Western Cape Government

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TO:	**Chief Directors**	**Metro Health Services (MHS)**
		Rural Health Services (RHS)
		Strategy
	District Managers:	**Metro Substructures**
		Rural Districts
	Directors:	**Professional Support Services**
		Emergency Medical Services
		Forensic Pathology Services
		Facilities Management: Provincial Environmental Health
		Communication
	Chief Executive Officers (CEOs):	**Central, Regional and District Hospitals**
	Managers:	**Private Hospitals and Private Clinics**
	Heads of Health / Executive Directors:	**Local Authorities/Municipalities/City of Cape Town**
		South African Military Health Services
	Managers:	**National Health Laboratory Services**
		Private Laboratories
		General Practitioners
	Regional Commissioner:	**Department of Correctional Services**

CIRCULAR: H ..146.../2023

DIPHTHERIA ALERT: PREPAREDNESS & PUBLIC HEALTH RESPONSE TO DIPHTHERIA: IDENTIFICATION OF TOXIGENIC RESPIRATORY CASES IN THE CAPE TOWN METRO DISTRICT

This circular is an update of Circular H91/2021, issued on 30/06/2021.

Diphtheria is a contagious and potentially life-threatening bacterial disease. It is a vaccine-preventable disease, however a drop in vaccine coverage could potentially lead to increased numbers of cases. Diphtheria is preventable by vaccination given at 6, 10, 14 weeks, with booster doses given at 18 months, 6 years, and 12 years of age.

Diphtheria is a rare disease and clinicians need to have a high index of suspicion to make an early diagnosis. Rapid contact tracing, testing, the administration of prophylactic antibiotics, and vaccination can contain outbreaks.

While diphtheria antitoxin is recommended as part of the treatment of patients with diphtheria, it is in short supply globally and limited supplies are available in South Africa. Clinicians involved in the care of patients with diphtheria will manage the appropriate use of diphtheria anti toxin - infectious disease specialists should be consulted with respect to this. Treatment, in the absence of anti-toxin, involves appropriate antibiotics and supportive care.

Diphtheria disease is a notifiable condition caused by infection with toxin-producing strains of *Corynebacterium diphtheriae* (*C. diptheriae* or rarely *C. ulcerans* or *C. pseudotuberculosis*) and presents most commonly as a membranous pharyngitis. Large neck glands (bull neck appearance) and low-grade fever are associated symptoms. A

toxin produced by the bacterium causes necrosis of the tissues, resulting in respiratory obstruction, renal failure, neuropathy, and myocarditis, which if left untreated causes heart failure and death. The mortality due to respiratory diphtheria may be as high as 50% in the absence of antitoxin. Diphtheria may also present with cutaneous lesions caused by non-toxigenic or toxigenic strains. Although cutaneous diphtheria is generally less severe, cutaneous lesions may serve as a potential reservoir for the transmission of toxigenic and non-toxigenic *C. diphtheriae*.

Cutaneous infection with toxigenic strains may rarely be associated with systemic symptoms, such as myocarditis. Non-toxigenic *C. diphtheriae* typically causes chronic skin ulceration; less common manifestations include upper respiratory tract infections, or rarely, invasive diseases (including endocarditis, mycotic aneurysms, osteomyelitis and septic arthritis). Classically, persons with underlying medical conditions (including alcoholism and IV drug users) appear to be at higher risk of developing sporadic invasive disease from non-toxigenic *C. diphtheriae*.

In 2017, a cluster of four respiratory diphtheria cases were identified in the Eastern sub-district of the Cape Town Metro district of the Western Cape Province. Prior to this cluster, two confirmed cases of diphtheria were identified in KwaZulu-Natal province in 2016, and an outbreak of 15 cases occurred in eThekwini, Kwa-Zulu Natal Province in 2015, affecting incompletely immunised children of primary-school-going age.

Nationally, forty-four (44) *C. diphtheriae* infections have been reported from 2015 to date (26 May 2023) representing toxin positive and –negative respiratory diphtheria (n=16), toxin-negative endocarditis (n=11) and (predominantly) toxin-negative cutaneous diphtheria (n=17) cases. Between 1 January and 20 October 2023, the Centre for Respiratory Diseases and Meningitis (CRDM) has confirmed 12 cases of *C.diphtheriae* infection across South Africa. Five of these individuals had toxigenic diphtheria (toxin-producing C. diphtheriae) and these cases were detected from the following provinces: Western Cape (n=2), KwaZulu-Natal (n=2) and Gauteng (n=1).

This alert serves to inform clinicians, healthcare workers or practitioners, laboratorians, district-and-sub-district public health officials in both the public and the private sector of:

- **A localised cluster/outbreak of toxigenic *Corynebacterium diphtheriae*** that has been detected at a Correctional Facility in the Cape Town Metro District.
- **The Quick Reference Guide for Case Finding for Diphtheria** in the Western Cape – it includes the respiratory, and cutaneous clinical presentation of the disease.
- **The importance of detection of any clinical diagnosis of diphtheria, of notifying and investigating suspected cases, which includes laboratory confirmation – see definitions below.**
- The recommendation **to laboratories to routinely screen all oropharyngeal (OP) and nasopharyngeal (NP) swabs for *C.diphtheriae*. Swabs from abscess or cutaneous lesion should also be screened for *C. diphtheriae* if cutaneous diphtheriae is clinically suspected and/or if it is part of an *C. diphtheriae* outbreak investigation.**

1. SITUATIONAL UPDATE (13 NOVEMBER 2023)

- A total of 9 cases of *Corynebacterium diphtheriae* have been identified, at a Correctional Facility in the Cape Town Metro District in the Western Cape. The index case presented at a local hospital with fever, swollen neck, shortness of breath, difficulty swallowing, sore throat, membrane in mouth on the 28th of October 2023. The case was laboratory confirmed on the 3rd of November 2023, and subsequently demised on the 5th of November 2023 due to complications.
- A public health response was launched following the positive result that included contact tracing for inmates, prison staff and consulting healthcare workers; the collection of swabs for diphtheria screening, provision of

prophylaxis (antibiotics), and vaccination as per the guidelines. Close contacts were isolated pending their results. In addition, a vaccination campaign of the inmates and staff of the block where the cases were detected is in progress.

- The Departments of Health & Wellness and Correctional Services are working closely with all partners including the National Institute for Communicable Diseases (NICD) and National Health Laboratory Services (NHLS) in managing these cases, to ensure a multi-sectoral response, focusing on early diagnosis of cases, screening of contacts, treatment, vaccination, and collaborative efforts to bring the situation under control.
- As of 13 November 2023, 79 swabs were received from contacts (55 inmates, 15 Correctional Services officials, 9 low-risk contacts) at the laboratory. Of the 79 contacts, 8 inmates (2 symptomatic, 6 asymptomatic) tested positive for *C. diphtheriae,* 70 tested negative, and further results are pending.
- The 8 inmates who tested positive have all been isolated and treatment has been extended to 14 days. Out of the 8 inmates who tested positive, only 2 were symptomatic: the rest were asymptomatic positive contacts.
- Prior to this cluster of cases in this confined setting, three laboratory-confirmed toxigenic diphtheria cases (2 cases, 1 asymptomatic contact) had been laboratory confirmed in the Western Cape this year.
- Active case finding for respiratory disease and/or cutaneous non-healing ulcers - and monitoring of inmates and staff at the correctional facility (including areas outside the designated section) is required. Any clinically suspected cases identified need to have laboratory samples/swabs collected and the clinical protocols should be followed.
- Healthcare workers in the province and at the correctional facility, have been urged to have a high index of suspicion for diphtheria. Ideally, suspected cases should be notified telephonically and then on the Notifiable Medical Condition (NMC) application. Appropriate specimens should be sent to the National Health Laboratory Services (NHLS) for testing.

2. RECOMMENDATIONS FOR THE MANAGEMENT AND PUBLIC HEALTH RESPONSE TO A LOCALISED CLUSTER / OUTBREAK OF DIPHTHERIA:

Clinicians, other healthcare workers, district/sub-district, and public health officials must be vigilant and report any clinical diagnosis of diphtheria, notify suspected cases, investigate, and ensure laboratory confirmation for all cases meeting the case definition of both the classical respiratory and cutaneous diphtheria presentation, for this cluster /outbreak specific area – Cape Town Metro District i.e., Southern sub-district.

A Quick Reference Guide for Case Finding for additional diphtheria cases in the Cape Town Metro District, Western Cape Province, 9 November 2023 (Annexure 1) has been compiled for easy reference.

2.1 DIPHTHERIA GUIDELINES, REPORTING AND INVESTIGATION FORMS

All the below-mentioned documents can be found on the NICD website:
https://www.nicd.ac.za/diseases-a-z-index/diphtheria/

- Diphtheria: NICD Recommendations for Diagnosis, Management and Public Health Response (Revised May 2023),
- Notifiable Medical Conditions (NMC) Form,
- Diphtheria Case Investigation Form
- Diphtheria Contact Line List
- Diphtheria Alert to healthcare workers, May 2023
- Diphtheria Frequently Asked Questions, compiled December 2016
- NMC Case Definition Flipchart: Diphtheria

2.2 DIPHTHERIA CASE DEFINITIONS SPECIFIC FOR THE CLUSTER/OUTBREAK:

- Diphtheria is a notifiable medical condition in South Africa. Complete the NMC form (available at http://www.nicd.ac.za/index.php/nmc/notifiable-medical-conditions-list/)
- **Adapted diphtheria case definitions have been compiled that includes the respiratory and cutaneous clinical presentation of the disease. (Table 1).** All healthcare workers are also reminded of the general case definitions that are found in the Notifiable Medical Conditions Case Definition Flip Chart (Table 2)
- Obtain detailed demographic, clinical and risk factor information. A case-investigation form (CIF) is available. Submit both forms (CIF and NMC) to the provincial and the district CDC focal person as well as emailing to NMCSurveillanceReport@nicd.ac.za and outbreak@nicd.ac.za
- Compile a case and contact line list and apply case definitions.

Table 1: Case Definitions for the diphtheria cluster/outbreak in Cape Town Metro District, November 2023	
Suspected case	Individual of any age in any community (but also focusing specifically at shelters, homeless populations and prisons) in the Cape Town Metro District, Southern Sub-district. **Any persons with upper respiratory-tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx.** Suspected cases must be notified and managed appropriately prior to laboratory confirmation.
Probable case	Individual of any age in any community (but also focusing including in shelters and homeless population and prisons) in the Cape Town Metro District with ANY of the following symptoms WITHOUT laboratory confirmation of C. diphtheriae: **A person who presents with an upper-respiratory tract illness characterized by sore throat, low grade fever AND an adherent (pseudo-) membrane of the nose, pharynx, tonsils, or larynx;** OR **A person who has an epidemiological link to a confirmed case, who has respiratory tract symptoms but no membrane;** OR **A person with a skin lesion** **AND** **C. diphtheriae or C. ulcerans or C. pseudotuberculosis has been isolated from relevant specimens but toxigenicity status has not been confirmed.**
Confirmed case	**Any person with signs and symptoms consistent with diphtheria (respiratory and/or cutaneous) AND a positive culture for or PCR detection of C. *diphtheriae* or C. *ulcerans* or C. *pseudotuberculosis* from a clinical specimen which is confirmed to be tox gene positive by PCR or toxin producing by ELEK testing.**
For case definitions of probable cases see Annexure 1: Quick Reference Guide for Case Finding for Diphtheria in the Cape Town Metro District, November 2023	

All public and private healthcare workers, laboratorians, and public health officials at district and sub-district levels are remined to report any cases meeting the case definition as stated below for respiratory diphtheria.

Table 2: Case Definitions for Respiratory Diphtheria (as in the NMC case definition flipchart)	
Suspected case	A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx.
Probable case	A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx; **OR** a person who has an epidemiological link to a confirmed case, who has respiratory tract symptoms but no membrane; **OR** a person with a skin lesion **AND** *C. diphtheria* or *C. ulcerans* or *C. pseudotuberculosis* has been isolated from relevant specimens but toxigenicity status has not been confirmed.
	Any person with signs and symptoms consistent with diphtheria (respiratory and/or cutaneous) **AND** a positive culture for or PCR detection of *C. diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis* from a clinical specimen which is confirmed to be tox gene positive by PCR or toxin-producing by ELEK testing.
See NMC Case definition flipchart.	

2.3 PREPAREDNESS AND PUBLIC HEALTH RESPONSE MEASURES

- These measures listed below must be implemented by both **public and private healthcare providers, health practitioners, sub-district, and district health offices. See Annexure 1 and 2 for a quick reference guide and contact details.**

Table 3 Measures for implementation to ensure early detection and public health response to diphtheria cases.

	Objective	Action
1.	**Intensify surveillance, notification, report and investigation of suspected diphtheria cases**	✓ **All suspected/probable/confirmed cases should be reported IMMEDIATELY to:** o the Infection Prevention and Control (IPC) Practitioners at health care facilities where applicable, as well as o District and Provincial Communicable Disease Control Coordinators / focal persons, urgently. ✓ **Contact the Communicable Disease Control (CDC) sub-directorate telephonically** if a suspected case is detected at your facility or diphtheria (toxigenic or non-toxigenic *Corynebacterium diphtheriae*) is identified at the laboratory.**:** **Ms Charlene A. Lawrence/Janine Bezuidenhoudt/Washiefa Isaacs/Levani Naidoo** **Tel:** at 021-830-3727 or 021-815-8660 / 8790/ 8676 **Cell:** 072-356-5146, 082-327-0394, 064-742-4005, 060-508-0896 See Quick Reference Guide and Contact details. ✓ **Inform the NICD 24-hour hotline, for use by health professionals (0800 212 552).** ✓ **Clinicians at referral health facilities e.g., Infectious Disease Specialist on call Tygerberg Hospital; 021- 938-4911; Groote Schuur Hospital, 021-404-9111, may be contacted, for further clinical advice or via Vula.**

		✓ **Infection prevention and control measures and supportive care must be initiated.** ✓ **Clinicians are required to notify suspected cases of diphtheria while awaiting laboratory confirmation**. ✓ The attached Diphtheria Case Investigation Form (CIF) found at: https://www.nicd.ac.za/wp-content/uploads/2017/08/Suspected-Diphtheria-Case-Investigation-Form.pdf and Diphtheria Contact Line List at https://www.nicd.ac.za/wp-content/uploads/2017/08/SA_Diptheria_Contact_Line-List_2017.pdf, can be used. ✓ Obtain detailed demographic, clinical and risk factor information. Submit both NMC (paper-based or electronic) form found on the following website: https://www.nicd.ac.za/nmc-overview/notification-forms/ , to the provincial and the district CDC focal person as well as emailing to NMCSurveillanceReport@nicd.ac.za and outbreak@nicd.ac.za
2.	**Adequate clinical management of cases**	✓ Clinicians must collect samples from individuals with clinically suspected diphtheria. The samples are sent to the nearest laboratory for culture and then to the National institute for Communicable Diseases (NICD) for PCR and toxigenicity **testing.** ✓ **Isolation and treatment of the index case - administration of diphtheria antitoxin (DAT) (where deemed appropriate by the attending clinician in consultation with an infectious disease specialist), antibiotics and immunisation** (booster dose for confirmed and probable cases once clinically stable, with vaccine appropriate for age and immunisation history) ✓ **See the attached guideline:** Diphtheria: NICD Recommendations for Diagnosis, Management and Public Health Response, Revised Version (May 2023), https://www.nicd.ac.za/wp-content/uploads/2023/06/NICD-guidelines_diphtheria_v4_2023_updated-after-review_2-JUN-2023_Final.pdf ✓ Early treatment with antitoxin, prior to the toxin binding to cells, is extremely important, and should be given based on clinical suspicion prior to laboratory confirmation where feasible and appropriate based on infectious disease specialist advice.
3.	**Public Health Response to a case or outbreak to diphtheria**	1. Conduct a detailed case investigation (demographic, clinical and risk factor information: case investigation form, case line list, case-contact line list 2. Identify close and at-risk contacts. 3. Conduct laboratory investigation of close contacts and eligible at-risk contacts o Isolation of *C. diphtheriae* on culture and toxigenicity testing (Elek test) 4. Administer chemoprophylaxis to close contacts and at-risk contacts. 5. Monitor close and eligible at-risk contacts (prophylactic antibiotics, booster vaccination appropriate for age, throat swabs for diphtheria diagnosis) 6. Exclude close and eligible at-risk contacts in high-risk occupations. 7. Vaccinate close and eligible at-risk contacts. 8. Alert other healthcare facilities in the area 9. Conduct health promotion activities and health education

		10. Selective vaccination campaigns targeting at-risk groups in response to an outbreak may be required. 11. District and sub-district health authorities must put measures in place to improve the routine vaccination coverage in the primary series, and especially at 6 and 12 years of age.

