

Buruli ulcer (*Mycobacterium ulcerans*)

NSW Control guidelines for Public Health Units

Revision History			
Version	Date	Revised by	Changes
1.0	3 February 2025	Created by NSW Health	

NSW guidance

There are no Series of National Guidelines for Buruli Ulcer. This document provides NSW guidance on the surveillance and management of Buruli Ulcer (*Mycobacterium ulcerans*)

Summary

Public health priority:	Routine. Buruli ulcer is a notifiable condition, pathology services are required to notify it in writing within five days of diagnosis.
PHU response time:	Case interview should be completed within 3 working days and data entry completed same day of interview. A public health response should commence within 5 working days.
Case management:	Cases diagnosed with Buruli ulcer must be notified to the public health unit (PHU) and probable and confirmed cases must be investigated by the PHU to ascertain a potential risk exposure location.
Contact management:	<p>Potentially co-exposed persons (people living or working on the same property as place of likely acquisition) should be provided information on the signs and symptoms of Buruli ulcer and provided advice to see their general practitioner should any symptoms appear. They should be provided with education on mosquito bite prevention.</p> <p>Local media or other health alerts may be issued to notify community members of potential risk.</p> <p>Person-to-person transmission has not been established.</p>
Roles & Responsibilities:	<p>PHU: Case follow-up, case classification, data quality</p> <p>HPNSW: State-wide epidemiology and detection, support inter-jurisdictional collaboration, develop state-wide policy and guidelines</p>

Buruli ulcer, also called Bairnsdale ulcer or Daintree ulcer, is a skin condition caused by *Mycobacterium ulcerans* (*M. ulcerans*). The toxins it releases damage skin cells, small blood vessels, and the underlying fat, resulting in ulcers and skin damage. These bacteria are found in the environment and have been identified in mosquitoes, plants, and the droppings of certain possum species in areas where Buruli ulcer cases occur.

Based on the extensive experience with Buruli ulcer management in Victoria, these control guidelines have been based upon resources provided by the Victorian Department of Health and based on advice provided by the Buruli ulcer expert reference group.¹

1. The disease

Infectious agent

Mycobacterium ulcerans is a member of the *Mycobacterium* family of acid-fast bacilli (AFB). *M. ulcerans* typically causes skin ulcers, variously known as Buruli, Bairnsdale's, or Daintree ulcer.

Reservoir

The exact reservoir remains unclear. In Victoria, there is now evidence that possums (mainly ringtail but less commonly brushtail species) are a major reservoir and amplifying host.

Further information about Buruli ulcer in animals can be found from [Wildlife Health Australia](#)²

Mode of transmission

Buruli ulcer is acquired from the environment. In Victoria, there is increasing evidence that mosquitoes and possums have a role in transmitting the infection. However, it is not yet known exactly how humans become infected with the bacteria.

Despite significant research efforts in Australia and elsewhere, the environmental source and mode of transmission of *M. ulcerans* remain unclear, making it difficult to provide prevention strategies. However, both laboratory and epidemiological studies suggest that mosquitoes may play a role in transmission.

The only confirmed risk factor for contracting Buruli ulcer is being in a Buruli-endemic area (potential link). While the risk of infection is highest during the warmer months, transmission can occur year-round. Buruli ulcer is not known to spread from person to person.

Clinical presentation

Buruli ulcer usually progresses slowly over several weeks. Occasionally it can develop more rapidly. An ulcer may not be initially present.

The first sign of Buruli ulcer is usually a painless, non-tender nodule or papule. It is often thought to be an insect bite and is sometimes itchy. The lesion may occur anywhere on the body but is most common on exposed areas of the limbs. Over weeks to months, the lesion typically ulcerates, forming a characteristic ulcer with undermined edges. If it is left untreated, extensive ulceration and tissue loss can occur.

Some people initially develop a painful lump, limb swelling (oedema) or cellulitis without an ulcer. Occasionally people develop severe pain and fever.

In patients with a non-healing or persistent lesion or cellulitis that does not respond as expected to usual antibiotics, the diagnosis of Buruli ulcer should be considered, especially in those with reported exposure to an endemic area. Early recognition, diagnosis and treatment are important to minimise tissue damage.

