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Children and Disaster Hazard Awareness



Blizzard Snow

- **Awareness:** Children are at greater risk of injury and death due to severe weather events. Young children are at a high risk of hypothermia. Pediatric admissions to hospitals associated with frostbite, hypothermia, and carbon monoxide poisoning should be anticipated.
- **Preparedness:** Warn community on carbon monoxide risks when using generators and alternate heating sources. Plan for workforce delays due to disrupted childcare, transportation. Assure re-warming equipment suitable for young children is in place.
- **Response:** Families with children who are dependent on medical devices are known to seek assistance from 911 and hospitals during a severe weather power outage.
- **Mitigation:** Children rely on their families, childcare providers, and schools to prepare and gather supplies prior to freezing winter storms. Health care facilities need to assure backup power and water is available and know where warming centers are in their communities.



Active Shooter

- **Awareness:** 15% of all active shooter events have occurred in schools (pre-K to 12) since 2000. In 2020 there were 113 shooting incidents and 44% of shooters were students. Shootings in communities frequently occur within proximity to schools.
- **Preparedness:** Active shooter drills in schools were associated with a 42% increase in anxiety & stress and 39% in depression. The American Academy of Pediatrics recommends that drills be conducted in a manner that does not traumatize children.
- **Response:** PsySTART Triage assists providers in allocating mental health resources to children and adults after the event. Limiting children's media exposure when an incident occurs reduces anxiety. Practice age-appropriate community messaging to reassure children.
- **Mitigation:** Stop-the-bleed training is for everyone, including middle and high school students. Hospitals need to ensure there is a practiced plan for family reunification and unaccompanied children.



Chemical Exposure

- **Awareness:** Children have a greater risk of respiratory failure and acute toxicity. Children breathe more air per body weight and have a higher body surface area that increases the absorption of toxins. Agents of the highest concern include nerve, blistering, asphyxiants, and disabling agents.
- **Preparedness:** Childcare, schools, and families should practice their plans for sheltering in place. Prehospital providers and hospitals should include children or child simulators during decontamination drills.
- **Response:** Anticipate the decontamination of children may be needed within a short period of time. Consider dry decontamination depending on the substance. Do not separate a young child from a parent. Prevent hypothermia using warmed water for decontamination. Prepare for pediatric medical countermeasure administration.
- **Mitigation:** Communities should have reliable mechanisms to alert the community to toxic exposure and communicate how to shelter in place.



Mass Casualty

- **Awareness:** Only 13% of communities have a mass casualty plan that includes children. Trauma accounts for approximately 20% of pediatric EMS encounters under normal conditions. Children are at greater risk of blunt chest and abdominal trauma, including traumatic asphyxia.
- **Preparedness:** Adopting a single standard for pediatric triage such as JumpSTART or SALT improves on-scene triage between responders. Instituting routines like Triage Tuesdays during day-to-day operations improves readiness for real-world events.
- **Response:** Children with critical trauma or burns require a regional coordinated system of response. EMS transport mutual aid, including air transport to distant pediatric regional centers, should be anticipated. Activate telemedicine consultation to support emergency department response.
- **Mitigation:** Promote Stop-the-Bleed and community CPR programs in schools. Place stop-the-bleed kits with public access defibrillators.



Cyber

- **Awareness:** Every year thousands of children become victims of cybercrime. The National Center for Missing and Exploited Children (NCMEC) [Cybertipline](#) reports included over 69 million images, videos, and other files related to child sexual exploitation.
- **Preparedness:** Secure computer networks in schools, libraries, and other areas where children gather. Train caretakers in the signs of child cybercrime.
- **Response:** As children move to online learning the need to monitor and report cybercrime events against children through appropriate law enforcement channels including the NCMEC.
- **Mitigation:** Promote programs known to reduce the risk of cybercrime of children from the FBI and National Center for Missing and Exploited Children.



Wildfire

- **Awareness:** Children are at risk of health impacts due to exposure to wildfire smoke, ash, and the chemicals from burned materials because their lungs are still growing. Children with asthma, allergies, and chronic health conditions are at the highest risk.
- **Preparedness:** Families should listen to air quality reports and evacuation orders. Families should know how to shelter in place during a smoke event. Community facilities in fire risk areas should routinely exercise evacuation and smoke mitigation plans.
- **Response:** Evacuate early prior to mandatory evacuation orders. Keep children indoors with doors and windows closed during a smoke event. Promote go-kits ready for rapid evacuation. Do not allow children to participate in clean-up.
- **Mitigation:** Consider HEPA air cleaning devices and indoor air filtration environmental controls to reduce the impact of smoke exposure. In the event of evacuation do not return home until informed it is safe by public officials.



