

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

- **Due to their development, behavior and physiology, children and adolescents can be more susceptible to certain adverse health effects resulting from disasters.**
- **More than 7 years after the WTC attacks on 9/11, some children may still be experiencing physical or mental health effects associated with the disaster.**
- **Pediatricians and other child health clinicians should know how to identify, evaluate, treat and, if necessary, refer pediatric patients with potential WTC-related mental or physical health conditions.**
- **As physical and mental health conditions often co-occur, a coordinated approach to care is advised, and referral to a WTC Center of Excellence may be necessary.**

Tens of thousands of children<sup>1</sup> – ranging in age from birth through 18 years – were living or attending school in lower Manhattan near the World Trade Center (WTC) on September 11, 2001. These children and others may have experienced emotional stress and adverse environmental exposures from the attacks and their aftermath. Some exposed children developed respiratory symptoms after the event as a result of exposure to the dust, debris and fumes from the collapsing towers.<sup>2</sup> The 9/11 disaster also had significant effects on children's mental health.<sup>3,4,5</sup> A study of New York City school children found high levels of agoraphobia, probable separation anxiety, and probable post-traumatic stress disorder six months after 9/11.<sup>6</sup> Disasters like 9/11 can disturb children's sense of safety and stability,<sup>7-10</sup> and children may suffer long-term mental health effects if symptoms are not recognized and treated.<sup>11,12,13</sup> Long-term adverse mental health effects following 9/11 experienced by parents can also impact the child.

Despite limited published information on the range of adverse health effects of 9/11 on children and adolescents, physicians can benefit from a review of what is known and not known, as well as guidance on basic mental health and pediatric environmental health principles when caring for a child or teenager exposed to a disaster. This publication should help physicians and other health care providers identify, evaluate, and treat symptoms possibly related to exposure to the WTC disaster among children. In these cases, physicians should encourage parental involvement and refer the child for specialized care if needed.

## Physical Health 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>14</sup> and the dust cloud also contained heavy metals, asbestos, and other carcinogenic substances. Smoke released from the persistent fires in the following months contained hazardous and carcinogenic substances. See Table 1 for possible exposures.

Clinicians can refer children and adolescents exposed to the WTC disaster to the World Trade Center Environmental Health Center at Bellevue for free monitoring and treatment (877-982-0107).

**Table 1: Possible WTC-Related Environmental Exposures\***

	Source	Pathway of Exposure
Particulate Matter	Dust, rubble and debris, and ongoing fires at the WTC site	Inhalation, ingestion
Asbestos	Used as an insulator and fire retardant on the WTC's North Tower	Inhalation
Lead	Computer and video monitors, and rust proofing paint on steel beams	Inhalation, ingestion of lead released into the air
Volatile Organic Compounds (VOCs)	Released into the air as a result of burning paint, plastics, and furniture and fuel	Inhalation though dermal absorption may also occur
Polychlorinated Biphenyls (PCBs)	Coolants and lubricants in electrical transformers, capacitors, old fluorescent lighting	Inhalation, dermal absorption
Dioxins	Dioxins formed during the fires as a result of burning insulation, plastics, and polyvinyl chloride,	Inhalation, dermal absorption
Polycyclic aromatic hydrocarbons (PAHs)	Fires at the World Trade Center site may have increased PAH levels in lower Manhattan for several months	Inhalation

\*Note: This listing is intended to provide the range of *possible* exposure types. No specific testing for these potential exposures is recommended at this point.

Many homes and schools were damaged or covered in dust,<sup>15,16,17</sup> and the speed and extent to which apartments were cleaned varied. Asking about 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 nearby schools or living in nearby residences at the time of collapse or in the months afterward.

**Table 2. Key History Questions on environmental exposures after the WTC disaster**

- 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 afterwards?
- 2) Were you/your child showered by the cloud of debris and dust when the towers collapsed?
- 3) If your child lived or attended school in lower Manhattan in the months after September 11th, what was the condition of home or school?
- 4) Are there other WTC-related exposures that concern you?

- For children born shortly after the disaster, ask the mother about her exposure history during her pregnancy.

## Principles of Pediatric Environmental Health: Why Children and Adolescents Often Are More Susceptible to the Effects of Toxic Substances

Outlined below are some basic concepts that illustrate why children deserve special consideration in relation to the environments they occupy. Although some factors may be protective, children generally have an increased risk of exposure to and harm from environmental contaminants.

