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Draft

Guidelines on Management and Control of

Human Anthrax

in South Africa

2018

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PREFACE

Anthrax is primarily a disease of wildlife and farm animals. In South Africa, anthrax is endemic to certain areas such as the Kruger National Park and parts of the Northern Cape Province. Sporadic anthrax outbreaks occur within these areas among animals. The few human anthrax cases that have occurred in the country have all been infections acquired through handling or eating infected meat.

Following the postal anthrax attacks in the United States of America (USA) in 2001, there was a spate of anthrax hoaxes ('white powder' incidents) in South Africa. While these 'white powder' incidents still occur sporadically, there has never been a true anthrax bioterrorism incident in the country.

Prevention and control of epidemic-prone communicable diseases, such as anthrax, remains a priority in South Africa. Therefore, epidemic preparedness through vigilance, strong coordination and rapid response mechanisms are critical.

The Department of Health has developed the Guidelines on Management and Control of Human Anthrax in South Africa to ensure a systematic approach when dealing with human anthrax. I trust that the information will enlighten all health care workers and other stakeholders, to strengthen management and control of human anthrax in South Africa.

ACKNOWLEDGEMENTS

The Department of Health emphasizes the importance of multidisciplinary and multisectoral collaboration, particularly in policy development and implementation of strategies for controlling communicable diseases. The Guidelines on Management and Control of Human Anthrax in South Africa was developed by the Department of Health in collaboration with several stakeholders.

On behalf of the Department I would also like to thank members of the working group that developed this document. The working group was represented by members from the following organizations:

- National Department of Health
- Department of Agriculture, Forestry and Fisheries (DAFF)
- South African National Defence Force (SANDF)
- World Health Organization (WHO)
- National Institute for Communicable Diseases (NICD)
- South African Regional Global Disease Detection (SARGDD)

I would like to thank provinces, academic institutions, and researchers for their continued valuable contribution. I am confident that all health care providers both within and outside the Department of Health will find this document useful, as they strive to strengthen epidemic preparedness and response in the country.

1. THE DISEASE AND ITS IMPORTANCE

Anthrax is primarily a disease of wildlife and farm animals (herbivores), although all mammals are susceptible. From earliest historical records until the development of an effective veterinary vaccine mid-way through the past century, together with the subsequent advent of antibiotics, the disease was one of the foremost causes of uncontrolled mortality in cattle, sheep, goats, horses and pigs worldwide. Humans almost invariably contract anthrax directly or indirectly from animals. The World Organisation for Animal Health (OIE) reports show that the disease is still enzootic in most countries of Africa.

Throughout sub-Saharan Africa, anthrax is endemic to certain areas. Within these endemic areas, sporadic anthrax epidemics occur. This situation has remained unchanged for decades and is set to remain this way for the foreseeable future. Within South Africa, this holds true for the Kruger National Park and areas of the Northern Cape Province, such as the Frances Baardt District, but more specifically Schmidtsdrift, Campbell and some parts of the Richtersveld.

Anthrax is considered a Tier 1 security-sensitive biological agent and has been used in acts of bioterrorism. While about 30 disease-causing pathogens have biowarfare/bioterrorism potential, there are some that are particularly suited for this role, including anthrax, smallpox, brucellosis, botulism, tularemia, plague, and certain haemorrhagic fever viruses. There are two main bioterrorism scenarios: first, the use of recognised, 'weaponised' biowarfare agents, such as anthrax; second, the use of common pathogens as weapons, e.g. *Salmonella* or *Shigella* species. Following the postal anthrax attacks in the USA in 2001, there was a spate of anthrax hoaxes in South Africa. While these 'white powder' incidents still occur sporadically, there has never been a true anthrax bioterrorism incident in South Africa. The few human anthrax cases that have occurred in the region have all been natural infections from handling or eating infected animals.

2. ETIOLOGY AND ECOLOGY

Anthrax is a bacterial zoonotic disease caused by the spore-forming *Bacillus anthracis*, a Gram-positive, rod-shaped bacterium.

2.1 Spores and vegetative forms

When conditions are not conducive to growth and multiplication of the anthrax bacilli, they tend to form spores. Sporulation requires the presence of free oxygen; within the anaerobic environment of the infected host, the organism is in the vegetative form. The vegetative forms of *B. anthracis* grow and multiply readily on or in normal laboratory nutrient agars or broths. However, they are more 'fragile' than the vegetative forms of other *Bacillus* species, dying more spontaneously in simple environments such as water or milk, and more dependent on sporulation for species survival. The spore forms are markedly resistant to biological extremes of heat, cold, pH, desiccation, chemicals (and thus to disinfection), irradiation and other such adverse conditions. Therefore, the spore forms are the predominant phase in the environment and it is very largely through the uptake of spores that anthrax is contracted. Within the infected host the spores germinate to produce the vegetative forms which multiply, eventually killing the host. A proportion of the bacilli released by the dying or dead animal into the environment

(usually soil under the carcass) sporulate, ready to be taken up by another animal. This cycle of infection is illustrated in Figure 1.

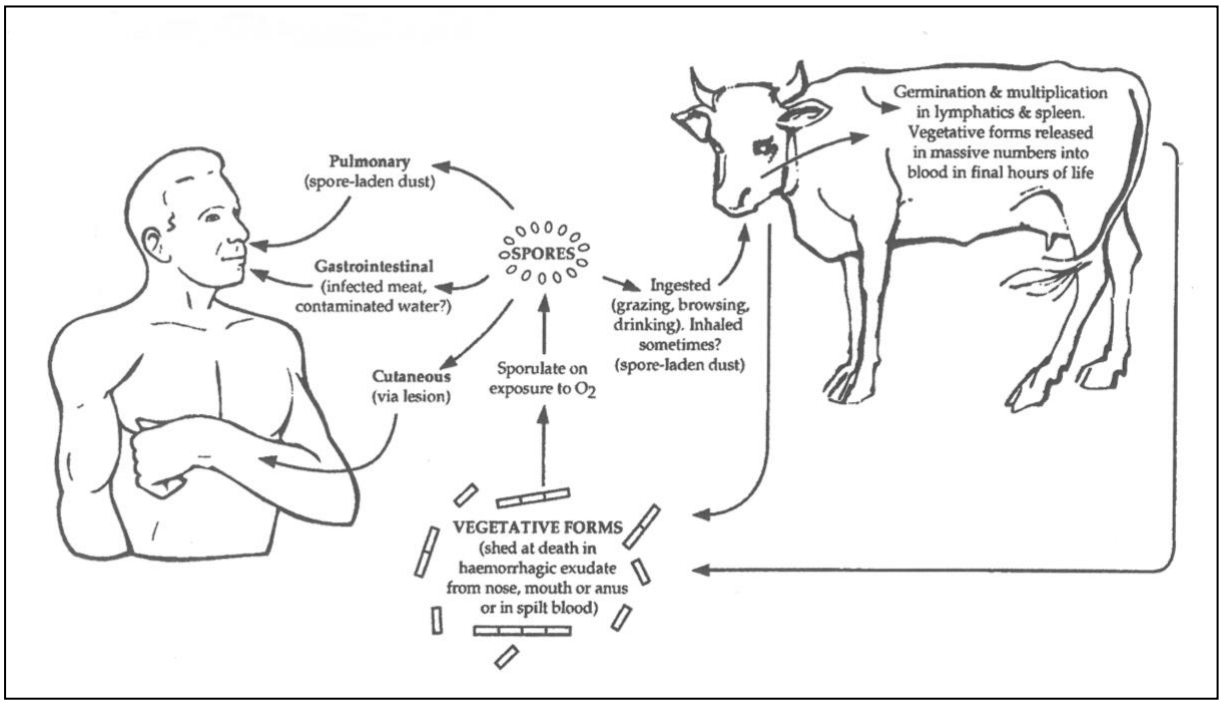

Figure 1. Cycle of infection in anthrax (Source: modified from WHO, 2008).

The spore is central to the cycle, although infection can also be acquired through uptake of the vegetative forms when, for example, humans or carnivores eat meat from an animal that died of anthrax. Human infections generally occur after direct contact with tissues of diseased animals or their products, such as handling of hair and wool. Inhalational anthrax was previously mainly an occupational disease in workers handling animal products (e.g. 'woolsorter's disease') and has disappeared from industrialised countries. A new form of anthrax has recently emerged in Europe, when heroin contaminated with spores is injected by drug users, causing severe cutaneous and soft tissue infection.