Complications

Early recognition and diagnosis are important to minimise tissue damage and prevent disability and/or disfigurement. Although Buruli ulcer is not a common cause of ulcers in Australia, it is important that it be considered in a person experiencing a non-healing or persistent ulcer that is not responding to empiric antibiotic treatment, especially in those with reported exposure to an endemic area.

Referral for treatment to infectious diseases doctors experienced in the management of this condition is strongly recommended.

Incubation period

The average incubation period is estimated to be between 4 and 5 months (range 1 to 9 months). This is based on data from two published studies from Victoria which estimates the incubation to be 4.5 months and 4.8 months, respectively.

Infectious period

Not applicable – *M. ulcerans* is not known to be transmissible from one person to another.

Persons at increased risk of infection

The most significant risk factor for developing *M. ulcerans* is to be living in or visiting an identified Buruli-endemic area. Everyone is susceptible to infection.

Disease occurrence and public health significance

M. ulcerans has been reported in more than 30 countries worldwide, and the main burden of disease occurs in sub-Saharan Africa where large, severe disabling ulcers may result in severe contractures from extensive skin loss.

Cases of *M. ulcerans* are often highly focally distributed, with endemic and non-endemic communities often separated by only a few kilometres.

In Australia the disease exists in Far North Queensland around the Mossman area and in many parts of Victoria. *M. ulcerans* was first diagnosed in the Bairnsdale area of East Gippsland where an outbreak of 120 cases occurred in the 1940s and became known as “Bairnsdale ulcer”. Bairnsdale ulcer continues to occur in the original Bairnsdale/Gippsland Lakes area but is now more common elsewhere in Victoria and several new endemic areas have developed.

In Victoria, annual notifications have been increasing, exceeding 100 cases for the first time in 2015 and peaked in 2018 with 340 cases. Case numbers ranged from 200 to 340 cases per year since 2017. There appears to be no gender specificity, with both men and women affected. Cases occur in all age groups, with a median age of 53 years in 2017-2021. Unlike sub-Saharan Africa where the disease affects mainly children, 35% of cases were aged 65 years and older in 2017-2021 and only 8% in children under 15 years.

In 2023 a locally acquired case of Buruli ulcer was detected in NSW. Retrospective review of laboratory notifications and follow-up identified two additional cases acquired in NSW. All three cases were residents of the Batemans Bay area.

Natural infections identical to those in humans have been observed in Australia in native Australian mammals including possums, and more recently in domestic animals including dogs, cats and horses. However, at present only possums are considered a reservoir species in endemic areas in Victoria and other animals are most likely spill over hosts (like humans).

Endemic areas

Travel in the previous year to the Batemans Bay area and other parts of the south coast of NSW should be considered when investigating Buruli Ulcer cases, as well as to more established endemic areas.

The areas in Victoria where local transmission of *M. ulcerans* has occurred include:

- Bellarine Peninsula (e.g. Point Lonsdale, Barwon Heads, Ocean Grove, Queenscliff, St Leonards)
- Frankston area (e.g. Langwarrin region, Seaford region)
- Gippsland (e.g. Bairnsdale, Raymond Island, Mallacoota)
- Inner Melbourne (e.g. Brunswick West, Essendon, Moonee Ponds, Pascoe Vale South, Strathmore)
- Mornington Peninsula (e.g. Rye, Tootgarook, Hastings, Somerville)
- Philip Island (e.g. Cowes, Silverleaves, Ventnor)
- Surf Coast (e.g. Aireys Inlet)
- South-east Melbourne bayside (e.g. Beaumaris)
- Several suburbs of Geelong, including Belmont, Highton, Newtown, Wandana Heights, Grovedale and Marshall

Other interstate and overseas areas where local transmission of *M. ulcerans* has occurred include:

- Far North Queensland (Daintree, Mossman)
- Papua New Guinea
- Japan
- Sub-Saharan Africa³ (e.g. Ghana, Benin, Côte d'Ivoire, Cameroon, Congo (see: <https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/buruli-ulcer>))

2. Routine prevention activities

Simple precautionary measures for members of the public regarding prevention include:

