



# City Health Information

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## CLINICAL GUIDELINES FOR CHILDREN AND ADOLESCENTS EXPOSED TO THE WORLD TRADE CENTER DISASTER

- More than 7 years after the WTC attacks on 9/11, some children and adolescents may still be experiencing physical or mental health effects associated with the disaster.
- Due to their development, behavior, and physiology, children and adolescents are more susceptible than adults to certain adverse health effects resulting from disasters.
- Pediatricians and other child health clinicians should know how to identify, evaluate, treat and, if necessary, refer pediatric patients with potential WTC-related physical or mental health conditions.
- Physicians should also consider WTC-related health effects among young adults who were exposed as adolescents.

More than 7 years after the World Trade Center (WTC) attacks on 9/11, adverse health effects have been documented in adults and children who lived or worked in the vicinity of the World Trade Center. In 2006 and again in 2008, the New York City Department of Health and Mental Hygiene disseminated clinical guidelines for evaluating and treating adults exposed to the World Trade Center disaster ([www.nyc.gov/html/doh/downloads/pdf/chi/chi27-6.pdf](http://www.nyc.gov/html/doh/downloads/pdf/chi/chi27-6.pdf)).<sup>1</sup> In addition to adults, tens of thousands of children were also exposed, such as those living or attending school

in lower Manhattan near the World Trade Center on September 11, 2001. Like adults, these children and adolescents experienced adverse environmental exposures and potential mental health trauma from the attacks and their aftermath, yet fewer studies have characterized the range of adverse health effects they experienced as a result.<sup>2</sup> Studies have identified elevated levels of respiratory symptoms and asthma among exposed children after the event, as well as significant effects on children's mental health.<sup>3-5</sup>

Clinicians can refer children and adolescents exposed to the WTC disaster to the WTC Environmental Health Center for ongoing monitoring and treatment at no out-of-pocket cost to the patient (877-982-0107).

This Center, funded by the City of New York and the Centers for Disease Control and Prevention, provides comprehensive medical and mental health evaluation and treatment for WTC-related illness. Specialized testing including lung function testing, radiographic imaging, and developmental evaluations is also provided when indicated.



This *City Health Information* (CHI) is a review of what is known and not known about the exposures and health effects of 9/11 in children, and of basic pediatric environmental health and mental health principles. This publication will assist health care providers in identifying, evaluating, and treating symptoms related to exposure to the WTC disaster among children and provide resources for additional information and referrals. Since information on 9/11 health

impacts among adults is more complete, physicians treating children and adolescents should also reference the previously published adult clinical guidelines<sup>1</sup> for additional information. In addition, many exposed adolescents have aged into adulthood and adult treatment recommendations may be indicated. Physicians should encourage parental involvement in care plans for children under 18 and refer the child or young adult for specialized care if needed.

**TABLE 1. POSSIBLE WTC-RELATED ENVIRONMENTAL EXPOSURES AND HEALTH EFFECTS IN CHILDREN\***

Particulate Matter	Possible Source	Route	Potential Health Effects of Exposure in Children (selected examples)
Particulate matter, including pulverized concrete and glass <sup>6-8</sup>	Dust, rubble, and debris and ongoing fires at the WTC site	Inhalation, ingestion	Upper and lower respiratory (sinusitis, asthma), mucous membrane irritation
Asbestos <sup>9,10†</sup>	Used as an insulator and fire retardant on the WTC's North Tower	Inhalation	Mesothelioma
Lead <sup>11</sup>	Computer and video monitors, paint from buildings	Inhalation, ingestion of lead released into the air or deposited on outdoor and indoor surfaces, transplacental	Neurological, reduced cognitive function, hypertension, reproductive
Volatile organic compounds (VOCs) <sup>12</sup>	Released into the air as a result of burning plastics, furniture, and fuel	Inhalation, transplacental	Neurological (peripheral neuropathy, developmental), respiratory (asthma)
Polychlorinated biphenyls (PCBs) <sup>12</sup>	Coolants and lubricants in electrical transformers, capacitors, old fluorescent lighting, building materials	Inhalation, transplacental, ingestion	Cancer, behavioral effects of prenatal exposure (cognition, shortened attention span)
Dioxins <sup>12</sup>	Burning insulation, plastics, and polyvinyl chloride	Inhalation, dermal absorption, transplacental, ingestion	Dermatological, cancer, behavioral effects of prenatal exposure (cognition, shortened attention span)
Polycyclic aromatic hydrocarbons (PAHs) <sup>13</sup>	Fires at the WTC increased PAH levels in lower Manhattan for several months post-9/11	Inhalation, transplacental	Cancer, reduced fetal growth, reduced cognitive function

\*Note: This listing is intended to provide the range of possible exposure types. With the exception of the effects of lead and asbestos, chronic health effects listed are mostly based on studies of prolonged, high-level occupational exposures. Their applicability to relatively shorter-term or lower levels of exposure to children is unknown. No specific testing for these potential exposures is recommended since relevant tests would no longer detect exposure.

