Flood Water Displaces Rodents, Raises Infectious Disease Concerns

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Although the storm may have passed in some areas, Southern United States residents have more to worry about than cleaning up and piecing their lives back together in the aftermath of Hurricane Harvey. In addition to safety hazards, the flood waters brought by the powerful storm have increased the risk of residents contracting water-borne and vector-borne diseases. Standing water leftover as a result of the storm will become a welcome breeding ground for disease-carrying mosquitoes, and rodents that have been displaced from their homes will have closer contact with humans as they look for dry land.

To this end, we have included a list of some of the diseases residents have an increased risk of contracting below:

Hantavirus Pulmonary Syndrome (HPS)
This severe respiratory disease is caused by the hantavirus, which is spread to humans through contact (via inhalation or ingestion) with rodent droppings, urine, or saliva. Most of the cases that occur in the United States are caused by the Sin Nombre virus, transmitted mostly from the North American deer mouse (*Peromyscus maniculatus*). According to the Centers for Disease Control and Prevention (CDC), the clinical case definition of HPS is, "A febrile illness (ie, temperature > 101.0° F (> 38.3° C) characterized by bilateral diffuse interstitial edema that may radiographically resemble Acute Respiratory Disease Syndrome, with respiratory compromise requiring supplemental oxygen, developing within 72 hours of hospitalization, and occurring in a previously healthy person." The lab criteria for diagnosis includes, "detection of: hantavirus-specific immunoglobulin M or rising titers of hantavirus-specific immunoglobulin G, or hantavirus-specific ribonucleic acid sequence by polymerase chain reaction in clinical specimens, or hantavirus antigen by immunohistochemistry."

The most recent data on the CDC website indicates that the majority of hantavirus cases reported between 1993 and January 1, 2017, have been in states west of the Mississippi River, which includes the hard-hit state of Texas.

Leptospirosis

For information on this infection, please see, Hurricane Harvey Puts Health Officials on Alert for Water-Borne Infections.

Rat-Bite Fever (RBF)

Rat-bite fever (RBF) is not common in the United States; however, because it is not a notifiable disease, incidence rates are unavailable, and so the true number of infections in the United States is unknown. Much as the infection's name indicates, transmission of the RBF pathogen, *Streptobacillus moniliformis* bacillus, occurs when an individual is infected via bite, scratch, or even skin contact with an infected rodent. Although primarily transmitted by rats, the bacterium can also be transmitted via mice and gerbils. According to the CDC, after an incubation period of about 3 to 10 days, the infection causes non-specific symptoms, such as "fever, chills, myalgia, headache, and vomiting." Some patients may also experience, "a maculopapular rash on the extremities 2 to 4 days after fever onset, followed by polyarthritis in approximately 50% of patients."

If not treated, a RBF infection can lead to endocarditis, myocarditis, meningitis, pneumonia or sepsis. The mortality rate for RBF is about 7% to 13%, according to the CDC. Because it is difficult to grow *S. moniliformis* in culture, diagnosis, "requires specific media and incubation conditions." Samples are taken from either blood, synovial fluid, or other body fluids. Specific methods are described by the CDC as follows: "In the absence of a positive culture, identification of pleomorphic gram-negative bacilli in appropriate specimens supports a preliminary diagnosis. *S. minus* does not grow in artificial media. For this reason, diagnosis is made by identifying characteristic spirochetes in appropriate specimens using darkfield microscopy or differential stains. If RBF is suspected in a severe illness or death, but a diagnosis has not been made, physicians can consider requesting diagnosis assistance from their state public health laboratories."

Salmonellosis

Salmonellosis can be spread in many ways; however, from small mammals, the disease can be spread to humans via contact with their feces, or contact with an infected animal. Information for healthcare professionals and laboratories can be found on the CDC website.

Tularemia

Spread by the bacterium *Francisella tularensis*, the disease is transmitted to humans via, "tick and deer fly bites, skin contact with infected animals (such as rodents, muskrats, ground squirrels, and beavers), ingestion of contaminated water, and inhalation of contaminated aerosols or agricultural dusts," according to the CDC. There are 6 different types to infection, depending on how the bacteria enter the body. The most common is ulceroglandular, which occurs after "a tick or deer fly bite or after handing of an infected animal. A skin ulcer appears at the site where the bacteria entered the body. The ulcer is accompanied by swelling of regional lymph glands, usually in the armpit or groin," according to the CDC.

Diagnosis is made through special diagnostics completed in the lab. (Rapid diagnostic testing is not available.) Specimens should be collected from appropriate sample sites, depending on the type of infection. The treatment of choice for the infection is streptomycin. Alternate treatment choices are available on the CDC website.

To avoid these zoonotic-borne diseases, residents are urged to avoid rodents and their droppings as best they can and clean up / seal up areas that would attract them.