Kindly bring the content of this alert/circular to the attention of all healthcare workers at your facility, institution, sub-district, and districts - especially Emergency Centre Clinicians, Infection Prevention & Control (IPC) Practitioners; District/sub-district CDC Coordinators/equivalent, NHLS diagnostic laboratories; and Private Laboratories and Environmental Health Practitioners.

We trust on your continued support in the early detection, report, investigation, and control of communicable diseases in the Western Cape Province.

Yours sincerely.

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DR. S. KARIEM
DDG: CHIEF OF OPERATIONS
WESTERN CAPE DEPARTMENT OF HEALTH & WELLNESS
DATE: 15 November 2023

Annexure 1: Quick Reference Guide for Case Finding of additional Diphtheria Cases, Cape Town Metro District, Western Cape, November 2023

Diphtheria infection is caused by the organism, *Corynebacterium diphtheriae (C. diphtheriae).* Strains of *C. diphtheriae* include toxin-producing *C. diphtheriae* and non-toxin producing *C. diphtheriae.* Severe life-threatening disease is caused by toxin-producing strains, mostly infecting the upper respiratory tract. Non-toxin producing strain are associated with cutaneous lesions (rarely toxin-producing strains) and invasive disease, such as endocarditis and septic arthritis.

Diphtheria is a vaccine preventable disease but with disruptions to vaccine schedules and low vaccine coverage cases are likely to emerge. Diphtheria is highly contagious and may spread very quickly in populations in confined settings with close contact.

Suspected case of diphtheria:

Individual of any age in any community (but also focusing specifically at shelters, homeless population and prisons) in the Cape Town Metro District.

Suspected cases must be notified and managed appropriately prior to laboratory confirmation.

- **Any persons with upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent (pseudo-) membrane of the nose, pharynx, tonsils, or larynx.**

Probable case of diphtheria:

Individual of any age in any community (but also focusing including in shelters and homeless population and prisons) in the Cape Town Metro District with ANY of the following symptoms **WITHOUT** laboratory confirmation of *C. diphtheriae*:

- **A person who presents with an upper-respiratory tract illness characterized by sore throat, low grade fever AND an adherent (pseudo-) membrane of the nose, pharynx, tonsils, or larynx;**
  OR
- **A person who has an epidemiological link to a confirmed case, who has respiratory tract symptoms but no membrane;**

  OR
- **A person with a skin lesion**

  AND
- ***C. diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis* has been isolated from relevant specimens but toxigenicity status has not been confirmed.**

Confirmed case of Diphtheria

- **Any person with signs and symptoms consistent with diphtheria (respiratory and/or cutaneous) AND a positive culture for or PCR detection of *C. diphtheriae or C. ulcerans* or *C. pseudotuberculosis* from a clinical specimen which is confirmed to be tox gene positive by PCR or toxin producing by ELEK testing.**

Notification of cases:

1. Diphtheria is a category 1 notifiable medical condition and immediate reporting should be done electronically/paper-based within 24 hours of diagnosing a case.
2. Please complete the NMC form and case investigation form and submit to provincial & district CDC coordinators and to the NICD: NMCSurveillanceReport@nicd.ac.za and outbreak@nicd.ac.za
3. Notify the provincial and the district CDC focal person telephonically, and via emailing, to coordinate and support the investigation and response to cases.

Sample collection from individuals with suspected diphtheria:

1. **A throat swab** should be collected (ideally from below the membrane) using a Dacron, Rayon or nylon-flocked swab and placed in Amies or modified Stuart's transport medium with charcoal. This can be obtained from your local laboratory. The specimen should immediately be transported on ice to the laboratory for testing. The specimen should be clearly labelled: "***Suspected diphtheria***."
2. For cutaneous lesions: Collect samples from specific sites where infection is suspected e.g., tissue, pus swab from abscess or cutaneous lesion/non-healing ulcer. Using the same transport media as respiratory cases. The specimen should be clearly labelled: "***Suspected diphtheria***."
3. If suspected bacteraemia, collect at least 2 blood culture specimens at different times for blood culture.

Treatment of a diphtheria case

1. Isolate: Prevent transmission of *C. diphtheriae* by practicing contact and droplet precautions with appropriate PPE.
2. Alert the referring health facility/hospital clinician, Emergency Medical Services and the Infection Disease Specialist on Call, for clinical guidance.
3. Refer the patient (suspected or confirmed case) to the referral hospital for further management, transport the case alone with all staff wearing appropriate PPE.
4. Refer to the guidelines for treatment protocol, and/or contact the on call infectious disease specialist on https://www.nicd.ac.za/diseases-a-z-index/diphtheria/)

Management of contacts

1. Identify close and at-risk contacts by creating a line list and discuss with Western Cape Communicable Disease Control Coordinator (CDCC) - Ms Charlene A. Lawrence, 021-830-3727, 072-356-5146
2. Identify if any respiratory and/or chronic skin lesions (may include scaling rash or ulcers with clearly demarcated edges) are present.
3. Collect an oropharyngeal swab and/or skin swab from contacts and complete contact line list

NICD Contact details: NICD Hotline: 0800 212 552

1. Clinical queries: Dr Anne von Gottberg (011-555-0316, annev@nicd.ac.za, Dr Sibongile Walaza (011-386-6410, sibongilew@nicd.ac.za), Dr Jocelyn Moyes jocelynm@nicd.ac.za 0828832044
2. Microbiology Laboratory Manager: Ms Linda de Gouveia (011-555-0327, lindad@nicd.ac.za)
   Molecular laboratory: Dr Mignon du Plessis (011-555-0387, mignond@nicd.ac.za)

Western Cape Department of Health and Wellness Contact Details (see Annexure 2):

- **Infectious Disease (ID) Specialist on call Tygerberg Hospital; 021- 938-4911; Groote Schuur Hospital, 021-404-9111,** for clinical management guidance for cases and contacts etc.
- **Western Cape CDC Team** – contact telephonically/email for guidance on case finding and contact tracing.

	Name	Designation	Tel/Cell	Email
1.	Ms Charlene Lawrence	Provincial CDC Coordinator	021- 830-3727 (tel) 072-356-5146 (cell)	Charlene.Lawrence@westerncape.gov.za
2.	Ms Washiefa Isaacs	CDC: Provincial NICD NMC Surveillance Manager	072-310-6881(cell)	Washiefa.Isaacs@westerncape.gov.za
3.	Ms Janine Bezuidenhoudt	Provincial NICD Epidemiologist	021-815-8790 (tel) 082-327-0394 (cell)	Janine.Bezuidenhoudt@westerncape.gov.za
4.	Ms Levani Naidoo	Provincial CDC Surveillance and Outbreak Response	021-815-8676 (tel) 060-508-0896 (cell)	Levani.Naidoo@westerncape.gov.za

Annexure 2: Contact Details of Public Health Practitioners involved in Communicable Disease Control and Epidemic Preparedness and Response

Table 1. Public health officials responsible for Communicable Disease Control, Surveillance, Environmental Health, and CDC coordinators / equivalent, In the Western Cape

	Province	Name	Designation	Tel/Cell	Email
1.	**SPC: Communicable Disease Control**	Ms Charlene Lawrence	Provincial CDC Coordinator	021- 830-3727 (tel) 072-356-5146 (cell)	Charlene.Lawrence@westerncape.gov.za
2.		Ms Washiefa Isaacs	CDC: Provincial NICD NMC Surveillance Manager	072-310-6881(cell)	Washiefa.Isaacs@westerncape.gov.za
3.		Ms Janine Bezuidenhoudt	Provincial NICD Epidemiologist	021-815-8790 (tel) 082-327-0394 (cell)	Janine.Bezuidenhoudt@westerncape.gov.za
4.		Ms Levani Naidoo	Provincial CDC Surveillance and Outbreak Response	021-815-8676 (tel) 060-508-0896 (cell)	Levani.Naidoo@westerncape.gov.za
5.		Ms Farzanah Frieslaar	Provincial EPI Disease Surveillance Manager	021-815-8740 (tel) 079-368-3693 (cell)	Farzanah.Frieslaar@westerncape.gov.za
6.		Mr. Francois Booysen	CDC: Administrative Officer	021-815-8661(tel) 061-600-3385 (cell)	Francois.Booysen@westerncape.gov.za
7.		Ms Felencia Daniels	CDC: Administrative Clerk	021-815-8660 (tel) 082-585-7295 (cell)	Felencia.Daniels@westerncape.gov.za
8.		Ms Sonia Botha	Provincial EPI Coordinator	021-815-8810 (tel) 083-576-7893 (cell)	Sonia.Botha@westerncape.gov.za
9.	**Facilities Infrastructure Management**	Mr. Stanley Nomdo	Assistant Director: Environmental Health	021-918-1564 (tel) 072-133-5644 (cell)	Stanley.Nomdo@westerncape.gov.za
10.	**Assurance: Infection Prevention and Control**	Dr. Ziyanda Vundle	Public Health Specialist	082-862-4331 (cell)	Ziyanda.Vundle@westerncape.gov.za
11.	**Communication**	Ms Marika Champion	Director	074-011-2244 (tel) 021-483-3235 (cell)	Marika.champion@westerncape.gov.za
12.	**Emergency Medical Services**	Dr. Wayne Smith	Head of Disaster Medicine and Special Events	021-815-8819 (tel) 082-991-0760 (cell)	Wayne.Smith@westerncape.gov.za
13.		Mr. Craig Wylie	Director: EMS	021-508-4517(tel) 078-800-5644(cell)	Craig.Wylie@westerncape.gov.za
14.	**Tygerberg Hospital**	Prof. Jantjie Taljaard	Infectious Disease Specialist	021-938-9645 (tel) 083-419-1452 (cell)	jjt@sun.ac.za
15.		Prof. Helena Rabie	Paediatric Infectious Disease Specialists	021-938-9197 (tel) 084-515-6746 (cell)	hrabie@sun.ac.za
16.	**Groote Schuur Hospital**	Prof. Marc Mendelson	Infectious Disease Specialists	021-404-5105 (tel)	Marc.mendelson@uct.ac.za
17.		Dr. Tari Papavarnavas	Infectious Disease Specialists	021-404-4456 (tel)	taripapas@gmail.com
18.	**Red Cross Hospital**	Prof. Brian Eley	RCWMCH: Head of Paediatric Infectious Diseases	021-658-5321 (tel) 083-947-7637 (cell)	Brian.eley@uct.ac.za
19.	**Forensic Pathology Services**	Ms Vonita Thompson	Director	082-443-3009 (cell)	Vonita.thompson@westerncape.gov.za
	Rural Health Services (Districts)	**Name**	**Designation**	**Tel/Cell**	**Email address**
1.	**Rural Health Services Chief Directorate**	Dr. David Pienaar	Public Health Specialist	083-275-9333 (cell)	David.Pienaar@westerncape.gov.za
2.		Ms Eugenia Sidumo	Deputy Director: Professional Support Services	044-695-0047 (tel) 082-735-5463 (cell)	Eugenia.Sidumo@westerncape.gov.za
3.	**Cape Winelands**	Ms Surina Neethling	Deputy Director: Specialised Support Services	023-348-8120 (tel) 072-227-6058 (cell)	Surina.Neethling@westerncape.gov.za

4.		Ms Roenell Balie	Manager: Facility Based Services	023-348-8122 (tel) 082-397-4467 (cell)	Roenell.balie@westerncape.gov.za
5.		Mr. Randall Humphreys	Cape Winelands District Municipality Environmental Health	021-870-3209 /(tel) 082-824-2010 (cell)	humphreys@capewinelands.gov.za
6.	**Central Karoo**	Dr. Abraham Muller	Medical Manager: Central Karoo	023-414-8200 (tel) 078-214-3300 (cell)	Abraham.Muller2@westerncape.gov.za
7.		Ms Annalette Jooste	Deputy Director: Specialised Support Services	023-414-3590 (tel) 083-445-8106 (cell)	annalette.jooste@westerncape.gov.za
8.		Ms Janine Nel	Deputy Director: Comprehensive Health	023-414-3590 (tel) 083-708-1679 (cell)	Janine.Nel@westernccape.gov.za
9.		Mr. Gerrit van Zyl	Central Karoo Municipality Environmental Health	023-449-1000 (tel) 083-654-9688 (cell)	gerrit@ckdm.co.za
10.		Mr. Nathan Jacobs	Environmental Health	044-813-2926 (tel) 081-030-4557 (cell)	Nathan.Jacobs@westerncape.gov.za
11.	**Garden Route**	Mr. Eugene Engle	Deputy Director: Specialised Support Services	044-803-2752 (tel) 083-441-8555 (cell)	Eugene.Engle@westerncape.gov.za
12.		Mr. Nathan Jacobs	Environmental Health	044-813-2926 (tel) 081-030-4557 (cell)	Nathan.Jacobs@westerncape.gov.za
13.		Ms Gerda Terblanche	Assistant Manager: Nursing	044-803-2755/2700 (tel) 084-581-6648 (cell)	Gerda.Terblanche@westerncape.gov.za
14.		Mr. Johan Compion	Garden Route District Municipality	044-803-1501/25 (tel) 082-803-5161 (cell)	jcompion@edendm.co.za
15.	**Overberg**	Ms Beatrice Groenewald	Child Health Coordinator	028-214-5852 (tel) 082-969-9297 (cell)	Beatrice.groenewald@westerncape.gov.za
16.		Ms Aletta Ludik	Assistant Manager: Facility Based Services	028-214-5851 (tel)	Aletta.Ludik@westerncape.gov.za
17.		Ms Petro Robertson	Deputy Director: Comprehensive Health	023-348-8142 (tel) 072-067-1309 (cell)	petro.robertson@westerncape.gov.za
18.		Ms Mashudu Mukoma	Overberg District Municipality, Environmental Health	028-342-8806 (tel) 064-890-4995 (cell)	Mmukoma@odm.org.za
19.	**West Coast**	Ms Hildegard Van Rhyn	Clinical Program Coordinator	022-487-9354 (tel) 082-871-9709 (cell)	Hildegard.VanRhyn@westerncape.gov.za
20.		Ms Anne Kogana	Deputy Director: Comprehensive Health	022-487-9263 (tel) 066-046-6541 (cell)	Anne.Kogana@westerncape.gov.za
21.		Mr. Andre Scott	Municipal Health Services Manager - Environmental Health	022- 433-8400 (tel) 082-557-7698 (cell)	health@wcdm.co.za
	District: Cape Town Metro District	**Name**	**Designation**	**Tel/Cell**	**Email address**
1.	**Metro Health Services (MHS) Chief Directorate**	Prof. Hassan Mahomed	Public Health Specialist (MHS)	021-815-8697 (tel) 082-334-5763 (cell)	Hassan.Mahomed@westerncape.gov.za
2.		Ms Anneline Janse Van Rensburg	Deputy Director: Comprehensive Health	021-815-8696 (tel) 082-897-2310 (cell)	Anneline.jansevanrensburg@westerncape.gov.za
3.	**MHS- Northern Tygerberg Substructure**	Ms Michelle Williams	Deputy Director: Professional Support Services	021-815-8882 (tel) 083-235-1155 (cell)	michelle.williams@westerncape.gov.za
4.		Ms Delaray Fourie	Deputy Director: Comprehensive Health Programmes	021-815-8879 (tel)	Delaray.fourie@westerncape.gov.za