†Measured levels of asbestos in bulk samples in lower Manhattan were higher than comparison areas above 59th Street.<sup>14</sup>

## PHYSICAL EXPOSURES RELATED TO THE WTC ATTACK

The burning and collapse of the WTC towers and neighboring buildings released a complex mixture of irritant dust, smoke, and gaseous materials. Pulverized concrete, glass, plastic, paper, and wood produced alkaline dust,<sup>7</sup> and the dust cloud also contained heavy metals, asbestos, and other carcinogenic substances. Chemical tests suggest that dust protected from moisture in indoor environments retained its alkalinity more than outdoor dust that was exposed to rain<sup>6</sup> and therefore may have greater potential to irritate airways of exposed individuals.<sup>9</sup>

See **Table 1** for possible exposures.<sup>8-14</sup> With the exception of the effects of lead and asbestos, chronic health effects listed are mostly based on studies of prolonged, high-level occupational exposures. Their applicability to shorter-term or lower levels of exposure to children is unknown. The risk of adverse effects from these exposures increases with increasing magnitude and duration. To identify children, adolescents, and young adults who may have experienced significant exposures, clinicians can use the questions in **Table 2**.

Children may have been exposed to the initial dust cloud from the collapsing buildings or to the dust and debris that

### TABLE 2. KEY WTC EXPOSURE HISTORY QUESTIONS

**For children and adolescents with known WTC exposure, inquire about potential signs and symptoms that have been linked to WTC-related conditions.**

#### Possible WTC-related respiratory symptoms:

1. Chronic cough.
2. Heartburn, hoarseness, and throat irritation.
3. Persistent sinus condition/postnasal drip.
4. Wheezing, shortness of breath, possibly presenting as reduction in activities such as sports or running.
5. Recurrent pneumonia.

#### If unknown, ask explicitly about WTC exposure if:

- patients present with signs and symptoms that could be a consequence of exposure to harmful substances involved in WTC (**Table 1**), or
- patients present with signs and symptoms consistent with mental health conditions that occur following exposure to a disaster (**Table 3**) or present with risk factors linked to disaster-related long-term problems (**Table 4**).

#### Key questions and considerations to assess environmental exposure and effects:

1. Were you/your child in Manhattan on the streets near the World Trade Center at the time of the impact of the planes, the collapse of the towers, or shortly afterward?
2. Were you/your child showered by the cloud of debris and dust when the towers collapsed?
3. Did you/your child live or attend school in lower Manhattan in the months after September 11th?
4. Were you/your child living in a home with an adult who was exposed to the cloud of debris and dust, or who worked at the disaster site in the weeks and months following September 11th?
5. Are there other WTC-related exposures that concern you?

#### For affirmative responses to one or more of questions 1-5 above:

- a) ask specifically whether any of the above symptoms/disorders appeared or worsened following exposure,
- b) follow the guidelines described in this document for monitoring, treatment, and referral (including possible referral to the World Trade Center Environmental Health Center), and
- c) remain aware of potential long-term consequences.

If appropriate, ask a mother if she was pregnant on or after 9/11 and then ask the above questions. For affirmative responses to one or more of questions 1-5, carefully review her child's birth and developmental history.

covered homes and schools,<sup>15</sup> as well as to fumes from the fires that burned for months after the event. The speed, adequacy, and extent to which apartments were cleaned varied. Longer duration of exposure to dust or odors in the home was associated with increased risk of respiratory symptoms.<sup>16</sup> Detailed questioning about potential exposure to the dust cloud and where the child and family lived and spent time on and after 9/11 can help clarify the extent and types of exposures for a patient with potential 9/11-related health effects (**Table 2**). Most directly affected children were attending lower Manhattan schools or living in nearby residences at the time of collapse or in the months afterward, although exposures varied widely.

## GENERAL PRINCIPLES OF PEDIATRIC ENVIRONMENTAL HEALTH

Children and adolescents have specific age-related susceptibilities to environmental toxins.

### Proportionately greater exposures

- Children's "living zones" and "breathing zones" are closer to the ground than those of adults; for example, they often come in contact with grass, soil, and dust while playing. Their exposure to vapors that are heavier than air may be much greater than exposures in adults in the same environment.
- Children may also spend more time in a single place, such as the home or day care, than adults.
- Because they are growing and developing, infants and children consume more food and water per unit of weight than adults and are therefore proportionately more exposed to toxic substances ingested.
- Behaviors unique to children increase their risk for exposure: young children crawl and they normally demonstrate hand-mouth and hand-object behavior. Older children and teens may lack the judgment and experience to comprehend and avoid danger, increasing their risk of exposures.
- Because children are growing, their metabolism favors absorption of nutrients (such as calcium needed for bones and teeth) and harmful substances, such as lead, are also absorbed at a greater rate. Health effects may be increased due to children's physiological immaturity and developing organ systems.
- Children have a greater skin surface to body volume ratio than adults and are at increased risk of adverse effects from dermatologic exposures.

### Longer life expectancy

- Because children and adolescents usually live for decades after specific exposures, there is more time for the expression of adverse effects with long latency periods.