### Age-Related Susceptibility

#### Proportionately greater exposures

- As they are in the process of growing and developing, infants and children consume more food and water per unit of weight than adults, and are therefore proportionately exposed to toxic substances in food and water to a greater extent.
- Children are also at increased exposure to toxic substances in the air due to a greater metabolic need; they breathe faster than adults.
- Children have different “living zones” and “breathing zones” from adults, e.g. they often come in contact with grass, soil and dust while playing, and are exposed to any toxic substances present.
- Certain behaviors unique to children increase their risk for environmental exposure, e.g. young children naturally explore the world by crawling on the floor and ground, and they demonstrate hand-mouth, and hand-object behavior. Older children and teens, lacking judgment and experience, may not comprehend danger, increasing their risk of experiencing environmental exposures.
- They may absorb proportionally more of some nutrients (especially children with even mild nutritional deficiencies), including calcium and iron, which have a recognized relationship with the absorption of lead, a known developmental toxin.

#### Longer life expectancy

- Most children live a long time, allowing more time for the expression of adverse effects from exposures with a long latency periods (e.g. asbestos).

#### Additional routes of exposure

- Besides the usual routes of ingestion, inhalation and skin/mucous membranes, children may be exposed to toxic substances prenatally through the placenta or after they are born, through breast milk.

#### Susceptibility to the effects of toxic substances

- Health effects of harmful substances may be increased due to children’s physiological immaturity and developing organ systems.

## 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. Research on longer-term respiratory impacts

suggests that new-onset asthma and exacerbation of pre-existing asthma increased among children, especially among those with heavy dust exposure.<sup>18,19</sup> Damage and dust in the home related to 9/11 has also been associated with increased respiratory symptoms.<sup>20</sup>

The WTC Health Registry (WTCHR) was established to evaluate the physical and psychological effects of the disaster. The WTCHR enrolled more than 71,000 people most likely to have been heavily exposed to air pollutants, including 3,184 children under age 18 on 9/11. Two to three years after 9/11, asthma prevalence among WTCHR enrollees less than five years of age was higher than national estimates, and new asthma diagnoses were particularly elevated among children caught in the dust cloud for children of all age groups.<sup>21</sup> Other physical health symptoms commonly reported among children enrolled in the WTCHR post-9/11 included heartburn, lower respiratory symptoms, and sinus problems (Table 3).<sup>22</sup>

**Table 3: Symptoms and conditions that began or worsened after 9/11, by age on 9/11, among 3,184<sup>a</sup> children enrolled in the WTCHR, September 2003 through November 2004 [no. (%)].**

Symptom/characteristic	Age on 9/11 (years)			
	0–4	5–11	12–17	Total
No.	875 <sup>a</sup>	1,072 <sup>a</sup>	1,237 <sup>a</sup>	3,184 <sup>a</sup>
Injuries on 9/11				
Eye <sup>b</sup>	160 (18.3)	246 (23.0)	283 (22.7)	689 (21.6)
Any other injury <sup>c</sup>	16 (1.8)	24 (2.2)	54 (4.4)	94 (3.0)
Symptoms that began or worsened after 9/11 <sup>*</sup>				
Any respiratory symptoms	441 (50.4)	574 (53.5)	665 (53.8)	1,680 (52.8)
Shortness of breath	192 (22.6)	253 (23.9)	333 (27.3)	778 (24.9)
Cough	291 (33.8)	287 (27.1)	303 (24.8)	881 (28.1)
Sinus problems	278 (32.9)	391 (37.7)	419 (34.7)	1,088 (35.2)
Throat irritation	198 (23.4)	329 (31.5)	324 (26.7)	851 (27.4)
Wheeze	246 (28.8)	273 (25.8)	278 (22.8)	797 (25.5)
Heartburn	26 (3.1)	79 (7.5)	100 (8.2)	205 (6.6)
Ever been told by a physician that you [your child] has asthma				
Before 9/11	55 (6.4)	151 (14.2)	211 (17.2)	417 (13.2)
New asthma diagnosis after 9/11	93	53 (5.0)	34 (2.8)	180 (5.7)

(10.8)

Met criteria for post-traumatic stress symptoms (“yes” to 6/8 stress questions)<sup>d</sup>

10 (1.2) 37 (3.7) 30 (5.3) 77 (3.2)

<sup>a</sup>Denominators are children in the age category for whom the interview provides an answer to the particular question. Some interviews are missing answers to some questions.

<sup>b</sup>Most had self-limited eye irritation from particulates in the dust cloud (five missing).

