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Melioidosis Locally Endemic in Areas of the Mississippi Gulf Coast after *Burkholderia pseudomallei* Isolated in Soil and Water and Linked to Two Cases – Mississippi, 2020 and 2022

Missouri healthcare providers please contact your local public health agency or the Missouri Department of Health and Senior Services' (DHSS) Bureau of Communicable Disease Control and Prevention at [573-751-6113](tel:573-751-6113) or [800-392-0272](tel:800-392-0272) (24/7) with questions regarding this CDC Health Advisory, or to report a patient suspected of having *Burkholderia pseudomallei* infection (melioidosis).

Summary

The Centers for Disease Control and Prevention (CDC) identified the bacterium *Burkholderia pseudomallei* (*B. pseudomallei*) for the first time in the environment in the continental United States. This bacterium causes a rare and serious disease called melioidosis. *B. pseudomallei* was identified through environmental sampling of soil and water in the Gulf Coast region of southern Mississippi during an investigation of two human melioidosis cases.

It is unclear how long the bacterium has been in the environment prior to 2020 or how widespread the bacterium is in the continental United States; modeling suggests that the environmental conditions found in the Gulf Coast states are conducive to the growth of *B. pseudomallei* [1]. Extensive environmental sampling is needed to answer these questions.

This Health Alert Network (HAN) Health Advisory serves to alert clinicians and public health officials throughout the country to consider melioidosis in patients whose clinical presentation is compatible with signs and symptoms of the disease, regardless of travel history to international disease-endemic regions, as melioidosis is now considered to be locally endemic in areas of the Gulf Coast region of Mississippi.

Background

The two melioidosis patients that led to this discovery were unrelated to each other but lived in close geographical proximity to each other in the Gulf Coast region of southern Mississippi. Both had no recent travel outside of the United States. They were diagnosed with melioidosis two years apart in July 2020 and May 2022. Genomic sequencing data revealed the two patients were infected by the same novel strain from the Western Hemisphere. Both patients were hospitalized with sepsis due to pneumonia and had known risk factors for melioidosis. Blood cultures were positive for *B. pseudomallei*, and both patients recovered following appropriate antibiotic therapy.

With permission from both patients, in June 2022, the Mississippi State Department of Health and CDC collected environmental samples (soil, water, plant matter) from the patients' properties and nearby areas they frequented and household products. Three of the samples taken from soil and water from the property of the 2020 patient tested positive at CDC for *B. pseudomallei* by polymerase chain reaction (PCR) and culture. *B. pseudomallei* isolates from both patients and the environmental samples were all genetically similar and were distinct from previous known isolates, indicating bacteria from the environment was the likely source of infection for both patients and has been present in the area since at least 2020.

Burkholderia pseudomallei is a gram-negative bacterium and [Tier 1 Select Agent](#) that typically lives in soil and water in regions with tropical and subtropical climates around the world, such as South and Southeast Asia, northern Australia, parts of Central and South America, the U.S. Virgin Islands, and Puerto Rico. It can infect both animals and humans through direct contact with non-intact skin (such as cuts or wounds) or mucous membranes, inhalation, or ingestion. *B. pseudomallei* is not considered to be

transmissible via respiratory droplets in non-laboratory settings. The risk of spread from person to person is considered extremely low as there are few documented cases of person-to-person transmission; contact between damaged (non-intact) skin and contaminated soil or water is the most frequent route for natural infection. For the majority of cases, symptoms occur 1-21 days from exposure, with an average of 7 days; with a high inoculum, symptoms can develop in a few hours. In about 5% of cases, symptoms can develop from latent-activated infections well past this 21-day window, months to years later [2].

Among the average of 12 melioidosis cases reported to CDC each year, most have occurred in people with recent travel to a country where *B. pseudomallei* is known to be endemic. In the United States, a few cases of melioidosis may have been due to contact with contaminated commercial products imported from disease-endemic countries. This occurred in 2021 when a cluster of four cases in four states were linked to an imported contaminated [aromatherapy spray](#) [3].