### Additional routes of exposure

- Children may be exposed to toxic substances prenatally through the placenta or through breast milk.

## PHYSICAL HEALTH EFFECTS LINKED TO THE WTC ATTACK

Many children experienced respiratory symptoms immediately after the event as a result of exposure to the dust, debris, and fumes from the collapsing towers.<sup>2,17,18</sup> These effects were seen especially among children with heavier levels of exposure, including exposure to the dust cloud on 9/11 and 9/11-related dust and damage to the home.<sup>2</sup>

The WTC Health Registry (WTCHR) collected information on 3,184 children who were under age 18 on 9/11. Two to 3 years after 9/11, parents of children who were less than 5 years old on 9/11 and enrolled in the WTC Health Registry reported twice as much newly diagnosed asthma than average levels in the northeastern United States for that age group. Other physical health symptoms commonly reported among children enrolled in the WTCHR post-9/11 included heartburn, lower respiratory symptoms, and sinus problems.<sup>2</sup> (See box on page 33 for a summary of WTCHR findings in adults.)

Self-reported rates of asthma exacerbations were elevated among all age groups in lower Manhattan and western Brooklyn in the months following the event; however, matching emergency department visits and hospitalizations only confirmed elevated rates of asthma exacerbation in western Brooklyn.<sup>18</sup> Follow-up studies are ongoing to better understand the long-term course of WTC-related asthma in both children and adults.

### Treatment of Physical Symptoms

For complete information on how to diagnose and manage asthma among children in general, see the NYC Health Department's recent CHI on asthma ([www.nyc.gov/html/doh/downloads/pdf/chi/chi27-10.pdf](http://www.nyc.gov/html/doh/downloads/pdf/chi/chi27-10.pdf)) or national asthma guidelines ([www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf](http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf)). These asthma treatment guidelines focus on the following key principles<sup>19,20</sup>:

- Initiate drug therapy based on asthma severity (intermittent or persistent); adjust therapy based on level of control.
- Prescribe an anti-inflammatory controller therapy, preferably an inhaled corticosteroid, for all patients with persistent asthma.
- Promote asthma self-management through education, joint development of treatment goals with patient and family, use of asthma action plans, and referrals to case management when available.
- Provide specific guidance to families on reducing exposure to environmental asthma triggers, especially secondhand smoke.

Most children with a history of WTC exposure and new-onset or exacerbated asthma, rhinosinusitis, or other illnesses potentially related to WTC exposure can be managed by their pediatricians. If symptoms are chronic, complex, or accompanied by mental health symptoms, pediatricians should consider referring the child to the WTC Environmental Health Center (WTC EHC) (**Resources**), which can provide a comprehensive assessment including pulmonary function testing and radiographic imaging as indicated. Children can receive combined medical and mental health care at the Center at no out-of-pocket cost.

### **WORLD TRADE CENTER HEALTH REGISTRY: PHYSICAL HEALTH FINDINGS IN ADULTS**

More studies have been published on health effects in adults exposed to the dust and particulates from 9/11 compared to the number of studies on children. New-onset upper and lower respiratory symptoms have also been described in local residents and occupants of the surrounding buildings.<sup>16,21-23</sup> Studies have documented asthma and other respiratory illnesses among rescue and recovery workers, particularly among those who arrived early to the WTC site, who worked directly on the pile, or who worked for longer durations.<sup>24-27</sup> Other common findings in exposed adults included chronic cough, chronic rhinitis, rhinosinusitis, and gastroesophageal reflux disease (GERD).<sup>1,24,26-28</sup> Some clinicians have described a triad that is typified by upper airway cough syndrome, asthma/reactive airways dysfunction syndrome (RADS), and GERD.<sup>1</sup> One study among NYC firefighters suggested that rates of sarcoidosis were elevated in the first 5 years after the attacks.<sup>29</sup> There have also been isolated case reports of other lung diseases.<sup>30-32</sup>

### **Children of Women Who Were Pregnant at the Time of the WTC Disaster**

Several studies have examined birth outcomes among children born to women who were pregnant on 9/11. These studies have found that exposure to the disaster may have impacted select birth outcomes, such as increased risk of lower birth weight, intrauterine growth restriction, or shorter length at delivery.<sup>33-35</sup> Although limited by small numbers, one study suggested that in utero exposure to elevated levels of polycyclic aromatic hydrocarbons (PAHs) in conjunction with prenatal environmental tobacco smoke exposure may have contributed to a modest reduction in cognitive development among a group of children.<sup>36</sup> More studies are ongoing, including an analysis of birth outcomes among women enrolled in the WTCHR and developmental outcome studies of children exposed in utero, who would currently be at least 7 years of age.