2.2 Incidence of anthrax in animals

2.2.1 South Africa

In South Africa, animal outbreaks are reported yearly due to the continued occurrence within the anthrax endemic areas of the country (Table 1).

2.2.2 Neighbouring countries

Good control programmes have been established in Botswana, Zimbabwe and Zambia, but sporadic outbreaks in domestic and wild animals occur in all South Africa's neighbouring states, as reported to the OIE. Swaziland has reported no anthrax outbreaks to the OIE for the period 2005 to 2017.

Table 1. Reported anthrax outbreaks in animals in South Africa, 2007 – 2017

Province or area	Total Number of Reported Anthrax Outbreaks in Animals within South Africa (Animal Species affected)										
	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Eastern Cape											
Free State				1 (W)			1 (B)				
Gauteng											
KwaZulu-Natal	2 (B)										
Limpopo											
Mpumalanga		1 (B)		1 (W)		1 (W)	1 (B)				
North West	2 (B)										
Northern Cape	6 (B, Cm Cp, E, W)	5 (B, O, W)	7 (B, W)		1 (W)	2 (B, W)	1 (Cp)	2 (Cp)	2 (W)		
Western Cape	1 (B)										
Kruger National Park		1 (W)	1 (W)	203 (W)	26 (W)	106 (W)	37 (W)	147 (W)	322 (W)	34 (W)	19 (W)
Country Total	**11**	**7**	**8**	**205**	**27**	**108**	**40**	**149**	**324**	**34**	**19**

B – bovine (cattle), Cm - camel, Cp – caprine (goat), E – equine (horses), O – ovine (sheep), W - wildlife
Source: Department of Agriculture, Forestry and Fisheries - National Animal Disease Database

3. ANTHRAX IN HUMANS

3.1 Incidence

Human anthrax incidence is dependent on the level of exposure to affected animals and incidence data for non-industrial cases reflect the livestock situation. Historical analysis of epidemiological data globally reveals the following approximate ratios: (a) one human cutaneous anthrax case to ten anthrax livestock carcasses; (b) one incident of enteric human anthrax to 30 – 60 anthrax-infected animals eaten; (c) in humans, 100 – 200 cutaneous cases for each enteric case that occurs.

In South Africa, there has been a small and intermittent incidence of anthrax in humans for a number of decades (Figure 2). Over the period 2005 – 2017, there were about 100 suspected human exposures in the Northern Cape and Mpumalanga provinces, but only 3 cases (one of which was fatal) have been laboratory-confirmed at the National Institute for Communicable Diseases (NICD), which serves as a regional reference laboratory for **human** anthrax. Specimens from human cases in neighbouring countries are sometimes referred to the NICD;

the true incidence in the region is not known but is likely to be underestimated if only laboratory-confirmed cases are counted.

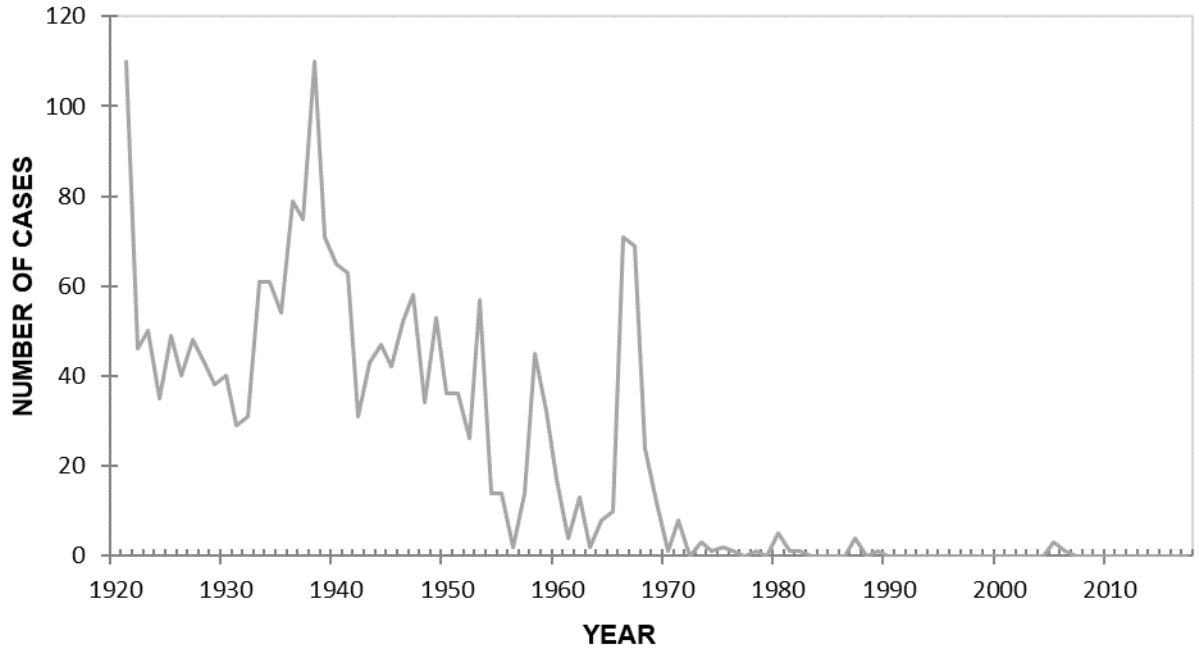

Figure 2. Notifications of human anthrax, South Africa, 1920 to 2017 (Source: Department of National Health and Population Development (1990), National Institute for Communicable Diseases (2005; 2006)).

3.2 Susceptibility: Data for risk assessments

Infectious doses, which have not been established for man, and the severity of the resulting infection, depend on several factors such as route of infection, nutritional and other states of health on the part of the infected person, and probably on the relative virulence of the infecting strain.

Cutaneous infections: It probably does not take many spores to initiate a cutaneous infection, but it is generally accepted that the spores must gain access to subepidermal tissue through a cut or abrasion before this can occur and risk of infection reflects the chance of this happening. This risk is greatly reduced in at-risk occupations by appropriate protective clothing, dressing of wounds, and other hygienic practices. Injection of contaminated drugs introduces spores directly into the tissues.

Pulmonary (inhalation) infections: Recorded inhalation LD_{50} (lethal dose, that kills 50%) in non–human primates ranges from 2 500 to 760 000 spores. The US Department of Defence bases its strategies on an estimate that the LD_{50} for humans is 8 000 to 10 000 spores. However, the only hard data on inhalation infectious doses in humans come from the studies in goat hair processing mills. In any event, substantial exposure is evidently necessary before the risk of inhalation anthrax becomes significant.

Oral route infections: There is very little information on infectious doses by the oral route, but what is true for the skin is probably largely true for the oropharyngeal and gastrointestinal

epithelium. The chance of infection is likely to be enhanced by, if not dependent on, the existence of a lesion in the epithelium through which spores can gain entry and establish an infection.

Treatability: The fact that anthrax is readily treated if diagnosed at a sufficiently early stage of infection also needs to be taken into account when assessing risks. Awareness of the likelihood of exposure having taken place is clearly an important part of the equation.

3.3 Epidemiology and transmission: the forms of anthrax

Anthrax in humans is traditionally classified in two ways:

A. According to occupational exposure:
   - Non-industrial anthrax, occurring in farmers, butchers, knackers, veterinarians and so on; and
   - Industrial anthrax, occurring in those employed in the processing of bones, hides, wool and other animal products (so-called 'woolsorter's disease').

B. According to the route by which the disease was acquired:
   - Cutaneous anthrax acquired through a skin lesion,
   - Gastrointestinal tract anthrax contracted from ingestion of contaminated food, primarily meat from an animal that died of the disease, or conceivably from ingestion of contaminated water,
   - Pulmonary (inhalation) anthrax from breathing in airborne anthrax spores; and
   - Injectional anthrax acquired from injection of contaminated drugs by drug users.

Non-industrial anthrax, resulting from handling infected carcasses, usually manifests itself as the cutaneous form; it tends to be seasonal and parallels the seasonal incidence in the animals from which it is contracted. Intestinal anthrax from eating infected meat is also a non-industrial form of the disease. Industrial anthrax also usually takes the cutaneous form, but has a far higher probability than non-industrial anthrax of taking the pulmonary form through inhalation of spore-laden dust.