Melioidosis may present as a localized infection, pneumonia, bacteremia, or disseminated infection and can infect any organ, including the brain. Melioidosis symptoms are nonspecific and vary depending on the type and site of infection. [Symptoms](#) may include fever, localized pain or swelling, ulceration, abscess, cough, chest pain, respiratory distress, weight loss, abdominal discomfort, muscle or joint pain, disorientation, headache, and seizures. Patients generally present with acute illness, but about 9% present with chronic infection, with symptoms lasting over two months. Chronic melioidosis cases often mimic tuberculosis clinically [4].

In regions where melioidosis is highly endemic, such as Thailand and Northern Australia, most healthy people who come into contact with *B. pseudomallei* never develop melioidosis [5-6]. People with certain conditions are at higher risk of disease when they are exposed to the bacteria. The most common underlying conditions that make a person more likely to become sick with or die from melioidosis include diabetes, excessive alcohol use, chronic lung disease, chronic kidney disease, and immunosuppressive conditions. Worldwide, 10-50% of melioidosis cases result in death [7].

Prompt diagnosis and treatment are critical. Melioidosis is confirmed by culture. Testing must be conducted by trained personnel because some automated identification methods in clinical laboratories may misidentify *B. pseudomallei* as a different bacterium (see recommendations for laboratorians). Treatment of melioidosis requires long-term antibiotic therapy (acute phase followed by eradication phase). Healthcare personnel are generally not at risk if they follow [standard precautions](#). However, laboratory personnel are at increased risk because some lab procedures may aerosolize particles and release *B. pseudomallei* into the air.

Once well-established in the soil, *B. pseudomallei* cannot feasibly be removed from the soil. Public health efforts should focus primarily on improving identification of cases so that appropriate treatment can be administered. Melioidosis is now a Nationally Notifiable Disease following a favorable vote at the 2022 CSTE conference which should enhance domestic surveillance and public health response.

Recommendations

Recommendations for Clinicians

- Learn about melioidosis and be aware of the potential for more cases as CDC and state partners continue investigating the potential geographic spread of *B. pseudomallei*.
- Consider melioidosis in patients with a [compatible illness](#) who reside in or have traveled to the Gulf Coast region of the southern United States or areas where *B. pseudomallei* has historically been endemic, especially in patients who:
 - have risk factors, such as diabetes, excessive alcohol use, chronic lung disease, or immunosuppressive conditions
 - report any occupational or recreational activities involving the handling of soil, like gardening, agriculture, or construction work

- have had recent contact with fresh water, such as swimming or fishing in lakes, ponds, or rivers.
- Report melioidosis cases to state and local health departments.
- When ordering specimen cultures to diagnose melioidosis, advise the laboratory that cultures may grow *B. pseudomallei* and that the laboratory personnel should follow all [laboratory safety precautions](#).
- Collect specimens for culture, guided by clinical syndrome from all relevant sites of infection. Culture of *B. pseudomallei* from any clinical specimen is considered diagnostic for melioidosis. Depending on the site(s) of suspected infection, recommended specimens for collection might include blood, sputum, urine, purulent exudate (from skin or internal abscesses), synovial fluid, peritoneal fluid, pericardial fluid, or cerebrospinal fluid. Throat and rectal swabs can also be collected.
- Consultation with infectious disease specialists is strongly recommended. [Treat](#) melioidosis with IV antibiotics (e.g., ceftazidime, meropenem) for at least two weeks. Depending on the response to therapy, IV treatment may be extended for up to eight weeks. Intravenous treatment is followed by oral trimethoprim-sulfamethoxazole (TMP/SMX) for three to six months to prevent relapse. Amoxicillin/clavulanic acid can be used in individuals who are unable to receive TMP/SMX [8-10].
- For clinicians with clinical inquiries, contact your state [health department](#) if you have any questions or suspect a patient may be infected with *B. pseudomallei*.

