CDNA Interim guidance for diphtheria outbreak management

April 2026

Title: CDNA Interim guidance for diphtheria outbreak management

Table of Contents

Interim guidance for diphtheria outbreak management

Purpose

The purpose of this interim guidance is to provide Australian state and territory public health units responding to communicable diseases with information about responding to outbreaks of diphtheria. This guidance is intended to outline the principles underpinning intervention options and does not provide specific recommendations for every outbreak scenario.

This interim guidance has been developed and released as a priority to respond to the current situation, while the development of the Diphtheria Series of National Guidelines (SoNG) is underway.

Aboriginal and Torres Strait Islander communities

Despite the strength and resilience of Aboriginal and Torres Strait Islander peoples, colonisation and its ongoing impacts have resulted in persistent health inequities. Structural and upstream determinants, including dispossession, racism, marginalisation, and socioeconomic policy settings, have shaped living conditions across generations. These factors in turn drive downstream risks that increase susceptibility to diphtheria transmission and the likelihood of severe disease and complications.

Aboriginal and Torres Strait Islander peoples must be central to the assessment and management of diphtheria risk in their communities to ensure responses are culturally safe, contextually appropriate, and effective. Outbreak planning and responses must account for factors such as high intra- and inter-community mobility, strong household and community connectedness, existing health service capacity, competing health priorities, distance from tertiary services, high burden of comorbidities, and social determinants of health including overcrowding and poor-quality housing.

All diphtheria outbreak response activities involving Aboriginal and Torres Strait Islander communities must align with the Priority Reforms under the National Agreement on Closing the Gap. This includes shared decision-making and genuine partnerships, strengthening the Aboriginal community-controlled health organisation (ACCHO) sector, transformation of mainstream services, and data sharing at a regional level. Jurisdictional health departments are required to partner with NACCHO affiliates, and local public health units must work in partnership with local ACCHOs to plan and deliver outbreak responses.

Background

Diphtheria is a disease caused by toxin-producing *Corynebacterium diphtheriae (C. diphtheriae)*, and uncommonly *Corynebacterium ulcerans* and other toxigenic strains of *Corynebacterium*. *C. diphtheriae* is presumed to be the causative bacteria for the purposes of this interim guidance for outbreak management. *C. ulcerans* is not known to cause human to human transmission and rarely causes outbreaks.[1]

When corynebacteria are infected with a corynebacteriophage that carries the gene for the toxin, they may become toxin-producing. The toxin induces the symptoms which characterise the disease diphtheria. Infection most commonly occurs in either the respiratory tract (respiratory diphtheria) or the skin (cutaneous diphtheria). Respiratory diphtheria is characterised by significant inflammation, cervical lymphadenopathy and local tissue necrosis, which if untreated may progress to severe disease characterised by development of a pseudomembrane at the back of the throat presenting a risk for airway obstruction. Other toxin related complications include cardiomyopathy and neuropathy, which may develop some time after the acute infection has resolved. Cutaneous diphtheria is characterised by well-demarcated non-healing ulcers that may be covered in a grey-white necrotic slough sometimes giving a bluish appearance to the wound. Systemic toxic manifestations are uncommon in cutaneous diphtheria, as skin lesions tend to absorb toxin slowly which prompts a host antibody response over time.

The case fatality rate for severe respiratory diphtheria is estimated to be approximately 5-10%, even with treatment.[1] Children aged less than 5 years old are more at risk (RR of 1.5) than adults over 20 years old of dying from diphtheria.[2]

Diphtheria is a notifiable disease in Australia – the surveillance case definition currently includes toxigenic diphtheria infection with a range of severity of clinical symptoms.

Defining an outbreak

Only cases of toxigenic *C. diphtheriae* infection should be included in the assessment and declaration of an outbreak. The criteria for defining an outbreak of diphtheria may vary depending on the context. Public health units should consider the following factors in assessing whether cases constitute an outbreak:

- The baseline epidemiology for the region.
- The type of clinical presentations, i.e. whether cases have cutaneous or respiratory infections or toxin related disease.
- The temporal, geographic or genomic relationship of cases.