### **Long-term Considerations**

Dust and debris from the WTC disaster included a number of toxic and carcinogenic substances, but the long-term health effects in children and adults exposed to the WTC dust are still unknown. Many researchers are working to track potential health conditions and determine whether rates of long-term health effects are elevated among people exposed, such as sarcoidosis and cancer, including hematological malignancies that may have relatively shorter latency periods. Primary care providers should remain aware of the literature on any emerging or identified conditions and consider referral to the WTC EHC (**Resources**), so that any such associations ultimately may be identified. Specialists at the WTC EHC can offer updated information about conditions under investigation; the program does not provide general primary care services and will therefore complement rather than supplant the role of the child's primary care provider. Under New York State Public Health Law, physicians are legally mandated to report any cancer that is diagnosed or treated; please contact the New York State Cancer Registry (**Resources**).

### **MENTAL HEALTH EFFECTS LINKED TO THE WTC ATTACK**

Literature from disasters similar to 9/11 demonstrate that such events can profoundly disturb children's sense of safety and stability,<sup>37-40</sup> and that children may suffer long-term mental health effects if symptoms are not recognized and treated.<sup>41-43</sup> While few studies have documented the long-term impacts of the WTC attacks on children's mental

health, several studies suggest 9/11-related vulnerability to longer-term mental health problems, particularly if children experience other compounding traumas.<sup>44,45</sup>

An early study of NYC schoolchildren, conducted in the first 6 months after 9/11, found that 11% of children surveyed had symptoms of probable post-traumatic stress disorder (PTSD).<sup>5</sup> The same study identified a higher risk of negative mental health outcomes among children who were either directly affected by the disaster, had parents who were directly affected, or who previously suffered from PTSD or depression. Two of the elevated negative outcomes were agoraphobia (the fear of being in places from which escape might be difficult or help might not be available if needed) and separation anxiety.<sup>5,43</sup> Children with prior trauma were twice as likely to develop anxiety and depressive disorders compared to those without such history.<sup>5</sup>

A more recent study of 115 lower Manhattan preschool children identified that children with a combination of

trauma exposure prior to 9/11 and WTC-related trauma exposure had an increased risk of clinically significant behavioral problems. Preschool children with no other trauma exposure history did not experience such problems after 9/11 exposure. This suggests that children with prior trauma exposure may be in particular need of mental health services.<sup>44</sup>

### Most Common Reactions After Exposure to a Disaster

Children's reactions to a disaster depend on their perception of the event, which is determined in part by age and developmental stage. Common reactions seen in children of all ages may include<sup>46</sup>:

- **Somatic reactions** such as headaches, abdominal pain, and chest pain may occur. Referral to a mental health professional should be considered after physical causes have been excluded.
- **Anxiety symptoms** are common after a disaster. Symptoms include stomach aches, muscle aches,

## AGE-SPECIFIC REACTIONS TO A DISASTER<sup>46,47</sup>

### Preschool

This is a particularly vulnerable age group, as these children lack the verbal and conceptual skills necessary to cope with the disruption caused by a disaster. Their major fear is abandonment, to which they usually respond with increased dependency. Other responses may include:

- Aggressive behavior (eg, hitting, biting, or pinching).
- Repetitious behaviors in play (eg, reenacting the event ["post-traumatic play"] or recurring nightmares).
- Regressive behavior, such as thumb sucking, bedwetting, separation anxiety, constipation, speech difficulties (eg, stammering).
- Other reactions, such as changes in appetite, whining, and a fear of the dark or animals.

### Early school years

Regressive behavior is the most typical response in this group. Responses may include:

- Overt competition with younger siblings for parental attention, less responsible behavior, and extreme dependency.
- Aggressive/defiant behavior at home or at school, avoiding school or loss of interest and poor concentration, irritability, and problems with peers.
- Other reactions: increased whining, clinging, nightmares, and fear of the dark.

### Pre-adolescent

Peer reactions become more significant than family reactions in this age group. The child needs to feel that his/her fears are both appropriate and shared by others. Responses may include:

- Aggressive/defiant behavior: fighting, rebellion (eg, refusal to do usual chores), withdrawal, loss of interest, attention-seeking, and problems with peers at school.
- Physical problems, such as headaches, vague aches and pains, bowel problems, and psychosomatic complaints.
- Other reactions, such as changes in appetite, sleeping difficulties, and loss of interest in social activities.

### Adolescent

The main focus of this age group is their peers. Adolescents tend to be especially distressed by disruptions to their peer group activities, as well as by not being allowed to partake fully in community-based post-disaster efforts undertaken by adults. Responses may include:

- Behavioral problems: delinquency, rebellion, and risk-taking behavior such as substance use and fast driving.
- Physical problems caused or exacerbated by stress, such as headaches, amenorrhea or dysmenorrhea, and bowel problems.
- Changes in appetite and sleep disturbances.
- Other reactions, such as agitation, decrease in energy level, apathy, poor concentration, and suicidal thoughts.