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Hurricane

- **Awareness:** In 2020 the US experienced 30 hurricanes affecting large portions of the US. Millions of children are impacted since children are on average 25% of the population. Evacuations commonly occur requiring evacuation and sheltering.
- **Preparedness:** Hurricanes are "noticed events" and allow families with children to move out of harm's way. Children at the most risk are homeless children, families without transportation or money, children with complex medical conditions. Use AAP Hurricane Preparedness: Tips for Families materials.
- **Response:** Families with children who cannot evacuate may seek shelter, power, and support at hospitals during a hurricane. Children may become separated in mass evacuations and require reunification.
- **Mitigation:** Promote child-centric preparedness programs like Ready.gov-Kids. Assure families with children with complex needs have plans and resources to prepare.



Tornado

- **Awareness:** Most tornados occur during April and May while children are in school. Injuries and deaths to children are associated with trauma due to fractures and brain injuries due to flying/falling debris. 50% of tornado-related injuries occur during rescue, cleanup, and post-tornado activities. Children experience anxiety and fear during these events.
- **Preparedness:** Children rely on school personnel to shelter in place during a tornado. Mass casualty events involving children may occur. Facilities should prepare accordingly.
- **Response:** First medical response will rely on community responders. Facilities should expect surges of self-transported children with their families after a tornado. Secondary surges of children should be anticipated with and without parents.
- **Mitigation:** Tornados are short notice events. Children, families, and communities need to know how to rapidly seek shelter and deal with power and housing failures.



Flood

- **Awareness:** 37% of fatalities associated with flooding in the US occurred in children < 19 in 2020. Young children and those with autistic disorders may be drawn to water and are at high risk for drowning. Children may go towards a threat due to their curiosity.
- **Preparedness:** Childcare, schools, and families should have plans for flood emergencies that include sufficient food, water, and medication. Flooding is typically a noticed event and families should monitor local communications for evacuation warnings.
- **Response:** Avoid separating children during evacuation. Keep children away from rising water. Prepare to follow boil water notices. Do not let children participate in flood cleanup due to contaminated water and mold.
- **Mitigation:** Prepare children and their families that flooding disrupts power, housing, transportation and increases the risk of infectious disease. Families should know not to drive through floodwaters. Six inches of water can knock you down and two feet or water can sweep a vehicle away.



Landslide

- **Awareness:** Landslides occur in all 50 states and will impact children in the immediate area. Landslides are more prevalent in wildfire and flood-prone areas. Landslides and debris flows can occur without warning and require immediate action.
- **Preparedness:** Being prepared beforehand is the best way to help children and family members recover after landslides. Children and families should be prepared to evacuate and quickly assemble an emergency go-kit and monitor landslide warning signs.
- **Response:** Children need to be moved out of harm's way. Move to high ground if outdoors. Move away from any debris flows. Help children cope by modeling calm behavior. Facilities should be prepared to treat and support injuries that occur during and after the event.
- **Mitigation:** Landslides may be no-notice events that create a cascade of secondary consequences including power, water, and housing disruptions. Children should be included in community mitigation activities. Childcare and school settings should avoid landslide risk areas. Maintain consistent routines and family norms to support recovery.



Earthquake

- **Awareness:** Children are especially vulnerable to hazards that may present during and after earthquakes. There were 55 earthquakes of significance in the US in 2020. Earthquakes are no-notice events, cannot be predicted, and can occur at any time.
- **Preparedness:** Childcare providers, schools and families should conduct a "hazard hunt" and assure objects that may fall on children are properly secured. Electricity, gas, and water lines may need to be shut off to prevent explosions. Children should know how to drop, take cover and hold during an earthquake
- **Response:** Facilities should anticipate a surge in child traumatic injuries should be anticipated during and after an earthquake. Fracture-related, crush and head injuries are common. Activation of child reunification plans should be anticipated.
- **Mitigation:** Anticipate the need to reassure children after earthquakes and deal with the situation as calmly as possible. Return to routine as soon as possible. Promote earthquake readiness drills.



Tsunami

- **Awareness:** Children who live near US coastlines that are prone to seismic activity are at the highest risk of injury or death associated with a tsunami. Tsunami travels 20-30 miles per hour with waves 10-100 feet high causing flooding.
- **Preparedness:** Children and families under a tsunami warning should protect themselves from an earthquake and rapidly move to higher ground as far inland as possible. Do not wait to evacuate.
- **Response:** Anticipate disruption of services such as water, housing, power and activate emergency plans and kits. Prepare for boil water notices due to contaminated drinking water. Prepare for disruption in emergency services that tend to the needs of children.
- **Mitigation:** Families who live in communities at risk should learn the signs of a tsunami and should sign up for local alerts from the US Tsunami Warning System. Promote Tsunami Ready Community Recognition.