While a general definition of outbreak is two or more locally acquired respiratory cases linked by time and place,[3] there may be nuance in deciding whether this constitutes an outbreak. For example, sporadic cases of cutaneous diphtheria, or a cluster of cases in a single household without wider community involvement, may not be declared as an outbreak.

Decisions regarding whether current cases reflect a local outbreak in the context of Aboriginal and Torres Strait Islander communities should be informed by the expertise of local ACCHOs or other community organisations.

Outbreak response

Outbreak response focusses on case and contact management as household-like contacts are at highest risk of developing disease. Compared with asymptomatic carriage, symptomatic diphtheria infection increases bacterial shedding and poses an increased risk to exposed people.

For outbreaks which affect Aboriginal and Torres Strait Islander communities, it is essential to include appropriate Aboriginal and Torres Strait Islander stakeholders in outbreak team meetings, in developing communications, and in other decision-making processes. Early engagement, co-design and co-leadership of outbreak response activities is crucial to building a culturally safe and effective response.

Outbreak response may include:

- establishment of an outbreak management team that includes appropriate local community representation
- increased surveillance, including case finding, collecting enhanced data, and regular reporting
- case identification, treatment and protection against transmission
- contact tracing and management
- use of vaccination to prevent cases of severe disease
- communication to raise awareness amongst the community and healthcare providers and encourage up-to-date vaccination.

Case finding

Public health units should liaise with local healthcare providers and laboratory services to determine local processes for swabbing, testing, and sequencing dependent upon workload and resources. During the outbreak, the focus may shift depending on volume of requested testing and capacity. For example, contacts of respiratory cases may be prioritised to those who are symptomatic for testing, similarly clearance testing may be adjusted based on local circumstances and demonstrated antibiotic effectiveness. Approaches should be responsive and adaptive. Screening of asymptomatic people who are not contacts of cases has not been demonstrated to contribute to the control of diphtheria and is not recommended.[1]

It is important during an outbreak of diphtheria to remind healthcare providers to continue to look for and treat more common skin and throat pathogens, such as Group A streptococcus and staphylococcus according to local protocols.

Case management

Respiratory diphtheria

Diphtheria antitoxin (DAT)

People with respiratory diphtheria must be urgently assessed for their risk for and evidence of severe disease, particularly if unvaccinated. Severe disease is characterised by any of the following:

- significant neck swelling ("bull neck" associated with lymphadenopathy)
- presence of a pseudomembrane in the pharynx
- difficulty breathing
- signs of sepsis.

Prompt administration of DAT is the most effective treatment for severe disease. DAT works by binding and neutralising toxin before it reaches and binds to tissues, so earlier administration provides more effective treatment. It cannot remove toxin that is already bound.

The use of DAT should be discussed with an infectious diseases specialist and should only be provided in an acute care setting. Public health units may need to assist with obtaining DAT if it is requested. Routine sensitivity testing prior to administration of DAT is no longer universally recommended for people with confirmed diphtheria or high clinical suspicion of diphtheria.[4] See WHO Guideline: Clinical management of diphtheria for more information.

Antibiotic therapy

Appropriate antibiotic therapy is important to eliminate the bacteria, halt toxin production, and reduce transmission. Antibiotic therapy reduces the average duration of infectiousness by as much as two weeks.[2]

Due to increasing resistance to penicillin, macrolide antibiotics such as azithromycin or erythromycin may be preferred. Refer to the Therapeutic Guidelines (eTG) Diphtheria | Therapeutic Guidelines and seek advice on locally relevant antimicrobial data and management from an infectious diseases specialist or specialist with equivalent skills.

Infection prevention and control

People with severe disease or complications should be managed in a healthcare setting where supportive airway and other management can be provided. People with non-severe disease may be managed in community. Standard, contact and droplet precautions should be used in healthcare settings when caring for people with respiratory diphtheria. Droplet and contact precautions should remain in place until clearance has occurred (see below).

