogous agents) may need to be used.

<sup>b</sup>Concentration should be maintained between 5 and 20 mcg/mL; some experts recommend that chloramphenicol<sup>Rx</sup> be used to treat patients with plague meningitis because chloramphenicol<sup>Rx</sup> penetrates the blood-brain barrier. Use in children younger than 2 years may be associated with adverse reactions but might be warranted for serious infections.

<sup>c</sup>Other fluoroquinolones (levofloxacin<sup>Rx</sup>, ofloxacin<sup>Rx</sup>) may be acceptable substitutes for ciprofloxacin; however, they are not approved for use in children.

<sup>d</sup>Ribavirin<sup>Rx</sup> is recommended for Arenavirus, Bunyavirus, and may be indicated for a viral hemorrhagic fever of an unknown etiology, although not FDA approved for these indications. For IV therapy, use a loading dose: 30 mg/kg IV once (maximum dose, 2 g), then 16 mg/kg IV q6h for 4 days (maximum dose, 1 g) and then 8 mg/kg IV q8h for 6 days (maximum dose, 500 mg). In a mass casualty setting it may be necessary to use oral therapy. For oral therapy, use a loading dose of 30 mg/kg PO once, then 15 mg/kg/day PO in two divided doses for 10 days.

<sup>e</sup>For children younger than 8 years. For children older than 8 years, adult regimens are recommended. Oral drugs should be given for 6 weeks. Gentamicin, if used, should be given for the first 5 days of a 6-week course of TMP/SMX (trimethoprim/sulfamethoxazole).

CDC, Centers for Disease Control and Prevention; FDA, Food and Drug Administration; IV, intravenous; PO, by mouth; q<sub>x</sub>h, every x hours.

This table was created from recommendations developed by the Columbia University Mailman School of Public Health National Center for Disaster Preparedness at the Pediatric Disaster and Terrorism National Consensus Conference and in part is based on reviewed reference materials from the American Academy of Pediatrics, Centers for Disease Control and Prevention, Food and Drug Administration, and Infectious Disease Society of America and published as Markenson D, Redlener I: Pediatric Disaster and Terrorism National Consensus Conference: Executive Summary. National Center for Disaster Preparedness, 2003.

Exposure to the virus is followed by an incubation period during which people do not have any symptoms and may feel fine. This incubation period averages approximately 12 to 14 days, but can range from 7 to 17 days. During this time, people are not contagious. A rash emerges first as small red spots on the tongue and in the mouth. These spots develop into sores that break open and spread large amounts of the virus into the mouth and throat. At this time, the person becomes most contagious. Around the time the sores in the mouth break down, a rash appears on the skin, starting on the face and spreading to the arms and legs and then to the hands and feet. The rash usually spreads to all parts of the body within 24 hours. As the rash appears, the fever usually falls and the person may start to feel better. By the third day of the rash, the rash becomes raised bumps. By the fourth day, the bumps fill with a thick, opaque fluid and often have a depression in the center that looks like the umbilicus (a major distinguishing characteristic of smallpox). Fever often rises again at this time and remains high until scabs form over the bumps. The bumps become pustules-sharply raised, usually round and firm to the touch as if there is a small round object under the skin. The pustules begin to form a crust and then scab. By the end of the second week after the rash appears most of the sores have scabbed over. Most scabs will have fallen off 3 weeks after the rash appears. The person is contagious to others until all of the scabs have fallen off.

Because smallpox was eradicated globally in 1980 and children are no longer being immunized, more than 80% of the adult population and 100% of children are susceptible to variola virus. The currently licensed smallpox vaccine (Dryvax; Wyeth, Philadelphia, Pa) makes no mention in its package insert of an approved age range. In practice, until the early 1970s, this vaccine was administered to children of 1 year of age. The CDC currently recommends against vaccination of children younger than 1 year. In reality, all contraindications to smallpox vaccination are relative. After bona fide exposure, even the youngest infants should be vaccinated.

