Melioidosis in Australian wildlife

Fact Sheet

April 2024

Key points

- Melioidosis is caused by infection with the bacterium *Burkholderia pseudomallei.*
- It is endemic to tropical areas of Australia and southeast Asia.
- It has a high fatality rate in susceptible animals and humans.
- A wide range of native Australian wildlife may be susceptible, although there are only a few reports of disease.
- Melioidosis is a notifiable disease in humans in WA, NT and Qld.

Aetiology

Burkholderia pseudomallei is a soil-dwelling Gram-negative bacterium which belongs to the *Burkholderiaceae* family [1].

One Health implications

Wildlife and the environment: a range of Australian native species are susceptible to *B. pseudomallei* infection, although infection rates appear to be low, with outbreaks of melioidosis uncommon [2]. This environmental pathogen is considered endemic to tropical areas of Australia [3] but there is no evidence of population-level effects in Australian wildlife.

Domestic animals: domestic animals, including livestock, are susceptible to melioidosis. Outbreaks of melioidosis in domestic animals have occurred in southwest WA and southern Qld [3], and captive animals in zoos in the NT [4, 5].

Humans: humans are susceptible to melioidosis and it can cause fatal disease if not treated [6]. Pre-existing disease and immunosuppression can increase a person's risk of melioidosis. First Nations people are also at higher risk of melioidosis.

Natural hosts, world distribution and occurrences in Australia

Burkholderia pseudomallei is an emerging pathogen of tropical and subtropical climates and is considered ubiquitous in southeast Asia and northern Australia [7, 8]. Cases of melioidosis have been reported across all continents except Antarctica [7].

A wide range of animals (terrestrial and aquatic mammals, birds and fish) are affected by melioidosis with varying susceptibility, severity and manifestations. This includes domestic animals such as sheep, goats and swine, and a wide range of zoological animals (see Sprague and Neubauer 2004 [9] for species affected by melioidosis)[3].

A number of native species may be susceptible to melioidosis. It has been reported in wallabies, koalas (*Phascolarctos cinereus*), tree kangaroos (genus *Dendrolagus*), pinnipeds, giant white-tailed rats (*Uromys caudimaculatus*) and saltwater crocodiles (*Crocodylus porosus*) in Australia [5, 10]. There are reports of melioidosis in captive Australian dolphins overseas [11] .

Birds appear to be relatively resistant to *B. pseudomallei* infection. There have been reports of infection in the emu (*Dromaius novaehollandiae*), galah (*Eolophus roseicapilla*), sulphur-crested cockatoo (*Cacatua galerita*) and rainbow lorikeet (*Trichoglossus moluccanus*) [2, 10].

Fatal melioidosis infections in captive slender-tailed meerkats (*Suricata suricatta*) and saltwater crocodiles have been reported in the NT [4, 5].

Burkholderia pseudomallei has been isolated from the faeces of wallabies and healthy bush rats (*Rattus fuscipes*), and from within the beak of a healthy native peaceful dove (*Geopelia placida*), suggesting potential pathways for bacterial dissemination [1, 2, 12].

Serological surveys indicate exposure is taxonomically widespread in Australian native terrestrial mammals in endemic areas, although infection rates (based on serosurveys) are low [10].

Antibodies against *B. pseudomallei* have been detected in:

- eastern grey kangaroo (*Macropus giganteus*)
- western grey kangaroo (*M. fuliginosus*)
- red kangaroo (*M. rufus*)
- red-necked wallaby (*M. rufogriseus*)
- rufous bettong (*Aepyprymnus rufescens*)
- rakali (*Hydromys chrysogaster*)
- bush rat
- fawn-footed melomys (*Melomys cervinipes*)
- giant white-tailed rat
- common brushtail possum (*Trichosurus vulpecula*) [10].

Epidemiology

Burkholderia pseudomallei is an environmental pathogen and transmission is through ingestion, inhalation or contact (via skin wounds) with contaminated soil, dust particles or water. Infection is generally seasonal and most likely during periods of heavy rain, as the organism rises to the surface of the soil as water levels rise. Stress or immunocompromise may play a role in outbreaks and some species are unlikely to show clinical signs unless stressed [10].

Historically, there have been endemic sporadic melioidosis cases or clusters after climatic events (heavy rain, tsunami etc.) [13]. Recent melioidosis cases in northern Qld residents occurred following flooding and tropical cyclones in northern Qld [14, 15].