5.		Ms Rayneze Saayman	Clinical Coordinator: Facility Based Programmes	021-815-8888 (tel) 073-782-6854 (cell)	Rayneze.Saayman@westerncape.gov.za
6.	**MHS- Klipfontein Mitchells Plain Substructure**	Ms Pearl Van Niekerk	Quality Assurance Manager	021-370-5000 (tel) 078-409-0030 (cell)	pearl.vanniekerk@westerncape.gov.za
7.		Ms Nombedesho Bizo	IPC and OHS Coordinator	081-088-7305 (cell)	Nombedesho.Bizo@westerncape.gov.za
8.	**MHS- Khayelitsha Eastern Substructure**	Ms Razia Vallie	Deputy Director: Professional Support Services	021-360-4633 (tel) 076-375-1945 (cell)	Razia.Vallie@westerncape.gov.za
9.	**MHS- Southern Western Substructure**	Ms Portia Hudsonberg	Facility Based Manager	021-202-0947 (tel) 082-321-5594 (cell)	Portia.Hudsonberg@westerncape.gov.za
10.		Ms Colleen Van Dieman	Clinical Coordinator	021-202-0900 (tel) 073-516-2809 (cell)	Colleen. Van Dieman@westerncape.gov.za
11.	**City of Cape Town (CoCT)**	Dr. Natacha Berkowitz	Epidemiologist	021-400-6864 (tel) 083-406-6755 (cell)	Natacha.Berkowitz@capetown.gov.za
12.		Ms Bettie Leedo	Programme Manager: Environmental Health	072-658-3865 (cell)	Bettie.Leedo@capetown.gov.za
13.	**CoCT: Eastern**	Ms Theda De Villiers	Head: PPHC	021-444-4667 (tel) 074-290-3647 (cell)	Theda.DeVilliers@westerncape.gov.za
14.		Ms Lena Stofile	Head: Environmental Health, Area: East	021-444-5032 (tel) 084-800-4419 (cell)	Lena.Stofile@capetown.gov.za
15.	**CoCT: Khayelitsha**	Ms Bukelwa Mbalane	Head: PPHC	021-360-1152 (tel) 084-499-3949 (cell)	Bukelwa.mbalane@capetown.gov.za
16.		Ms Yonela Mentese	Head Environmental Health, Area Eastern: Khayelitsha	021-400-1920 (tel) 078-109-9467 (cell)	Yonela.Mentese@capetown.gov.za
17.	**CoCT: Northern**	Ms Everin Van Rooyen	Head: PPHC	021-400-3917 (tel) 071-896-1674 (cell)	Everin.VanRooyen@capetown.gov.za
18.		Ms Jaquelene Peterson	Head Environmental Health: Northern Sub District	021-444-1729 (tel) 072-112-2574 (cell	Jaquelene Peterson@capetown.gov.za
19.	**CoCT: Tygerberg**	Ms Marilyn Dennis	Head: PPHC	021-444-0899 (tel) 079-517-3318 (cell)	Marilyn.Dennis@capetown.gov.za
20.		Mr. Andy Lucas	Head Environmental Health; Area Central Tygerberg	021-444-0879 (tel) 082-421-5805 (cell)	Andy.Lucas@capetown.gov.za
21.	**CoCT: Klipfontein**	Ms Stephanie Sirmongpong	Head: PPHC	021-444-0894 (tel) 084-792-7247 (cell)	Stephanie.Sirmongpong@capetown.gov.za
22.		Mr. Elroy Plaatjies	Head Environmental Health; Area Central	021-444-2332 (tel) 086-576-0834 (cell)	Elroy.plaatjies@capetown.gov.za
23.	**CoCT: Mitchells Plain**	Ms Marcelle Segels	Acting Head: PPHC	083-764-8267 (cell)	Marcelle.Segels@capetown.gov.za
24.		Ms Zanele Figlan	Head Environmental Health	021-400-4076 (tel) 083-700-2141(cell)	Ntombizanele.Figlan@capetown.gov.za
25.	**CoCT: Southern**	Ms Kelebogile Sannah Shuping	Head: PPHC	021-444-3261 (tel) 064-559-3526 (cell)	Kelebogile.Shuping@capetown.gov.za
26.		Mr. Anzil Sampson	Head: Environmental Health	021-444-3259 (tel) 082-533-8183 (cell)	Anzil.Sampson@capetown.gov.za
27.	**CoCT: Western**	Ms Melissa Stanley	Head: PPHC	021-444-1741 (tel) 072-329-6361(cell)	Melissa.stanley@capetown.gov.za
28.		Mr. Gavin Heugh	Head Environmental Health; Area: North	021-444-1739 (tel) 084-220-0141(cell)	Gavin.Heugh@capetown.gov.za

Table 6: Infection Prevention and Control (IPC) Practitioners / equivalent at Public and Private Hospitals in the Western Cape

	District	Name	Hospital and Designation	Tel/Cell	Email
1.	**Cape Town**	Ms Heidi Van Reenen	Groote Schuur Hospital: IPC Practitioner	021-404-44556	Heidi.VanReenen@westerncape.gov.za
2.		Ms Kholiwe Binase	Groote Schuur Hospital: IPC Practitioner	021-404-5246	Kholiwe.Binase@westerncape.gov.za

3.		Ms Maahirah Abrahams	Groote Schuur Hospital: IPC Practitioner	021-404-6182	Maahirah.Abrahams@westerncape.gov.za
4.		Ms Eunice van der Westhuizen	Tygerberg Hospital: IPC Practitioner	021-938-4582	Eunice.vanderWesthuizen@westerncape.gov.za
5.		Ms Sarah Booysen	Tygerberg Hospital: IPC Practitioner	021-938-5053	Sarah.Booysen@westerncape.gov.za
6.		Ms Magda Mocke	Tygerberg Hospital: IPC Practitioner	021-938-4911 021-938-5576	Magda.Mocke@westerncape.gov.za
7.		Ms Donita Erasmus	Tygerberg Hospital: IPC	021-938-5056	Donita.Erasmus@westerncape.gov.za
8.		Ms Shamiela January	Red Cross War Memorial Hospital: IPC Practitioner	021-658-5977	Shamiela.January@westerncape.gov.za
9.		Ms Marilyn Philander	New Somerset Hospital: IPC Practitioner	021-402-6232	Marilyn.Philander@westerncape.gov.za
10.		Ms Michelle Charles-Jefthas	Karl Bremmer Hospital: IPC Practitioner	021-918-1984	Michelle.Charles-Jefthas@westerncape.gov.za
11.		Ms Magdalena Aucamp	Mowbray Maternity Hospital: IPC Practitioner	021-659-5549	Magdalena.Aucamp@westerncape.gov.za
12.		Ms Nomakhula Konza	Alexandra Hospital: IPC	021-503-5123	Nomakhula.Konza@westerncape.gov.za
13.		Ms Jessica Minnaar	Lentegeur Hospital: IPC	021-370-1463	Jessica.Minnaar@westerncape.gov.za
14.		Mr. Adrian Agulhas	Valkenberg Hospital	021-440-3231	Adrian.Agulhas@westerncape.gov.za
15.		Ms Valerie Nel	Stikland Hospital: IPC Practitioner	021-940-4400	Valerie.Nel@westerncape.gov.za
16.		Ms Jayaluxmi Anand	Eerste River Hospital: IPC Practitioner	021-902-8082/1	Jayaluxmi.anand@westerncape.gov.za
17.		Ms Leisl Pasquallie	Helderberg Hospital: IPC Practitioner / Clinical Programme Coordinator	021-850-4747	Leisl.Pasquallie@westerncape.gov.za
18.		Mr Sam Manga	Khayelitsha Hospital: IPC Practitioner	021-360-4320	Sam.manga@westerncape.gov.za
19.		Ms Francina Brown	Mitchells Plain District Hospital: Nurse Manager	021-377-2283/7578	Francina.brown@westerncape.gov.za
20.		Mr Siphiwo Mkokeli	False Bay Hospital: IPC Manager	021-782-1121	Mkokeli@westerncape.gov.za
21.		Ms Aletta Le Grange	Victoria Hospital: IPC Practitioner	021-799-1133	Alletta.leGrange@westerncape.gov.za
22.		Ms Marlene Van der Berg - Titus	Wesfleur Hospital: IPC Practitioner	021-572-8054/8148	Marlene.Vanderberg-Titus@westerncape.gov.za
23.		Ms Laticia Esbagh	Brooklyn Chest Hospital: IPC Practitioner	021-508-8330	Laticia.esbagh@westerncape.gov.za
24.		Capt. C Cloete	2 Millitary Hospital: IPC Practitioner	021-799-6184	ccloete@2military.co.za; cornel572@gmail.com
25.		Ms Hannelie Herselman	Mediclinic Cape Town: IPC & Patient Safety Manager	072-463-8584	Hannelie.herselman@Mediclinic.co.za
26.		Ms Salome Nel	Mediclinic Constantiaberg: IPC Manager /Patient Safety Manager	021-799-2911 / 2473	Salome.nel@mediclinic.co.za
27.		Ms Michelle Vermeulen	Mediclinic Durbanville: IPC Manager	021-980-2499	Michelle.Vermeulen@mediclinic.co.za
28.		Ms Vidette Fourie	Mediclinic Milnerton: IPC Practitioner & Control Manager	021-529-9064 066-294-9118	Vidette.Fourie@mediclinic.co.za
30.		Ms Liezl Henning	Mediclinic Panorama: IPC Manager	021-938-3674	Liezl.Henning@mediclinic.co.za
31.		Ms Claudine Page	Mediclinic Cape Gate: IPC Manager	021-983-5969	Claudine.Page@mediclinic.co.za
32.	**Cape Town**	Ms Teresa Van Heerden	Mediclinic Louis Leipoldt: IPC Manager	021-957-6165	Teresa.VanHeerden@mediclinic.co.za
33.		Ms Mandy Du Plessis	Mediclinic Vergelegen / Strand: IPC Manager	021-850-6393	Mandy.Duplessis@mediclinic.co.za
34.		Ms Sheila Tredoux	Melomed Bellville: Quality Assurance Officer	021-950-8929	mbquality@melomed.co.za
35.		Ms Meriaan Whitlow	Melomed Bellville: IPC Practitioner	021-948-8131	mbipc@melomed.co.za

36.		Ms Nadeema Muller	Melomed Gatesville: IPC Practitioner	021-637-8100	mgipc@melomed.co.za
37.		Ms Roselin Linden	Melomed Mitchell's Plain: IPC Practitioner	021-392-3126	mpipc@melomed.co.za
38.		Ms Joyce Mogale	Melomed Tokai Hospital: IPC Practitioner	021-764-7500	mtipc@melomed.co.za
39.		Ms Rileen Strauss	Netcare: N1 City Hospital: IPC Practitioner	021-590-4094 072-378-6070	Rileen.Strauss@netcare.co.za
40.		Ms Jacqueline Prince	Netcare: Chris Barnard Memorial Hospital: IPC Practitioner	021-441-0000 082-843-7606	Jacqueline.Prince@netcare.co.za
41.		Ms Madelaine Strydom	Netcare N1 City Hospital: IPC Practitioner	021-590-4094	Madelaine.strydom@netcare.co.za
42.		Ms Danielle Claasen	Netcare: Chris Barnard Memorial Hospital: IPC Practitioner	021-441-0347	Danielle.Claasen@netcare.co.za
43.		Ms Laeticia Vass	Netcare: Kuilsriver Hospital: IPC	021-900-6687 072-585-9628	Letitia.Vass@netcare.co.za
44.		Ms Lenie Jordaan	Netcare: Kuilsriver Hospital: IPC	021-900-6291	Lenie.Jordaan@netcare.co.za
45.		Ms R. Fakier	Netcare: UCT Academic: IPC Practitioner	021-442-1829 083 361 6867	Rushana.Fakier@netcare.co.za
46.		Ms Carol Gray	Netcare: UCT Academic: IPC Practitioner	021-442-1846	Carol.Gray@netcare.co.za
47.		Ms Dane Nagel	Netcare: Blaauwberg Hospital: IPC Practitioner	021-554-9037 082-807-1134	Dane.Nagel@netcare.co.za
48.		Ms Charlotte Botha	Netcare: Blaauwberg Hospital: IPC Practitioner		Charlotte.Botha@netcare.co.za
49.		Ms Megan Paton	Life health Care: Claremont and Kingsbury Hospital: IPC Specialist	021-670-4032	Megan.Paton@lifehealthcare.co.za
50.		Ms Patricia Curle	Life health Care: Vincent Palotti Hospital: IPC Specialist	021-506-5111/5503	Patricia.Curle@lifehealthcare.co.za
51.		Ms Enid Scott	Life health Care: Vincent Palotti Hospital: IPC Practitioner	021-506-5492	Enid.Scott@lifehealthcare.co.za
52.		Ms Kamiela Williams	Rondebosch Medical Centre, Quality Assurance Coordinator	021-680- 5920 (Ext 1233)	ipc@rondeboschmc.com matronw@rondebosch.com
53.		Ms Vicky Niemand	Busamed, Paardevlei Private Hospital: Risk Manager	021-840-6600	VickyN@Busamed.co.za
54.	**Cape Winelands**	Ms Laurette Pekeur	Worcester Hospital: IPC Practitioner	023-348-1146	Laurete.Pekeur@westerncape.gov.za
55.		Ms Yolanda Van Zyl	Paarl Hospital: IPC Practitioner	021-860-2532	Yolanda.vanZyl@westerncape.gov.za
56.		Ms Danelia Jacobs	Brewelskloof Hospital: Clinical Program Coordinator IPC & OHS	023-348-1313/37	Danelia.Jacobs@westerncape.gov.za
57.		Mr. Geoffrey Vermeulen	Ceres Hospital: Nursing Service Manager	023 316 9600	Geoffrey.Vermeulen@westerncape.gov.za
58.		Ms Cheray Jordaan	Ceres Hospital: IPC Practitioner / QA	023-316 9600/61	Cheray.Jordaan@westerncape.gov.za
59.		Ms Elizabeth Van Zyl	Montagu Hospital: Nursing Service Manager	023-614-8103	Elizabeth.VanZyl2@westerncape.gov.za
60.		Ms Sandra Kortje	Robertson Hospital: Nursing Service Manager	023-626-8598	Sandra.Kortje@westerncape.gov.za
61.		Ms Rene De Silva	Stellenbosch Hospital: Nursing Service Manager / IPC Practitioner	021-808-6135	Rene.Desilva@westerncape.gov.za
62.		Ms Johanna Webster	Mediclinic Worcester: IPC Practitioner	023-348-1608	Johanna.webster@mediclinic.co.za
63.		Ms Elizma De Klerk	Mediclinic Paarl: IPC Practitioner	021-807-8296	Elizma.DeKlerk@mediclinic.co.za
64.		Ms Karlien Pienaar	Mediclinic Stellenbosch: IPC Practitioner	021-861-2200	Karlien.pienaar@mediclinic.co.za