- Reduce mosquito breeding sites around houses and other accommodation by reducing areas where water can pool (including pot plant containers, etc).
- Ensure appropriate insect screens on windows and doors on accommodation
- Avoid mosquito bites by:
 - Using personal insect repellents containing diethyltoluamide (DEET), picaridin, or oil of lemon eucalyptus
 - Covering up by wearing long-sleeved, light-coloured, loose-fitting clothing and covered footwear and socks
 - Avoiding mosquito-prone areas, especially during dusk and dawn
- In addition to the above, when gardening, working or spending time outdoors:

- Wear gardening gloves
- Protect cuts and abrasions with a dressing
- Promptly wash any new scratches or cuts you receive with soap and applying a topical antiseptic and dressing
- Exposed skin contaminated by soil or water should be washed following outdoor activities

3. Surveillance objectives

- Identify risk areas for transmission to alert the community about prevention and reduce risk of infection
- Understand and monitor the epidemiology for *M. ulcerans* with respect to time, population groups, geography and risk factors
- Guide the planning and implementation of policy, service provision, prevention and communication strategies and other public health interventions.

4. Case definition

Confirmed case:

A confirmed case requires laboratory definitive evidence AND clinical evidence.

Probable case

A probable case requires clinical evidence, laboratory suggestive evidence

Laboratory definitive evidence

1. Detection and specific identification of *M. ulcerans* by culture on a clinical specimen from a lesion/ ulcer, by a Mycobacterium Reference Laboratory (MRL)
- OR
2. Detection of *M. ulcerans* by polymerase chain reaction (PCR) targeting IS2404 directly in clinical samples from skin lesion/ ulcer
(Note: see laboratory suggestive evidence below for 'weak positive' PCR results)

Laboratory suggestive evidence

1. Histological examination of biopsied tissue demonstrates the presence of acid-fast bacilli
- OR
2. A 'weak positive' *M. ulcerans* PCR targeting IS2404 (where the cycle threshold is given, a cycle threshold of 35 or higher would be considered a weak positive result).

Clinical evidence

A clinician, experienced in the management of *M. ulcerans* infections makes a clinical diagnosis of *M. ulcerans* disease, or consults with a clinician experienced in the management of *M. ulcerans* infections to make a clinical diagnosis of *M. ulcerans* disease, including appropriate clinical follow-up to ensure a consistent clinical course

5. Data management

All probable and confirmed cases must be investigated by the PHU to ascertain a potential risk exposure location.

Clinicians and laboratories must report confirmed and probable cases within 5 days of laboratory diagnosis.

PHUs should enter cases into NCIMS within 1 working day of notification.

When entering potential exposures and data onto NCIMS, the following variable are considered minimum data requirements:

Required Data	Where to enter data in NCIMS
Place of exposure	Clinical and Risk History package
Occupation	Demographic and Risk History packages
Aboriginal or Torres Strait Islander status	Demographic package
Mosquito exposure	Risk History packages
Include any other relevant exposure information in appropriate risk history fields or notes / attachments	

6. Laboratory testing

If an ulcer is present or if a scabbed lesion can be deroofed, two dry swabs (or pre-moistened with sterile saline) from beneath the undermined edges of the lesion should be sent for staining for acid-fast bacilli, *M. ulcerans* specific (IS2404) PCR and culture. It is essential that there is visible clinical material on the swab. As the PCR for *M. ulcerans* is very sensitive and specific, a well collected swab has powerful positive and negative predictive value.

The key to accurate diagnosis is that *M. ulcerans* is found in the subcutaneous fat layer. This can only be accessed with a swab if an ulcer has already formed. Repeat testing or punch biopsy should be undertaken if initial PCR is negative, and clinician has a high clinical suspicion for Buruli ulcer.

Specimens should be tested at a Mycobacterium Reference Laboratory.

Further advice on sample collection should be sought from infectious diseases / microbiology staff, as required.

7. Case management

Response times

Upon notification of a probable, or confirmed case of Buruli ulcer, begin follow up investigation and notify the One Health Branch.

For confirmed and probable cases, the Buruli Ulcer Investigation Form (see appendices) should be completed and data transferred to NCIMS at the earliest opportunity.