Humans almost invariably contract anthrax directly or indirectly from infected animals. Records of person-to-person spread or laboratory-acquired anthrax are rare. It is generally believed that *B. anthracis* is non-invasive and cutaneous and gastrointestinal tract anthrax infection requires entry through a small cut, abrasion or other lesion (ulcer, etc.). Thus anthrax eschars are generally seen on exposed regions of the body, mostly on the face, neck, hands and wrists.

3.4 The clinical disease

Globally, cutaneous anthrax accounts for 95% or more of human cases. All four forms, namely cutaneous, injectional, gastrointestinal tract and pulmonary, are potentially fatal if untreated, but the cutaneous form is often self-limiting. Data from pre-antibiotic and vaccine days indicate that 10 – 20% of untreated cutaneous cases might be expected to result in death. With treatment, less than 1% of cases are fatal. Overt gastrointestinal tract and pulmonary cases are more often fatal (25 – 60% and 75%, respectively), largely because they go unrecognized until it is too late for effective treatment. However, serological and epidemiological evidence suggests that undiagnosed low-grade gastrointestinal tract or pulmonary anthrax with

recovery can also occur, and may not be infrequent, among exposed groups. Development of meningitis can be a serious complication in all four forms of anthrax, with a mortality rate of >80%.

3.4.1 Cutaneous anthrax

The incubation period ranges from as little as 9 hours to 2 weeks, mostly 2 to 7 days.

The general scenario is as follows:

***Day 0*:** Entry of the infecting *B. anthracis* (usually as spores) through a skin lesion (cut, abrasion, etc.).

***Days 2-3*:** A small pimple or papule appears.

***Days 3-4*:** A ring of vesicles develops around the papule. Vesicular fluid may be exuded. Unless the patient was treated, capsulated forms of *B. anthracis* can be identified in polychrome methylene blue-stained (M'Fadyean stain) smears of this fluid and isolated on conventional agars, preferably blood agar. Marked oedema starts to develop. Unless there is secondary infection, there is no pus and the lesion is not painful, although painful lymphadenitis may occur in the regional lymph nodes.

Days 5-7 The original papule ulcerates to form the characteristic blackish eschar. Topical swabs will not pick up *B. anthracis*. Detection by polychrome methylene blue-stained smears or isolation requires lifting the edge of the eschar with forceps (this gives no pain unless there is secondary infection) and obtaining fluid from underneath. The fluid will probably be sterile if the patient has been treated appropriately. Oedema extends some distance from the lesion. Clinical symptoms may be more severe if the lesion is located in the face, neck or chest. In these more severe forms, clinical findings are high fever, toxaemia, regional painful lymph node enlargement and extensive oedema; shock and death may ensue.

Day 10 The eschar begins to resolve; resolution takes almost six weeks and is not hastened by treatment. A small proportion of cases, if untreated, develop systemic anthrax with hyperacute symptoms.

A typical anthrax lesion is characterised by marked oedema, vesicle formation, fluid exudation, and development of a black, necrotic eschar (a characteristic black necrotic area in the centre) that usually develops within 2 to 6 days of infection (Figure 3), which should not be confused with other skin lesions. The absence of pus, the lack of pain, and the patient's occupation may provide further diagnostic pointers. Orbital cellulitis, dacrocystitis and deep tissue infection of the neck should be considered in the case of severe anthrax lesions involving the face, neck and anterior chest wall. Necrotising soft tissue infections, particularly group A streptococcal infections and gas gangrene, and severe cellulitis due to staphylococci, should also be considered in the differential diagnosis of severe forms of cutaneous anthrax.

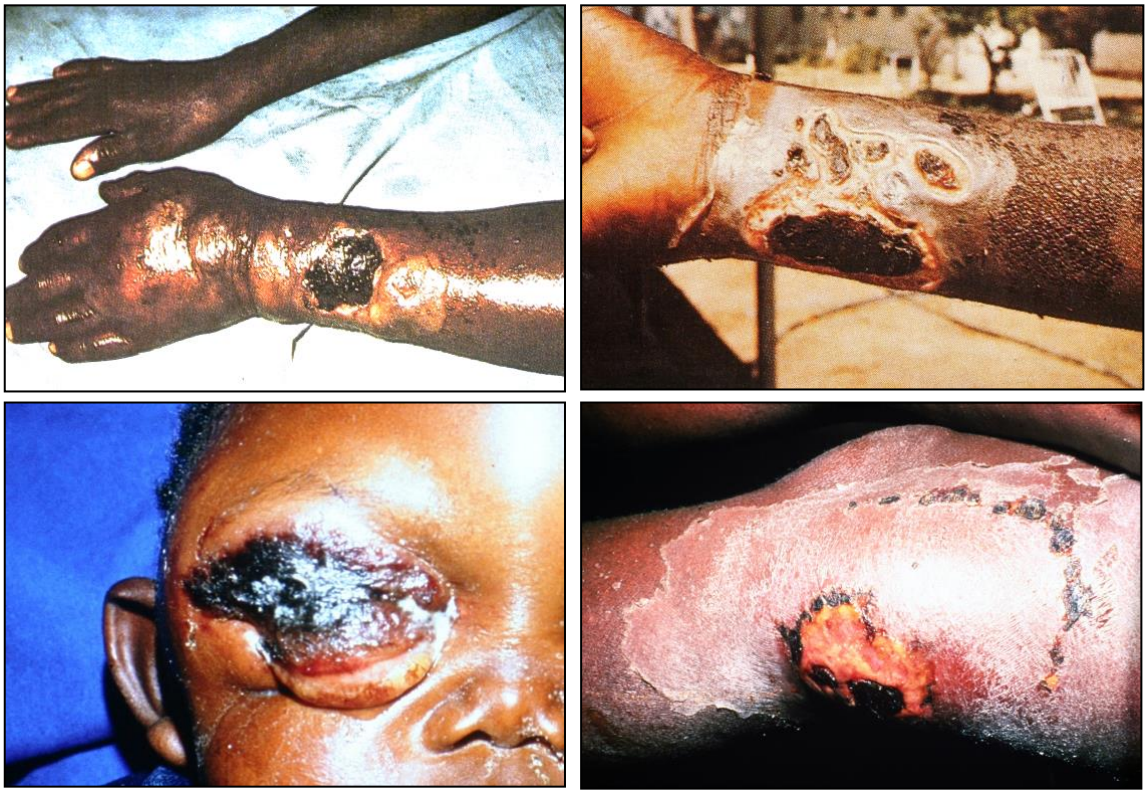

Figure 3. Cutaneous form of anthrax in humans with eschar lesion and extensive skin reaction. Top right photograph shows a resolving infection. (Source: NICD, collection of the late Prof. Margaretha Isaäcson)

3.4.2 Gastrointestinal anthrax

There are two clinical forms of gastrointestinal anthrax that may present following ingestion of *B. anthracis* in contaminated food or drink.

i) Intestinal anthrax: symptoms include nausea, vomiting, fever, abdominal pain, haematemesis, bloody diarrhoea and massive ascites. Unless treatment commences early enough, toxaemia and shock develops, followed by death. There is evidence that mild, undiagnosed cases with recovery occur.

ii) Oropharyngeal anthrax: the main clinical features are sore throat, dysphagia, fever, regional and cervical lymphadenopathy and toxaemia. Even with treatment, the mortality is about 50%.

The suspicion of anthrax depends largely on awareness and alertness on the part of the physician as to the patient's history and to the likelihood that he/she had consumed contaminated food or drink.

The differential diagnosis in intestinal anthrax includes foodborne disease (in the early stages of intestinal anthrax), acute abdomen due to other reasons, and haemorrhagic gastroenteritis due to other microorganisms, particularly necrotising enteritis due to *Clostridium perfringens*. In the differential diagnosis of oropharyngeal anthrax, streptococcal pharyngitis, Vincent's

angina, Ludwig's angina, parapharyngeal abscess, and deep tissue infection of the neck should be considered.

3.4.3 Pulmonary (inhalation) anthrax

Initial symptoms are non-specific and resemble a flu-like illness including fever, chills, malaise, myalgia and headache. This mild initial phase is followed by the sudden development of dyspnoea and cyanosis, which may be associated with disorientation and rapid progression to coma and death within 24 hours.