65.	**Central Karoo**	Mr. Tshokolo Ntombana	Beaufort West Hospital: Nursing Service Manager / IPC Practitioner	023-414-8212 023-414-8200	Tshokolo.ntombana@westerncape.gov.za
66.		Ms Nomnene Bhistoli	Nursing Service Manager: Laingsburg Hospital	023-814-2353	Nomnene.Bhistoli@westerncape.gov.za
67.		Ms Sonja Frieslaar	Nursing Service Manager, Prince Albert Hospital	023-541-1300	Sonja.Frieslaar@westerncape.gov.za
68.	**Garden Route**	Ms Ann Calitz	George Hospital : IPC Practitioner	044- 802-4397	Ann.Calitz@westerncape.gov.za
69.		Ms Jabulisile Mahlangu	Mossel Bay Hospital: Nursing Service Manager / IPC Practitioner	044-604-6104	Jabulisile.Mahlangu@westerncape.gov.za
70.		Ms Yolande De Wit-Stevens	Mossel Bay Hospital: IPC Practitioner	044-604-6142	Yolande.DeWit-Stevens@westerncape.gov.za
71.		Ms Helen Human	Oudtshoorn Hospital: Nursing Service Manager	044-203-7203	Helen.Human@westerncape.gov.za
72.		Ms Florence Thomas	Oudtshoorn Hospital: IPC Practitioner	044-203-7463	Florence.Thomas@westerncape.gov.za
73.		Mr. Pieter Moolman	Riversdal Hospital: Nursing Service Manager / IPC Practitioner	028-713-8643/8643	Pieter.Moolman@westerncape.gov.za
74.		Ms Anneke Du Preez	Uniondale Hospital: Nursing Service Manager / IPC Practitioner	044-752-1068	Anneke.Dupreez@westerncape.gov.za
75.		Ms Wendy Burnett	Mediclinic George / Geneva: IPC Practitioner	044-803-2187	Wendy.Burnett@mediclinic.co.za
76.		Ms Andrie Wiese	Mediclinic Klein Karoo: Infection Control Practitioner	044-272-0111	Andrie.Wiese@mediclinic.co.za
77.		Ms Annelie Barnard	Mediclinic Plettenberg Bay: IPC Practitioner	044-501-5100	Annelie.Barnard@mediclinic.co.za
78.		Ms M.J. Nel	Knysna Private Hospital: QSSS/ IPC Specialist	044-384-1083 Ext 287	MargaretJanis.Nel@lifehealthcare.co.za
79.		Ms Marianca Stols	Bayview Hospital: IPC Specialist	044-691-3718	Marianca.Stols@lifehealthcare.co.za
80.	**Overberg**	Ms Melonise Raats	Mediclinic Hermanus: IPC Practitioner	028-313-0168	Melonise.Raats@mediclinic.co.za
81.		Ms Rosemary Davel	Caledon Hospital: Nursing Service Manager	028-212-1070	Rosemary.Darvel@westerncape.gov.za
82.		Ms Nicohilda Bouwer	Hermanus Hospital: Nursing Service Manager	028-313-5203	Nicohilda.Bouwer@westerncape.gov.za
83.		Ms Michelle Hattingh	Otto Du Plessis Hospital: Nursing Service Manager	028-424-2652	Michelle.Hattingh@westerncape.gov.za
84.		Ms Elvira Whittles	Swellendam Hospital: Nursing Service Manager	028-514-8400	Elvira.Whittles@westerncape.gov.za
85.	**West Coast**	Ms Johanna De Nobrega	Nurse Manager: Vredenburg Hospital: IPC Practitioner	022-709-5099	Johanna.DeNobrega@westerncape.gov.za
86.		Mr. Niel Goeieman	Nurse Manager: Clanwilliam Hospital: IPC Practitioner	027-482-2166	Niel.Goeiman@westerncape.gov.za
87.		Ms Liezel Van Geems Standing in at present	Nurse Manager: Citrusdal Hospital: Infection Control Practitioner	022-921-2153	Liezel.VanGeems@westerncape.gov.za
88.		Ms Trudie Fredericks	Assistant Manager Nursing: Lapa Munik Hospital (Porterville): IPC Practitioner	022-931-2140	Trudie.fredericks@westerncape.gov.za
89.		Ms Trudie Fredericks	Nurse Manager: Radie Kotze Hospital (Piketberg): IPC Practitioner	022-913-1175	Trudie.fredericks@westerncape.gov.za
90.		Ms Pearl Robyn	Nurse Manager: Swartland Hospital: IPC Practitioner	022-4879204	Pearl.Robyn@westerncape.gov.za
91.		Ms Denise Booysen	Nurse Manager: Vredendal Hospital: IPC Practitioner	027-213-2039	Denise.Booysen@westerncape.gov.za
92.		Ms Gerda Karstens	West Coast Private Hospital, Life Health Care Group: IPC Practitioner	022-719-1030 Ext:210	Gerda.Karstens@lifehealthcare.co.za

Table 7: National Health Laboratories Services, NHLS Referral Laboratories in the Western Cape

	NHLS Laboratories	Designation / Person in charge	Telephone / Cell	Email
1.	Ms. N Mohamed	NHLS: Area Manager	021-417-9376/77	Nasima.Mohamed@nhls.ac.za
2.	Mr. I. De Villiers	Green Point Laboratory Manager, Lab Support services	021-417-9366	Izak.devilliers@nhls.ac.za
3.	Prof. A. Whitelaw Microbiologist, University of Stellenbosch, & NHLS	NHLS Microbiology, Tygerberg Hospital	021-938-4032 082-375-6297	awhitelaw@sun.ac.za / Andrew.Whitelaw@nhls.ac.za
4.	Dr. R. Hoffman Microbiologist	NHLS Microbiology, Tygerberg Hospital	021-938-4006	renah@sun.ac.za
5.	Dr. C. Pienaar Microbiologist	NHLS Microbiology, Tygerberg Hospital	021-938-4006/4032	Colette.Pienaar@nhls.ac.za
6.	Dr. A. Khumalo Microbiologist	NHLS Microbiology, Groote Schuur Hospital	021-406-6727	Amanda.Khumalo@nhls.ac.za
7.	Dr. E. Prentice Consultant Microbiologist	NHLS Microbiology, Groote Schuur Hospital	021-404-5282 084-589-9877	Elizabeth.Prentice@nhls.ac.za
8.	Dr. W. Dowling Microbiologist	NHLS Microbiology, Groote Schuur Hospital	021-404-5282	Wentzel.dowling@nhls.ac.za
9.	Dr. H. Tootla Microbiologist	NHLS Microbiology, Groote Schuur Hospital	021-658-5235	hafsah.tootla@nhls.ac.za

Table 8: National Health Laboratories Services, NHLS Laboratories in the Western Cape

	NHLS Laboratories	Laboratory Manager / Person in charge	Telephone / Cell	Email
1.	Paarl	Ms N. Singh	021-860-2746 082-617-2813	Natasha.Singh@nhls.ac.za
2.	Vredendal	Ms J. Marcus	027-213-3924 083-625-6310	Jacky.Marcus@nhls.ac.za
3.	Vredenburg	Ms M. Mouton	022-713-4468	Marianne.Mouton@nhls.ac.za
4.	Karl Bremer	Ms O. Max	022-719-1634 073-762-5465	Odette.Max@nhls.ac.za
5.	Mitchells Plain	Ms M. Hill	021-371-7921 082-605-9756	Marguerita.Hill@nhl.ac.za
6.	Worcester	Ms P. Dlakavu	023-348-1407/1401	Portia.Dlakavu@nhls.ac.za
7.	Helderberg	Ms M. Adams	021-852-3623 076-489-1572	Moveen.adams@nhls.ac.za
8.	George	Ms A. Bench	044-874-2022	Anna.Bench@nhls.ac.za
9.	Mossel Bay	Ms D. Van Heerden	044-690-3745	Daneld.Vanheerden@nhls.ac.za
10.	Oudtshoorn	Mr. P. De Klerk	044-279-1104 067-428-0601	Peter.Deklerk@nhls.ac.za
11.	Knysna	Ms S. Muller	044-382-0991	Samantha.Muller@nhls.ac.za
12.	Beaufort West	Mr. C. Brink	023-415-1447	Cornelius.Brink@nhls.ac.za
13.	Khayelitsha	Mr. L. Ramashoai,	021-360-4522/4521 073-249-1949	Leneuwe.Ramashoai@nhls.ac.za
14.	Hermanus	Ms S. Van Wyk	028-312-1005 082-328-1592	Sonja.Vanwyk@nhls.ac.za

Table 9: Contact details of Private Laboratories in Western Cape

	Private Laboratory	Name and Designation	Telephone/Cell	Email
1.	PathCare	Ms I. Howes; Head Office, (Enquiries / Helpdesk)	021-596-3400/2130	howesi@pathcare.org
2.	PathCare	Dr. H. Orth; Clinical Microbiologist	021-596-3400	Heidi.orth@pathcare.org
3.	Ampath	Dr. JD Deetlefs; Pathologist	021 -596-5000	deetlefsj@ampath.co.za
4.	Lancet	Dr. J. Wojno; Pathologist	021-673-1700	Justyna.wojno@lancet.co.za

Table 10: Contact details of Regional Commissioner Department of Correctional Services

	Name and Designation		Telephone / Cell	Email
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NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

DIPHTHERIA ALERT

An update for Physicians, Accident & Emergency practitioners and Laboratorians

Centre for Respiratory Diseases and Meningitis
National Institute for Communicable Diseases (NICD)
Office: 011 555 0395 / Fax: 0867 583 326

May 2023

Update: Two laboratory-confirmed cases of toxigenic *Corynebacterium diphtheria* disease were in identified in April 2023. One was in the Western Cape in a child and the other in an adult in KwaZulu-Natal. These cases are a reminder that a drop in vaccine coverage (likely due to the pandemic) may lead to more cases and that C. *diphtheriae* may be circulating undetected in other provinces. Diphtheria antitoxin is in short supply globally; the World Health Organization is working to secure additional supplies of antitoxin. Treatment in the absence of anti-toxin is appropriate antibiotics and supportive care.

Alert: All clinicians throughout the country are urged to have a high index of suspicion for diphtheria, to notify suspected cases and to send specimens to the laboratory for testing.

Guidelines for diagnosis, testing, and treatment on https://www.nicd.ac.za/diseases-a-z-index/diphtheria/

Suspected case definition:

Any person who presents with an upper-respiratory tract illness characterised by a sore throat, low-grade fever and an adherent membrane of the nose, pharynx, tonsils, or larynx.

An example of the adherent membrane of diphtheria is shown in the photograph on the right

Photo courtesy https://www.bestonlinemd.com/how-to-avoid-getting-diphtheria/

Specimen collection and transport

A throat swab should be collected (ideally from below the membrane) using a Dacron, Rayon or nylon-flocked swab and placed in Amies or modified Stuart's transport medium with charcoal. This can be obtained from your local laboratory. The specimen should immediately be transported on ice to the laboratory for testing. The specimen should be clearly labelled: "***Suspected diphtheria***."

For laboratory staff:

All laboratories are encouraged to screen throat and nose swabs for *C. diphtheriae*

Please send any suspected/confirmed isolates of Corynebacterium spp. to CRDM/NICD for identification/ confirmation and further characterisation. Please INCLUDE the original specimen/s (swab or tissue) for PCR testing.

Case notification

All suspected cases should be notified urgently to district or provincial communicable disease coordinators (CDCCs) as per notifiable medical condition notification procedures. In the event of a confirmed case, CDCCs will conduct contact tracing. This includes collection of throat swabs and administration of prophylactic antibiotics, with or without catch-up vaccination. https://www.nicd.ac.za/nmc-overview/notification-process/

Contact details

If any additional laboratory support is needed, please contact Linda de Gouveia on 011 555 0327 or lindad@nicd.ac.za, or Mignon du Plessis on 011 555 0387 or mignond@nicd.ac.za at the Centre for Respiratory Diseases and Meningitis, NICD.

Treatment of a case of diphtheria:

Treatment should be started prior to laboratory confirmation

- **Isolate:** prevent transmission of *C. diphtheriae* by practicing contact and droplet precautions.
- **Provide supportive care:** Provide oxygen, monitor with ECG and intubate or perform a tracheostomy if necessary.
- **Provide diphtheria antitoxin:** Dosage is according to severity of illness and weight of patient.
- **Treat with appropriate antibiotics.**

Advice regarding the clinical management of suspected cases, and preventive interventions including contact tracing may be directed to the NICD doctor-on-call on 080 021 2552 after hours. The NICD guidelines for diphtheria management and laboratory detection can be found at:

https://www.nicd.ac.za/diseases-a-z-index/diphtheria/

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

REVISED MAY 2023
CENTRE FOR RESPIRATORY DISEASES AND MENINGITIS
OUTBREAK RESPONSE, DIVISION OF PUBLIC HEALTH SURVEILLANCE AND RESPONSE

Diphtheria:

NICD recommendations for diagnosis, management and public health response

Version 1.0 (7 May 2015):

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Version 2.1 (22 March 2016):

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Version 4.0 (26 May 2023) (in alphabetical order)

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Summary of changes:

Date reviewed	Reviewed by	Summary of changes
Version 2.0 September 2015	Guideline writing committee	Case definitions changed Laboratory diagnostics section updated References and 'quick reference guide' added
Version 3.0 May 2018	Guideline writing committee	Laboratory – sample collection, transport Treatment & prophylaxis Case definitions NMC reporting
Version 4.0 May 2023	Guideline writing committee	General update

Disclaimer:
The information contained in this document, be it guidelines, recommendations, diagnostic algorithms or treatment regimens, are offered in this document in the public interest. To the best of the knowledge of the guideline writing team, the information contained in these guidelines is correct. Implementation of any aspect of these guidelines remains the responsibility of the implementing agency in so far as public health liability resides, or the responsibility of the individual clinician in the case of diagnosis or treatment.

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Quick Reference Guide - Diphtheria

Treatment of a suspected diphtheria case (Section 8, pg. 18-19)

1. Isolate: Prevent transmission of *C. diphtheriae* by practising contact and droplet precautions as soon as diphtheria is suspected
2. Provide supportive care: Provide oxygen, monitor with ECG and intubate or perform a tracheostomy if necessary (using appropriate PPE)
3. Provide diphtheria antitoxin according to severity of illness and weight of patient (if indicated & prior to lab confirmation)
4. Treat with appropriate antibiotics
5. Notify the case to the NMC
6. Alert the laboratory and send specimens to confirm diagnosis

Management of close contacts (pg. 20)

1. Identify 'close' and 'at-risk' contacts
2. Collect a nasopharyngeal/mid-turbinate nasal and oropharyngeal swab
3. Administer chemoprophylaxis after swab collection
4. Vaccinate contacts appropriately
5. Monitor contacts for 10 days (from last date of contact) for symptoms
6. Collect follow-up swabs (from contacts that were culture or PCR positive for toxigenic *C. diphtheriae* on primary culture) after completion of chemoprophylaxis
7. Repeat chemoprophylaxis if contacts are still *C. diphtheriae* positive

Notification of cases and additional support (Section 10, pg. 22-24):

Diphtheria is a Category 1 notifiable medical condition. Immediate reporting, even in the absence of laboratory confirmation, should be done telephonically followed by written or electronic notification within 24 hours of diagnosing a case.

Please complete the NMC form (NOTIFICATION FORMS - NICD) or App and case investigation form (Diphtheria - NICD) and submit to provincial & district CDC coordinators and to the NICD: NMCSurveillanceReport@nicd.ac.za and outbreak@nicd.ac.za

Centre for Respiratory Diseases and Meningitis (NICD):

- Clinical queries: Dr Anne von Gottberg (011-555-0316 annev@nicd.ac.za) or Dr Sibongile Walaza (011 386 6410 sibongilew@nicd.ac.za)
- Laboratory Manager: Mrs Linda de Gouveia (011-555-0327 lindad@nicd.ac.za)
- Medical Scientist: Dr Mignon du Plessis (011-555-0387 mignond@nicd.ac.za
- After hours: **NICD Clinician Hotline (0800 212 552)**

Diphtheria case definitions (Section 6, pg. 11):

A suspected case:
A person who presents 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

A confirmed case:
A person who presents with an upper respiratory tract illness characterised by sore throat, low-grade fever and/or an adherent (pseudo-)membrane of the nose, pharynx, tonsils or larynx
AND/OR
culture of *C. diphtheriae*, *C. pseudotuberculosis* or *C. ulcerans* which is confirmed to be toxin producing by ELEK or *tox* gene positive by PCR

For case definitions of probable cases and asymptomatic carriers see pg. 11

Laboratory identification of *C. diphtheriae* (Section 7, pg. 12-17):

1. Collect an oropharyngeal swab from the affected area, ideally from below the membrane (include pseudomembrane tissue if present)
2. Plate swab for single colonies on a) blood agar (incubate at 37°C in CO_2 for 48 hours) and b) on Hoyle's agar (incubate at 37°C in O_2 for 48 hours)
3. *C. diphtheriae* form black colonies on Hoyle's and look similar to staphylococci on blood agar. They are catalase-positive, small Gram-positive bacilli
4. Confirm identification using API Coryne or VITEK or MALDI-TOF
5. Submit culture and swab/specimen to NICD for confirmation, ELEK testing, PCR, whole genome sequencing

For laboratory staff:

1. Please send any suspect or confirmed isolates of *Corynebacterium* spp. to the NICD for identification/confirmation and for further characterisation (including pus/cutaneous or blood isolates)
2. Please include the original specimen (swab, blood, tissue) (if available) for PCR testing
3. Please also send culture-negative specimens to NICD for PCR testing

1. Introduction

Diphtheria is caused by *Corynebacterium diphtheriae* (or rarely *C. ulcerans* or *C. pseudotuberculosis*) and presents most commonly as a membranous pharyngitis. The most common manifestation of diphtheria is classic respiratory diphtheria, whereby disease is toxin-mediated and characterised by the formation of a pseudomembrane in the upper airways. The mortality of diphtheria was as high as 50% but declined to about 15% after antitoxin use became widespread [1]. Death may occur as a result of acute respiratory obstruction, acute systemic toxicity, myocarditis, renal failure and neurologic complications. *C. diphtheriae* can also can also infect the skin (known as cutaneous diphtheria). More rarely, it may affect mucous membranes at other sites such as genitalia and conjunctiva [2]. Following introduction of the vaccine in the 1940-50s, diphtheria was practically eradicated and clinical diphtheria become an uncommon disease globally and in South Africa. There is presently global concern that diphtheria is re-emerging. A number of outbreaks of diphtheria have been reported from Eastern Europe, Southeast Asia, South America and West Africa [3–6]. Persons (most especially children) who are not vaccinated or are partially vaccinated are most at risk of diphtheria, however adults may also be at risk due to waning immunity over time, especially in the absence of booster doses during childhood [1].