It is rare for the disease to be transmitted between people or for zoonotic transmission to occur from domestic animals to humans [3]. There are no confirmed reports of transmission from wildlife to humans.

Clinical signs and pathology

Infection with *B. pseudomallei* can have a wide range of clinical manifestations or can be latent [3]. There are few reports of disease and few descriptions of associated pathology in Australian wildlife.

In Australian tree kangaroos and wallabies, signs of melioidosis include nasal discharge, hind limb paralysis, dull appearance and sudden death. From the few reports of melioidosis in Australian birds, signs include lethargy, anorexia and diarrhoea [10]. Overseas, captive dolphins showed signs of inappetence, anorexia, pyrexia and respiratory distress before death [10]. Infected captive meerkats had necrotising skin lesions [4].

Pathological findings of melioidosis in wildlife are similar to findings in domestic species. In acute cases, septicaemia with multisystemic haemorrhage necrosis in parenchymatous organs may be present. In chronic infections, large discreet lesions may be present, which vary in size and amount of capsule and resemble abscesses but with caseous contents. Lesions are commonly found in the lung, liver, spleen and associated lymph nodes [10].

In humans, the disease causes a broad spectrum of signs, such as pneumonia, septicaemia and skin lesions [6]. General symptoms include fever, cough, chest pain, headache and respiratory distress [7]. In domestic animals, clinical signs may vary widely depending on the site of infection. General signs of melioidosis in domestic animals include fever, anorexia, swollen glands, respiratory distress, incoordination and spasms [16, 17].

Diagnosis

Melioidosis cannot be diagnosed through clinical signs alone. A definitive diagnosis requires the organism to be isolated. Samples can be collected from lesions, blood, discharge or exudate. *Burkholderia pseudomallei* can be cultured, preferably using Ashdown's medium. PCR, gene sequencing and mass spectrometry can be used for bacterial identification [16].

Treatment, prevention and control

Treatment is difficult but is undertaken in humans, pets and other valuable domestic species by use of antibiotics. In wildlife, successful treatment has been reported in an infected saltwater crocodile [10].

Prevention involves removing animals from the contaminating source, although this is not feasible for Australian wildlife. Domestic animals can be removed from soil by raising them from the ground on wooden slats, concrete or paved floors. Water supplies can be chlorinated [3].

There is no vaccine to prevent melioidosis. In endemic areas such as north Qld, WA and NT, preventive measures can assist in reducing a person's risk when working in and interacting with wet environmental conditions. See https://www.qld.gov.au/health/condition/infections-and-parasites/bacterial-infections/melioidosis, https://nt.gov.au/wellbeing/health-conditions-treatments/bacterial/melioidosis and https://health.nt.gov.au/__data/assets/pdf_file/0006/1303386/melioidosis-nt-health-factsheet.pdf for more information.

Surveillance and management

Melioidosis is a notifiable disease in humans in WA (www.health.wa.gov.au/Articles/J_M/Melioidosis), NT (https://health.nt.gov.au/public-health-notifiable-diseases/melioidosis) and Qld (www.qld.gov.au/health/condition/infections-and-parasites/bacterial-infections/melioidosis).

Melioidosis is not a notifiable disease in animals. Wildlife Health Australia is interested in hearing from anyone with information on this condition in Australia, including laboratory reports, historical datasets or survey results that could be added to the National Wildlife Health Information System. Negative data are also valuable. If you can help, please contact us at admin@wildlifehealthaustralia.com.au.

Wildlife Health Australia administers Australia's general wildlife health surveillance system, in partnership with government and non-government agencies. Wildlife health data is collected into a national database, the electronic Wildlife Health Information System (eWHIS). Information is reported by a variety of sources including government agencies, zoo based wildlife hospitals, sentinel veterinary clinics, universities, wildlife rehabilitators, and a range of other organisations and individuals. Targeted surveillance data is also collected by WHA. See the WHA website for more information https://wildlifehealthaustralia.com.au/Our-Work/Surveillance and https://wildlifehealthaustralia.com.au/Our-Work/Surveillance/eWHIS-Wildlife-Health-Information-System.

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Wildlife Health Australia recognises the Traditional Custodians of Country throughout Australia. We respectfully acknowledge Aboriginal and Torres Strait Islander peoples' continuing connection to land, sea, wildlife and community. We pay our respects to them and their cultures, and to their Elders past and present.

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