

Neurocysticercosis—a Parasitic Brain Infection

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Sarah Gregory] Neurocysticercosis, which is brain infection with *Taenia solinium* larval cysts, causes substantial neurologic illness around the world. To assess the effect of neurocysticercosis in the United States, the authors reviewed hospitalization discharge data in the Nationwide Inpatient Sample for 2003 through 2012 and found an estimated 18,584 hospitalizations for neurocysticercosis and associated hospital charges totaling more than \$908 million U.S. dollars. In addition, hospitalizations and associated charges related to cysticercosis far exceeded those for malaria and were greater than those for all other neglected tropical diseases combined. Neurocysticercosis is an increasing public health concern in the United States.

Today I'm talking with author, Dr. Seth O'Neal, about his article on neurocysticercosis.

Thanks for speaking with me, Dr. O'Neal.

[Seth O'Neal] It's my pleasure, Sarah. Thanks for the invitation.

[Sarah Gregory] Tell me, what is neurocysticercosis and what causes it?

[Seth O'Neal] Neurocysticercosis is a disease that occurs when larvae of the pork tapeworm infect the human brain, forming cysts. People become infected with the larvae if they ingest eggs from the adult tapeworm, which actually lives in the human intestinal tract. These eggs are shed in feces, so the route of transmission is through fecal-oral contamination.

[Sarah Gregory] You mention epilepsy in your article. What are some of the other most common manifestations of neurocysticercosis?

[Seth O'Neal] The cysts can form anywhere within the central nervous system, so the symptoms will vary depending on the number of cysts, their location, their size, and the strength of the host immune response against them. In addition to seizures, neurocysticercosis also commonly manifests with chronic headache, hydrocephalus, encephalitis, cognitive and mental health disorders, and stroke.

[Sarah Gregory] Is this a prevalent health concern or something that affects only a few people? What impact does it have on our healthcare system?

[Seth O'Neal] Neurocysticercosis is a relatively uncommon disease among the general population in the United States. However, it does occur with greater frequency among migrant populations from Latin America, Asia, and Africa where the parasite is common. For example, Hispanics are 35 times more likely to be hospitalized for this disease in the United States, compared to non-Hispanic whites.

In this study, we found that there are about 1800 hospitalizations for neurocysticercosis in the United States each year, resulting in about \$90 million dollars in hospital charges. The number of hospitalizations and associated charges for neurocysticercosis far exceeds those for malaria and are greater than for all of the other neglected tropical diseases combined. About 40 percent of the hospital charges were billed to publicly funded insurance programs, including Medicaid and Medicare. However, the impact on the healthcare system is likely much greater. Patients with

neurocysticercosis often require long-term outpatient care or may be seen frequently in the emergency department, but we were unable to capture any of these healthcare interactions in this study.

[Sarah Gregory] You just said that the risk of hospitalization is higher among Hispanic males 20-44 years old. Why are they most often infected?

[Seth O’Neal] The disease is more common among Hispanics in the United States, in general, because our country has strong ongoing ties to Latin America through migration and travel. It’s unclear though why young males are predominantly infected. This pattern is seen in regions where the parasite is endemic as well.

[Sarah Gregory] It seems that neurocysticercosis is easily misdiagnosed. If this is the case, what does this do to the burden of medical and hospital care?

[Seth O’Neal] The diagnosis of neurocysticercosis requires visualizing the larval cysts in the brain, using either a CT scan or an MRI. These exams are expensive and clinicians may be reluctant to order them unless a patient is acutely ill, especially if the patient does not have insurance. Many clinicians are also simply unaware of the disease, which also contributes to misdiagnosis. Because of this, we suspect that the number of cases and the burden on the healthcare system are higher than we report.

Getting accurate information about the burden of neurocysticercosis in the United States is difficult because only 6 states currently require that cases are reported to public health authorities.

[Sarah Gregory] Dr. O’Neal, how can people prevent being infected if they eat pork?

[Seth O’Neal] Well, because transmission is through fecal-oral contamination, the best way to prevent being infected with neurocysticercosis is through careful hand-washing. You don’t get neurocysticercosis directly by eating pork.

[Sarah Gregory] So people can get this even if they don’t eat pork?

[Seth O’Neal] That’s right, Sarah. Even vegetarians can become infected if they ingest the eggs, so remember to wash your hands.

[Sarah Gregory] I’ve been speaking with Dr. Seth O’Neal about his article, Hospitalization Frequency and Charges for Neurocysticercosis, United States, 2003–2012. The entire article is online in the June issue of the EID journal at cdc.gov/eid.

I’m Sarah Gregory for Emerging Infectious Diseases.

[Announcer] For the most accurate health information, visit www.cdc.gov or call 1-800-CDC-INFO.