2. Microbiology

Respiratory diphtheria is caused by infection with toxin-producing (toxigenic) strains of *C. diphtheriae*, or rarely *C. ulcerans* or *C. pseudotuberculosis. C. diphtheriae* is a nonsporulating, unencapsulated, nonmotile, pleomorphic, small Gram-positive bacillus. When viewed under a light microscope, 'metachromatic granules' can be seen (best seen on methylene blue staining), along with the characteristic 'Chinese character' palisading morphology [7]. Formerly, isolates of *C. diphtheriae* were typed using biochemical reactions into four biovars – *gravis, intermedius, mitis* and *belfanti,* but these methods of strain differentiation were superseded by molecular methods (ribotyping) and subsequently by multilocus sequence typing and whole genome sequencing.

C. diphtheriae produces an exotoxin, encoded on a lysogenic toxin gene-carrying bacteriophage, that is responsible for the pathogenesis and clinical presentation of diphtheria. Following infection, the phage's circular DNA integrates into the host bacteria's genetic material. Production of the toxin follows. Lysis of the cell releases the toxin and a new bacteriophage. The toxin is a 62,000-dalton polypeptide, that has a B sub-unit (which binds and facilitates cell entry), and a highly toxigenic A subunit that inhibits protein synthesis in a variety of tissues including the heart (where it causes myocarditis) and nerves (where it causes demyelination). Toxin production is regulated by the toxin repressor protein (DtxR) which is also present in many non-toxigenic isolates. Therefore, non-

toxigenic strains serve as a potential reservoir for the re-emergence of toxigenic strains if they possess a functional *dtxR* gene and become infected with a *tox* gene-carrying phage.

3. Epidemiology

Implementation of the DTP (diphtheria-tetanus-pertussis) vaccine and extensive vaccine coverage led to significant declines in the global incidence of diphtheria. However, since the early 1990s, there has been a global resurgence in *C. diphtheriae* disease, due to disruptions in healthcare systems and vaccination programs [6,8–10] and due to increased reports of non-toxigenic *C. diphtheriae* infections [11–13].

In South Africa, early studies in the 1940s and 1950s reported rates of respiratory diphtheria significantly higher than those in developed countries at the time, ranging from 20-35 per 100,000 population, equating to approximately 3000 case notifications annually [14]. From 1980 to 2014, 412 diphtheria cases were reported by South Africa through the WHO/UNICEF Joint Reporting Process with the majority (>80%) notified prior to 1990 [15]. A laboratory-confirmed respiratory diphtheria case reported in South Africa occurred in a young adult in February 2010 in Western Cape Province (https://www.nicd.ac.za/archives/). From March to June 2015, a cluster of 15 respiratory diphtheria cases (in children and adults) was reported from KwaZulu-Natal (KZN) Province in South Africa with a case-fatality ratio of 27% [16]. In 2014, prior to the outbreak, KZN reported coverage for the primary series diphtheria vaccinations in the province at 96%, and 83% for the 18-month booster vaccination. Tetanus-diphtheria (Td) booster coverage rates for 6- and 12-year-old children were 54% and 20%, respectively. A novel, toxin-positive clone, sequence type (ST) 378, was the cause of this outbreak [17]. The 2015 outbreak prompted immediate health promotion activity in the country, including notifications to all healthcare practitioners and laboratories to consider and exclude *C. diphtheriae* in the differential diagnosis for a sore throat, and to submit any isolates including those isolated from blood (infective endocarditis) and cutaneous diphtheria cases to the national reference laboratory (NICD) for further characterization (toxin confirmation and strain typing). An additional 44 *C. diphtheriae* infections have been reported from 2015 to date (26 May 2023) representing toxin-positive and –negative respiratory diphtheria (n=16), toxin-negative endocarditis (n=11) and (predominantly) toxin-negative cutaneous diphtheria (n=17) cases (unpublished data).

4. Pathogenesis, pathology and transmission

Humans are the only known natural host for *C. diphtheriae*. By contrast, *C. ulcerans* and *C. pseudotuberculosis* are zoonotic diseases in humans (acquired from domesticated or wild animals), although human-to-human transmission of these pathogens has been suggested in some

cases. *C. diphtheriae*, *C. ulcerans* and *C. pseudotuberculosis* are spread via large respiratory droplets or direct contact with infected skin lesions or respiratory secretions, or rarely by fomites. After colonisation of the pharynx, *C. diphtheriae* remains in the superficial layers of the respiratory mucosa or skin lesions. The incubation period for respiratory diphtheria is usually 2-5 days, but may range from 1-10 days. Diphtheria toxin causes local tissue necrosis which leads to inflammation, ulceration and oedema of affected tissues, and results in the formation of a classic adherent (pseudo-) membrane. Additionally, the toxin can cause a variety of systemic effects including myocarditis and neurologic complications. Invasive disease caused by *C. diphtheriae* occurs rarely, most commonly as a result of non-toxigenic strains and can include bacteremia, endocarditis, osteomyelitis or arthritis.

Persons with respiratory diphtheria are contagious during disease, but may also be contagious during the incubation period (when they are asymptomatic), and sometimes also during convalescence (when carriage may last many weeks). Healthy persons may also be asymptomatic carriers of toxigenic *C. diphtheriae*. Carriage can be eradicated by appropriate antibiotic treatment. Cutaneous diphtheria can cause secondary respiratory and cutaneous infections and may be a source of outbreaks. Cutaneous diphtheria lesions potentially act as silent reservoirs of disease.

5. Clinical presentation and risk factors for diphtheria

5.1. Respiratory diphtheria

The classic presentation of respiratory diphtheria is associated with extensive pseudomembranous pharyngitis, massive swelling of the tonsils, uvula, cervical lymph nodes, submandibular region, and anterior neck (‘bull neck’) [7]. Following an average incubation period of 2-5 days (range 1-10 days), the onset of disease is usually gradual and initial symptoms include low-grade fever, malaise, cervical lymphadenopathy and sore throat. Respiratory diphtheria may occur in unvaccinated persons, persons with incomplete primary vaccination series, or more rarely, in persons who have been vaccinated as immunity wanes in older individuals especially those who did not receive booster doses during childhood [18]. However, disease in persons with prior vaccination may be mild, and systemic symptoms do not usually occur. *C. diphtheriae* isolates causing respiratory diphtheria are usually toxin producing.

5.1.1. Local symptoms and clinical findings

Pharyngeal infection commences with erythema, and progresses to isolated spots of grey and white exudate which may coalesce into a pseudomembrane. The pseudomembrane is usually found on the tonsils, and may extend to involve the tonsillar pillars, uvula, soft palate, oropharynx, nasopharynx or even tracheobronchial mucosa. The membrane is initially glossy and white, but evolves to a dirty

grey-white colour; necrotic green or black patches on the membrane may also be seen. The membrane is fibrinous and firmly adherent, and typically bleeds when scraped or dislodged. The extent of the pseudomembrane generally correlates with the severity of disease. Localised tonsillar disease is usually mild, but involvement of posterior pharynx, soft palate and periglottal area is often associated with more severe generalised symptoms (malaise and weakness), more severe local symptoms (including extremely painful throat, difficulty swallowing, and drooling), and cervical swelling due to cervical lymphadenopathy and oedema of the anterior cervical tissues. Marked cervical lymphadenopathy and swelling result in the classical 'bull-neck' appearance of severe respiratory diphtheria, and results in respiratory stridor. Hoarseness and barking cough usually indicate laryngeal involvement, and tracheobronchial involvement is usually associated with dyspnoea and respiratory compromise.

5.1.2. Systemic manifestations

Systemic manifestations 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 local infection. Myocarditis is the most common cardiac complication (and the most common systemic complication overall), and subtle evidence of myocarditis (as evidenced by ECG changes including ST-T wave changes, QTc prolongation, or first-degree heart block (severe forms of heart block, AV dissociation and other arrhythmias that carry poor prognosis) can be detected in as many as two-thirds of patients. Cardiac toxicity can be acute (manifesting during illness), or delayed (manifesting 7-14 days after the onset of respiratory symptoms during recovery). Acute cardiac toxicity presents as cardiac failure and circulatory collapse, whilst delayed toxicity presents as progressive dyspnoea, weakness, diminished heart sounds, cardiac dilatation and gallop rhythm. Because patients without clinical evidence of myocarditis may have significant ECG changes, it is important to monitor ECG patterns regularly in all patients with diphtheria. Serum AST levels may also be useful in monitoring myocarditis.

Neurological complications are primarily toxic neuropathies and occur in about 5% of cases overall but up to 75% of patients with severe diphtheria develop some manifestation of neurological

involvement. Local neuropathies (i.e. paralysis of the soft palate and posterior pharynx) are most common in the first few days of disease, and manifest as regurgitation of swallowed fluids through the nose. Cranial neuropathies (most commonly oculomotor and ciliary, but also facial or laryngeal cranial nerves) may also occur later in the course of disease. Demyelinating peripheral neuritis is a delayed complication, usually developing weeks to months after acute disease and ranges from mild weakness with diminished tendon reflexes, to total paralysis. Predominantly a motor deficit, it usually begins as proximal weakness in the upper and lower limbs, extending distally. Neurologic toxicity usually resolves completely, but recovery may be slow with prolonged convalescence. Renal complications may develop as a direct effect of the toxin on the kidneys and may result in renal failure.

5.2. Cutaneous diphtheria

The incubation period for cutaneous diphtheria is not well defined and may be longer than the range for respiratory disease. Persons with cutaneous diphtheria may subsequently develop respiratory diphtheria and serious complications. Cutaneous diphtheria can occur in persons who have been fully vaccinated and is usually milder, and toxic manifestation are rare in vaccinated individuals. The types and appearance of cutaneous diphtheria are extremely variable [7]. *C. diphtheriae* can colonise existing skin lesions such as those resulting from surgery or trauma, or from underlying skin conditions (pyoderma, eczema, impetigo, dermatitis) and insect bites. Chronic non-healing ulcers are the typical manifestation of cutaneous diphtheria, usually with a time course of weeks to months. An ulcerative lesion begins as a vesicle or pustule filled with straw-coloured fluid which breaks down quickly. The lesion then progresses to form a punched-out ulcer (or multiple ulcers) of variable size, often with elevated margins. Lesions are initially painful and may be covered with an adherent eschar (essentially a dark pseudomembrane) during the first 2 weeks. The lesion then becomes painless and the pseudomembrane falls away leaving a haemorrhagic base, sometimes associated with a serous/serosanguinous exudate. The surrounding tissue is oedematous and may be pink, purple or dark in colour; there may be blisters and even bullae in some cases. In mild forms of the disease, a scaling rash may be the only manifestation. Common sites for lesions include lower legs, feet and hands. Bacterial co-infection of cutaneous diphtheria lesions is common, most notably with *Staphylococcus aureus* and *Streptococcus pyogenes*. This may mask or delay the diagnosis of cutaneous diphtheria. Cutaneous diphtheria is mostly due to toxin-negative *C. diphtheriae* although toxigenic strains have also been isolated from skin lesions and ulcers.

5.3 Non-toxigenic C. diphtheriae

Non-toxigenic *C. diphtheriae* typically causes chronic skin ulceration; less common manifestations include upper respiratory tract infections, or invasive diseases (including endocarditis, mycotic

aneurysms, osteomyelitis and septic arthritis). Classically, persons with underlying medical conditions (including alcoholism and IV drug users) appear to be at higher risk of developing sporadic invasive disease from non-toxigenic *C. diphtheriae*. However, in the last two decades clusters and outbreaks of invasive disease caused by unique epidemic strains of non-toxigenic *C. diphtheriae* disease have been described in marginalised social groups with high morbidity and mortality.

6. Case definitions and classification of diphtheria

Why is surveillance necessary?

Diphtheria is caused by infection with toxin-producing strains of *Corynebacterium diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis*
Diphtheria is spread via respiratory droplets or direct contact with infected skin lesions from an infected person.
Diphtheria has a high mortality rate. Notification is essential because additional cases can be prevented amongst contacts by early administration of antibiotics. Persons who are fully vaccinated are at lower risk of diphtheria.

Who must notify and when?

The clinician who suspects diphtheria should notify the case immediately. Healthcare workers should NOT wait for laboratory confirmation before notifying or treating cases.

Suspected case definition

A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx.

Probable case definition

A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx;
OR
a person who has an epidemiological link to a confirmed case, who has respiratory tract symptoms but no membrane;
OR
a person with a skin lesion
AND
C. diphtheriae or C. ulcerans or C. pseudotuberculosis
has been isolated from relevant specimens but toxigenicity status has not been confirmed.

Confirmed case definition

Any person with signs and symptoms consistent with diphtheria (respiratory and/or cutaneous)
AND
a positive culture for or PCR detection of *C. diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis* from a clinical specimen which is confirmed to be *tox* gene positive by PCR or toxin-producing by ELEK testing.

Additional notes

Clinicians who suspect diphtheria should contact the **NICD 24-hour Clinician Hotline (0800 212 552)** for assistance with specimen collection and diagnosis. It is essential to: 1) collect a throat swab from suspected cases using the correct procedures, and 2) to complete a case investigation to provide authorities with information to identify contacts and implement prevention measures.

https://www.nicd.ac.za/nmc-overview/notification-forms/

7. Laboratory detection of *C. diphtheriae*

7.1. Specimen collection from suspected cases of respiratory or cutaneous diphtheria, and close/at-risk contacts

Please refer to pg. 22 for guidance on close and at-risk contacts

Swabs should preferably be collected prior to antibiotic treatment and taken from the nasopharynx, oropharynx and underneath the pseudomembrane (if present), or wound base in cutaneous ulcers (under the pseudo membrane if present). Pseudomembrane tissue should also be collected if possible and stored in saline (not formalin). Dacron, rayon or nylon-flocked swabs should be used and placed in Amies or Stuart transport medium (Fig. 1). Specimens must be transported to the laboratory, with ice packs, as soon as possible.

Please use the **specimen submission form** available at https://www.nicd.ac.za/wp-content/uploads/2023/05/CRDM-specimen-submission-form-v3_02-11-22.pdf

Please alert the laboratory that the specimens are for suspected diphtheria to ensure appropriate testing is performed. Following treatment, repeat swabs should be collected to ensure eradication.

For close and at-risk contacts, nasopharyngeal (or nasal) and oropharyngeal swabs should be collected prior to chemoprophylaxis. Following completion of chemoprophylaxis, swabs should be collected again from *C. diphtheriae*-positive contacts to ensure eradication of carriage. Refer to Fig. 2 for the correct swabs to use.

Persons may find the collection of pharyngeal and particularly nasopharyngeal swabs uncomfortable. The procedures may induce coughing, spluttering, sneezing and watering eyes. It is important that persons collecting the specimens are appropriately protected. Droplet precautions are necessary, including a surgical mask. Eye and mask protection is advisable. Persons collecting the swabs should ensure that they are adequately protected through vaccination, and that booster vaccines against diphtheria are up to date.

Figure 1. Amies transport media used for the transport of throat and nasal swabs

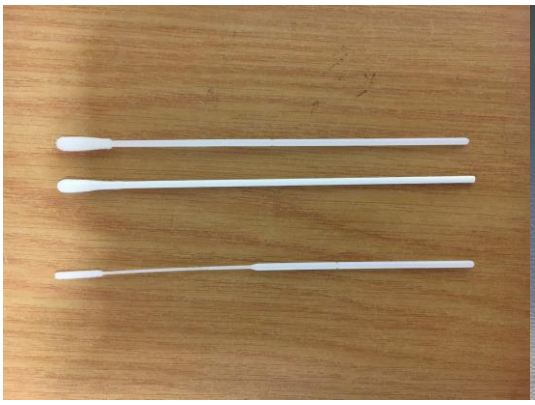


Figure 2A. Top two swabs may be used for throat. Bottom swab (thin/flexible shaft) to be used for nasopharyngeal specimen collection.