<sup>c</sup>Other injuries: sprain/strain (46), cut/laceration (48), burn (13), broken bone (3), concussion (6).

<sup>d</sup>Includes individuals < 18 years of age at interview. For individuals answering six or seven of the eight questions, we imputed answers.

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<sup>e</sup>It is not clear how long after 9/11 symptoms persisted.

Uncomplicated asthma, whether the result of WTC exposure or not, can be effectively treated by most physicians. For complete information on how to appropriately diagnose and manage asthma among children, see the Health Department’s recent asthma CHI publication

(<http://www.nyc.gov/html/doh/downloads/pdf/chi/chi27-10.pdf>) or national Asthma Guidelines

(<http://www.nhlbi.nih.gov/guidelines/asthma/asthgdln.pdf>). If children do not improve, or if they have other physical health or mental health complications, consider referring the child to a WTC Center of Excellence (Resources). Follow-up studies are ongoing to better understand the long-term course of WTC-related asthma in both children and adults.

## Studies of children and pregnant women

A small number of studies on women pregnant on 9/11 have suggested that exposure to the disaster may have impacted birth outcomes, such as increased risk of lower birth weight or shorter length at delivery.<sup>23,24,25</sup> These impacts were small in magnitude and of unclear clinical significance. An analysis of birth outcomes among to women enrolled in the World Trade Center Health registry is ongoing, and should help clarify the nature of the association. These children would be at least 7 years of age currently.

In one study, researchers followed a subset of children born to WTC-exposed pregnant women to measure cognitive and motor development using the Bayley-II scales of child development. Presence of cord blood adducts (measuring PAH exposure) and *in utero* exposure to environmental tobacco smoke (ETS) were associated with a lower mental development index score when the children were 3 years old. However, neither adducts alone nor ETS alone were significant predictors of cognitive development.<sup>26</sup> Long-term implications of these findings are not clear.

## Findings in adults

More studies have been published on health effects of adults exposed to the dust and particulates from 9/11 than children. Many exposed adults experienced immediate upper respiratory problems, exacerbation of existing asthma, and acute psychological distress. Rescue and recovery workers who arrived early to the WTC site or who worked for longer durations were at greater risk for asthma and other respiratory illness than workers with lower exposure levels,<sup>27,28,29</sup> and asthma rates were also elevated among adults exposed to the cloud of dust and debris following the collapse of the towers.<sup>30</sup> Other common adult findings included: chronic cough, gastroesophageal reflux disease, laryngopharyngeal reflux disease, and chronic rhinitis and rhinosinusitis.<sup>31</sup> One study among NYC

firefighters suggests that rates of sarcoidosis were elevated in the first five years after the attacks.<sup>32</sup> There have also been isolated case reports of other lung diseases.<sup>33,34,35</sup>

### **Long-term considerations**

WTCHR and other researchers are working to determine whether children as well as adults have an increased rate of cancer. Although it is unknown whether children had sufficient exposure to result in an epidemiologically detectable increase in cancer risk, primary care providers aware of patients exposed as a child to the WTC disaster should remain aware of the literature on any emerging or identified conditions.

## **Mental Health Effects Linked to the WTC Attack and Other Disasters**

An early study of NYC schoolchildren, conducted in the first six months after 9/11, found that 11% of children surveyed had symptoms of PTSD.<sup>36</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>37,38</sup>

A 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, whereas 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 particularly in need of mental health services.<sup>39</sup>

## **The Pediatrician's Role in Providing Disaster Related Mental Health Care**

Pediatricians and other health professionals responsible for the care of children should consider the short and long-term mental health impact disasters have on children. Mental health problems in children should be identified when taking a basic pediatric history, with the parent(s) present. This includes recording any major disruptions, such as the death of a parent or serious injury or illness, as well as the child's eating and sleeping habits, school performance, and emotional and physical conduct. During the teen years, the standard of pediatric care is to interview the adolescent privately, and inquire about school performance, career goals, and substance use, sexual activity, and involvement in any form of risk-taking behavior.

By providing mental health-oriented care, pediatricians can identify and help children with prolonged disaster-related reactions associated with the WTC disaster. (8m, 15m)

### **Providing Mental Health-Oriented Care**

#### Screening

Screen all children and adolescents during regular check-ups for general psychosocial distress using standardized, general screening tools. The Pediatric Symptom Checklist ([http://www.massgeneral.org/allpsych/psc/psc\\_home.htm](http://www.massgeneral.org/allpsych/psc/psc_home.htm)) and the Strengths and Difficulties

Questionnaire <http://www.sdqinfo.com/>) are both available in the public domain and are well-validated tools for use in primary care settings.