Exclusion and isolation

Where possible, cases should receive clearance testing, with two nasopharyngeal and/or throat swabs taken at least 24 hours after cessation of appropriate antibiotic

therapy and at least 24 hours apart. People must be excluded from work, school, and childcare until they have returned two negative test results if they receive clearance testing.

Where clearance testing is challenging due to factors such as the size of the outbreak, limited laboratory capacity, remote location, or difficulty following up cases, public health units should rationalise clearance testing based on the context of the outbreak response. This may include prioritising severe cases, or those working in or attending settings with high risk of exposure or vulnerable people for example. All cases should be advised to avoid contact where possible with people beyond their household at least for the duration of their antibiotic course.

Vaccination of respiratory diphtheria cases

Infection does not always lead to immunity against diphtheria. Vaccination using an age-appropriate diphtheria-containing vaccine should be given during convalescence.

- For people who have completed their primary course: give one dose if greater than 12 months since last dose.
- For people who are unvaccinated or incompletely vaccinated: commence primary or catch-up course (as per the Australian Immunisation Handbook).

If cases have received DAT, vaccination should be delayed for 4 weeks from date of administration.

Cutaneous diphtheria

Systemic toxigenic manifestations are rare in cutaneous diphtheria – DAT is not routinely recommended for the management of cutaneous diphtheria cases. Severe cases, for example an extensive wound (larger than $2cm^2$) and the presence of a membrane over the wound or signs of sepsis, may prompt consideration of the need for DAT, case-by-case.[3]

The primary approach for the management of cutaneous diphtheria is administration of appropriate antibiotics and adequate coverage of wounds to prevent spread.

Infection prevention and control

Use standard and contact precautions in healthcare settings during care for people with cutaneous diphtheria until at least 72 hours of antibiotic therapy has been completed. Additionally, use droplet precautions until an initial nasopharyngeal

and/or throat culture is negative, or at least 72 hours of antibiotics are given, whichever is shorter. Most people with cutaneous diphtheria can be managed in the community.

Exclusion and isolation

People with cutaneous diphtheria should be excluded from work, school and childcare settings until their wounds are healed or are clinically improving and can be covered with a waterproof occlusive dressing, and they have met the criteria above for ceasing contact precautions.

Vaccination of cutaneous diphtheria cases

Vaccinate in convalescent phase as for respiratory diphtheria above.

Contact management

Where available, community healthcare services, including ACCHOs, are best placed to lead contact tracing, risk assessment and management given their local knowledge and established community relationships. However, these services may require resourcing support to perform these functions while maintaining critical primary healthcare services. It is important to liaise early with community healthcare providers during outbreaks.

Where applicable, public health assessments and response should take into account the unique living arrangements of Aboriginal and Torres Strait Islander communities. Kinship structures may involve extended family groups residing across multiple households; there may be high levels of intra- and inter-community mobility, which can increase the complexity of contact identification, risk stratification, and follow-up.

A guide for assessing level of risk for contacts is provided in Appendix A.

Identified contacts should be managed as follows:

High/medium risk contacts

- Provide antibiotic prophylaxis (see Diphtheria | Queensland Health for dosage recommendations).
- Provide information and advise to monitor for symptoms for at least 5 days after last contact with an infectious case.

- Vaccination:
    - If vaccination is up to date for age (See AIH recommended schedules), provide a booster dose of diphtheria-containing vaccine if it has been more than 12 months since their last dose. Note: it is safe to provide a booster vaccination with a diphtheria-containing vaccine in a shorter timeframe than recommended if necessary (i.e., if it is uncertain when the last dose was given, a booster can still be provided).
    - Unvaccinated or incompletely vaccinated people should commence a primary or catch-up course of vaccination against diphtheria as per the Australian Immunisation Handbook guidance.
- **High risk only –** Swab nasopharynx, throat, and any skin lesions for culture. If a contact returns a positive result:
    - With symptoms – treat as a case, see Case management.
    - Asymptomatic – continue antibiotic prophylaxis, contact tracing is not routinely required, but may be beneficial in high-burden populations.
- **High risk only –** Exclude person from high-risk settings until culture results are negative, or 72 hours of antibiotics have been completed (whichever is shorter).
    - Exclusion of medium risk contacts may be considered depending on additional risk factors such as the infectiousness of the case during exposure, the contact's vaccination status, and whether they have been repeatedly exposed.