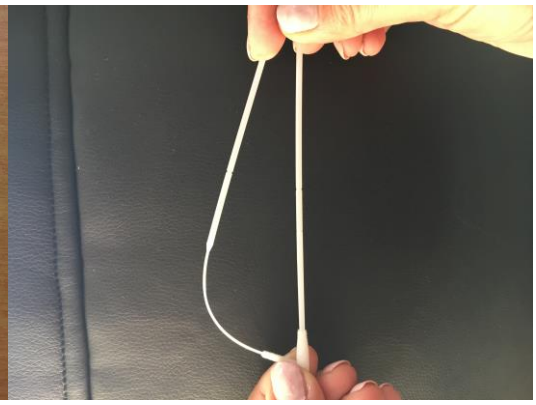


Figure 2B. Note difference in flexibility of shaft. Nasopharyngeal swab = thin/flexible shaft Throat swab = no flexibility.

7.1.1. Procedure for the collection of nasopharyngeal and oropharyngeal swabs from persons with suspected diphtheria or close contacts

1. The pharynx should be clearly visible and well illuminated.
2. Depress the tongue with a tongue depressor and swab the throat without touching the tongue or inside the cheeks.
3. Rub vigorously over any membrane, white spots, or inflamed areas; slight pressure with rotating movement must be applied to the swab.
4. If any membrane is present, lift the edge and swab beneath it to reach the deeply located organisms.
5. Through one nostril, insert the swab into the nose beyond the anterior nares.

6. Gently introduce the swab along the floor of the nasal cavity, under the middle turbinate, until the pharyngeal wall is reached. Do not use force to overcome any obstruction. If the patient/individual resists, collect a mid-turbinate nasal swab instead.
7. Place the swab in Amies or Stuart transport medium and dispatch immediately to the laboratory for culture and PCR. In the absence of transport media, dry swabs may also be sent and should reach the laboratory without delay.

7.2. Processing of specimens for the detection of C. diphtheriae

7.2.1. Staining and microscopic examination of specimens

The 'Chinese lettering' that is typical of small Gram-positive coryneform bacteria and the metachromatic granules that are specific to *C. diphtheriae* are not sufficiently sensitive nor specific enough to be useful in the diagnosis of diphtheria. Rather, diagnosis relies on the detection of *C. diphtheriae* through culture or PCR detection [7,19].

7.2.2. Procedure for the isolation of *C. diphtheriae* from culture of clinical specimens

1. Roll the swab, or place the tissue on a segment of a blood agar plate and a solid agar plate of selective tellurite-containing media (e.g., Hoyle's agar).
2. Incubate the blood agar and selective media at 37°C in O_2 for 48 hours.
3. Examine plates at 24 and 48 hours for colonies typical of *C. diphtheriae.* On selective media*,* colonies appear greyish black with a garlic-like odour (Fig. 3A and 3B). Other *Corynebacterium* spp. and some staphylococci tolerate tellurite and thus may also grow on selective media and appear greyish black. On blood agar, colonies appear similar to staphylococci.
4. Perform a Gram's stain of typical or suspect colonies on either plate. Coryneform bacteria will appear as pleomorphic Gram-positive rods that occur in angular arrangements (may appear coccobacillary in older cultures).
5. Subculture suspicious colonies onto blood agar in order to carry out identification procedures.

Figure 3A: Typical colonial appearance after 18 hours of incubation on Hoyle's medium (~1mm in diameter, black matt colonies, bottom half of agar plate)

Figure 3B: Typical colonial appearance after 18 hours of incubation on blood agar

7.2.3. Procedure for the confirmation of suspected *C. diphtheriae* isolates through biochemical testing

Traditional biochemical testing of *C. diphtheriae* will demonstrate a positive catalase reaction, and acid production from glucose and maltose, and not from lactose and sucrose. However, identification is most often through the use of commercial identification kits (e.g. API) or an automated system or Matrix-Assisted Laser Desorption Ionization Time-of-Flight (MALDI-TOF) technology.

7.2.4. Procedure for the confirmation of toxin production in *C. diphtheriae* isolates

An Elek test is carried out to confirm toxin production from *C. diphtheriae* bacterial colonies. Elek testing is available at the Centre for Respiratory Diseases and Meningitis (CRDM). Specimens and cultures can also be tested by PCR for the presence/absence of *C. diphtheriae* and the toxin gene [19]. In very rare cases, *tox* gene-bearing non-toxigenic *C. diphtheriae* has been described [20], and therefore the Elek test should ideally be performed on all *C. diphtheriae* isolates. Confirmed or suspected *C. diphtheriae* cultures should be submitted to the NICD for confirmation and toxigenicity testing. Isolates should be submitted as pure cultures heavily inoculated onto Dorset transport medium or other common agar slants or plates and submitted without delay, at ambient temperature (not on ice) (Fig. 4). Submission should not be delayed for incubation of the Dorset or other medium. The organism will grow minimally as it travels at ambient temperature, and further incubation can be done at the NICD if necessary.

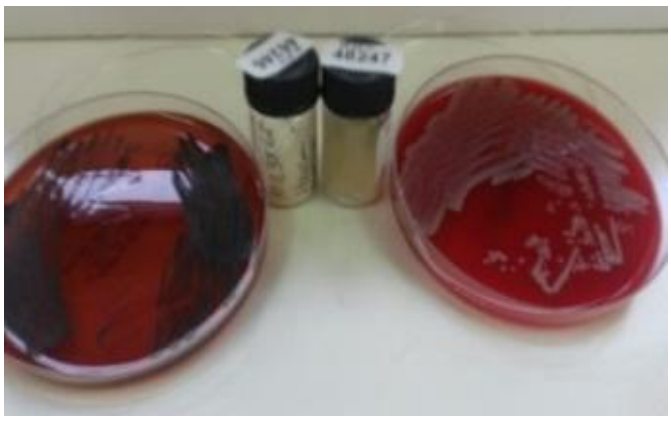
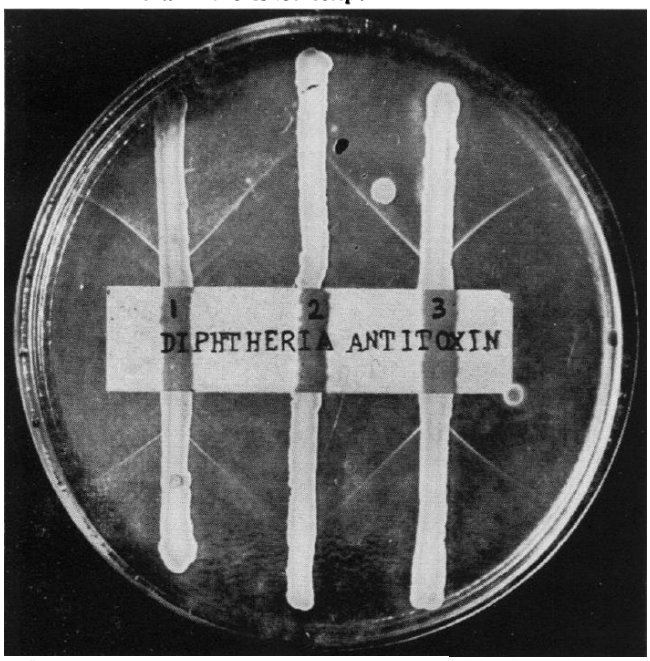


Figure 4: Submit plates with suspected *C. diphtheriae* colonies to NICD on Dorset transport media, or send the blood or Hoyle's agar plate (sealed in e.g. Parafilm M)

FIG. 5.—Plate photographed after prolonged incubation and several days at room temperature showing secondary lines. Strains 1 and 3 are virulent, 2 is avirulent. Strain 1 shows two fine lines developing between the toxin line and the filter strip.



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J. clin. Path. (1949), 2, 250.

7.3. Transport of specimens to NICD

Culture plates, Dorset slopes, swabs and other clinical specimens (blood, tissue, pus swabs) should be transported without delay to:

Centre for Respiratory Diseases and Meningitis (CRDM), National Institute for Communicable Diseases (NICD), 1 Modderfontein Road, Sandringham, Johannesburg, 2192

Please use the **specimen submission form** available at:
https://www.nicd.ac.za/wp-content/uploads/2023/05/CRDM-specimen-submission-form-v3_02-11-22.pdf

For NHLS laboratories, please liaise with CRDM NICD regarding transport if unable to use NHLS transport – we can arrange collection and courier. It is important to contact CRDM NICD staff before isolates/samples are sent to ensure that they receive appropriate priority, especially ahead of weekends/public holidays.

Additional information:

- Laboratory queries: Laboratory Manager: Mrs Linda de Gouveia (011-555-0327 lindad@nicd.ac.za) or Medical Scientist: Dr Mignon du Plessis (011-555-0387 mignond@nicd.ac.za)

- Clinical queries: Dr Anne von Gottberg (011-555-0316 annev@nicd.ac.za) or Dr Sibongile Walaza (011-386-6410 sibongilew@nicd.ac.za)
- After hours: **NICD Hotline (0800 212 552)**

8. Management and treatment of diphtheria

8.1 Diphtheria antitoxin treatment (DAT)

The mainstay of treatment is DAT. Disease course and outcome depend on how early from disease onset that antitoxin treatment is started. Approximately 2-3 days from onset of symptoms, the risk of complications and fatal outcome increases with each day DAT administration is delayed. If diphtheria is strongly suspected, treatment with DAT should be given immediately without waiting for laboratory results. The dose of DAT given varies depending on site and extent, time since onset and severity of infection. DAT should be considered for use in cases of probable or confirmed cases of toxigenic diphtheria. DAT is not recommended in asymptomatic carriers or close contacts. Clinicians are advised to contact their respective provincial CDCs regarding access to DAT; it may not be readily available due to global shortages.

8.2 Infection prevention and control considerations

Isolate all patients with suspected diphtheria until the diagnosis is confirmed or excluded. Isolate hospitalised patients with standard contact (use of gloves and plastic aprons etc.) and droplet precautions (wearing a surgical face mask) until two cultures from the throat and nose (and skin lesions in cutaneous diphtheria) taken at least 24 hours apart after completion of antibiotic therapy are negative for *C. diphtheriae*. In the absence of follow-up cultures, patients should be isolated until they have completed 14 days of antibiotic therapy. Where patients are not hospitalised, restrict contact with others until completion of antibiotic therapy.

8.3 Supportive care

Refer all probable or confirmed diphtheria cases for specialist assessment by a paediatrician or an Ear, Nose and Throat surgeon. Patients with respiratory diphtheria require careful monitoring (ideally in a high or intensive care setting) for potentially life-threatening complications from local disease (e.g. airway obstruction or respiratory compromise due to tracheobronchial disease) or systemic manifestations (especially cardiac complications). Because patients without clinical evidence of myocarditis may have significant ECG changes, it is important to monitor ECG patterns regularly in all patients with diphtheria. Serum AST levels may also be used to monitor myocarditis.

8.4 Antibiotic treatment

Antibiotic treatment is not a substitute for DAT treatment. Recommended antibiotics include macrolides (erythromycin, azithromycin or clarithromycin) or benzylpenicillin. Antibiotics eradicate the organism from the nasopharynx and prevent further transmission to others.

Elimination of the organism must be confirmed after antibiotic treatment is completed: two sets of nasopharyngeal/ mid-turbinate nasal and throat swabs must be collected for culture, taken at least 24 hours apart and more than 24 hours after completing antibiotic treatment. If the toxigenic strain persists, an additional 10 days of antibiotic treatment is indicated.

In symptomatic individuals, antibiotic therapy should be administered for 14 days [21] [2]:

Parenteral treatment for patients unable to swallow. Switch to oral as soon as patient is able to swallow:

- Benzylpenicillin, IV, 50 000 units/kg/dose 6 hourly

Oral treatment for patients able to swallow:

- Phenoxymethylpenicillin, oral, 15 mg/kg/dose 6 hourly (maximum: 500 mg per dose)
- IV erythromycin
  For children 40mg/kg/day dose a day (maximum 2g per day), divided dose administered every 6 hours
  For adults, 2g/day, divided dose administered every 6 hours
- Oral erythromycin
  For children, 40mg/kg/day (maximum 2gm/day), divided dose every 6 hours
  For adults, 2 grams/day divided dose every 6 hours

In individuals with severe penicillin allergy:
Parenteral treatment for patients unable to swallow. Switch to oral as soon as patient is able to swallow:

- Azithromycin, IV, 10 mg/kg daily (maximum 500mg/day)
  Oral treatment for patients able to swallow
- Azithromycin, oral, 10 mg/kg daily (maximum 500mg/day)

Close and at-risk contacts:

1. Contacts should receive antibiotic therapy (penicillin or erythromycin) for 7 days.
2. If a contact is positive for **toxigenic *Corynebacterium* *spp.***, then the contact should be treated as a case with an antibiotic course for two weeks (DAT is not needed for asymptomatic cases or cases without a pseudomembrane). Do a new investigation of contacts and implement proper case management, including isolation. This contact would now be classified as a laboratory-confirmed case.
3. If the contact is positive for non-toxigenic *Corynebacterium spp.,* they should complete the course of antibiotics and be retested.
4. If the contact is negative for *Corynebacterium spp.*, antibiotics and monitoring can be stopped.

9. Control and prevention of diphtheria

Population-level vaccine coverage should be 80%-85%, to induce herd protection and reduce the threat of an outbreak [22]. Adherence to the Expanded Programme for Immunisation vaccination schedule is essential for the prevention of diphtheria and includes primary vaccinations with diphtheria toxoid-containing vaccine at 6, 10 and 14 weeks followed by a booster dose at 18 months, and at 6 and 12 years of age. The booster doses are essential for long term protection.

All persons diagnosed with confirmed or probable diphtheria should receive a booster dose of diphtheria-containing vaccine once they are clinically stable, as infection may not reliably induce protective antibody levels. The booster dose should be given as a diphtheria-toxoid containing vaccine appropriate to age and immunisation history (i.e. DTaP-IPV/Hib or DTaP-IPV/Hib/HBV or Td or Tdap-IPV). Offer an accelerated diphtheria vaccination series to children, adolescents or adults who are unimmunised or incompletely immunised. Children who have completed their primary diphtheria vaccination series plus routine booster/s, and adolescents and adults who have been previously immunised should be offered a diphtheria-containing vaccine booster dose (Td or Tdap-IPV).

Table 3. Currently available vaccines that are appropriate for the prevention of diphtheria*.

Product name	Vaccine description	Appropriate indications
Pentaxim® (DTaP-IPV/Hib)	Diphtheria, tetanus, acellular pertussis, *Haemophilus influenza type b*, inactivated polio	Primary vaccination series, and booster at 18 months licenced for use in children aged 6 weeks to 7 years
Infranix® Hexa (DTaP-IPV/Hib/hep B)	Diphtheria, tetanus, acellular pertussis, *Haemophilus influenza type b*, inactivated polio and hepatitis B	Primary vaccination series, and booster at 18 months licenced for use in children aged 6 weeks to 7 years; can only be given at 6 weeks if Hep B given at birth, else commence schedule at 2 months.
Infanrix® (DTaP)	Diphtheria, tetanus, acellular pertussis	Primary vaccination series, and booster at 18 months, licenced for use in children aged 6 weeks to 7 years
Diftavax® (Td)	Diphtheria (reduced dose), tetanus	Routine booster immunisation. Licenced for use in persons 6 years and older
Adacel Quadra® Boostrix Tetra® (TdaP-IPV).	Tetanus, diphtheria (reduced dose), acellular pertussis, inactivated polio	Active immunisation or booster in persons aged 3 (Adacel Quadra®) or 4 years and older (Boostrix Tetra®)

*Product details and components obtained from South African Medicines Formulary, 2014.