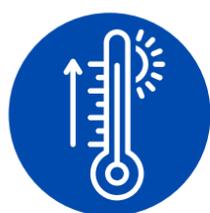
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Civil Unrest

- **Awareness:** Indirect exposure to civil unrest on the media is a significant risk for children.
- **Preparedness:** Food insecurity can occur following widespread civil unrest with the closure of grocery stores/restaurants.
- **Response:** Hospitals and communities should anticipate that children may be directly or indirectly involved in civil unrest events. Anticipate potential for a surge of children exposed to traumatic injury or chemical deterrents e.g. pepper spray. Reunification issues may arise associated with children separated during events. Institute appropriate decontamination for children exposed to pepper spray. Limit children's exposure to media. Watch with them and be open and honest with questions. Reassure safety in their environment.
- **Mitigation:** Provide reassurance and reunify separated children ASAP. Ok for child to be upset, but if child not able to recover from fears then should seek guidance from pediatrician, school counseling/mental health services



Excess Heat

- **Awareness:** Children who are left unintended in a parked car are at the greatest risk for heatstroke and possibly death. Heat-related injury/death is most common in infants and those aged > 75.
- **Preparedness:** Cooling centers during heat waves should consider the needs of children to risks of heat. Never leave children in parked cars should be heavily promoted through media centers.
- **Response:** Children 0-4 are at the greatest risk of heat related illness. Mental health issues and suicidal risks also increase during heat waves. Children with chronic lower respiratory disease are also at increased risk.
- **Mitigation:** Heat-related events are frequently associated with power brownouts and outages. Drought.gov provides resources for teachers/students and parents from a number of organizations



Pandemic Novel Viruses

- **Awareness:** Children are significantly impacted by pandemics depending on their susceptibility for infection and/or public health measures that disrupt childcare and schools.
- **Preparedness:** Surges in pediatric hospitalizations may occur as consequences of infection rates in children, mental health impacts, intentional or unintentional injury. Assure consistent public messaging in alignment with CDC and public health to include guidance for infants, children, and pregnant women.
- **Response:** Community emergency managers and the local health care system will need to play a critical role in the care of children during pandemics. Countermeasures and Points of Distribution (PODS) will need to be activated as treatment measures are made available.
- **Mitigation:** Simple public health measures such as masking, social distancing, and handwashing can significantly reduce transmission. Resources for testing and contact tracing will need to include planning for children.



Nuclear Radiologic

- **Awareness:** Children carry a lifetime risk of cancer 2-3 times general population for given radiation dose. Certain radioactive isotopes are more rapidly absorbed in growing bones of children and adolescents. Thyroids in children can accumulate more iodine leading to 8-9 times greater radiation dose in infants than adults.
- **Preparedness:** Breast milk and milk from impacted area carry a high risk of contamination and efforts should be made to find alternative sources of local & maternal breast milk for infants.
- **Response:** Ionizing radiation fallout settles to the ground increasing the risk for children with higher respiratory rates, hand-to-mouth behavior, and dietary habits. Utilize just in time mobile applications such as Radiation Emergency Medical Management (REMM) that includes guidance for children and pregnant women
- **Mitigation:** FDA limitations of radionuclide-specific agents in food by age group to prevent toxicity in children.



Volcanic Hazards

- **Awareness:** Families who live near volcanos are most at risk and may need to abandon homes and land. Children living farther away may be impacted by smoke, volcanic gas, lava flow, and ash fallout that can disrupt power, water, and transportation. Avoid low-lying areas where carbon monoxide can concentrate.
- **Preparedness:** N-95 NIOSH facemasks should be in emergency kits. Healthcare facilities in volcanic zones need to prepare for a surge of children with respiratory emergencies. Children may become separated from their parents during the event.
- **Response:** If in a lava flow zone, move to high ground and shelter in place. Obey officials during the event. Facilities should activate family reunification plans as needed.
- **Mitigation:** Promote volcano emergency teaching materials from the USGS. Promote family preparedness emergency go-kits and supplies for evacuation and sheltering. Assure families and older children are aware of community warning systems. Register with USGS Volcano Notification System (VNS)



Biologic Chemical Agents

- **Awareness:** Children's faster respiratory and metabolic rate increase susceptibility to inhaled toxins (chlorine gas). A higher surface/volume ratio makes them greater risk for cutaneous exposure (sarin). Children have hand-to-mouth tendencies increasing the risk of biological agent exposure.
- **Preparedness:** Children can rapidly decompensate when become ill, considered when using triage systems that are often designed for adults. Mobile applications such as Chemical Hazards Emergency Medical Management (CHEMM) provide guidance for children. Children play a role in transmission between child/adult with close contact.
- **Response:** Ensure antidotes for chemical agents are dosed for children and decontamination procedures include consideration for hypothermia.
- **Mitigation:** Pediatric anthrax countermeasure doxycycline administration requires crushed tablets and liquid suspension form in any hospital or regions stockpile.