Low risk contact

- Provide information and advise to monitor for symptoms for at least 5 days after contact.
- Vaccination:
    - Offer a dose of diphtheria-containing vaccine if it has been more than 5 years since their last dose.
    - Unvaccinated or incompletely vaccinated people should commence a primary or catch-up course of vaccination against diphtheria as per the Australian Immunisation Handbook guidance.

In outbreaks which generate a large number of contacts, high risk contacts and symptomatic contacts should be prioritised for follow-up.

Vaccination

Immunisation is an important measure to reduce morbidity and mortality and should be considered in populations at risk of exposure. Available diphtheria-containing vaccines utilise diphtheria toxoid to induce immunity against the toxin to prevent severe disease. However, vaccination does not prevent colonisation with *C. diphtheriae* or protect from non-toxin mediated infection. Vaccination is also unlikely to be effective as a single intervention to prevent transmission during outbreaks.[2]

As a first step in outbreak response, public health units should review information about the outbreak cases and define who is most at-risk for exposure. This may include considering:

- if there are specific age groups affected
- if there are specific communities, geographical areas, or other risk factors for exposure
- known links between affected communities and unaffected communities which may put them at risk in the future
- an assessment of the time since receipt of recommended vaccine doses for identified affected or at-risk groups or areas.

Where the outbreak involves Aboriginal and Torres Strait Islander communities, definition of a target population for vaccination and an appropriate approach should be determined in partnership with community healthcare organisations including ACCHOs.

The choice of diphtheria-containing vaccine for use in outbreak response should be guided by recommendations for age contained in the Australian Immunisation Handbook. Where feasible, formulations that include pertussis are recommended to provide opportunistic protection against other vaccine preventable diseases. All vaccines given in an outbreak response should be recorded on the Australian Immunisation Register.

Vaccination in an outbreak response

During an outbreak, multiple approaches to vaccination may be appropriate. Promotion of routine immunisation programs should always be included as part of a response systematically but may need to be supplemented with additional targeted vaccination campaigns if control is no longer considered adequate through targeting case and contact management for example.

Campaigns may be selective or non-selective (see below), or a combination of both as required. Determination of the preferred approach to vaccination programs and

campaigns should be made in partnership with local healthcare services and communities. Vaccination approaches should be responsive to community needs, and may include fixed-site clinics, outreach services, and opportunistic vaccination through existing healthcare encounters.

Routine immunisation programs

Regardless of implemented vaccination campaigns, routine and opportunistic vaccination per the schedule through existing immunisation services should be regularly promoted during an outbreak in addition to vaccination of identified cases and contacts. This should extend to regions outside of the outbreak but at risk of exposure. Emphasising the need for on-time vaccination of all recommended vaccine doses is important in building long-term community resilience during and after an outbreak.

Selective vaccination

In an outbreak where specific populations are identified as being most at-risk for exposure, a selective vaccination campaign targeting those populations (eg specific age groups, selected or adjusted by immunity status, focal geographical risk) may be the most appropriate approach. Selective vaccination campaigns may take more time if they require identification of individuals based on multiple factors such as community, age, vaccination status, or being a healthcare worker.

Selective vaccination campaigns may have the advantage of a smaller scale, requiring fewer vaccines to achieve campaign targets and being most suitable in settings where there are fewer or localised reported cases. This needs to be offset by the timeliness and HR required to implement.