10. Recommended public health response to a case of diphtheria in South Africa

Diphtheria is a Category 1 notifiable medical condition (NMC) in South Africa. All cases (suspected, probable or confirmed) should be notified telephonically by a doctor or nurse within 24 hours and reported to infection prevention and control practitioners at healthcare facilities where applicable. Suspected case should also to the local sub district/district as well as District and Provincial communicable disease control (CDC) coordinators urgently (as per routine notifiable medical condition notification procedures). On notification of a case, the following public health actions should be initiated immediately:

Step 1: Conduct a detailed case investigation

a. Obtain detailed demographic, clinical and risk factor information. A case-investigation form (CIF) is available at https://www.nicd.ac.za/diseases-a-z-index/diphtheria/
b. Complete the NMC form (available at NOTIFICATION FORMS - NICD) or complete using the App
c. Submit both forms (CIF and NMC) to the district CDC focal person as well as emailing to NMCSurveillanceReport@nicd.ac.za and outbreak@nicd.ac.za
d. Compile a case and contact line list (Diphtheria - NICD) and apply case definitions

Step 2: Identify close and at-risk contacts

Close contacts include the following groups, who had contact with the suspected case during the 5 days prior to the start of symptoms. Those having **close contact** with the patient in a household-type setting. This includes those living and/or sleeping in the same household; those such as scholars/students etc. who sleep in the same dormitory/flat or have shared kitchen facilities; and kissing/sexual contacts of the patient If the index case is a young child, persons who care for the child. Healthcare workers who have given mouth-to-mouth resuscitation to the patient, intubated the patient or who were exposed to respiratory droplets (cough, sneezing etc.) without appropriate PPE (N95 mask) or have dressed the wounds of a cutaneous case without appropriate infection control procedures (droplet and contact precautions).

At-risk contacts – for this group risk of disease will depend on the duration of contact and their immunization status. At-risk contacts need to be assessed on a case-by-case basis by health authorities to determine likely level of risk and need for prophylaxis. Examples of such contacts would include (within 5 days of onset of symptoms in the case):
a. Friends, relatives, and caregivers who regularly visit the home

b. School/pre-school class contacts

c. Those who share the same room at work

d. Other healthcare workers who have had direct/close contact with the case without adequate infection control procedures (droplet and contact precautions)

Step 3: Swab collection in close contacts and eligible at-risk contacts

Collect nasopharyngeal/mid-turbinate nasal and oropharyngeal swabs for culture and PCR – this should ideally be done before chemoprophylaxis is administered (see pg. 13).

Step 4: Administer chemoprophylaxis to close contacts and at-risk contacts

Offer post-exposure chemoprophylaxis to all close contacts and eligible at-risk contacts to eliminate asymptomatic carriage and to treat incubating disease. Either benzylpenicillin or azithromycin may be used for chemoprophylaxis (see pg. 19-20 for details). Monitor close contacts and eligible at-risk contacts for signs/symptoms of diphtheria for at least 10 days after last contact with the index case. Educate them about the disease and advise them to seek medical care if they develop symptoms.

All close contacts: if primary culture was positive, follow up with second oropharyngeal and nasopharyngeal/ mid-turbinate nasal swab after 2 weeks of initiating chemoprophylaxis and treat again if organism has not been eradicated.

Step 5: Isolation of positive case and disinfection of environment

Should a contact test positive for toxigenic *C. diphtheriae*, the person will require full treatment and follow-up cultures as per symptomatic cases. Infection control measures should be implemented (isolation with standard contact and droplet precautions) until two cultures (taken at least 24 hours apart) from both nose and throat >24 hours after completing antibiotic therapy are negative for *C. diphtheriae.* Disinfection of toys, pacifiers and other fomites that the patient used or touched should also be done.

Step 6: Exclude close and eligible at-risk contacts in high-risk occupations

Those whose work involves handling food (especially those involved in milk production for *C. ulcerans*), those who work with unvaccinated children, or health and social care workers should be excluded from work until laboratory tests confirm that they are not carriers. If isolation is practically not feasible (e.g. high number of HCW contacts), then contacts should wear surgical masks.

Step 7: Vaccinate close and eligible at-risk contacts

Diphtheria vaccine is not indicated for routine post-exposure prophylaxis. However, it is an opportunity to check diphtheria vaccination status in contacts and address waning immunity in older children/adults. All unimmunised /incompletely immunised contacts should complete their primary vaccination and booster doses as per the EPI schedule.

Step 8: Alert other healthcare facilities in the area

Alert healthcare practitioners in the area and inform them to maintain a high index of suspicion for diphtheria amongst persons presenting with pharyngitis, or chronic, non-healing ulcers. Provide fact sheets about the disease aimed at healthcare professionals

Step 9: Conduct health promotion activities and health education

Identify at-risk populations, such as school children and health care workers for health promotion activities. Produce and distribute information, education and communication materials that provide basic information about the disease and the vaccine and vaccination schedule. Encourage good personal hygiene practices (hand hygiene and cough etiquette).

Step 10: Vaccination campaigns in response to outbreaks

In the event of an outbreak, selective vaccination campaigns targeting at-risk groups (including healthcare workers) may be considered. This is dependent on various factors – please refer to WHO guidelines [2] for more detailed information.

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DIPHTHERIA INVESTIGATION FORM

This form should be completed in full for each suspected Diphtheria case/contact

INVESTIGATOR DETAILS							
Name			**Surname**				
Contact number			**Date of investigation**				
SOURCE(S) OF INFORMATION							
Interview	Yes ☐ No ☐		**Medical record review**	Yes ☐ No ☐			
Person(s) interviewed	Clinician ☐	Parent ☐	Caregiver ☐	Guardian ☐	Patient ☐	Contact ☐	
DEMOGRAPHIC DETAILS							
Name		**Surname**		**Date of birth**			
Age(years)		**Gender (M/F)**		**Contact number**			
Race	Black ☐	Coloured ☐	Indian ☐	White ☐	Other ☐	Specify other	
Residential address							
Code		**District**		**Province**			
Occupation			**Is the person a learner?**		Yes ☐ No ☐		
If learner, name of school				**Grade**			
CLINICAL DETAILS							
Symptomatic? (Y/N)		**If symptomatic date of onset of symptoms**					
If symptomatic, tick all the listed symptoms below that the person experienced:							
Fever ☐	Swollen neck ☐	Fatigue ☐	Shortness of breath ☐	Difficulty swallowing ☐			
Malaise ☐	Sore throat ☐	Stridor ☐	Change in voice ☐	Membrane in mouth ☐			
Other ☐	**If other, specify**						
Did the person experience any complications? (Y/N)							
If complications experienced, tick all the listed complications below that the person experienced:							
Airway obstruction ☐	Myocarditis ☐	Peripheral neuritis ☐	Kidney failure ☐	Other ☐			
If other, specify							
List any comorbidities							
ADMISSION DETAILS							
Admitted? (Y/N)		**Previous admissions in the last year? (Y/N)**		**Number of previous admissions**			
Date of current admission		**Health facility name**					
Ward		**Placed in isolation? (Y/N)**		**Outcome**	Died ☐	Discharged ☐	UNK/RHT ☐
Admission/facility record number			**Outcome date**				
Was patient referred? (Y/N)		**Name of referring facility**					
Date of referral			**Date of first presentation**				
TREATMENT INFORMATION							
Is person on antibiotic therapy? (Y/N)		**Name of antibiotic**					
Dose (mg)		**Date start**		**Date finish**			
Has this person received Diphtheria Anti-Toxin? (Y/N)							
VACCINATION HISTORY							
Vaccination history available? (Y/N)		**Source of history**	RTHC ☐	Medical records ☐	Self-reported ☐		
Primary series of vaccinations			***Booster doses***				
6 weeks ☐	Date received		**6 years** ☐	Date received			
10 weeks ☐	Date received		**12 years** ☐	Date received			
14 weeks ☐	Date received						
EXPOSURE HISTORY							
Travel history							
Has this person travelled *outside* the borders of South Africa within 10 days prior to onset of illness? (Y/N)							
If yes, specify country (ies) visited							
Date of departure from South Africa		**Date of return to South Africa**					
Has this person travelled *within* the borders of South Africa within 10 days prior to onset of illness? (Y/N)							
If yes, specify area (s) visited below:							

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Place visited	Date of arrival	Date of departure

Contact history					
Has this person had contact with a suspected or confirmed diphtheria case? (Y/N)					
If yes, provide details of the suspected or confirmed case:					
Include name, address, contact details					
Has this person had contact with any person(s) with similar symptoms or illness? (Y/N)					
If yes, provide details of the symptomatic or ill person(s):					
Include name, address, contact details					
Has this person attended any gatherings within 10 days prior to onset of illness? (Y/N)					
If yes, provide details:					
Name of event		**Location**		**Date of event**	

LABORATORY INFORMATION							
Were specimens collected from this person for laboratory testing? (Y/N)					**Collection date**		
Specimen type	Nasal swab☐	Throat swab☐	Skin/wound swab☐	Other☐	Specify other		
Health facility laboratory specimen number							

Test conducted	***Test result***

DATA CAPTURE INFORMATION					
Data capture date		**Data capturer name**		**Line-list record number**	

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DIPHTHERIA CONTACT LINE LIST

health
Department: Health
REPUBLIC OF SOUTH AFRICA

Confirmed Case Information

Surname	Name	Age	DOB	City/Town/ Village	District	Province	Date of Symptom Onset	Date of Admission to hospital	Date of Death
							dd/mm/yyyy	dd/mm/yyyy	dd/mm/yyyy

For all information pertaining to location, please list information on where the contact will be residing for the next week.

Contact Information

Surname	Name	Sex (M/F)	Age (yrs)	DOB	Relation to Case	Date of Last Contact with Case	Type of Contact (1 or 2)* List all	Street address	City/Town	District	Contact Phone Number	Learner or Employed (Y/N) *If yes,* school or workplace name?	Swab Taken (Y/N) Date	Antibiotic Prophylaxis Given (Y/N) Date	Vaccine Given (Y/N) Date
						dd/mm/yyyy									
						dd/mm/yyyy									
						dd/mm/yyyy									
						dd/mm/yyyy									
						dd/mm/yyyy									

***Types of Contact:**
1 = Had direct physical contact with the body of the case (alive or dead)
2 = Slept or spent time in the same household or room as the case

Completed by: **Surname and name:**_____ **Cell number :**_____ **Date:**_____

Diphtheria
Frequently asked questions

1. What is diphtheria?

Diphtheria is a contagious and potentially life-threatening bacterial infection. It is caused by infection with a toxin-producing strain of *Corynebacterium diphtheriae* or more rarely *Corynebacterium ulcerans* or *Corynebacterium pseudotuberculosis*. It occurs in two forms- respiratory diphtheria and cutaneous diphtheria.

2. Who can get diphtheria?

Children who are not immunized or who did not receive complete the Expanded Programme of Immunization (EPI) schedule, are at increased risk of getting diphtheria. Adults may also be at risk of contracting diphtheria if the organism is present in the community because adult immunity following vaccination wanes with time. Susceptible persons living in crowded conditions are at increased risk of getting the disease.

3. Where does diphtheria occur in South Africa?

Diphtheria is an uncommon disease in South Africa. Since the implementation of diphtheria immunization in South Africa in the 1950s, only sporadic cases of diphtheria, mostly involving children aged <15 years, have been identified and reported. Between January 2008 and March 2015, three laboratory-confirmed cases of respiratory diphtheria were reported: two from Western Cape Province (March 2008 and January 2010), and one from Eastern Cape Province (March 2009). An outbreak of diphtheria in KwaZulu-Natal Province involving 15 confirmed cases occurred during March to June 2015. Two cases of diphtheria were identified also from KwaZulu-Natal Province in 2016.

4. How is diphtheria transmitted?

C. diphtheriae spreads from person to person through contact with respiratory droplets or hand-to-mouth contact with secretions from an infected person's mouth, nose, throat or skin. Sometimes, persons can carries the microorganism in their throat but have no symptoms. These persons can also spread the organism through respiratory droplets. Less frequently, the infection can be transmitted through close contact with skin lesions in a person with the cutaneous form of the illness. Prolonged close contact is normally required for the infection to be transmitted to others. Diphtheria caused by *C. ulcerans* or *C. pseudotuberculosis* can also spread through contaminated milk or close contact with infected animals (e.g. through working on a farm or as a veterinarian).

5. How does diphtheria affect animals?

Humans are the only known natural host for *C. diphtheriae*. *C. ulcerans* and *C. pseudotuberculosis* are zoonoses and cause mastitis and lymphadenitis in cattle.

6. What are the signs and symptoms of diphtheria?

Symptoms of respiratory diphtheria usually start 2 to 5 days after exposure, although the incubation period can be longer (range 1 to 10 days). Initial signs and symptoms include fever, malaise, chills, loss of appetite, sore throat, nausea and vomiting. Within days, a whitish/greyish pseudomembrane may form over the throat and tonsils that can make it hard to swallow and breathe. Typically the membrane is adherent to the pharynx and cannot be dislodged. The 'membrane' is actually necrotic tissue. The infection can also cause the lymph glands and tissue on both sides of the neck to swell (bull neck). Complications of diphtheria include respiratory obstruction, and myocarditis with cardiac arrest or cardiac failure. The cutaneous form of diphtheria often presents as a non-healing ulcer with a dirty grey membrane.

7. How is diphtheria diagnosed?

Respiratory diphtheria is first suspected clinically in a patient with pharyngitis by the presence of an adherent pharyngeal pseudomembrane and fever, with or without a bull neck. The diagnosis is confirmed by culture of the organism from a pharyngeal or wound swab. Clinicians should label the swab 'suspected diphtheria'. The laboratory will plate the organism onto selective media. Once the organism has been identified as *C. diphtheriae*, it will be subjected to PCR testing for the *tox* gene, which is responsible for toxin production, and to ELEK testing, to determine if toxin production is 'switched on'.

8. How is diphtheria treated?

Patients should be given diphtheria antitoxin (DAT) to neutralize the diphtheria toxin. The decision to give diphtheria antitoxin is based on clinical diagnosis, and should not wait for laboratory confirmation. Antibiotics have not been demonstrated to affect healing of local infection. However, they are used to eliminate *C. diphtheriae* from the nasopharynx and prevent its spread to others.

9. How can diphtheria be prevented?

Diphtheria is prevented by immunisation with diphtheria containing vaccine. In South Africa, the Expanded Program on Immunisation (SA-EPI) schedule includes 6 doses of diphtheria vaccine. The primary series of vaccination is given in 3 doses at 6, 10 and 14 weeks of age using diphtheria toxoid given in combination with other antigens. Boosters are given at 18 months and 6 and 12 years of age respectively. Following exposure to a case of diphtheria, contacts (persons sharing meals or living in the same house, or caring for infected children, or health care workers who have conducted CPR, or procedures involving contact with respiratory secretions) should receive chemoprophylaxis, booster vaccination and should have a throat swab to determine carriage status.

