HEALTH & SAFETY CONCERNS AFTER A FLOOD

Information for Medical Providers

Injury/trauma Related to floods and clean-up: After the flood, many preventable deaths can happen due to physical trauma, heart attacks, electrocution, and carbon monoxide poisoning. Injuries may come from contact with debris, moving objects, falling into manholes or sinkholes, building collapse/damage, and electrocution. Ensure same-day access to follow up **wound care/assessment** in the community. During clean-up activities, protective clothing, gloves, and a mask should be worn. Emphasize immediately washing wounds and strict wound care with anticipatory guidance about healing and infections. Ensure tetanus vaccinations to those that are not up to date and participating in clean-up activities and/or presenting for wound assessment care. Assessment of **tetanus vaccination status** is critical for trauma and wound care: https://www.idsociety.org/public-health/hurricane-resources/hurricane-resources/tetanus-in-areas/

Dermatologic conditions: "Flood rashes" are common after floods, due to contact with flood waters, debris, construction materials, chemicals, and allergens. Other noninfectious skin disorders, such as immersion foot syndromes and exacerbation of existing skin conditions are also common after floods. The rashes are most commonly red, itchy or painful **contact dermatitis**. Common irritants include fiberglass, detergents, bleach, other cleaning agents, and nitrogenous substances such as ammonia, urea, and pesticides. Exposure to industrial or farming chemicals such as fertilizers must also be considered. Employees should have access to a list of potentially hazardous chemicals at their worksite and/or employer-provided housing; employees can seek assistance from Cal/OSHA to identify and address hazards. **Trauma** to the skin is also common both during and after flood during cleaning up. **Cellulitis** and deeper skin infections typically peak 3–4 days after a flooding event but remain high in the following weeks as cleanup continues. Typical bacterial causes of cellulitis and soft-tissue infections (*Staphylococcus aureus* and *Streptococcus pyogenes*) should be considered first. There are less common water-dwelling organisms that need to be considered if the infection does not respond promptly to treatment. **Polymicrobial, nontuberculous mycobacterial, and fungal infections** must also be considered. Healthcare providers should familiarize themselves with fungal infections. Although rare, fungal infections have occurred in open wounds are exposed. Consult clinical guidelines published by the Infectious Diseases Society of America (IDSA) on the management of fungal infections. Fungal infections can be difficult to diagnose, and biopsy to confirm the mycological species and determine the presence of vascular invasion may be indicated. Treatment may include removal of foreign bodies, surgical debridement, and antifungal therapy. In immunocompromised persons, mucormycosis has high mortality rates and may present as a rapidly progressive necrotizing fasciitis that requires urgent medical and surgical intervention.

Gastrointestinal illness: After a flood, there are increased risks for outbreaks of foodborne disease and gastroenteritis due to contaminated foods, impaired cold chain and heating/cooking of foods, poor sanitation, more risky food handling practices, communal eating, and living in shelters. Breastfeeding is often safer for infant feeding when water safety is uncertain; infant feeding with formula may require access to bottled water when water safety is uncertain. Prevention should focus on hand hygiene, cleaning utensils, separating raw and cooked foods, cooking foods thoroughly, feeding foods at a safe temperature, choosing safe raw ingredients, choosing safe water for food preparation and drinking. Healthcare providers should consider foodborne and waterborne diseases, norovirus, hepatitis A, typhoid fever and other bacterial dysentery and report cases to the county public health department for investigation and outbreak management.

Respiratory illness: Due to crowding in shelters, there is a high risk for outbreaks due to COVID-19, influenza, RSV, varicella, and other respiratory viruses. Healthcare providers should report cases to the county public health department for investigation and outbreak management. Shelters should provide masks, encourage hand hygiene, connect residents to vaccination services and prompt access to prophylaxis and treatment. Dust, mold, and other allergens can cause exacerbations in chronic Obstructive Pulmonary Disease (COPD) and asthma. Patients should be proactive about mold prevention and remediation, and they should ideally wear an N95 respirator or other high-quality mask when they enter a room that smells "musty" and when they are participating in clean-up activities after the flood as listed in the CDC Respiratory Protection for Residents Reentering and/or Cleaning Homes that Were Flooded Guidance.

Zoonosis and vector-borne illness: Residents in flood zones should seek medical advice if they are having fevers or other significant symptoms, particularly if they do not rapidly improve within 1-2 days. Healthcare providers should consider zoonoses in humans after floods, especially **leptospirosis**, which is carried by a variety of animals and can present with a wide range of symptoms (high fever, headaches, chills, muscle aches, abdominal pain, vomiting, jaundice, and red eyes) and progress to complications like meningitis and liver failure without antibiotics. CDC information: https://www.cdc.gov/leptospirosis/symptoms/index.html **Rodent contact** with food supply may increase after flooding, so special attention should be pain to food storage in sealed containers and in cupboards out of reach of rodents, not leaving human food or pet food out in the open, keeping waste sealed in bins, and sealing entrances to housing to prevent rodent intrusion. Due to standing water, it is important to consider **mosquito-borne illness** that may increase after floods as well.

Carbon monoxide poisoning: CO poisoning can happen when there is gas/electric disruption, when camping stoves are used inside, and when equipment such as pressure washers and generators are used inside closed spaces without adequate ventilation – particularly during pumping and/or dehumidifying after floods. Use of damaged equipment, boilers, and heating systems increase long-term risk after flooding. The most common symptoms of CO poisoning are headache, dizziness, weakness, nausea, vomiting, chest pain, and confusion. Blood measurement for carboxyhemoglobin via arterial blood gas (ABG) may help diagnose carbon monoxide poisoning. CDC information: https://www.cdc.gov/nceh/features/copoisoning/index.html

Nitrites/nitrates poisoning: Well water should be tested for the presence of harmful chemicals. Local well water has been known to have high level of contamination with nitrates/nitrites, and this may have been worsened by flooding. Methemoglobinemia causing oxygen deprivation is the critical health effect from exposure to nitrates and nitrites. Blood measurement of methemoglobin can be obtained via arterial blood gas (ABGs) with co-oximetry. Symptoms of poisoning may include shortness of breath, difficult/rapid breathing, low exercise tolerance, lightheadedness, dizziness, fatigue, weakness, muscle tremors, incoordination, oxygen deprivation, pallor or cyanosis, abnormal heart rhythms, convulsions, and coma. Adverse effects in pregnancy may include anemia, preeclampsia, premature labor, spontaneous abortions, IUGR, and various birth defects. Infants and young children may be at greater risk of methemoglobinemia after exposure, secondary to lower stomach acidity. Infants <4 months old are more susceptible to the effects of oxygen deprivation from methemoglobinemia.

Handout for Patients: https://www.atsdr.cdc.gov/toxfaqs/tfacts204.pdf

Reference for Providers: https://www.atsdr.cdc.gov/csem/nitrate-nitrite/cover-page.html