**TABLE 3. MENTAL HEALTH DISORDERS ASSOCIATED WITH EXPOSURE TO A DISASTER**

Disorder	Description	Symptoms
<b>Anxiety Disorders</b>		
<b>Post-traumatic stress disorder</b> <sup>38-40,46,48</sup>	<ul style="list-style-type: none"> <li>• Most commonly associated with trauma exposure.</li> <li>• Duration of up to several years.</li> <li>• Children rarely exhibit all symptoms or develop the full disorder.</li> <li>• Delayed onset is possible.</li> <li>• Can be exacerbated by secondary exposure to the media.</li> </ul>	<ul style="list-style-type: none"> <li>• Symptoms are grouped into three major categories<sup>48</sup>:               <ul style="list-style-type: none"> <li>• Reexperience symptoms: repeated intrusive reliving of the event through play, nightmares, and events resembling initial trauma.</li> <li>• Avoidance/numbing symptoms: avoiding things and places associated with the traumatic event, difficulty remembering the event, markedly diminished interest or participation in significant activities.</li> <li>• Hyperarousal symptoms: being easily startled, irritability, sleeping problems, difficulty concentrating.</li> </ul> </li> <li>• To make a diagnosis, symptoms must be present for at least 1 month and must cause clinically significant distress or impaired functioning.</li> </ul>
<b>Generalized anxiety disorder</b> <sup>48</sup>	<ul style="list-style-type: none"> <li>• Persistent, excessive worry without a real cause.</li> <li>• Exposure-related fears persist and interfere with normal functioning.</li> </ul>	<ul style="list-style-type: none"> <li>• Frequent stomach, muscle, or headaches; difficulty swallowing (lump in the throat); trembling, twitching, sweating; irritability; inability to relax; sleep disturbance; lack of concentration; fatigue; clingy behavior including refusing to go to school; excessive and persistent worry and fear about safety.</li> <li>• Symptoms may vary and can resemble other medical conditions.</li> <li>• To make a diagnosis, symptoms must be present for at least 6 months.</li> </ul>
<b>Separation anxiety</b> <sup>48</sup>	<ul style="list-style-type: none"> <li>• Anxiety about separations, especially from a parent.</li> <li>• Normal part of child development; decreases with age.<sup>49*</sup></li> </ul>	<ul style="list-style-type: none"> <li>• Excessive anxiety about leaving the house and family members, extreme fear of being alone, refusal to attend school, nightmares about separation.</li> </ul>
<b>Agoraphobia</b> <sup>48</sup>	<ul style="list-style-type: none"> <li>• Fear of situations from which escape is difficult or help unavailable.</li> <li>• Not diagnosable as a disorder; often seen as a feature of panic disorder.</li> </ul>	<ul style="list-style-type: none"> <li>• Anxiety when outside or home alone, in crowds, on bridges, in tunnels, cars, and places from which escape is difficult, embarrassing, or impossible (eg, subway, full movie theater).</li> </ul>
<b>Panic disorder</b> <sup>48†</sup>	<ul style="list-style-type: none"> <li>• Recurrent episodes (usually lasting several minutes) of extreme and uncontrollable distress in the absence of any real danger.</li> </ul>	<ul style="list-style-type: none"> <li>• Intense fear in the absence of real danger, shortness of breath, chest pains, nausea, numbness in limbs, fear of dying, persistent worry of having recurrent episodes.</li> <li>• Symptoms of agoraphobia may or may not be present.</li> </ul>
<b>Mood Disorders</b>		
<b>Major depressive disorder</b> <sup>48</sup>	<ul style="list-style-type: none"> <li>• Serious and debilitating disorder with persistent sadness and loss of interest in activities.</li> <li>• Anxiety and behavioral disorders often precede depression in children.</li> </ul>	<ul style="list-style-type: none"> <li>• Persistent sadness, loss of interest in activities, changes in appetite/weight, difficulty sleeping or oversleeping, agitation or loss of energy, feelings of worthlessness, difficulty concentrating, recurrent thoughts of death or suicide.</li> <li>• To make a diagnosis, symptoms must impair functioning and be present for a minimum of 2 weeks.</li> </ul>
<b>Substance Use Disorders</b>		
<b>Substance abuse</b> <sup>48</sup>	<ul style="list-style-type: none"> <li>• Use of alcohol and other drugs, including illicit drugs, prescription and over-the-counter medications.</li> </ul>	<ul style="list-style-type: none"> <li>• Substance abuse is a maladaptive pattern of substance use characterized by one or more of the following within a 12-month period:               <ul style="list-style-type: none"> <li>• Failure to fulfill major role obligations.</li> <li>• Using substances in situations where it is physically hazardous.</li> <li>• Continued use despite recurrent social or interpersonal problems.</li> </ul> </li> </ul>
<b>Substance dependence</b> <sup>48</sup>		<ul style="list-style-type: none"> <li>• Substance dependence is characterized by 3 or more of the following within a 12-month period: tolerance; withdrawal; frequent or extended use; unsuccessful attempts to limit/quit use; extensive periods spent obtaining, using, or recovering from substance use; giving up or reducing important activities; continued use despite physical or psychological problem caused or made worse by substance use.</li> </ul>

\* Psychopathology should be considered if seen in older children, or if demonstrated excessively.

† Referrals are essential, as panic disorder has been linked to depression and suicide.

