January 24, 2017

To: Wisconsin Health Care Providers
From: James Kazmierczak, DVM, MS, State Public Health Veterinarian
Re: Outbreak of Seoul virus (hantavirus) infections among rats and humans

This memo is to provide background and guidance regarding a recently detected outbreak of a hantaviral disease associated with contact with pet rodents from facilities in Illinois and Wisconsin.

The Wisconsin Department of Health Services, Division of Public Health (DPH) is aware of two recently confirmed cases of human illness caused by Seoul virus, which is a hantavirus. Both cases occurred in Wisconsin residents who cared for domestic rats in a rattery in northeastern Wisconsin. Additionally, six human cases have been identified among Illinois residents exposed to at least two ratties in that state. There has been considerable movement of these rats via sales and swapping of breeding stock among these rat breeding facilities, and to other ratties in both Illinois and Wisconsin.

The Seoul virus is an old world hantavirus whose reservoir is rats. Humans become infected by direct exposure to urine, droppings, or saliva from infected rodents, or exposure to dust from their bedding. Transmission may also result from bites from infected rodents. Seoul virus is not transmitted person-to-person. Human infections with this virus are rare in the United States.

Individuals who become infected with Seoul virus often exhibit relatively mild or no disease but some will develop a form of hemorrhagic fever with renal syndrome (HFRS) which can result in death in approximately 1-2% of cases. Signs and symptoms of Seoul virus infection include fever, severe headache, back and abdominal pain, chills, blurred vision, redness of the eyes, or rash. In rare cases, infection can result in HFRS. HFRS is characterized by a prodromal phase with non-specific symptoms and can progress to hypotension, oliguria, and renal failure, which often resolve following a diuretic phase. Coagulopathy and pulmonary edema are rare complications. Laboratory findings include thrombocytopenia, electrolyte abnormalities, azotemia, and proteinuria. The incubation period is typically 1 to 2 weeks, but in rare cases, may be up to 8 weeks. Clinicians are advised to ask about exposure to pet rats when gathering patient history.

The Division of Public Health is working with the CDC and local public health departments to identify and test persons who have been in contact with the implicated rat colony. Our recommendations are:

1) **Patients who are symptomatic** should have, at a minimum, a CBC (with platelet count), urinalysis, and a chemistry panel which includes BUN, creatinine, and liver transaminase levels. Additional testing and consultation with an infectious disease specialist is at your discretion.

Additionally, serum should be collected for hantavirus serology. Details regarding specimen submission can be found below.
2) **Patients who are not symptomatic** should also be offered serologic testing for hantavirus. Additional testing is at your discretion. Details regarding specimen submission can be found below. Hantavirus infections are legally notifiable in Wisconsin. Please report any suspect or confirmed infections immediately to your local public health department.

Instructions regarding submission of specimens for Seoul virus serology:

1) Serologic testing of specimens can be performed on a fee-exempt basis by the CDC, however, tests must be pre-approved by the Wisconsin DPH. Testing can be approved on epidemiologically linked persons whether or not the patient is symptomatic.

   **Note that approval of fee-exempt testing will require information regarding an epidemiologic link between the patient and an implicated rattery.** Patients are considered epidemiologically-linked if they have been in contact with rats from implicated Wisconsin rat colonies which were obtained after October 1, 2016 (after September 1 for animals from the Illinois ratteries). Contact includes direct physical contact with the rat(s) or their bedding, droppings, or urine.

   DPH epidemiologists maintain a current list of implicated ratteries. **Clinicians should gather the following exposure information from patients prior to calling DPH, or approval will be delayed:**
   - Dates of rat exposure since September 1, 2016 (or ongoing exposure)
   - Nature of rat exposure
   - Names of ratteries/facilities/breeders/sources where the rats with which the patient had contact were obtained. Only information on rats obtained since September 1, 2016 is required
   - Information on clinical signs and symptoms (if any) will also be required

   Approval for testing may also be granted for patients with highly suggestive symptoms of HFRS and a history of rat contact, regardless of whether the rat is associated with an implicated rat facility.

   Once DPH approval is granted, we will fax back an approved submission form which should accompany the specimen to the Wisconsin State Laboratory of Hygiene (WSLH).

2) The specimen of choice for submission is anticoagulated whole blood (EDTA tube). Transport on ice packs to the WSLH. Your laboratory should request hantavirus serology. The WSLH will forward the serum to CDC for testing. If the patient is currently symptomatic and your lab has the capability, please freeze the specimen and ship on dry ice so that a PCR assay can also be performed.

3) When forwarding serum for hantavirus serology, please ask your laboratory to ship to:
   - Wisconsin State Laboratory of Hygiene
   - 2601 Agriculture Drive
   - Madison, WI 53718
   - ATTN: Viral Serology

   For testing approval, or if you have questions pertaining to this letter, please call the Bureau of Communicable Diseases at (608) 267-9003 and ask to speak with an epidemiologist about hantavirus.

   Thank you for your cooperation in this matter.