3.4.4 Injectional anthrax

Injectional anthrax is a newly-recognised form that is associated with intravenous drug use. It involves severe soft tissue infection with prominent tissue edema, diffuse capillary bleeding, and necrosis of the superficial adipose tissue. In contrast to cutaneous disease, papules, vesicles, and eschars are not typically observed.

3.4.5 Anthrax meningitis

Meningitis due to anthrax is a serious clinical development that may follow any of the other four forms of anthrax. The case fatality rate is almost 100%; the clinical signs of meningitis with intense inflammation of the meninges, markedly elevated cerebrospinal fluid (CSF) pressure and the appearance of blood in the CSF (haemorrhagic meningitis) are followed rapidly by loss of consciousness and death.

Differential diagnosis should take into account acute meningitis of other bacterial aetiology. The definitive diagnosis is obtained by visualisation of the encapsulated bacilli in the CSF and/or by culture.

3.4.6 Anthrax sepsis

Sepsis develops after the lympho-haematogenous spread of *B. anthracis* from a primary lesion (cutaneous, injectional, gastrointestinal or pulmonary). Clinical features are high fever, toxaemia and shock, with death following in a short time. In the differential diagnosis, sepsis due to other bacteria should be considered. Definitive diagnosis is made by the isolation of *B. anthracis* from the primary lesion and from blood cultures.

4. DIAGNOSIS

The clinicians suspecting anthrax cases should inform the laboratory to ensure that appropriate samples are collected. The communicable disease control coordinators must also be informed to initiate a timely public health response.

4.1 Confirmation of clinical diagnosis

Clinical diagnosis is dependent on knowledge of the patient's history; early symptoms are non-specific and 'flu-like', with mild upper respiratory tract signs in pulmonary anthrax, or resembling mild foodborne illness in intestinal anthrax. In pulmonary anthrax, the X-ray picture of the lung is very characteristic, with a widened mediastinum due to markedly enlarged mediastinal lymph nodes. Other X-ray findings may include consolidation and pleural effusion. Confirmatory diagnosis of pulmonary or gastrointestinal anthrax will usually take place after the patient has died or, if correct treatment is initiated early enough, when he or she is well

recovered. Clinicians should be aware that anthrax symptoms and signs may mimic other conditions hence the differential diagnosis in Table 2 may be considered.

The gold standard for laboratory confirmation of anthrax is isolation of *B. anthracis* from clinical specimens by direct culture onto blood agar with demonstration of typical Gram stain, motility, penicillin sensitivity and gamma(γ)-phage sensitivity. *B. anthracis* may be readily cultured from clinical specimens including blood (systemic infections), skin lesion exudates, pleural fluid, cerebrospinal fluid (CSF), vomitus and stool, if collected prior to antimicrobial therapy. Blood cultures may be positive in both pulmonary and gastrointestinal anthrax. Depending on the treatment administered and the stage the disease has reached at the time of collection of specimens, smears stained for demonstration of the capsule may be positive, or the specimens may be positive by culture. *B. anthracis* may be visualized in or isolated from sputum (pulmonary anthrax) or faeces (intestinal anthrax), but a negative result does not exclude it.

Table 2. Differential diagnosis of human anthrax

Forms of anthrax	**Diagnosis**	**Differential diagnosis**
Cutaneous anthrax	• Clinical history and symptoms as per section 3.4.1 • Microscopic examination	Boil (early lesion), spider bites, ulcer (especially tropical); erysipelas, glanders, plague, syphilitic chancre, ulceroglandular tularaemia; clostridial infection; rickettsial diseases (eschar of spotted fever or scrub typhus); vaccinia and cowpox, rat-bite fever, or leishmaniasis.
Gastrointestinal anthrax	• Clinical history & symptoms as per section 3.4.2 • Culture from stool & blood • Complete blood count and LFT	Oropharyngeal anthrax has to be differentiated from diphtheria and complicated tonsillitis, streptococcal pharyngitis, angina, parapharyngeal abscess, and deep-tissue infection of the neck, whereas gastrointestinal anthrax has to be differentiated from food poisoning (in the early stages of intestinal anthrax), acute abdomen owing to other reasons, and haemorrhagic gastroenteritis caused by other microorganisms, particularly necrotizing enteritis caused by *Clostridium perfringens,* and dysentery (amoebic or bacterial).
Inhalation anthrax	• Clinical history & symptoms as per section 3.4.3 • Chest X-ray • Culture from sputum & blood • Complete blood count and LFT	Mycoplasmal pneumonia, legionnaires' disease, psittacosis, tularemia, Q fever, viral pneumonia, histoplasmosis, coccidiomycosis, malignancy.

4.2 Post-mortem diagnosis

A post-mortem should not be performed on confirmed anthrax cases. For suspected anthrax cases, a heart blood sample should be taken for diagnosis without conducting a full post-mortem. Where anthrax has not been suspected prior to post-mortem, characteristic signs on autopsy are dark haemolysed non-clotting blood, enlarged haemorrhagic spleen, petechial haemorrhages throughout the organs, and a dark oedematous intestinal tract, ulcerated or with areas of necrosis. In pneumonic anthrax, the mediastinal lymph nodes are always affected with haemorrhagic necrotizing lymphadenitis. Nevertheless, it may be hard to differentiate between pulmonary and intestinal anthrax at autopsy and the decision as to how the disease was contracted may have to be based on the patient's history.

4.3 Collection and transport of specimens for laboratory diagnosis

All diagnostic laboratories, both public and private must refer suspected human anthrax exposure-related specimens to the Centre for Emerging Zoonotic and Parasitic Diseases (CEZPD), National Institute for Communicable Diseases (NICD). Diagnostic specimens and suspected *B. anthracis* cultures should be sent directly to the NICD together with a completed case investigation form (Appendix 1). Please refer to Table 3 below for specimen collection guidelines.

Universal safety precautions should be taken when collecting and handling diagnostic samples. Surgical tools should be sterilised without delay after use, and dressings should be incinerated. The wearing of surgical gloves by medical staff is recommended, but risks to staff are NOT high. Direct human-to-human transmission is exceedingly rare; however, universal principles of infection control are recommended.

Specimens should be packaged and transported in compliance with the National Road Traffic Act, 1996 (Act No. 93 of 1996) and United Nations Model Regulations for shipping of infectious substances. Diagnostic specimens are classified as *Biological substance, category B* assigned to UN 3373 and should be packaged in accordance with Packing Instruction P650. *Bacillus anthracis* cultures are classified as *Infectious substance affecting humans, category A* assigned to UN 2814 and may only be transported in packaging that meets the United Nations class 6.2 specifications and complies with Packing Instruction P620.

Table 3. Sample collection for diagnosis of anthrax in humans

Disease (ICD 10 code: A22)	**Sample collection** (E.g. sample source, type, amount, specimen container, transport medium, type of swab)	**Specimen transportation requirements**	**Special instructions** Case investigations forms to be completed (see Appendix 1), guidelines, other relevant info)	**Laboratory and contact phone numbers**
Cutaneous anthrax	Vesicular stage: Soak 2 x sterile dry swabs in vesicular fluid from a previously unopened vesicle. Eschar stage: Rotate 2 x sterile dry swabs for 2-3 seconds beneath the edge of eschar without removing it. Biopsy of lesion: Fresh tissue in PBS/saline *Please note:* Do not send formalin-preserved tissue.	Transport at room temperature	Safety precautions should be taken when handling/collecting samples. Samples should be taken prior to antibiotic treatment and should reach laboratory as quickly as possible. **Important** Please notify laboratory prior to sending specimens. Note: Serological testing for anthrax is not available.	Special Bacterial Pathogens Reference Laboratory (SBPRL) Centre for Emerging Zoonotic and Parasitic Diseases (CEZPD) NICD 1 Modderfontein Rd (R25), Sandringham Johannesburg 2192 Tel: 011 555 0331 / 0306 After hours: NICD Hotline 082 883 9920
Inhalation anthrax	Pleural fluid or sputum plus whole blood (EDTA)	Transport at 2-8°C		
Gastrointestinal anthrax	Intestinal type: Stool/rectal swab plus whole blood (EDTA) Oropharyngeal type: Swab surface and edges of suspected lesions in the oropharynx or buccal cavity, or on the tongue, tonsils or posterior pharyngeal wall using 2 x sterile swab pre-moistened with sterile saline.	Transport at 2-8°C		
Meningeal anthrax	CSF	Transport at 2-8°C		
Anthrax sepsis	Blood cultures and/or whole blood	Room temperature		
Anthrax- all forms	Suspected *B. anthracis* culture	Room temperature		

4.4 Surveillance

4.4.1 Surveillance during the prevention phase

Surveillance during preventive phase comprises of clinical and laboratory surveillance in high risk areas and when there is imminent threat of anthrax incursion. The reporting should be done as per the notifiable diseases surveillance reporting system.