#### Identifying high-risk children

Be aware of the risk factors associated with developing disaster-related psychopathologies (Table 4), and identify children and adolescents at a higher risk for developing long-term trauma related psychopathology.

#### Identifying symptomatic children

Be familiar with age specific signs and symptoms of post-traumatic stress, and be aware of their variation with age and developmental level; identifying children with symptoms suggestive of trauma (Table 5).

#### Making a referral

Consider a referral to the appropriate mental health service for children scoring positive on the general screen and with recurrent, persistent or worsening trauma-related symptoms, which interfere with normal functioning and development. (11m, 12m)

#### Treating and collaboration

Provide treatment when appropriate (e.g. pharmacotherapy) and/or collaborate with mental health providers to monitor treatment and recovery.

#### Promoting parental engagement

Understand the influence of family and parents on children's post-disaster coping and health, in order to effectively promote parental involvement.

### **Table 4: Risk Factors for Developing Disaster Related Long-Term Psychopathology (10,11,12,21m,22m)**

#### **Exposure to the traumatic event**

Both direct and indirect exposure increases the risk of developing a post-disaster long-term psychopathology.

##### 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, e.g. moving and new school

#### **Characteristics of the child**



Certain demographic factors and problems in pre-disaster functioning may negatively influence the child's reaction to the event.

- 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 gender
- Ethnic minority
- Poor coping skills
- Absence of post event assistance/help

### **Family and community environment**

Certain characteristics of the family and family environment can also negatively affect the child's reaction to the event.

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

## **CONSIDERING THE ROLE OF THE FAMILY AND PARENTAL ADJUSTMENT**

Parental ability to cope with a disaster and its aftermath are important factors that influence children's reactions (11, 23, 24) Pediatricians should assess the family environment, support parental involvement and also educate parents about the potential short- and long-term psychological impact of trauma exposure. Topics may include discussion about the signs and symptoms of disaster-related stress reactions in children and adolescent, and about the effects their own reactions may have on their children. (9,12,14).

Parents suffering from the long-term effects of the WTC disaster may unknowingly impact their children; they may intensify the psychological and emotional damage by being unable to control their own anxiety. A parent who is unable to cope is also unavailable to their child emotionally; this can increase the child's stress levels and can also cause them to fail to recognize their child's post-traumatic needs and symptoms (11,12). In addition, pre-existing family conditions such as domestic violence, substance abuse or other psychopathology may also decrease the parent's/family's ability to cope. (12) Pediatricians encourage traumatized parents to seek help for themselves (11, 12, 16m, 40, 41).

## **MOST COMMON PROBLEMS AFTER EXPOSURE TO A DISASTER**

Children's reactions to a disaster depend on their perception of the event; this is determined by age and developmental stage. However, there are certain reactions that are not age dependent and may be typical for any age group. (11, 12, 20m)

**Common reactions** seen in children of all ages may include:

**Somatic reactions** such as headaches, abdominal pain, and chest pain; these are normal in both children and adolescents. Referral to a mental health professional should only be considered once all physical causes have been excluded. The family should then be reassured that somatic symptoms after exposure to trauma are not necessarily signs of a physical illness and can be addressed with counseling. (12)



**Anxiety** is displayed commonly by children and adolescents. Symptoms include stomach, muscle or headaches, difficulty swallowing, trembling and sweating, irritability caused by 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 are dealing with their own symptoms of anxiety or anxiety disorders. (12)

**Sadness** is a normal and transient emotion in the aftermath of a disaster and should not be confused with the symptoms of depression. (12)

Feelings of **guilt** for surviving is common in young children who often believe that they caused the disaster. They should be reassured that they are in no way responsible for what happened, and supported in adapting and focusing on the future. (12)

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 the anniversary of the event, birthdays of deceased loved ones, or family holidays, can all result in a recurrence of symptoms.