## TABLE 4. RISK FACTORS FOR DEVELOPING DISASTER-RELATED LONG-TERM PROBLEMS<sup>5,39,40,43,46,50-56</sup>

### Exposure to the traumatic event

#### Direct and interpersonal exposure

- The child or someone close to the child was the victim of the event.
- The child lost someone due to the event.
- The child became separated from his/her family.
- The child directly witnessed the event.
- The child feared for his/her life.
- The event disrupted or destroyed the child's home and/or community.

#### Indirect exposure

- The child witnessed the event repeatedly through the media.
- The child was exposed to secondary negative consequences of the event, eg, moving and new school.

### Characteristics of the child

- History of previous exposure to trauma(s).
- History of previous psychopathology.
- Younger age.
- Low school performance before the event.
- Subsequent exposure to trauma(s).
- Female.
- Ethnic minority.
- Poor coping skills.
- Absence of post-event assistance/help.

### Family and community environment

- Parental distress and coping difficulties.
- Adverse family events: divorce, illness, death.
- Parental psychopathology such as depression.
- Poverty.
- Lack of community/social support.

or headaches; difficulty swallowing; trembling and sweating; irritability; sleep disturbance; lack of concentration; and general fatigue. These may vary and can resemble other medical conditions; they can also be unintentionally transmitted to children by parents who may have their own symptoms of anxiety following a disaster.

## USING THE PEDIATRIC SYMPTOM CHECKLIST

The Pediatric Symptom Checklist (PSC) is a psychosocial screening tool designed to help identify children with emotional/behavioral problems. There are two versions of the PSC: the parent-completed version (PSC) and the youth self-report (Y-PSC). The Y-PSC can be administered to adolescents ages 11 and up.

**Administration:** The PSC is designed to be administered in the waiting room and scored by a receptionist or clinical aide.

**Scoring:** Each of the 35 items is rated as never=0, sometimes=1, or often=2. Items that are left blank are scored as 0. If 4 or more items are left blank, the questionnaire is considered invalid. The sum of the scores of the 35 items is the total score.

**Interpretation:** For children and adolescents ages 6 through 16 years, a total score of 28 or higher indicates need for further evaluation. For children ages 4 and 5, ignore items 6, 7, 14, and 15 and add the scores of the remaining 31 items for the total score. PSC cutoff score in this age group is 24. The cutoff score for the Y-PSC is 30 or higher.

A positive score reflects a high likelihood that a child is having significant psychosocial dysfunction. Although certain responses may suggest a diagnosis, the PSC is a screening tool and not diagnostic. If the screen is positive, the clinician should pursue a brief interview reviewing the child's major areas of functioning (school, family, activities, friends, and mood). If this brief interview supports the PSC findings, the clinician then decides whether a follow-up appointment, further evaluation, or referral is indicated.

For more information on the PSC and the Y-PSC, visit [www2.massgeneral.org/allpsych/psc/psc\\_home.htm](http://www2.massgeneral.org/allpsych/psc/psc_home.htm).

Jellinek M, Murphy JM. The Pediatric Symptom Checklist: A primary care screening tool to identify psychosocial problems. [www.dbpeds.org/articles/detail.cfm?TextID=32](http://www.dbpeds.org/articles/detail.cfm?TextID=32).

- **Sadness** is a normal and transient emotion in the aftermath of a disaster and should not be confused with symptoms of depression, which is more persistent and impairing.
- Feelings of **guilt** for surviving are common in young children who often believe that they caused the disaster. Children should be reassured that they are in no way responsible for what happened, and they should be supported in adapting and focusing on the future.



### FIGURE 1. THE PEDIATRIC SYMPTOM CHECKLIST

Date \_\_\_\_\_

Name \_\_\_\_\_

#### Pediatric Symptom Checklist (PSC)

Emotional and physical health go together in children. Because parents are often the first to notice a problem with their child’s behavior, emotions, or learning, you may help your child get the best care possible by answering these questions. Please indicate which statement best describes your child.

Please mark under the heading that best describes your child:

	Never (0)	Sometimes (1)	Often (2)
1. Complains of aches and pains	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Spends more time alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Tires easily, has little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Fidgety, unable to sit still	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Has trouble with teacher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Less interested in school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Acts as if driven by a motor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Daydreams too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Distracted easily	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Is afraid of new situations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Feels sad, unhappy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Is irritable, angry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Feels hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Has trouble concentrating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Less interested in friends	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Fights with other children	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Absent from school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. School grades dropping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Is down on him or herself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Visits the doctor with doctor finding nothing wrong	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Has trouble sleeping	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Worries a lot	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Wants to be with you more than before	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Feels he or she is bad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Takes unnecessary risks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Gets hurt frequently	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Seems to be having less fun	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Acts younger than children his or her age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Does not listen to rules	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Does not show feelings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Does not understand other people’s feelings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Teases others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Blames others for his or her troubles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Takes things that do not belong to him or her	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Refuses to share	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Total Score: \_\_\_\_\_

Does your child have any emotional or behavioral problems for which she/he needs help?  No  Yes

Are there any services that you would like your child to receive for these problems?  No  Yes

If yes, what type of services? \_\_\_\_\_

All of the above reactions are considered normal if they last no longer than a few weeks and do not lead to a significant disruption of functioning. Triggers such as the anniversary of the event, birthdays of deceased loved ones, or family holidays can all result in a recurrence of symptoms. See the box on page 34 for a description of age-specific reactions to a disaster. Providers may want to distribute this information to parents.