Recommendations for Laboratorians

- Laboratory automated identification algorithms (e.g., MALDI-TOF, 16s, VITEK-2) may misidentify *B. pseudomallei* as another bacterium. Consider re-evaluating patients with isolates identified on automated systems as *Burkholderia* spp. (specifically *B. cepacia* and *B. thailandensis*), *Chromobacterium violaceum*, *Ochrobactrum anthropic*, and, possibly, *Pseudomonas* spp., *Acinetobacter* spp., and *Aeromonas* spp.
- If *B. pseudomallei* is identified or an organism is suspicious for *B. pseudomallei*, contact your state or local public health department immediately. The health department should facilitate forwarding the isolate for confirmation to the closest state laboratory or a Laboratory Response Network (LRN) laboratory. State lab/LRN can facilitate sending presumptive positives to CDC for confirmation as needed.
- If an isolate is confirmed as *B. pseudomallei*, the state lab/LRN should forward the isolate to CDC for whole genome sequencing. Once isolates have been confirmed as *B. pseudomallei*, [select agent regulations](#) will apply.
- Laboratory personnel can reduce their risk of exposure by following good laboratory [practices](#). Laboratory staff who may have been exposed to *B. pseudomallei* should refer to [CDC guidance](#).
- For laboratorians with clinical inquiries, contact your state [health department](#) if you have any questions or suspect a patient may be infected with *B. pseudomallei*

Recommendations for Public Health Departments and Public Health Jurisdictions

- If *B. pseudomallei* is identified or an organism is suspicious for *B. pseudomallei*, facilitate sending the isolate for confirmation to the closest reference laboratory/[LRN laboratory](#) in your jurisdiction and initiate a public health investigation. Once the reference lab or LRN has confirmed *B. pseudomallei*, facilitate isolate submission to CDC for whole genome sequencing.
 - Ask about both international and domestic travel history when investigating a case.
- States should consider adding melioidosis to their state's reportable disease list if they have not done so already. Melioidosis is now a Nationally Notifiable Disease following a favorable vote at the 2022 CSTE conference. The updated position statement for melioidosis will be posted on the Council of State and Territorial Epidemiologists [\(CSTE\)'s website](#) very soon.

Recommendations for the Public

- If you live in or visit the Gulf Coast of Mississippi and especially if you have conditions that may put you at higher risk, such as diabetes, chronic kidney disease, chronic lung disease, or excessive alcohol use, take the following precautions to protect yourself:
 - Avoid contact with soil or muddy water, particularly after heavy rains.
 - Protect open wounds, cuts, or burns from coming into contact with soil or water by using waterproof bandages. If open wounds, cuts, or burns come into contact with soil, wash them thoroughly.
 - If you have diabetes, foot care and preventing contamination of foot or other open wounds is important. Wear footwear and use gloves when gardening or working outdoors (e.g., doing yard work, agricultural work).
 - Wear waterproof boots during and after flooding or storms if working or playing outside which can prevent infection through the feet and lower legs.
- Visit your doctor or go to the emergency room if you are ill and have [signs or symptoms](#) of melioidosis. It can be treated with antibiotics that your doctor can prescribe to you.
- If you are diagnosed with melioidosis, be sure to complete all of the antibiotics that your doctor prescribes to you so you don't get melioidosis again.
- [Drink safe water](#); do not drink water directly from shallow wells, lakes, rivers, ponds, and streams.

For More Information

- General information on [melioidosis](#)
- For urgent or technical clinical questions, contact CDC's Bacterial Special Pathogens Branch at bspb@cdc.gov or 404-639-1711 or call the CDC 24/7 Emergency Operations Center at 770-488-7100
- [How to submit samples to CDC for melioidosis testing](#)

References

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