4.4.1.1 Clinical disease surveillance

Clinical surveillance is aimed at detection of anthrax cases based on clinical signs and symptoms of anthrax at the individual/household level and health centres. Anthrax should be suspected when any patient is found or visit health centres with cutaneous lesion on hand, legs, face and neck, abdominal distress characterized by nausea, vomiting, and anorexia, respiratory distress syndrome and acute encephalitis syndrome with history of exposure to anthrax suspected animals or/and their products.

4.4.1.2 Laboratory surveillance

Laboratory surveillance is not applicable for anthrax in humans; however, whenever there is a suspected case, appropriate samples should be collected and sent to the laboratory for confirmation.

4.4.1.3 Targeted surveillance

Targeted surveillance in human is recommended only in the high-risk areas or households where incidents of animal anthrax have been reported in the past and in those people who handle meat and meat products (e.g. butchers, slaughterhouse workers).

4.4.2 Surveillance plan for anthrax in humans following an outbreak and post-outbreak phase

Surveillance must be carried out in humans based on epidemiological risk assessment and on the basis of history of contact, consumption and trade of animal products of the animal suspected to have died of anthrax.

4.5 Reporting

Anthrax is a notifiable medical condition that requires immediate (within 24 hours) notification as a clinical case (by health care provider), and as a laboratory-confirmed case (by laboratory) in accordance with the National Health Act, 2003 (Act No. 61 of 2003) and regulations relating to communicable diseases and notifiable medical conditions. For detailed information on the Notifiable Medical Conditions national surveillance system, refer to the NICD website (http://www.nicd.ac.za/index.php/nmc/).

Notification to WHO is universally required in the event that an outbreak fulfills the decision instrument for assessment and notification of events that may constitute a public health emergency of international concern, in terms of the International Health Regulations (2005), under Article 6.

Standard case definitions for the various forms is as follows:

Suspected case

Any person with acute onset characterized by several clinical forms which are:

a) ***Cutaneous form****:* Any person with skin lesion evolving over 1 to 6 days from a papular through a vesicular stage, to a depressed black eschar invariably accompanied by oedema that may be mild to extensive.
b) **G*astro-intestinal***: Any person with abdominal distress characterized by nausea, vomiting, anorexia and followed by fever.
c) **P*ulmonary (inhalation)***: Any person with brief prodrome resembling acute viral respiratory illness, followed by rapid onset of hypoxia, dyspnoea and high temperature, with X-ray evidence of mediastinal widening.
d) ***Meningeal***: Any person with acute onset of high fever possibly with convulsions, loss of consciousness, meningeal signs and symptoms; commonly noted in all systemic infections, but may present without any other clinical symptoms of anthrax.
e) ***Injectional***: An injecting drug user with soft tissue involvement and a clinical syndrome compatible with anthrax.

AND has an epidemiological link to confirmed or suspected animal cases or contaminated animal products or injected drugs.

Confirmed case

A confirmed case of anthrax in a human can be defined as a clinically compatible case of cutaneous, inhalational or gastrointestinal illness that is laboratory-confirmed by:

- Isolation of *B. anthracis* from an affected tissue or site; or
- Other laboratory evidence of *B. anthracis* infection based on at least two supportive laboratory tests.

Note: it may not be possible to demonstrate *B. anthracis* in clinical specimens if the patient has been treated with antimicrobial agents.

5. TREATMENT

Prompt and timely antibiotic therapy usually results in dramatic recovery of the individual or animal infected with anthrax. Empiric treatment should be started immediately if there is a suspicion of anthrax, since laboratory test results may be delayed and anthrax may progress rapidly. For mild uncomplicated cutaneous anthrax, amoxicillin is sufficient, with some provisos. Some strains are naturally resistant to beta-lactams. **Cephalosporins should never be used,** for this reason, but penicillin is sometimes also affected. *In vitro* tests have indicated that some strains of *B. anthracis* grown in the presence of sub-inhibitory concentrations of flucloxacillin become resistant to penicillin and amoxicillin either by induction of beta-lactamase or through some other, unidentified mechanism. **It is therefore important to use high doses of penicillin when this is being used for treatment.** *B. anthracis* strains that have been bio-engineered to be resistant to penicillin are more likely in a bioterrorism situation; hence, if this is suspected, **beta-lactam antibiotics should be avoided in bioterrorism situations until susceptibility tests have been done**.

For patients with severe systemic anthrax, combination antimicrobial therapy is recommended. Since the pathogenesis of anthrax involves exotoxin production, protein synthesis inhibitors in combination with bactericidal agents are recommended. See Table 4 for summary (compiled from WHO, 2008; Hendricks *et al*., 2014; Pillai *et al*., 2015).

5.1 Mild uncomplicated cutaneous cases

Mild uncomplicated cutaneous anthrax refers to a localised lesion without systemic involvement or extensive oedema, and where the lesion is not on the head and neck region, in individuals over 2 years of age. If the infection is naturally acquired (i.e., bioterrorism is ruled out), then an acceptable first choice is amoxicillin, but susceptibility testing should be done if possible. If bioterrorism is suspected oral ciprofloxacin is recommended.

Oral therapy should be given for 7 to 10 days. Cutaneous lesions usually become sterile within the first 24 hours of such regimens but, although early treatment will limit the size of the lesion, it will not alter the evolutionary stages it must go through.

5.2 Severe cutaneous, inhalational and gastrointestinal cases

Severe cutaneous cases of anthrax include those with systemic involvement, extensive oedema, lesions of the head and neck region, or disease in those <2 years of age. Inhalational, gastrointestinal and severe cutaneous cases require intravenous antibiotics for 7 to 10 days. A bactericidal agent should be used plus a protein synthesis inhibitor to reduce exotoxin production. Unless there are major contraindications, ciprofloxacin should be first-line treatment, together with clindamycin. If intravenous (IV) ciprofloxacin is not available and/or bioterrorism is unlikely and/or penicillin susceptibility is shown, intravenous penicillin G, as described below, can replace ciprofloxacin

Anthrax meningitis should be suspected in inhalational anthrax and all cases with systemic involvement. The development of anthrax meningitis is associated with very high mortality and therefore cases that have meningitis should have at least one other bactericidal drug in addition to ciprofloxacin plus clindamycin: either meropenem or penicillin (if sensitivity to penicillin is shown). Glucocorticoids should be considered in all anthrax cases with systemic involvement; the recommendation is IV dexamethasone 10 mg 6 hourly for 4 days. Paediatric dose: 0.15 mg/kg 6 hourly for 4 days.

5.3 Supportive treatment for cutaneous anthrax

The swelling seen in an anthrax infection is due to the action of oedema toxin and there is very little associated inflammation. In theory, therefore, steroids should be of little value. In practice, some reports indicate that these have been administered with evidence of benefit but others have concluded that they were ineffective, discontinuing their use (Kayabas *et al.*, 2012). Early tracheotomy is advised if there is danger of tracheal obstruction; once oedema is extensive, performing a tracheostomy can be technically difficult.

5.4 Supportive therapy for inhalational anthrax

Mechanical ventilation may be required for respiratory distress, airway protection in patients with altered mental status, or airway oedema in patients with head, neck, thorax or oropharyngeal involvement (Hendricks *et al*, 2014). Pleural fluid drainage should be started early in all inhalational anthrax cases, as this has been shown to decrease mortality. This better outcome is attributed to both an improvement in mechanical respiration as well as the removal of toxins that have been shown to accumulate in high levels in the pleural fluid.

5.5 Recurrence after treatment

Recurrence of disease on termination of treatment is very rare, but convalescent cases should remain under observation for at least a week after treatment has ceased. Although also extremely rare, re-infections have been described.