### **MOST COMMON MENTAL HEALTH DISORDERS AND RISK FACTORS AFTER EXPOSURE TO A DISASTER**

Mental health disorders commonly associated with children exposed to trauma, and risk factors for long-term mental health problems, are listed in **Tables 3** and **4** to help providers identify children and adolescents who need help.

### **MENTAL HEALTH TREATMENT RECOMMENDATIONS**

Pediatricians should assess the family environment, support parental involvement, and educate parents about the potential psychological impact of trauma exposure. Topics to discuss may include age-specific signs and symptoms of disaster-related stress reactions in children and adolescents, as well as the potential effects of parental reactions on their children.<sup>57</sup> Parental ability to cope with a disaster and its aftermath is an important factor influencing children's reactions.<sup>3,46,54</sup> In addition, pediatricians can counsel families to limit child and adolescent exposure to media coverage of a disaster.

Psychotherapy and pharmacotherapy alone or in combination may help children suffering from the psychological aftermath of the WTC attacks.<sup>47,57</sup> In order to provide the best treatment possible, collaboration with mental health providers is strongly encouraged. Psychotherapy is commonly used as the treatment of choice; it should only be undertaken by trained mental health specialists. The therapies available include trauma-focused cognitive behavioral therapy, shown to be effective in treating children suffering from PTSD and separation anxiety disorder. Cognitive-behavioral therapy and interpersonal therapy are both effective clinical interventions for adolescents with depression; however, no scientific data are available to confirm the effectiveness of these therapies in prepubescent and preschool children.<sup>58</sup> Pharmacotherapy, frequently used in combination with psychotherapy, can also improve treatment outcome.

Family therapy and consultation with the child's school may also be helpful, and encouraging regular eating and sleeping habits can be beneficial. The major role of pediatricians in treating children suffering from disaster-related long-term psychopathology is to encourage parental involvement and refer the child for specialized care.

### **SUMMARY OF DISASTER-RELATED MENTAL HEALTH CARE FOR CHILDREN AND ADOLESCENTS**

Providers caring for children and adolescents who have been exposed to disaster should:

1. Screen all children and adolescents during regular check-ups for general psychosocial distress. Screening tools may be helpful, such as the Pediatric Symptom Checklist (see **Figure 1** and box on page 36), which is well validated for use in primary care settings.
2. Identify symptomatic children (**Table 3**).
3. Identify children who have risk factors for developing longer-term problems (**Table 4**).
4. Consider a referral to a mental health clinician.
5. Provide appropriate treatment and/or collaborate with mental health providers to monitor treatment and recovery.
6. If symptoms persist, or exist in conjunction with medical illness, consider referring to the WTC EHC (**Resources**).
7. Promote parental engagement.

### **CONCLUSION**

Years after disaster-related exposures, children and adolescents may still experience related physical and mental health effects. Pediatricians and other clinicians have an important role in evaluating these conditions. This CHI provides information about children's special susceptibilities to environmental contaminants, such as those released during the WTC disaster and its aftermath, and the possible physical and mental health effects of the WTC disaster. It also provides information about referral resources for medical and mental health symptoms specifically related to the WTC disaster. Clinicians should monitor the scientific literature for new information about WTC-associated health effects as ongoing research may reveal additional chronic outcomes related to the disaster. ♦

## RESOURCES

### Medical Treatment Program

**World Trade Center Environmental Health Center (WTC EHC)** (Offering medical and mental health services at no cost to the patient)  
877-WTC-0107  
[www.nyc.gov/html/hhc/html/services/wtc-health-center.shtml](http://www.nyc.gov/html/hhc/html/services/wtc-health-center.shtml)

### Medical and Mental Health Referral Services

#### LIFENET

New York City Department of Health and Mental Hygiene 24 hour, 7 days a week crisis hotline and information and referral network  
English: 800-LIFENET/800-543-3638  
Spanish: 877-AYUDESE/877-298-3373  
Chinese (Asian LifeNet): 877-990-8585  
Other languages: 800-LIFENET/800-543-3638  
TTY hard of hearing 212-982-5284  
[www.mhaofnyc.org/2lifenet.html](http://www.mhaofnyc.org/2lifenet.html)

#### American Academy of Pediatrics

Referral: [www.aap.org/referral](http://www.aap.org/referral)  
Disaster preparedness policy statements for pediatricians, including those on radiation and chemical-biological terrorism:  
[www.aap.org/healthtopics/disasters.cfm](http://www.aap.org/healthtopics/disasters.cfm)

#### American Academy of Child and Adolescent Psychiatry

[www.aacap.org](http://www.aacap.org)  
202-966-7300

#### American Psychological Association

800-445-0899 (New York State)  
800-964-2000 (outside NY)  
[www.apahelpcenter.org](http://www.apahelpcenter.org)

