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**NEWS**

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## **CHILDREN MORE VULNERABLE THAN ADULTS IN THE EVENT OF A CHEMICAL SPILL OR CHEMICAL WEAPONS ATTACK**

**LOS ANGELES (July 14, 2003)** – Children are more vulnerable than adults in the event of a chemical spill or chemical weapons attack, says Lloyd Brown, M.D., Associate Director of the Pediatrics Residency Training Program at Cedars-Sinai, and Medical Director of the hospital's C.O.A.C.H. for Kids Program. In addition, because chemical agents – unlike biological agents – have an almost instantaneous impact, immediate intervention is needed to help minimize injuries and damage. Also unlike some biological weapons, there are no vaccinations available for chemical exposure. All of this combined means that parents and teachers should know and be prepared to provide on-site “chemical” first aid for their children and students.

“Kids are at increased risk for several reasons,” says Dr. Brown.

1. Because kids are smaller than adults, it takes less of the chemical to have an adverse affect on them.
2. Kids breathe faster than adults do, so pound-for-pound they take in more air. This means that in the event of a chemical disaster, kids inhale proportionately more of the harmful chemicals.
3. Children are closer to the ground than are adults. Because many chemicals are quite “dense,” they tend to hover closer to the ground, so children breathe in a more concentrated dose.
4. Because children's skin tends to be thinner and more permeable than that of adults, harmful chemicals are more easily absorbed in kids.
5. Kids are often more prone to vomiting and diarrhea than are adults. Thus, in the event of a chemical event, they are more likely to become dehydrated faster.
6. Because kids' organs are still growing and developing, there may be greater potential for long-term organ damage when children are exposed to harmful chemicals.
7. Children are at higher risk for depression and anxiety after a chemical attack.
8. Young kids either aren't able to physically run away from an attack, or aren't developmentally mature enough to know to that they should run away to protect themselves.

(more)

Treatments for children exposed to chemical attack have not been fully developed and because of some of the differences between children and adults, even treatments for chemical exposure can carry their own risks to children. For example:

1. High-pressure hoses and cold water showers are often used to wash off, or decontaminate, victims. Because of a child's thinner skin, the child may go into shock or hypothermia from the cold water.
2. In a chemical event, emergency care providers need to wear full protective suits when treating victims. Because the suits are bulky, it is in many cases more difficult to treat very small children who might need blood draws, IV placements or other intricate procedures.
3. Antidotes that are available for some chemicals are not formulated in ready-to-give pediatric dosages.
4. Most physicians and health care workers are unaware of the management or presentation of symptoms from a chemical weapons attack or chemical release.

According to Dr. Brown, there are five main classifications of chemical weapon agents.

1. Vesicants, or blister agents, include Sulfur Mustard (Mustard Gas), Lewisite and Phosgene Oxime. Mustard Gas was first used in World War I. These chemicals can be in the form of a vapor or a liquid and may have a garlic, onion or mustard smell when released. These agents can cause very painful blisters on the skin, burning and stinging of the eyes, nausea and vomiting, cough and respiratory problems. Death can result from infection or respiratory failure.

**FIRST AID:** Rinse immediately (within 1-2 minutes of injury) with soap and water or a 0.5% hypochlorite solution (dilute household bleach to a solution of 1 part bleach to 9 parts of water). Remove contaminated clothing. Skin blisters are treated similar to blisters from burns. Eyes should be flushed with water and the victim should be instructed to wear dark sunglasses as the eyes have light sensitivity. In the event of an injury to the airway, oxygen should be given as soon as possible. The victim should also seek medical attention promptly.

2. Nerve agents include Tabun, Sarin, Soman, and VX. Nerve agents are the most potent chemicals known and can cause death, in some cases, almost instantly. Sarin was a nerve agent used by the Aum Shimrikyo cult in a Tokyo subway in 1995 that resulted in 12 deaths. These clear, colorless liquids are highly volatile. Exposure to large amounts of liquid chemicals can result in symptoms within 30 minutes. People who are exposed to small amounts of liquid may not have symptoms until up to 18 hours later. If these chemicals are inhaled, however, symptoms will be seen and felt almost instantly – within minutes or even seconds. Symptoms can include blurred vision, painful, bloodshot eyes, excessive secretions from the salivary glands and in the lungs, excessive sweating, nausea, vomiting, diarrhea, urinary & fecal incontinence, muscle twitching and respiratory problems. In children, seizures are more likely, and brain damage can occur.

**FIRST AID:** Skin exposed to nerve agents must be rinsed with soap and water or dilute bleach immediately. Contaminated clothing should be removed. The victim must seek out medical attention immediately because there are antidotes for nerve agent poisoning, which include atropine and pralidoxime chloride. Anti-seizure medications may also be needed.

3. Cyanide can present as a colorless gas, a colorless or pale blue liquid, or crystals. Cyanide is also found naturally in some plants, including some fruit seeds, is found in tobacco smoke and is used in manufacturing of textiles and plastics. Symptoms of cyanide poisoning can include dizziness, anxiety or restlessness, seizures, stoppage of breathing and irregular heartbeat. Death may occur within 6-8 minutes after exposure to a high concentration.

**FIRST AID:** Move the victim to fresh air immediately, and provide supportive care, including oxygen if available, until professional medical care is available. Antidotes for cyanide poisoning include sodium nitrite and sodium thiosulfate.

4. Pulmonary Irritants or Choking Industrial Chemicals. These agents include Chlorine, Phosgene and Diphosgene. These chemicals are widely used and available throughout the country and chemical plants are considered to pose a potentially serious threat to terrorism. Symptoms of exposure to these agents can include a sense of suffocation or intense irritation of the nose, throat and mouth, cough, wheezing and shortness of breath. The presence of Chlorine can often be detected by its very strong odor, while Phosgene smells like mowed hay – but only at very high, nearly toxic levels. These are “heavy” gases that tend to be suspended close to the ground, presenting special risks for children.

**FIRST AID:** Wash any exposed skin or eyes with water and provide supportive care until professional medical help is available. If available, and if needed, give oxygen. Wheezing can be treated with inhaled medications.

5. Riot Control Agents. The goal of these agents is to create temporary incapacitation. They can cause painful burning of the eyes and even temporary blindness. There may also be a burning sensation in the chest, mouth and throat, along with skin irritations.

**FIRST AID:** Removal of victim into fresh air. Most symptoms disappear within 30 minutes without treatment. Intensely irritated skin or eyes can be flushed with water.

According to Dr. Brown, the needs of children have not yet been taken into adequate account when preparing for terrorism, especially terrorism from chemical weapons. The following are still needed:

1. Increased antidote availability and antidote injectors specially formulated with dosages applicable to children.
2. Decontamination areas specially designed for children
3. Improved emergency department preparedness.
4. More research into the effects of chemical weapons, and their treatment, specific for the pediatric population.
5. Medical education
6. Specific guidelines for the treatment of children exposed to such weapons.

Cedars-Sinai Medical Center is one of the largest nonprofit academic medical centers in the Western United States. For the fifth straight two-year period, it has been named Southern California's gold standard in health care in an independent survey. Cedars-Sinai is internationally renowned for its diagnostic and treatment capabilities and its broad spectrum of programs and services, as well as breakthroughs in biomedical research and superlative medical education. Named one of the 100 "Most Wired" hospitals in health care in 2001, the Medical Center ranks among the top 10 non-university hospitals in the nation for its research activities.