Table 4. Treatment guidelines

Uncomplicated cutaneous anthrax	**Severe cutaneous, inhalational & gastro-intestinal anthrax**	**Anthrax meningoencephalitis**
Oral ciprofloxacin - Adults: 500 mg, 12 hourly - Children (>2 years): 15 mg/kg twice daily (not to exceed 500 mg per dose) Children ≤2 years to be treated as severe cutaneous disease protocol **OR** If antimicrobial tests show penicillin susceptibility, oral amoxicillin: - Adults & children ≥12 years: 500 mg three times daily - Children <12 years: 45 mg/kg divided into three doses, not to exceed 500 mg per dose. Duration of therapy for all regimens should be 7 – 10 days.	Intravenous ciprofloxacin - Adult: 400 mg, 8 hourly - Children: 10 mg/kg 8 hourly (not to exceed 400 mg per dose or 1 g/day) If IV ciprofloxacin is not available, IV meropenem can be substituted, or IV penicillin (non-bioterrorism situation) as follows: penicillin G, 4 to 6 million units four times daily in adults and children ≥12 years, 250 000 to 400 000 units/kg per day divided into 4 to 6 hour doses in those <12 years of age, not to exceed 24 million units per day **PLUS** A protein synthesis inhibitor with good *in vitro* activity against *B. anthracis*, e.g.: - clindamycin **CONSIDER** Glucocorticosteroids - dexamethasone 10 mg 6 hourly for 4 days Paediatric dose: 0.15 mg/kg 6 hourly for 4 days	Intravenous ciprofloxacin - Adult: 400 mg, 8 hourly - Children: 10 mg/kg 8 hourly (not to exceed 400 mg per dose) **PLUS** 2 other antibiotics (a bactericidal agent and a protein synthesis inhibitor) with good central nervous system penetration and *in vitro* activity against *B. anthracis*. These include adequate dosages of the following: A. Protein synthesis inhibitors: - clindamycin B. Bactericidal antibiotics - penicillin or ampicillin (if susceptible) - or meropenem (if penicillin susceptibility is unknown) **CONSIDER** Glucocorticosteroids - dexamethasone 10 mg 6 hourly for 4 days Paediatric dose: 0.15 mg/kg 6 hourly for 4 days

6. RESPONSE TO SUSPECTED ANTHRAX EXPOSURE

Exposure to anthrax may be through intentional exposure such as weaponised anthrax spores or unintentional exposure through contact with infected animals or their products; most common being through handling and consumption of contaminated meat.

6.1 Response to suspected intentional exposure to anthrax: Bioterrorism

6.1.1 Introduction

Bioterrorism is the use of biological agents against civilians or non-combatants with the intention of causing widespread panic and social disruption. Concern about the use of microbes as weapons for terror has increased significantly since the 2001 attacks in the USA, when *B. anthracis* spores were disseminated via the USA postal system using letters. South Africa had a spate of 'white powder' threats after 2002, and although no anthrax was involved, investigations were very costly and the incidents incited localised public panic.

Anthrax is classified as a category A pathogen with priority level 1, according to the Centers for Disease Control and Prevention classification of bioterror agents. These constitute the greatest threat for mass morbidity and mortality, and are therefore of greatest concern.

The South African Police Services (SAPS) is in overall command of all incidents where there are indications that the incident was caused through criminal intent. In such cases the incident will be managed as outlined in the Government Gazette no. 28437 dated 3 Feb 06, Government Notice 143/3 Feb 06–Manual: Joint Management of Incidents Involving Chemical or Biological Agents or Radio-active Materials.

6.1.2 Management of 'white powder incidents' or other suspected anthrax bioterrorism exposures

The release of biological weapons can be covert or overt. In the case of an overt release, the usual responders are the police/military, fire department and emergency personnel. In a covert release the responders will be health care workers, as the recognition of an attack is often delayed. Public health and medical communities need to be prepared to recognize and respond to a threat or real attack with biological weapons.

6.1.2.1 Health care practitioner as first responder

Features that should alert health care workers to the possibility of a bioterrorism-related outbreak include:

a) A rapidly increasing disease incidence (e.g. within hours or days) in a normally healthy population.
b) An epidemic curve that rises and falls during a short period of time.
c) An unusual increase in the number of people seeking care, especially with fever, respiratory, or gastrointestinal complaints.
d) An endemic disease rapidly emerging at an uncharacteristic time or in an unusual pattern.
e) Lower attack rates among people who had been indoors, especially in areas with filtered air or closed ventilation systems, compared with people who had been outdoors.
f) Clusters of patients arriving from a single locale.

g) Large numbers of rapidly fatal cases.
h) Any patient presenting with a disease that is relatively uncommon and has bioterrorism potential (e.g. pulmonary anthrax, tularemia, or plague).

Should a bioterrorism event be suspected, a network of communication must be activated to involve the infection control team in the facility, facility management, Provincial and National Departments of Health, the South African Police Service (SAPS), South African Military Health Services (SAMHS), the National Institute for Communicable Diseases (NICD), and the National Outbreak Response Unit. All facilities are encouraged to compile a list of relevant contact numbers that can be easily accessed in case of a bioterror incident.

6.1.2.2 Actions at scene

a) Do not shake or empty the contents of any suspicious envelope or package.
b) Leave the suspicious parcel or package alone and leave the room.
c) Do not try to clean up any spilled substance, immediately cover it.
d) Switch off any fan, air conditioner or blower.
e) Leave the room and close the door or section of the area to prevent others from entering (i.e. limit exposure as much as possible).
f) Wash your hands thoroughly with soap and water to prevent spread.
g) Immediately notify the SAPS Explosives Unit ('Bomb Disposal') and the provincial Department of Health (refer to Appendix 3 for contact details).
h) Make a list with contact numbers of people who were in the vicinity of the suspicious package and hand it to the Incident Commander for medical follow-up.
i) The police will be responsible for the removal of the substance. The provincial Outbreak Response Unit will be responsible for follow-up of contacts and administration of post exposure prophylaxis.

6.1.2.3 Management by South African Police Service

Responsibility rests with the SAPS Explosives Unit, in its capacity as primary manager of all suspicious package investigations; substances or articles suspected of being of biological hazard will be secured, then passed to 7 Medical Battalion Group of the South African Military Health Services, who will conduct preliminary screening to determine whether the substance contains anthrax or not. They will then send samples to Protechnik Laboratories for detailed analysis. Protechnik Laboratories will provide the final analysis report to the SAPS Explosives Unit. The SAPS Explosives Unit will notify all role players of the screening results and the final analysis report.

6.1.2.4 Handling of specimens

a) The substance must be packed in a plastic bag, which should then be placed in another plastic bag or in a sealed plastic container, by the SAPS.
b) The bag/container must be clearly labelled as 'For anthrax investigation', and also clearly marked as a 'Biological hazard'. It should also have other relevant information like police docket number and name of the place/person for identification and follow-up of results.
c) The sample will be handled as per paragraph 6.1.2.3.

6.1.3 Management of contacts

Human contacts should be subjected to a simple algorithm (Appendix 2: *Algorithm for management of 'white powder incident' contacts*) to determine their risk of exposure, and managed as indicated. The collection of human specimens is generally not indicated following exposure to a suspected white powder incident, but is only required in cases of suspected anthrax disease. Specimens from humans can be sent directly to the NICD or submitted to any National Health Laboratory Service laboratory (or other private laboratory) for forwarding to the NICD as indicated in section 4.3.

a) If persons in the vicinity of a suspected substance answer positively to one or more of the following questions, they should be regarded as contacts:
   - Did you handle the article or any of the material?
   - Did you inhale, touch or taste any powder or get it on your skin?
   - Were you sitting or standing next to the person who handled the article?

b) The contacts must be decontaminated by washing twice with soap and water, including washing of their hair.

c) If clothes have been contaminated they must be removed carefully so as not to cause spread or inhalation of suspicious substance. They can be washed separately from other clothes with soap and water. They are then good for re-use.

d) If no other source of specimen is available and only the clothes have suspicious substance on them, then they must be carefully removed and placed in a plastic bag, which in turn should be sealed in another plastic bag and clearly labelled as 'For anthrax investigation", and also clearly marked as a 'Biological hazard', and handled as described above (6.1.2.3).

e) Contacts must be referred to the closest health care facility for investigation and follow-up.

f) Clinical specimens must be referred to the NICD as indicated in section 4.3.
   NB: Clinical specimens should only be collected from persons showing signs and symptoms of anthrax disease, and not from asymptomatic contacts.

g) Administer prophylactic treatment if there is evidence of inhalation of the suspicious substance; refer to Table 5 below. Continue antibiotic prophylaxis until laboratory results are available.

h) If the powder sample is negative for anthrax, discontinue prophylaxis.

i) If the powder sample is positive for anthrax, continue prophylaxis of all contacts for 8 weeks.

j) If there are no signs or symptoms of disease (flu-like symptoms, breathing problems), hospitalisation is not required. Continue self-observation.

k) If contact becomes ill, report immediately to health care facility or medical practitioner.
   NB: Contact with the spores does not necessarily cause illness.

l) Health workers need not fear taking care of the patient, as there is no risk of person-to-person spread of anthrax.

m) While handling blood specimens (e.g. in case of septicaemia) normal primary precautions must be observed.

n) In the hospital, patients should be treated based on culture results of specimens.

o) Compile a line list of all suspected and confirmed cases and forward it to the National Outbreak Response Unit on a daily basis.