### Mental Health Resources

**Alcoholics Anonymous (AA) World Service, Inc.**  
212-647-1680  
[www.aa.org](http://www.aa.org)

#### Substance Abuse and Mental Health Services Administration

National Drug and Alcohol Treatment Referral Routing Service  
800-662-HELP/800-662-4357  
[www.findtreatment.samhsa.gov](http://www.findtreatment.samhsa.gov)

#### The National Mental Health Center

800-789-2647 [www.samhsa.gov](http://www.samhsa.gov)

#### New York State Office of Mental Health

800-597-8481 [www.omh.state.ny.us](http://www.omh.state.ny.us)

### Registries and Other Resources

#### NYC Department of Health and Mental Hygiene 9/11 Health Web site

For updated resources and information, go to [www.nyc.gov/9-11healthinfo](http://www.nyc.gov/9-11healthinfo) or call 311 in NYC, or 212-NEW YORK/212-639-9675 outside NYC.

#### NY State Cancer Registry

The New York State Department of Health is phasing in physician reporting of cancers diagnosed and/or treated in ambulatory settings (eg, melanoma or prostate cancer). For cancer reporting forms, call 518-474-2255.

### Pediatric Environmental Health Resources

#### Mount Sinai Pediatric Environmental Health Specialty Unit

866-265-6201 [www.mssm.edu/cpm/pehsu](http://www.mssm.edu/cpm/pehsu)

#### National PEHSU network

[www.aoc.org/PEHSU](http://www.aoc.org/PEHSU)

#### ATSDR Pediatric Environment Health Training Toolkit

[www.atsdr.cdc.gov/emes/training/index.html](http://www.atsdr.cdc.gov/emes/training/index.html)

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# CLINICAL GUIDELINES FOR CHILDREN AND ADOLESCENTS EXPOSED TO THE WORLD TRADE CENTER DISASTER

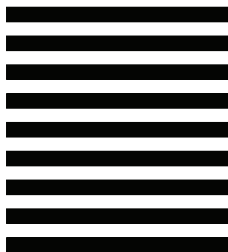
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Read this issue of *City Health Information* for the correct answers to questions. To receive continuing education credit, you must answer 4 of the first 5 questions correctly.

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## Continuing Education Activity

Clinical Guidelines for Children and Adolescents Exposed to the World Trade Center Disaster

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CITY HEALTH INFORMATION

JULY 2009

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### Objectives

At the conclusion of the activity, the participants should be able to:

1. Understand the role of pediatricians and other clinicians in the evaluation and treatment of 9/11-related physical and mental illnesses.
2. List 3 common medical and 3 common mental health conditions associated with 9/11-exposure.
3. Describe treatment and referral recommendations for asthma and post-traumatic stress disorder.

### CME Accreditation Statement

The New York City Department of Health and Mental Hygiene is accredited by the Medical Society of the State of New York to sponsor continuing medical education for physicians. The New York City Department of Health and Mental Hygiene designates this continuing medical education activity for a maximum of 1.5 AMA PRA Category 1 credit(s).™ Each physician should only claim credit commensurate with the extent of their participation in the activity.

Participants are required to submit name, address, and professional degree. This information will be maintained in the Department's CME program database. If you request, the CME Program will verify your participation and whether you passed the exam.

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**CME participants must submit the accompanying exam by July 31, 2012.**

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## CME Activity Clinical Guidelines for Children and Adolescents Exposed to the World Trade Center Disaster July 2009

### 1. Mental health disorders that may be seen in children, adolescents, and young adults with exposure to 9/11 disaster and its aftermath include the following:

- A. Major depression.
- B. Post-traumatic stress disorder.
- C. Substance use disorders.
- D. All of the above.

### 2. Self-reported rates of asthma exacerbation episodes were reported to be increased for the following groups of children:

- A. Residents of lower Manhattan.
- B. Residents of western Brooklyn.
- C. Residents of the Bronx.
- D. A and B.
- E. None of the above.

### 3. Children are more susceptible to environmental exposures than adults due to all of the following EXCEPT:

- A. They breathe more slowly than adults.
- B. They are growing, and consume more water and food per unit of weight than adults.
- C. Longer life expectancy.
- D. Behaviors unique to children, such as hand-mouth and hand-object behavior.

### 4. Role of the pediatrician in evaluating and treating WTC-exposed children or adolescents does NOT include:

- A. Screening for general psychological distress using standardized screening tools.
- B. Identifying high-risk or symptomatic children.

- C. Referring children with new-onset or exacerbated asthma potentially related to WTC exposure for comprehensive assessment, including pulmonary function testing.
- D. Providing direct psychotherapy for children suffering psychological effects of the WTC attacks.
- E. Promoting parental engagement.

### 5. Risk factors for long term mental health problems in children exposed to WTC disaster include:

- A. History of prior trauma.
- B. Low school performance prior to the event.
- C. History of previous psychopathology.
- D. All of the above.

### 6. How well did this continuing education activity achieve its educational objectives?

- A. Very well.
- B. Adequately.
- C. Poorly.

### PLEASE PRINT LEGIBLY.

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