Despite the lack of FDA indications for some medications and relative contraindications for some, recommended agents can be used in response to category A agents. These recommendations represent FDA-indicated medications-they do not have an FDA indication for children but literature and medical judgment support their use, acceptable alternatives, or valid reasons to use an agent despite its relative contraindications (Tables 2 and 3). As part of effective pediatric preparedness for bioterrorism events, one must not only have these agents for pediatric use but must maintain them in forms that allow



pediatric administration. This includes the availability of liquid preparations but also staff and facilities for dosing to accommodate different-weight children and to reconstitute the liquid medications.

In addition to the medications described in the event of bioterrorism, immunotherapy and immunoprophylaxis may have to be considered. These agents also have unique pediatric considerations because many of them are not used or may not be FDA indicated for children ([Box 1](#)).

## Common Pitfalls

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### BOX 1 Immunotherapy and Immunoprophylaxis

- Anthrax: The currently licensed anthrax vaccine (anthrax vaccine adsorbed<sup>®</sup> [AVA]; Bioport, Lansing, Mich) is approved for persons 18 to 65 years of age. This vaccine may have a limited role as an adjunct to postexposure chemoprophylaxis, although data are limited. In such an event, potential benefit will have to be weighed against unproven risk to children. This vaccine has limited potential for use in a civilian preexposure setting, but future studies of new-generation vaccines should include children.
- Smallpox: The currently licensed smallpox vaccine (Dryvax; Wyeth, Philadelphia, Pa) makes no mention in its package insert of an approved age range. In practice, until the early 1970s, this vaccine was administered to children of 1 year of age. The Centers for Disease Control and Prevention (CDC) currently recommends against vaccination of children younger than 1 year. All contraindications to smallpox vaccination are relative. After bona fide exposure or known usage of weaponized smallpox, even the youngest exposed at-risk infants should be vaccinated. Moreover, future studies of new-generation vaccines must include children.
- Botulism: A licensed trivalent (types A, B, E) antitoxin is available through the CDC. This antitoxin is to be used in children of any age known to have been exposed to botulinum toxin<sup>®</sup> of the appropriate serotypes. An IND pentavalent (types A-E) botulinum immune globulin (human) is available through the California Department of Health specifically for the treatment of infantile botulism. The study of this product must be continued and that licensure pursued.
- Plague: No licensed plague vaccine<sup>®</sup> is currently in production. A previously licensed vaccine was approved only for persons 18 to 61 years of age. There is little, if any, role for this or similar vaccines in a bioterrorist context.

### BOX 2 Important Clues that May Signal a Biologic Emergency

- 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, geographical, 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
- Sudden increase in the following nonspecific illnesses: pneumonia, flulike illness, or fever with these atypical features:
  - Bleeding disorders
  - Unexplained rashes and mucosal or skin irritation, particularly in adults

- Neuromuscular illness, such as muscle weakness and paralysis
- Diarrhea






Adapted from materials developed by the Centers for Disease Control and Prevention and the American Medical Association.

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One of the key elements in terrorism preparedness is early detection of any possible terrorism event. The most likely scenario involves exposure in a community, which may manifest with subtle symptoms and signs and unusual patient presentations in terms of numbers of diseases. Physicians must function continually as part of a surveillance system to provide for early detection of any bioterrorism agent.

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. Physicians must have an increased level of suspicion regarding the possible intentional use of biologic 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 ([Box 2](#)).

## SUGGESTED READINGS

1. Committee on Environmental Health and Committee on Infectious Diseases: Chemical-biological terrorism and its impact on children. *Pediatrics* 105:662-670, 2002. **Review article from the American Academy of Pediatrics that covers key concepts related to children and chemical and biologic terrorism.**
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5. American Academy of Pediatrics: Children, terrorism and disasters. Available at [www.AAP.org/Terrorism](http://www.AAP.org/Terrorism) (accessed November 10, 2005). **Page on the American Academy of Pediatrics website that contains all the AAP resources and information on pediatric aspects of preparedness.**
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7. National Center for Disaster Preparedness: Home page. Available at [www.ncdp.mailman.columbia.edu](http://www.ncdp.mailman.columbia.edu) (accessed November 10, 2005). **This website offers a comprehensive compendium of emergency preparedness resources and has a specific program dedicated to addressing the unique needs of children.**

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