A dose of diphtheria-containing vaccine should be considered for people identified within the defined target population. The example approach in a selective campaign would be to target people who have not had a vaccine dose within the preceding 5 years. Where reliable documentation of past vaccine receipt is not available and risk to the community imminent, the time since last vaccine dose may be shortened, or non-selective vaccination may be appropriate (see below).

Non-selective vaccination

Non-selective vaccination campaigns aim to provide vaccination for all people in a broader target population, regardless of the time since their last vaccine dose. This approach is faster to implement than selective vaccination campaigns as it does not require assessment of individuals in the target population and is appropriate in

settings with ongoing transmission. However, it may require a significant number of vaccine doses, depending on the size of the target population.

Factors that may influence the choice to use a non-selective vaccination campaign include:

- the size of the defined target population – it may be easier to implement non-selective vaccination in large populations
- the level of exposure occurring, including an elevated estimated attack rate for the population
- the type of cases – transmission risk is higher from respiratory diphtheria cases, and respiratory infection is more often associated with severe disease
- the trajectory of the outbreak – rapidly rising numbers of cases (particularly respiratory diphtheria cases) and increasing numbers of exposed people may require broader vaccination approaches
- unknown sources of infection – in diphtheria outbreaks where cases are not clearly linked and sources of infection are unknown, vaccination in the broader population may be required to prevent further severe disease
- the availability of resources to implement the campaign
- assessment of population-level vaccination coverage and existing immunity gaps.

In non-selective vaccination campaigns, the defined target population should all be offered a dose of diphtheria-containing vaccine, regardless of when their last dose was given.

It may be appropriate to combine approaches with a selective vaccination campaign in a sub-group of the target population as required. For example, selective vaccination may be used for children aged under 5 years focussing on catchup with National Immunisation Program-recommended doses while also implementing a non-selective campaign of a single dose to everyone aged 5 years and older.

Doses of vaccine provided during additional vaccination campaigns can be considered as additional doses, and do not need to disrupt or replace scheduled doses in the National Immunisation Program (for example if given to older children and adolescents).

Repeated rounds of non-selective vaccination (i.e., second or subsequent doses), may be required in high-risk, highly under-vaccinated target populations.

Prioritisation

Where vaccine supply is limited campaigns may need to prioritise to achieve timely implementation. Prioritised groups may include:

- children under 5 years, due to a higher risk of severe disease and death
- people with reduced access to healthcare services including acute care
- groups or areas with lower vaccination coverage or known immunity gaps
- groups at greater risk of exposure
- cohorts of the target population with cases occurring more frequently, such as in a specific age group or geographical area.

People who are included in the target population who require further doses to be appropriately vaccinated for age may be provided with a plan for completing the remainder of their required course to ensure they are effectively protected dependent on the strategy being used.

Communications

Effective and timely communication to affected populations, healthcare providers and key stakeholders is a critical component of outbreak management. Communication strategies should be culturally appropriate, proportionate to risk, and responsive to community needs.

Public communication

Public communications should be coordinated at the jurisdictional level and tailored to affected communities, including the medium through which it is delivered. Messaging should:

- clearly describe the risk of exposure and populations at increased risk
- support early identification of symptoms and outline recommended actions if symptoms develop
- include clear and strong vaccination recommendations for people living in, or planning to visit, affected areas
- reinforce prevention measures (hand and respiratory hygiene, staying home if unwell) and pathways to access testing, treatment and vaccination.

For Aboriginal and Torres Strait Islander communities, communications should be developed and delivered in partnership with ACCHOs, trusted community leaders and

local champions to support cultural safety, acceptability, reach and uptake. A range of communication channels should be used, including Aboriginal and Torres Strait Islander media, depending on the community, including social media, radio, and other locally appropriate platforms. Where possible, templates that can be adapted locally with local ACCHO logos, language and imagery, should be considered.

Communication with healthcare providers

Dissemination of communication to healthcare providers should be achieved through existing channels where possible, for example through NACCHO affiliates, Primary Health Networks, the Royal Australian College of General Practitioners, and local health districts.