Response procedure

Case investigation

The response to a notification should be carried out in collaboration with the case's health care providers. Regardless of who does the follow-up, for probable and confirmed cases, PHU staff should ensure that action has been taken to:

- Confirm the results of relevant pathology tests or recommend additional testing be done.
- Confirm onset date and symptoms of illness to identify potential exposure period
- Find out if the case or relevant caregiver has been provided the diagnosis before beginning any case interview
- Obtain travel, occupational and recreational history to identify any possible travel to endemic areas within exposure period
- Identify likely source of infection / place of exposure

If a case of Buruli ulcer is identified outside endemic areas or areas of known risk, contact the One Health Branch to discuss further.

Exposure investigation

If a case of Buruli ulcer is identified as being acquired outside an endemic area or known area of risk, ensure further investigation is undertaken to identify potential new area of risk (see 10. Special situations - Management of emerging areas of transmission)

Case treatment

Treatment of a case is the responsibility of their treating clinician. Cases with Buruli ulcer are typically cared for by infectious diseases specialists with experience managing this condition.

Local infectious diseases specialists can support general practitioners (GPs) to treat patients or to initially manage patients as they are commenced on antibiotics.

Surgery, including wound debridement, is generally reserved for specific situations and is not usually required when Buruli ulcer is diagnosed early.

Education

Cases of Buruli ulcer should be provided with the Buruli ulcer (*Mycobacterium ulcerans*) factsheet (see

Appendix 1).

It is recommended that ulcers be kept covered and thorough hand washing performed following dressing changes. Soiled dressings and other materials can be disposed of in regular clinical waste.

As mosquitoes have been implicated in disease transmission of Buruli ulcer, provide information and education to cases and the wider community to avoid mosquito bites.

Further information and resources to provide to cases and the wider community are available:

<https://www.health.nsw.gov.au/Infectious/mosquito-borne/Pages/bite-prevention.aspx>

Isolation and restriction

Not applicable.

8. Environmental Investigation

Environmental investigation

If a case of Buruli ulcer is identified outside endemic areas or areas of known risk, contact the One Health Branch to discuss further.

Environmental investigation would normally be indicated when a new, emerging, or re-emerging focus of disease is identified by surveillance and follow up of notifications or increased positive PCR tests from a local area.

Environmental investigation would normally include:

- Possum excreta survey
- Mosquito trapping and surveillance

The key insight from research in Victoria is that possum excreta (faeces) is the most likely environmental sample to test positive when investigating new foci. When areas of potential risk are identified, environmental surveillance opportunities should be considered by the Public Health Unit director in consultation with the One Health and Environmental Health Branches.

9. Contact management

Identification of contacts

Person-to-person transmission has not been demonstrated for *M. ulcerans*.

Potentially co-exposed persons (people living or working on the same property as place of likely acquisition) should be provided information on the signs and symptoms of Buruli ulcer and provided advice to see their general practitioner should any symptoms appear.

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Local media or other health alerts may be issued to notify community members of potential risk.

Prophylaxis

Not applicable.

Education

Potentially co-exposed persons (people living or working on the same property as place of likely acquisition) should be provided the same information as cases of Buruli ulcer (see Education in 7. Case management)

Isolation and restriction

Not applicable.

10. Special situations

Management of emerging areas of transmission

If surveillance or follow-up of cases indicates an emerging area of transmission or intense local clustering, the affected PHU and One Health Branch should work together to undertake a risk assessment and consider the appropriate level of response. This may include:

- Environmental investigations (see 9. Environmental management) (e.g. possum excreta survey or mosquito surveillance)
- Active case finding to identify other potential cases acquired within the area
- Liaise with relevant laboratory partners for genomic data
- Liaise with key stakeholders and experts in Buruli ulcer
- Alerts to doctors in the community (e.g. General Practitioner alerts and/ or Safety Alert Broadcast)
- Media alerts to the wider community

11. References

1. Victoria State Government; Department of Health – Mycobacterium Ulcerans; Public Health Response – July 2022
2. [Wildlife Health Australia – Buruli ulcer and Australian Wildlife: Factsheet – January 2024](#)
3. [World Health Organisation – The Global Health Observatory - Buruli ulcer](#)
4. [Australian Journal of General Practice – An overview of Buruli ulcer in Australia, Vol. 53, Issue 9, September 2024 - doi: 10.31128/AJGP-08-23-6914](#)

12. Appendices and additional information

- **Appendix 1:** [Buruli Ulcer \(Mycobacterium ulcerans\) Factsheet](#)
- **Appendix 2:** [Buruli Ulcer Investigation Form](#)