### **Age-specific reactions**

#### **Preschool**

This is a particularly vulnerable age group, as they 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, e.g. hitting, biting, or pinching
- Repetitious behaviors in play, e.g. re-enacting the event (“post-traumatic play”) or recurring nightmares
- Regressive behavior such as thumb sucking, bed wetting, separation anxiety, constipation, enuresis, encopresis, speech difficulties, e.g. stammering
- Others reactions, e.g. changes in appetite, whining, and a fear of darkness or animals

#### **Early childhood**

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 e.g. avoiding school or loss of interest and poor concentration, irritability, problems with peers
- Others reactions, e.g. increased whining, clinging, nightmares and fear of darkness

#### **Pre-adolescent**

Peer reactions are especially significant in this age group. The child needs to feel that his/her fears are both appropriate and shared by others. Help should be targeted at lessening tensions and anxieties and possible feelings of guilt. Typical responses include:

- Aggressive/defiant behavior such as fighting, rebellion, e.g. refusal to do usual chores, withdrawal, loss of interest, attention seeking, and problems with peers at school
- Physical problems, e.g., headaches, vague aches and pains, skin eruptions, bowel problems and psychosomatic complaints

- Other reactions, e.g., changes in appetite, sleeping difficulties, loss of interest in social activities

### Adolescent

The main focus of this age group is their peers. Children of this age 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. Typical responses include:

- Behavioral problems such as delinquency and rebellion e.g. substance abuse, fast driving
- Physical problems such as headaches and tension, amenorrhea or dysmenorrhea, and psychosomatic symptoms such as rashes, bowel problems, and asthma
- Changes in appetite and sleep disturbances
- Other reactions, e.g. agitation or decrease in energy level, apathy, poor concentration, and suicidal thoughts.

## DISORDERS COMMONLY ASSOCIATED WITH EXPOSURE TO A DISASTER

Mental health disorders commonly associated with children exposed to trauma can include anxiety disorders (e.g. Post Traumatic Stress Disorder (PTSD), Generalized Anxiety Disorder (GAD), panic disorder, agoraphobia and other phobias, mood disorders (such as Major Depressive Disorder), child traumatic grief, behavioral disorders (e.g. substance use or abuse) and somatoform disorders. (17m)

The rate of PTSD was elevated among New York City school children in the first six months after 9/11.<sup>42</sup> PTSD can develop into a chronic disease or may have a delayed onset. Thus it is important to screen exposed children for PTSD and other possible mental illnesses (see center insert—to be developed).

TABLE 5: MENTAL HEALTH DISORDERS

Disorder	Description	Symptoms
<b>Anxiety Disorders</b>		
<b>PTSD</b> (12m, 18m, 24m)	<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>• Result of direct, or secondary exposure through the media</li> </ul>	<p>Symptoms<sup>43</sup> are grouped into three major categories:</p> <ul style="list-style-type: none"> <li>• <b>Re-experience symptoms:</b> e.g. repeated intrusive re-living of the event through play, nightmares and events resembling initial trauma</li> <li>• <b>Avoidance symptoms:</b> e.g. avoiding things and places associated with the traumatic event; difficulty remembering the event</li> <li>• <b>Hyperarousal symptoms:</b> e.g. being easily startled, irritability, sleeping problems, difficulty concentrating</li> </ul> <p>To make a diagnosis, symptoms must be present for at least 1 month.</p>

<b>GAD</b>	<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 head aches; 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 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>	<p>Anxiety about separations, especially from a parent:</p> <ul style="list-style-type: none"> <li>● Normal part of child development; decreases with age.<sup>44</sup></li> <li>● Psychopathology should be considered if seen in older children, or if demonstrated excessively.</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>	<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. (Ref)</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 (i.e. subway, full movie theater)</li> </ul>
<b>Panic Disorder</b>	<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> <li>● Referrals are essential, as panic disorder has been linked to depression and suicide.</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 (Ref)</li> </ul>
<b>Mood Disorders</b>		
<b>MDD</b>	<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>Behavior Disorder</b>		

<b>Substance Use Disorders</b>	Using “drugs of abuse” illegal or street drugs (e.g., marijuana, cocaine, heroin, PCP, Ecstasy, GHB); prescription medications (e.g., amphetamines, tranquilizers, pain killers) and over-the-counter or non-prescription drugs; drinking alcohol illegally and excessively.	<p><b>Substance abuse</b> is a maladaptive pattern of substance use characterized by one or more of the following within a 12-month period:</p> <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> <p><b>Substance dependence</b> is characterized by three 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.</p>
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## MEALTH HEALTH TREATMENT RECOMMENDATIONS

Psychotherapy and pharmacotherapy alone or in combination may help children suffering from the psychological aftermath of the WTC attacks.(9m) Psychotherapy is commonly used as treatment 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, and cognitive-behavioral therapy and interpersonal therapy, both effective clinical interventions for adolescents ith depression. No scientific data are available to confirm the effectiveness of these therapies in pre-pubescent and pre-school children.<sup>45</sup> Pharmacotherapy can also improve treatment outcome. For example, antidepressant medications can help adolescents manage anxiety and depression. Fluoxetine (Prozac®), a selective serotonin re-uptake inhibitor, is the only “labeled” antidepressant currently approved by the FDA for treating depression in children and adolescents. 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. In order to provide the best treatment possible, collaboration with mental health providers is also encouraged.