10. Where can I find out more information?

Guidelines and other useful resources are available on the NICD website: www.nicd.ac.za. For more information contact:

- Medical/clinical related queries: contact NICD Hotline number +27 (0) 82 883 9920 (for use by healthcare professionals only)
- Laboratory related queries
  - Centre for Respiratory Diseases and Meningitis: (Linda de Gouveia 011-555-0327 lindad@nicd.ac.za , Mignon du Plessis 011-555-0387 mignond@nicd.ac.za or Nicole Wolter 011-555-0352 nicolew@nicd.ac.za
- Results enquiries: Centre for Respiratory Diseases and Meningitis laboratory (011-555-0315/7/8)

health
Department:
Health
REPUBLIC OF SOUTH AFRICA

Notifiable Medical Conditions (NMC) Case Notification Form

{Section 90 (1) (j), (k) and (w) of National Health Act, 2003 (Act no. 61 of 2003)}

This form must be **completed immediately** by the health care provider who diagnosed the condition ***Please mark applicable areas with an X***

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

Health facility name *(with provincial prefix)*	Health facility contact number	Health district
Patient file/folder number	Patient HPRS-PRN	Date of notification y y y y - m m - d d

Patient demographics				**Patient residential address**
First name				Street/dwelling unit/building/ERF number
Surname				Street name, building, location description
S.A ID number				Sub-place, suburb, village, postal area
Passport/other ID number				Town/city Post code:
Citizenship				**Employer/educational institution address**
Date of birth	y y y y - m m - d d			Institution name
Age	Years	Months (if less than 1yr	Days (if less than 1 month)	Street name, building, location description
Gender	Male	Female		Sub-place, suburb, village, postal area
Is patient pregnant?	Yes	No	Unknown	Town/city Post code:
Contact number				Contact number

Medical conditions details						
Name of NMC diagnosed			History of possible exposure to NMC in the last 60dys		No Yes Unknown	
Method of diagnosis	Clinical signs and symptoms ONLY		Rapid test	X-ray	Laboratory confirmed	Other:
Clinical symptoms relating to the NMC						
Treatment given for the NMC						
Date of diagnosis	y y y y - m m - d d			Date of symptom onset	y y y y - m m - d d	
Patient admission status	Outpatient	Discharged		Inpatient	Ward name	
Patient vital status	Alive	Deceased		Date of death	y y y y - m m - d d	

Travel history in the last 60 days			
Did patient travel outside of usual place of residence?	Yes	No	*If yes, complete the travel details below*
Place travelled from	Place travelled to	Date patient left usual place of residence	Date patient returned to usual place of residence
Country/Province/Town	Country/Province/Town	y y y y - m m - d d	y y y y - m m - d d
Country/Province/Town	Country/Province/Town	y y y y - m m - d d	y y y y - m m - d d

Vaccination history *for the NMC diagnosed above (complete only for vaccine preventable NMC)*				
Vaccination status	Not vaccinated	Up-to-date	Unknown	Date of last vaccination y y y y - m m - d d

Specimen details			**Notifying health care provider's details**	
Was a specimen collected?	Yes	No	First name	
Date of specimen	y y y y - m m - d d		Surname	
Specimen barcode/lab number			Mobile number	
			SANC/HPCSA number	Notifier's signature

The top copy (white) must be sent to NMCsurveillanceReport@nicd.ac.za or fax to 086 639 1638 or NMC hotline 072 621 3805 and to the sub-district/district office. The middle copy (blue) must be attached to the patient referral letter or patient file. The bottom copy (pink) must remain in the booklet

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Notifiable Medical Conditions (NMC) Case Notification Form

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NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES
Division of the National Health Laboratory Service

This form must be **completed immediately** by the health care provider who diagnosed the condition ***Please mark applicable areas with an X***

For each of the data elements below, capture/document the information as explained	
Age	Enter the age of the patient in the **Years** box for patients aged 1yr and above, in the **Months** box for patients aged less than 1yr and in the **Days** box for patients aged less than 1 month.
Clinical symptoms	Document two or more classical presenting symptoms for the NMC being notified.
Citizenship	Document the patient's nationality or country of origin.
Date of birth	Complete the date of birth in full if known. – If only year of birth is known, complete as YYYY/06/15. – If only year and month of birth are known, complete as YYYY/MM/15.
Date of diagnosis	Enter the date when the NMC was clinically diagnosed by health care provider.
Date of notification	Enter the date when the NMC case was reported/notified.
Date of symptom onset	Enter the date when the patient first noticed clinical signs and symptoms for the NMC.
Date specimen taken	Enter the date when the specimen(s) were drawn from the patient.
Employer/educational institution address And Residential address	If patient is employed, enter the physical address of employment. If patient is a scholar, enter school address as follows: 1st line – only enter name of the institution 2nd line - only enter street/dwelling number and name 3rd line - only enter location/village/suburb 4th line - only enter town/city and postal code Enter the patient's physical address as above. If the street address is not known, use the postal address.
First name and surname	Enter the first name and surname of the patient in full as it appears on their Identity Document. No nicknames or initials should be put in this field.
Gender	Mark with X either male or female. If the patient is a female also indicate whether she is pregnant or not.
Health facility name	Enter the name of the health facility as it is reflected on the DHIS org unit hierarchy. Put Provincial prefix in lower cases i.e. kzn HEALTH_FACILITY_NAME.
Method of diagnosis	Indicate how the NMC was diagnosed by marking with an X in the appropriate box.
NMC diagnosed	Enter the name of the NMC being reported/notified (suspected or confirmed). Only one NMC per form.
Notifier's mobile number	Enter the mobile phone number of the health care provider who notified the case for acknowledgement and feedback purposes.
Patient File/folder number	Enter the patient file/folder number.
Patient HPRS-PRN	Enter the Department of Health's Health Patient Registration System – Patient Registration Number. If the facility is not yet on the HPRS, leave this field blank.
Patient admission status	Mark with an X the patient admission status. If patient is admitted then complete the name of the ward.
SA ID number	Enter the patient's 13-digit South African identity number.
SANC/HPCSA number	Enter the notifier's South African Nursing Council or Health Professions Council of South Africa number.
Specimen barcode	Stick the laboratory barcode sticker or write the barcode number on the space provided.
Travel history	Indicate whether the case travelled outside of their usual place of residence by marking the relevant box. If the yes box is marked, then complete all travel related information.
Treatment given for the NMC	List the medication given to treat the NMC.
Vaccination status	For vaccine preventable NMC ONLY. Mark the appropriate box with an X.

Category 1: Immediate reporting telephonically followed by written or electronic notification within 24hrs of diagnosing a case

DIPHTHERIA

Why is surveillance necessary?	Who must notify and when?	Suspected case definition	Probable case definition	Confirmed case definition
Diphtheria is caused by infection with toxin-producing strains of *Corynebacterium diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis* Diphtheria is spread via respiratory droplets or direct contact with infected skin lesions from an infected person. Diphtheria has a high mortality rate. Notification is essential because additional cases can be prevented amongst contacts by early administration of antibiotics. Persons who are fully vaccinated are not at risk of diphtheria.	The clinician who suspects diphtheria should notify the case immediately. Healthcare workers should NOT wait for laboratory confirmation before notifying cases.	A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx.	A person who presents with an upper-respiratory tract illness characterised by sore throat, low-grade fever AND an adherent membrane of the nose, pharynx, tonsils, or larynx; **OR** a person who has an epidemiological link to a confirmed case, who has respiratory tract symptoms but no membrane; **OR** a person with a skin lesion **AND** *C. diphtheria or C. ulcerans or C. pseudotuberculosis* has been isolated from relevant specimens but toxigenicity status has not been confirmed.	Any person with signs and symptoms consistent with diphtheria (respiratory and/or cutaneous) **AND** a positive culture for or PCR detection of *C. diphtheriae* or *C. ulcerans* or *C. pseudotuberculosis* from a clinical specimen which is confirmed to be *tox* gene positive by PCR or toxin-producing by ELEK testing.

Additional notes

Clinicians who suspect diphtheria should contact the NICD 24-hour hotline (082-883-9920) for assistance with specimen collection and diagnosis. It is essential to: 1) collect a throat swab from suspected cases using the correct procedures, and 2) to complete a case investigation to provide authorities with information to identify contacts and implement prevention measures. See resources below.

Additional resources

A case-investigation form (CIF), frequently asked questions document (FAQ), Guidelines for the management and public health response to diphtheria (2018), and specimen collection guidelines are available at http://www.nicd.ac.za/diseases-a-z-index/diphtheria/

DIPHTHERIA

FACT SHEET FOR HEALTHCARE WORKERS

What is diphtheria?

Diphtheria is a contagious and potentially life-threatening bacterial infection caused by toxin-producing strains of *Corynebacterium diphtheriae* or more rarely *Corynebacterium ulcerans* or *Corynebacterium pseudotuberculosis*.

What are the symptoms?

- Symptoms usually begin two to five days (range 1 - 10 days) after exposure to the diphtheria bacteria. The symptoms will depend on the site of infection, but the most severe form of diphtheria affects the throat and tonsils.
- The first symptoms are usually a sore throat, loss of appetite and a mild fever. Within 2-3 days, a membrane forms over the throat and tonsils that can make it hard to swallow and breathe. The infection can also cause the lymph glands and tissues on both sides of the neck to swell ("bull neck").
- The toxin formed by the diphtheria bacteria can spread via the bloodstream and cause inflammation of the heart muscle and the nerves which can be fatal.
- Death occurs in 5-10% of cases of diphtheria.
- Sometimes diphtheria can cause small skin sores that form larger ulcers, commonly on the legs.

How is it spread?

- Diphtheria bacteria can live in the mouth, nose, throat or skin on infected individuals.
- The bacteria is normally spread from person to person in respiratory droplets. These droplets are created by coughing or sneezing. Rarely, diphtheria spreads from close contact with discharges from an infected person's mouth, nose, throat or skin.
- Without antibiotic treatment, people with diphtheria are infectious for up to 4 weeks from the onset of symptoms. Some people become carriers and are infectious for longer.
- Corynebacterium ulcerans infection is occasionally associated with consumption of unpasteurised milk or contact with animals.

Who is at risk?

- Anyone who comes in contact with diphtheria during its infectious period who has not had diphtheria in the past, or has not been fully immunised is at risk.
- Susceptible persons living in crowded conditions are at increased risk of getting the disease.

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DIPHTHERIA

FACT SHEET FOR HEALTHCARE WORKERS

How is it prevented?

- Diphtheria vaccination protects against the disease. It is part of the routine vaccination schedule as a primary series at 6,10 and 14 weeks with boosters at 18months as well as 6 and 12 years.
- At 6, 10 & 14 weeks and 18 months it is provided as a combined vaccine against diphtheria, tetanus, acellular pertussis, inactivated polio vaccine , Haemophilus Influenzae type b and Hepatitis B vaccine (Hexavalent vaccine).
- At 6 years and at 12 years of age it is given in combination with tetanus (Td vaccine).
- A high vaccination rate in the community is important to protect the population from resurgence of this disease.

How is it diagnosed?

- A doctor can suspect diphtheria based on a clinical examination when the membrane is seen in the throat, this membrane is usually grey or whitish and importantly it is adherent to the tissues below.
- Special laboratory tests to confirm the diagnosis. Throat and nose swabs need to be sent for culture and toxin production.
- If the diagnosis is suspected, it is important to contact the Department of Health and notify the case and obtain advice on the procedure to confirm the diagnosis.

How is it treated?

- Diphtheria infection is treated with antibiotics and antitoxin.

What is the public health response?

- Laboratories, hospitals, school principals and directors of childcare centres are required to report/notify suspected cases of diphtheria to the Department of Health.
- Public health officials and the Communicable Diseases Control unit will investigate cases and their contacts to identify possible sources of infection and prevent further spread.
- Cases are isolated until they are not infectious. All contacts are put on prophylactic treatment and may require booster doses of diphtheria vaccine if not immunised/ not fully immunised.

Please consult the National Diphtheria guidelines, Frequently Asked Questions and provincial circulars for further information.

**Source: Adapted from KZN Department of Health Diphtheria Factsheet*

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DIPHTHERIA
WHAT YOU NEED TO KNOW

"Protect your child against vaccine preventable diseases. Vaccinate today."

What is diphtheria?
Diphtheria is a vaccine preventable serious disease caused by a toxin (poison) made by a bacteria. It causes a thick coating in the back of the nose or throat that makes it hard to breathe or swallow.

What are the symptoms of diphtheria?
Diphtheria starts with a sore throat, mild fever and chills. Next, there is swelling of the throat followed by the diphtheria toxin making a thick coating on the back of the nose or throat and swelling of the neck. The coating may be white or greyish.

How does diphtheria spread?
Diphtheria spreads when an infected person coughs or sneezes. A person can spread the disease for up to two weeks after infection. Prolonged close contact is necessary for the infection to be spread.

How can it be prevented?
Through routine vaccination of children with diphtheria vaccine, in combination with other vaccines (Hexavalent) at the age of 6 weeks, 10 weeks, 14 weeks, 18 months, Td vaccine as booster dose at 6 years and 12 years. **The vaccine is available for FREE in all Western Cape healthcare facilities. It is recommended that all children get the vaccine.**

Who is at risk?
Any person who is not vaccinated against diphtheria can get the disease. Diphtheria mostly affects children, but any age group can be affected.

What can be done if symptoms appear?
Please visit your nearest healthcare facility urgently for assessment. If diphtheria is suspected – laboratory tests will be done.

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WITSEERKEEL
WAT JY MOET WEET

“Beskerm jou kind teen siektes wat deur entstowwe voorkom kan word. Gaan vandag vir inenting.”

Wat is witseerkeel?
Witseerkeel is ’n ernstige siekte wat veroorsaak word deur ’n gifstof wat deur bakterieë gemaak word. Dit lei tot ’n dik laag agter in die neus wat dit moeilik maak om asem te haal of te sluk.

Wat is die simptome van witseerkeel?
Witseerkeel begin met ’n seer keel, ligte koors en kouekoors. Dan swel die keel op en dit word gevolg deur die witseerkeel-gifstof wat ’n dik laag maak agter in die neus of keel en die nek wat opswel. Die laag kan wit of gryserig wees.

Hoe word witseerkeel versprei?
Witseerkeel word versprei wanneer ’n persoon wat die siekte het, hoes of nies. ’n Persoon kan ander mense aansteek vir tot twee weke nadat hulle daarmee aangesteek is. Verlengde noue kontak is nodig vir die infeksie om te versprei.

Hoe kan witseerkeel voorkom word?
Deur kinders in te ent met die witseerkeel-entstof in kombinasie met ander entstowwe (Hexavalent) wanneer hulle 6 weke, 10 weke, 14 weke en 18 maande oud is en die Td-entstof as versterkdosis wanneer hulle 6 jaar en 12 jaar oud is. **Die entstof is GRATIS by alle klinieke beskikbaar. Dokters beveel aan dat alle kinders die entstof kry.**

Wie is vatbaar vir witseerkeel?
Enige persoon wat nie teen witseerkeel ingeënt is nie, kan die siekte kry. Witseerkeel tas meestal kinders aan, maar enige ouderdomsgroep kan aangetas word.

Wat kan gedoen word as die simptome voorkom?
Gaan asseblief dringend na jou naaste kliniek om ondersoek te word. Indien daar ‘n vermoede is dat dit witseerkeel is, sal laboratoriumtoetse gedoen word.

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Wes-Kaapse Regering
VIR JOU

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IPHEPHA ELENZELWE

ULUNTU ELINENKCAZELO NGEDIPTHERIA

“Khusela umntwana kwizifo ezithintelwa ngokugonya. Gonya namhlanje.”

Yintoni idiphtheria?

Idiphtheria sisifo esinobuzaza kakhulu esibangelwa yityhefu (ipoyizini) eyenziwa ziintsholongwane. Yenza into engqindilili apha ngasemva empumlweni okanye emqaleni ebangela ukuba kube nzima ukuphefumla okanye ukuginya.

Zintoni iimpawu zediphtheria?

Idiptheria iqala ngomqala obuhlungu, ifiva nokuxhaha. Okulandelayo, kukudumba komqala okulandelwa yityhefu yediphtheria eyenza ubungqindilili apha emva empumlweni okanye emqaleni nokudumba kwentamo. Obu bungqindilili bungaba mhlophe okanye bubegreyi. Obu bungqindilili benza kube nzima ukuphefumla okanye ukuginya.

Isasazeka njani idiphtheria?

Idiphtheria isasazeka xa umntu onayo ekhohlela okanye ethimla. Umntu onayo angathi ayisasaze into engangeveki ezimbini emva kokuba umntu esulelekile.

Ikhuselwa njani idiphtheria?

Ewe ikhuselwa ngokugonywa kwabantwana abanediptheria ichiza lidityaniswe kunye namanye amachiza angala(Hexavalent) kumntana obudala buziveki ezi-6, ezili-10, iinyanga ezili-14, ezili-18, ichiza iTd lisetyenziswa njengebhusta kwabaminyaka mi-6 neli-12 ubudala. **Ichiza lifumaneka MAHALA kwikliniki zonke. Oogqirha bakhuthaza ukuba bonke abantwana balifumane ichiza.**

ngubani ochaphazelekayo yile meko ekufuneka sigxininisise kuye?

Namphi na umntu ongagonyelwanga idiphtheria angasifumana esi sifo kwaye ikakhulu sichaphazela abantwana, kodwa namphi na umntu singamchaphazela.

Yintoni enokwenziwa xa zinokuthi iimpawu zayo zibonakale?

Yiya kwikliniki ekufutshane kuwe wenziwe uvavanyo. Xa irhaneleka idiphtheria - kuyakwenziwa iimvavanyo naselebhu.

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URhulumente weNtshona Koloni
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