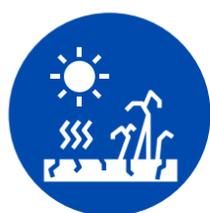
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Explosives

- **Awareness:** Children are 7 times more likely to die from blast injury than adults. In global conflicts, 70% of deaths in children due to explosive weapons compared to 15% of adults. Children are 50% more likely to be victims post-conflict due to remnants of war remaining in fields in which they are playing.
- **Preparedness:** Promote stop the bleed programs for all potential first responders. Include children in mass casualty exercises involving blast injuries. Assess the ability of your health care coalition to respond to a large scale explosive event involving children
- **Response:** Activate mass casualty plan. Prepare for children to be brought in by private vehicle. Face, head, neck, and upper limb injury in 80% of children compared to 30% of adults from explosive weapons. Child pain management is often insufficient.
- **Mitigation:** Promote first aid and stop the bleed programs for youth, child care, and school responders. Mobilize resources to reduce long-term mental health traumatic impacts for children and their families.



Drought

- **Awareness:** Droughts may increase overall hazard risk for children and increases the risk of wildfire, heat emergencies and is accompanied by an array of secondary disruptions in water and electricity. This increases the need to assure workforce and community practice family readiness and have supplies of water and food in the event of an emergency..
- **Preparedness:** Children in areas prone to drought should know how to prepare for it. Promote drought child-centric readiness activities like Weather WizKids (http://www.weatherwizkids.com/?page_id=89)
- **Response:** Facilities should activate water conservation strategies and monitor for accompanying hazards that will impact the whole community including children.
- **Mitigation:** During drought, communities may be asked to conserve water by reducing non-essential water use. Children should be included in measures to conserve water in drought including taking shorter showers, turning off the water when washing hands and brushing teeth.



Power Disruption

- **Awareness:** Be aware that power disruptions are frequently the consequence of severe weather. Be weather aware before during and after severe weather. Carbon monoxide poisoning is common during power disruptions during cold weather.
- **Preparedness:** Communities and organizations need to pre-plan for power disruption that will impact technology depended children and their families. A prolonged lack of power may impact safety net services that would support child-care and schools. Sign up for emergency alerts from your emergency. Have
- **Response:** Be prepared by gathering supplies for each household member. Anticipate a surge of children and youth who may be technology-dependent to seek resources to power for their devices and sheltering at community hospitals.
- **Mitigation:** Cooling or warming centers with backup power need to support sheltering families with children. Safe child spaces and supplies will be needed to reduce impacts.



Water Disruption

- **Awareness:** Compared to adults children drink more water/kg of body weight making them more susceptible to dehydration. Tap water can be 85% of a bottle-fed infant's diet.
- **Preparedness:** Water purification systems can be impacted during widespread power outages. Boil water notifications and bottled water deployment are likely to be needed in these events. Families should have a gallon of water per person per day.
- **Response:** Having an ample supply of clean water is a top priority in an emergency. The child-centric response may include boil water notification, deployment of bottled water. Check boiled water temperature prior to adding formula and giving it to an infant.
- **Mitigation:** CDC has instructions for the safety of drinking water for infants/ children during and after water disruption resulting in potentially unsafe drinking water. <https://www.cdc.gov/disasters/foodwater/facts.html>



Dam Failure

- **Awareness:** Hundreds of dam failures have occurred involving children and are most commonly associated with flooding or erosion. There are over 90,000 dams in the US. The average age of dams in the US is 57 years old.
- **Preparedness:** Communities with dams and levees need to prepare for the risk created to children in their communities. Rapid evacuation may be needed requiring reliable community warning systems, preplanned evacuation routes, and child-safe transportation. Family preparedness programs should include plans for children.
- **Response:** According to damsafety.org there were 53 incidents involving dams in the US resulting in 38 deaths and 18 injuries (2020). Communities with dams and levees should prepare for flooding and the need for rapid evacuation.
- **Mitigation:** The National Inventory of Dams available on the FEMA website should be reviewed by Emergency Management to understand risks to schools, childcare, and housing in the region.



Telecom Failure

- **Awareness:** Over half the children in the US have a cell phone by age 11 and many children as young as 8 communicate with a smartphone. Children with cell phones may not memorize their parent's contact information.
- **Preparedness:** Families should have a communication plan that includes emergency phone numbers and contact information. SMS messaging may be preserved during telecom failures. Children should be taught how to notify 911 in an emergency. Childcare and schools should have plans to address telecom and internet failures.
- **Response:** Activate family emergency communication plans. Activate family reception areas and reunification plans. Anticipate sheltering children if unaccompanied till they can be reunified with guardians.
- **Mitigation:** Promote Stop-the-Bleed Programs. Place stop-the-bleed kits with public access defibrillators.