Clear and timely communication to healthcare providers should include:

- case definitions and testing strategies
- recommended infection prevention and control measures, including appropriate use of personal protective equipment (PPE) when assessing suspected cases
- vaccination recommendations relevant to the outbreak, including eligibility criteria and priority groups
- the importance of opportunistic vaccination and catch-up for under-vaccinated individuals.

Additionally, public health units should work together with local hospital services and their networks to ensure adequate supplies of DAT are available and accessible, as well as with laboratory services to determine appropriate testing strategies.

Appendix A: Diphtheria contact definitions

		Cutaneous diphtheria[a]	Respiratory diphtheria[b]
High risk	Community	Household-like contact (e.g. overnight stay in the same room, intimate partner, close physical contact) and had direct contact with skin lesions, dressings or contaminated items (e.g. towels, clothing, bedding)	Household-like contact (e.g. overnight stay, intimate partner, close travel contact)
	Inpatient	Direct contact with skin lesions, dressings, or contaminated items (e.g. towels, clothing, bedding)	Stayed in same room or bay ≥ 24 hours, or stayed overnight in same room or bay
	Health worker	Had direct contact with the wound in a situation where droplets may be generated, e.g. wound irrigation, and was not wearing a mask	Direct unprotected exposure to respiratory secretions. E.g. intubation, airway procedures without appropriate PPE (mask and hand hygiene).

[a] NT CDC Cutaneous diphtheria contact management matrix - April 2026
[b] NT CDC Respiratory diphtheria contact management matrix - April 2026

		Cutaneous diphtheria[a]	Respiratory diphtheria[b]
Medium risk	Community	Close contact in shared indoor space ≥ 20 hours cumulative while case infectious with potential for exposure to uncovered skin lesions or contaminated items. E.g. childcare and residential facilities	Close contact in shared indoor space ≥ 8 hours. E.g. classroom, childcare.
	Inpatient	Indirect prolonged exposure, i.e. ≥ 20 hours cumulative when wound uncovered	Shared room or bay for less than 24 hours and did not stay overnight
	Health worker	Direct contact with the wound but no risk of droplet exposure, and not wearing appropriate PPE (gloves, mask) OR Uncertain exposure requiring further risk assessment	Close contact without appropriate PPE (mask and hand hygiene) but no direct secretion exposure OR Uncertain exposure requiring further risk assessment.
Low risk	Community	Casual or indirect contact (e.g. same school or workplace without close exposure)	Casual or indirect contact (e.g. same school or workplace without close exposure)
	Inpatient	Indirect exposure for < 20 hours cumulative when wound uncovered	Stayed in same ward/hospital without close contact

		Cutaneous diphtheria[a]	Respiratory diphtheria[b]
	Health worker	No direct exposure to skin lesions or wound droplets (includes appropriate use of PPE), or uncertain exposure is assessed as unlikely	No exposure to respiratory droplets nor direct contact with respiratory secretions, (includes appropriate use of PPE), or uncertain exposure is assessed as unlikely

References

1. American Public Health Association. *Control of Communicable Diseases Manual*. 21st ed. Washington DC, USA: American Public Health Assocation; 2022.

2. Truelove SA, Keegan LT, Moss WJ, Chaisson LH, Macher E, Azman AS, et al. Clinical and Epidemiological Aspects of Diphtheria: A Systematic Review and Pooled Analysis. *Clin Infect Dis*. 2020;71(1):89-97.

3. WHO Western Pacific Region. *Field guide for preparedness and response to diphtheria outbreaks in the Western Pacific Region*. Manila: World Health Organization Regional Office for the Western Pacific; 2023. Field guide for preparedness and response to diphtheria outbreaks in the Western Pacific Region

4. World Health Organization. *Clinical management of diphtheria: guideline*. Geneva: World Health Organization; 2024. Clinical management of diphtheria: guideline, 2 February 2024