6.2 Response to unintentional exposure

People acquire anthrax from infected farm or wild animals. In South Africa, the greatest risk is posed by butchering, handling or eating meat from animals infected with anthrax. Where animals are suspected as a source of infection, the animal and human health officials must be involved in investigations using a One Health approach. The following steps are recommended to respond to a suspected/confirmed unintentional anthrax exposure:

- Report case-based information telephonically immediately to the appropriate levels including district and provincial CDC (Appendix 3) and State Veterinary Services. Contact NICD for advice on clinical management and sample collection (also refer to Section 4).
- Use standard barrier precautions for all forms of anthrax. Use protective equipment and clothing (gloves, gowns, face shields), and respiratory protection if there is a risk of aerosols, disinfection and dressing any cuts and abrasion before putting on protective clothing. Any incidents should be reported immediately.
- Particular attention should be paid to body fluid spills which should be managed by the usual methods for cleaning and decontamination of any body-fluid spills. This should be done promptly and thoroughly, because organisms which remain on surfaces may form spores which are infectious
- Collect specimens safely to confirm the case (refer to Section 4). See the NICD-NHLS Quick Reference Guide for the Laboratory Diagnosis of Priority Communicable Diseases for further details.
- Treat and manage the patient with supportive care and antibiotics (refer to section 5). A high index of clinical suspicion and prompt institution of appropriate antimicrobial therapy (preferably following specimen collection) is essential for the treatment of suspected anthrax disease.
- Conduct joint (public health and animal health sectors) investigation of cases/deaths (Appendix 1: Anthrax case investigation form).
- Conduct active searches for additional cases that may not come to the health care setting (older women or small children, for example) and provide information about prevention in the home and when to seek care.
- Identify additional cases and contacts and manage appropriately.
- Consider community engagement for early detection and care. Conduct community education about the suspected/confirmed case, how the disease is transmitted, and how to use infection control in the home care setting.
- Perform safe burial or cremation (if practiced) of dead bodies (humans and animals).
- Request additional help from national level as needed.

For detailed information on outbreak preparedness and response, refer to National Guidelines on Epidemic Preparedness and Response.
https://www.idealclinic.org.za/docs/Protocols/National%20Guidelines%20on%20Epidemic%20Preparedness%20and%20Response%20.pdf

6.3 Preventive Measures

6.3.1 Post-exposure prophylaxis

There is no human anthrax vaccine available in South Africa. Antibiotics used in post-exposure prophylaxis (PEP) are very effective in preventing anthrax disease from occurring after an exposure. Table 5 shows the recommendations for PEP following exposure to anthrax.

Table 5. Recommendations for post-exposure prophylaxis after exposure to *Bacillus anthracis*.

Patient	**Recommended initial antibiotic***	**Duration**
Adults	• Ciprofloxacin 500 mg orally twice daily, or • Amoxicillin 500 mg orally three times daily may be substituted if anthrax isolate has been found to be a penicillin-sensitive strain.	60 days
Pregnant or breastfeeding women	• Ciprofloxacin 500 mg orally twice daily, or • Amoxicillin 500 mg orally three times daily may be substituted if anthrax isolate has been found to be a penicillin-sensitive strain.	60 days
Children	• Ciprofloxacin 10 -15 mg/kg not to exceed 500 mg orally twice daily, or • If anthrax isolate is penicillin-sensitive amoxicillin should be substituted. - Weight <20 kg: 80 mg/kg orally in three divided doses - Weight >20 kg: 500 mg orally three times a day	60 days

* In cases of allergy or other intolerance to any antimicrobial, use an appropriate alternative listed

6.3.2 Isolation of cases/contacts

Anthrax is not known to spread from person-to-person. Therefore, there is no need to isolate individuals suspected of being exposed to anthrax or to treat contacts of persons ill with anthrax, such as household contacts, friends, or co-workers, unless they were also exposed to the same source of infection.

7. REFERENCES

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8. GLOSSARY

Bioterrorism: the use, or the threat of use, of biological agents against non-combatants, with the aim of intimidating and/or creating mass panic. Biological agents are living organisms or material or toxins derived from them, which are intended to cause disease or death in humans, animals or plants.

CEZPD: Centre for Emerging Zoonotic and Parasitic Diseases

CSF: cerebrospinal fluid

DAFF: Department of Agriculture, Forestry and Fisheries

Ecology: the science of communities; the science of relationships of organism to environment.

Etiology: the study of causation, or origination.

Epidemic: the occurrence in a community or region of cases of an illness (or an outbreak) with a frequency clearly in excess of normal expectancy. Applied to a disease or pathogen, which becomes widespread and attacks more than expected numbers of humans at the same time.

Enzootic: temporal pattern of disease occurrence in an animal population in which disease occurs with predictable regularity. Disease of animals, which is indigenous to a certain locality.

Endemic: indigenous or native disease in a restricted locality; a disease prevailing continually in a region.

Epizootic: denoting a disease attacking large numbers of animals; animal equivalent of human epidemics.

IV: intravenous

NICD: National Institute for Communicable Diseases

OIE: World Organisation for Animal Health

PEP: post-exposure prophylaxis

SAMHS: South African Military Health Service

SANDF: South African National Defence Force

SAPS: South African Police Service

SARGDD: South African Regional Global Disease Detection

USA: United States of America

WHO: World Health Organization

Zoonosis: a disease of animals that is transmissible to humans under natural conditions

APPENDIX 1

ANTHRAX CASE INVESTIGATION FORM

Completed by:	Telephone number:	Date (dd/mm/yyyy): ____/____/20____

PATIENT INFORMATION

Surname: _____ Name: _____

Residential address: _____ Age: _____ Date of birth: ____/____/_____

Sex: M F

Telephone no: _____

PATIENT COURSE

Date of onset of symptoms: ____/____/20____

Consultation date: ____/____/20____

Was antibiotics given? YES NO

If YES, give name, details:

Name *Dose* *Start date*

____/____/20____

____/____/20____

____/____/20____

Was the patient hospitalized? YES NO

Admission date: ____/____/20____

Hospital number: _____

Name and location of hospital:

Physician's name, email and telephone number:

CURRENT DIAGNOSIS OR PRIMARY SYNDROME

□ Mediastinitis or mediastinal lymphadenitis □ Fever with hemorrhagic enteritis □ Meningitis

□ Fever with severe respiratory disease □ Other (specify): □ Cutaneous lesion

CLINICAL FEATURES *(Check all that apply)*

Symptoms	YES	Symptoms	YES	Symptoms	YES
Fever (_____°C)	□	Trouble swallowing	□	Soft tissue swelling	□
Headache	□	Ulcers at base of tongue	□	Black eschar	□
Malaise	□	Nausea	□	Skin lesion	□
Lymphadenopathy	□	Vomiting of blood	□	Describe lesion: _____	
Dry cough	□	Diarrhoea	□	_____	
Pain or tightness in chest	□	Black/bloody stool	□	Chest X-ray: _____	
Trouble breathing	□	Abdominal pain/swelling	□	_____	
Sore throat	□	Coma	□	*Please attach any laboratory reports*	

Describe other:

EPIDEMIOLOGICAL

Occupation:

(Give exact job, type of business or industry, location/address)

