THE PATHCARE NEWS

DIPHTHERIA ALERT

Four laboratory-confirmed adult cases of diphtheria, caused by *Corynebacterium diphtheriae*, have recently been identified in the Cape Metropole district in the Western Cape. These cases are a reminder that a reduction in vaccine coverage may lead to more cases and that *C. diphtheriae* may be circulating in the community undetected. Despite fewer than 600 diphtheria cases reported in South Africa since 1980, this represents a public health concern given the potential severity and communicability of the disease.

Treatment of diphtheria includes management of cases with appropriate antibiotics, supportive care, and, in hospitalised cases requiring intensive care, diphtheria antitoxin may be required. Isolation of cases, and provision of antibiotic prophylaxis, vaccination in non-immune individuals is appropriate for exposed contacts.

Clinicians are urged to have a high index of suspicion for diphtheria when seeing patients presenting with an upper respiratory tract illness characterised by sore throat, low-grade fever AND an adherent (pseudo)membrane of the nose, pharynx, tonsils or larynx.

Rarely, *Corynebacterium diptheriae*, may colonise skin and cause cutaneous infections, causing skin and soft tissue infections.

What is Diphtheria?

Diphtheria is a serious infectious disease caused by the bacteria, *Corynebacterium diphtheriae* (or, rarely, *C. ulcerans* or *C. pseudotuberculosis*). It primarily affects the respiratory system but can also involve the skin and other tissues. The bacteria release a toxin that can lead to severe complications, including myocarditis, nerve damage, and respiratory failure if untreated.

As a Category 1 notifiable illness, diphtheria requires immediate reporting to health authorities upon clinical suspicion when suspected cases fit the case definition. This classification emphasizes its public health importance and ensures swift actions to prevent outbreaks.

Vaccination remains the most effective preventive measure, and booster doses are essential for sustained protection.

When to clinically suspect Diphtheria?

Healthcare providers should maintain a high index of suspicion for diphtheria, particularly in patients presenting with the following clinical features:

- **Respiratory symptoms**: Sore throat, difficulty swallowing, hoarseness, a "bullneck" and lymphadenopathy.
- **Systemic symptoms**: Fever, malaise, or signs of toxin-mediated complications such as myocarditis (chest pain, arrhythmias) or neurological symptoms (weakness, paralysis).

AND

- **Pseudomembrane formation:** Grayish-white pseudomembrane in the throat, tonsils, or nasal passages that bleeds when swabbed.

Systemic manifestations may occur most commonly from the effects of absorbed toxin, most importantly the heart and nervous system. The risk of developing cardiac and/or neurological toxicity is proportional to the severity of upper respiratory tract infection and pseudomembrane formation. Myocarditis is the most common cardiac complication and can be acute (manifesting during illness) or delayed (manifesting 7-14 days after the onset of respiratory symptoms during recovery). Neurological complications are primarily toxic neuropathies and occur in about 5% of cases overall. Renal complications may develop as a direct effect of the toxin on the kidneys and may result in renal failure.

Epidemiology:

Humans are the only known natural reservoir for *C. diphtheriae*, has an incubation period that's typically 2–5 days but may range from 1–10 days. At-risk groups include unvaccinated individuals, those with incomplete vaccination, and individuals residing in crowded conditions are at higher risk. Sporadic cases have been reported in South Africa, with recent clusters' of 15 respiratory cases in Kwazulu Natal in 2015, and 8 cases in Pollsmoor Prison in 2023. Effective control depends on widespread vaccination, rapid case detection, and the implementation of appropriate infection control measures.

Transmission & pathogenesis

Diphtheria spreads primarily through **respiratory droplets** when droplets are expelled by coughing, sneezing, or talking. Rarely, *C. diphtheriae*, may spread by physical contact when touching infected wounds or skin lesions.

Upon entering the body, *Corynebacterium diphtheriae*, attaches to mucous membranes of the throat, nose, or skin. Diphtheria-causing strains produce diphtheria toxin, which inhibits protein synthesis in host cells, leading to cell death, inflammation, and the resultant pseudomembrane at the site of infection. Toxin absorption into the bloodstream can damage distant organs, particularly the heart (myocarditis), nervous system (neuropathy), and kidneys (nephropathy.

Diagnosis and recommended sampling

The diagnosis of diphtheria is primarily clinical (as outlined above), supported by laboratory confirmation. A high index of suspicion is essential, particularly in areas with known cases or low vaccination coverage. It is important that persons collecting the specimen are appropriately protected. Droplet precautions are necessary, including a surgical mask and eye protection. Clinicians' collecting the swabs should ensure that they are adequately protected through vaccination, and that booster vaccines against diphtheria are up to date. Serological testing for *C. diphtheriae* antibody (*C. diphtheriae* IgG) is available via PathCare laboratory.

Recommended clinical sampling

Respiratory Sampling:

- Clinicians should submit both a nasopharyngeal and oropharyngeal swab.
- The swab should be taken from underneath the pseudomembrane edge (or wound, in cutaneous infection), prior to antibiotic treatment.
- Dacron, Rayon or nylon-flocked swabs should be used and placed in Amies transport media (PathCare-provided **purple** or **orange-capped microbiology swabs**)
- Tissue sampling of pseudomembrane can also be collected and should be placed in sterile saline (not formalin).
- Specimens will be transported to the laboratory, on ice, as soon as possible.
- **Please SPECIFICALLY indicate on the request form: DIPHTHERIA CULTURE, in addition to any other testing required.**

In hospitalised patients, additional blood tests are useful for assessing complications (e.g., myocarditis) but not for confirming diphtheria.

Management, treatment and prevention

The current management principles include isolation and treatment of diphtheria cases, appropriate use of diphtheria antitoxin therapy in hospitalised, severe cases, antibiotic therapy for *C. diptheriae* elimination and transmission prevention, immunization and prophylaxis for exposed contacts, and repeat swabbing to confirm organism elimination 24-48 hours after antibiotic completion.

In hospitalised patients with a strong clinical suspicion of diphtheria, antitoxin therapy with diphtheria antitoxin (DAT) is the mainstay of therapy and administered promptly to neutralize circulating toxin.

Antibiotic therapy is recommended to eliminates *C. diphtheriae* and prevents transmission.

Antibiotic therapy:

- **Preferred**: Azithromycin (oral or IV) 10 mg/kg daily (maximum 500mg/day) OR Erythromycin (oral or IV): 40–50 mg/kg per day (maximum 2 g daily) divided dose administered every 6 hours, for 14 days.
- **Alternative**: Benzylpenicillin, 50 000 units/kg/dose 6 hourly IV or Phenoxymethylpenicillin, oral, 15 mg/kg/dose 6 hourly (maximum: 500 mg per dose), for 14 days.

Supportive care including airway obstruction management if present, and additional specialist management of myocarditis, neuropathy or nephropathy in hospitalised patients.

Post-treatment follow-up nasopharyngeal and oropharyngeal swab culture 24–48 hours after completing antibiotics to confirm eradication are always indicated.

Prevention

Diphtheria is vaccine-preventable through the primary childhood immunization schedule and through booster dose administration to close contacts and non-immune individuals (or every 10 years) to maintain immunity through administration of diphtheria toxoid-containing vaccines (e.g., DTaP, TdaP, or Td).

References

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