## The Pediatrician’s Role in Pediatric Environmental Health

Physicians and other providers have an important role in screening, evaluation, and treatment of 9/11-related conditions, as with other environmentally related diseases. In the event of exposures which occurred in the past, such as 9/11, it is sometimes challenging to determine whether a physical health condition was or was not related to the exposure, and how this might affect treatment. Resources exist for pediatricians and parents (**Resources**).

### Disease Reporting

Accurate, timely, and complete reporting is essential to monitoring and understanding the extent of WTC-related disease. Under the New York City Health Code, physicians, health care facilities, and clinical laboratories are legally mandated to report:

- Poisoning by drugs or other toxic agents including lead poisoning to be defined as a blood lead level of 10 micrograms per deciliter or higher; carbon monoxide poisoning defined as clinical signs and symptoms of carbon monoxide poisoning and/or a carboxyhemoglobin level above 10%, and confirmed or suspected pesticide poisoning
- An outbreak or suspected outbreak of any disease or condition, of known or unknown etiology, which may be a danger to public health, occurring in three or more persons
- Any unusual manifestation of a disease in an individual

Under New York State Public Health Law, physicians, health care facilities, and clinical laboratories are legally mandated to report any cancer that is diagnosed or treated; please contact the New York State Cancer Registry (**Resources**).

In the event of a future emergency, pediatricians should be alert to advice prepared and distributed by local and state health departments and federal agencies such as the CDC and EPA. This information is usually available by the web or through email and fax alert networks such as the NYC and NYS Health Alert Networks (<https://a816-healthpsi.nyc.gov/>).

## Conclusion

Years after disaster-related environmental 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. 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 Programs*

#### **World Trade Center Environmental Health Center**

(Offering free or need-based services)

*Parents who wish to make an appointment for a child whom they believe is suffering from a health problem related to WTC exposure should call the number below.*

877-WTC-0107

[www.nyc.gov/html/doh/wtc/html/treatment/centers.shtml](http://www.nyc.gov/html/doh/wtc/html/treatment/centers.shtml)

### *Mental Health Resources*

#### **LIFENET**

*New York City Department of Health and Mental Hygiene 24 hour, 7 days a week crisis hotline and information and referral network*

English: 1-800-LIFENET/1-800-543-3638

Spanish: 1-877-AYUDESE/1-877-298-3373

Chinese: (Asian LifeNet): 1-877-990-8585

Other languages: 1-800-LIFENET/1-800-543-3638

TTY hard of hearing 1-212-982-5284

[www.mhaofnyc.org/2lifenet.html](http://www.mhaofnyc.org/2lifenet.html)

#### **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)

### *Medical and Mental Health Referral Services*

#### **American Academy of Pediatrics**

[www.aap.org/referral/](http://www.aap.org/referral/)

**American Academy of Pediatrics disaster preparedness policy statements for pediatricians, including those on radiation and chemical-biological terrorism**

<http://www.aap.org/healthtopics/disasters.cfm>

#### **American Academy of Child and Adolescent Psychiatry**

<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)

**The National Mental Health Center**

800-789-2647

[www.samsa.gov](http://www.samsa.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**

**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.

**NY State Occupational Lung Disease Registry**

For occupational lung disease reporting forms, call (866) 807-2130 or go to [www.health.state.ny.us/nysdoh/lung/lung.htm](http://www.health.state.ny.us/nysdoh/lung/lung.htm)

**NYC DOHMH - World Trade Center Health Registry**

For updated resources and information, go to [www.nyc.gov/9-11healthinfo](http://www.nyc.gov/9-11healthinfo). Those without internet access can also call 212-788-9753.

**Pediatric Environmental Health Resources**

Mount Sinai Pediatric Environmental Health Specialty Unit

<http://www.mssm.edu/cpm/pehsu/>

1-866-265-6201

National PEHSU network

<http://www.aoec.org/PEHSU/>

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