Does the patient work with or around livestock or wild animals? If YES, describe:	YES	NO
Is the patient aware of any sudden animal deaths in the area? If YES, describe symptoms:	YES	NO
Does the patient have a history of travel within 15 days of onset? If YES, document travel history:	YES	NO
Has the patient had any contact with animal products (e.g. skins, furs, bone, slaughter of animals or post-mortem)? If YES, describe:	YES	NO
Has the patient attended any large social gathering within 15 days of onset? If YES, describe:	YES	NO
Have any household members experienced similar symptoms recently? If YES, describe:	YES	NO

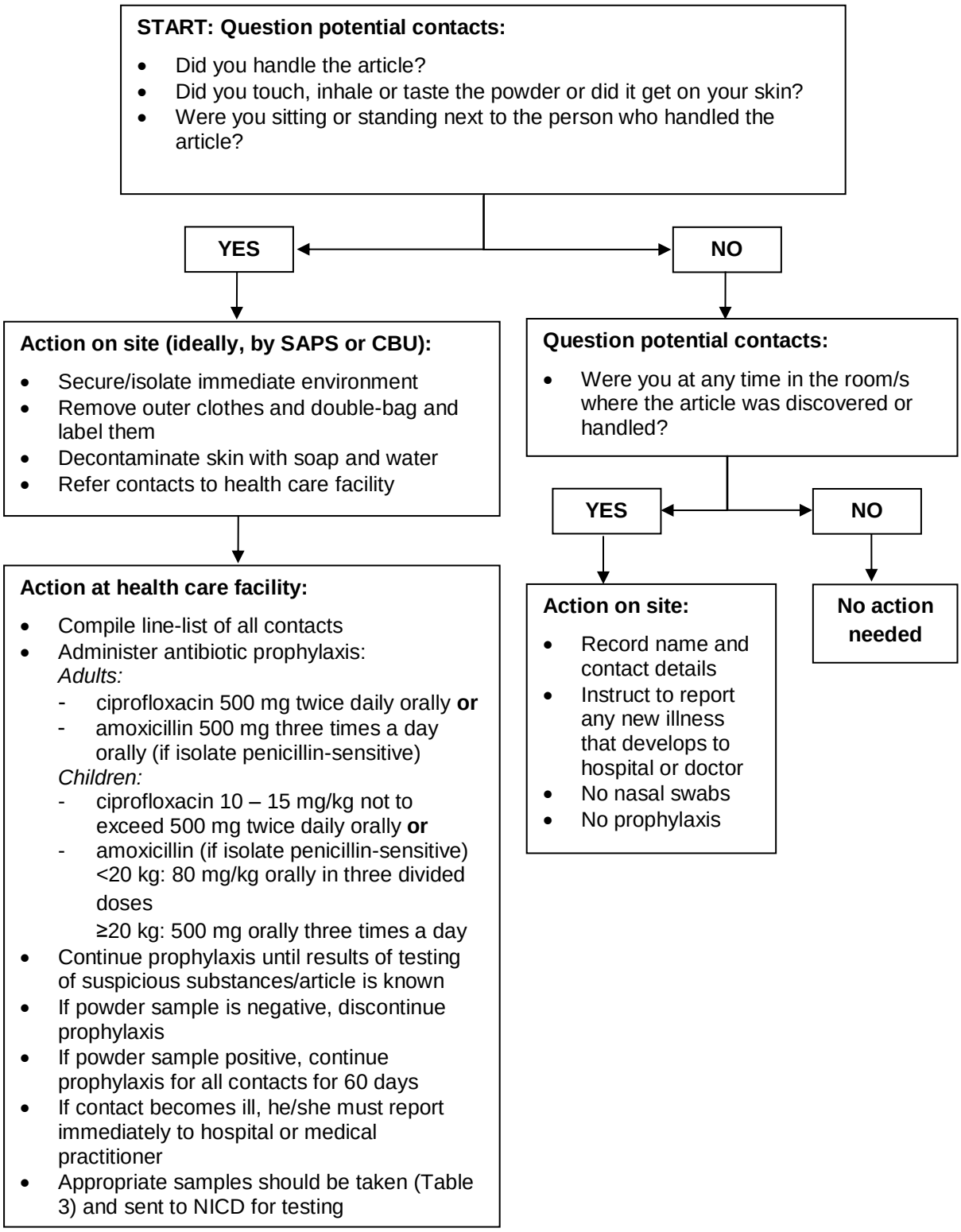
Describe other possible routes of exposure:

SEND COMPLETED FORM WITH SPECIMEN TO:
Special Bacterial Pathogens Reference Laboratory
Centre for Emerging Zoonotic and Parasitic Diseases
National Institute for Communicable Diseases
1 Modderfontein Road, Sandringham, 2192

LABORATORY CONTACT NUMBERS:
Telephone number: +27 11 555 0331 or +27 11 555 0306
Fax number: +27 11 555 0447
NICD Hotline for clinical advice: +27 82 883 9920

APPENDIX 2

Algorithm for management of 'white powder incident' contacts


START: Question potential contacts:
Did you handle the article?
Did you touch, inhale or taste the powder or did it get on your skin?
Were you sitting or standing next to the person who handled the article?
YES
NO
Action on site (ideally, by SAPS or CBU):
Secure/isolate immediate environment
Remove outer clothes and double-bag and label them
Decontaminate skin with soap and water
Refer contacts to health care facility
Action at health care facility:
Compile line-list of all contacts
Administer antibiotic prophylaxis:
Adults:
ciprofloxacin 500 mg twice daily orally or
amoxicillin 500 mg three times a day orally (if isolate penicillin-sensitive)
Children:
ciprofloxacin 10 – 15 mg/kg not to exceed 500 mg twice daily orally or
amoxicillin (if isolate penicillin-sensitive)
<20 kg: 80 mg/kg orally in three divided doses
≥20 kg: 500 mg orally three times a day
Continue prophylaxis until results of testing of suspicious substances/article is known
If powder sample is negative, discontinue prophylaxis
If powder sample positive, continue prophylaxis for all contacts for 60 days
If contact becomes ill, he/she must report immediately to hospital or medical practitioner
Appropriate samples should be taken (Table 3) and sent to NICD for testing
Question potential contacts:
Were you at any time in the room/s where the article was discovered or handled?
YES
NO
Action on site:
Record name and contact details
Instruct to report any new illness that develops to hospital or doctor
No nasal swabs
No prophylaxis
No action needed

APPENDIX 3
Contact details

National

Organization	Telephone	Fax	Cell phone	Address
National Department of Health	012 395 8096	012 395 8906	082 419 9686	DoH, P/Bag X828, Pretoria, 0001
SAPS Explosives Unit Head Office – Bomb Disposal	012 393 2786	012 323 1711	083 626 9123	SAPA Head Office Wacthuis Building 231 Pretorius Street
National Institute for Communicable Diseases	011 555 0331 011 555 0306	011 555 0447	082 883 9920 (Hotline)	Special Bacterial Pathogens Laboratory, 1 Modderfontein Road (R25), Sandringham, 2192
World Health Organization	012 305 7725	012 305 7729		P.O. Box 13113, Tramshed, Pretoria, 0126

Provincial Departments of Health

Province	Telephone	Fax	Cell phone	Address
Northern Cape	053 830 0529	053 830 0655	072 391 3345	DoH, P/Bag X5049, Kimberley, 8301
KwaZulu-Natal	033 846 7461	033 846 7272	071 609 2505	DoH, P/Bag X9051, Pietermaritzburg, 3200
Mpumalanga	013 766 3078	013 766 3473	082 229 8893	DoH, P/Bag X11285, Nelspruit, 1200
Gauteng	011 355 3867	011 355 3338	082 335 3134	DoH, P/Bag X085, Marshalltown, 2107
North West	018 397 2600	018 391 4065	082 578 34061	DoH, P/Bag X2068, Mmabatho, 0273
Limpopo	015 293 6062	086 215 6480	079 491 1909	DoH, P/Bag X9302, Polokwane, 0700
Free State	051 408 1595	051 408 1074	083 452 8954	DoH, P.O. Box 227, Bloemfontein, 9300
Western Cape	021 483 3737	021 483 2682	083 488 0777	DoH, P.O. Box 2060, Cape Town, 8000
Eastern Cape	040 608 0857	043 642 1409	083 378 0189	DoH, P/Bag X0038, Bisho, 5605

Contact numbers for SAPS Explosives Units in South Africa

Office	Contact Number
Head Office - Commercial Explosives	079 529 5118
Head Office - Bomb Disposal	083 626 9123
Eastern Cape - Regional Office	079 874 2295
Port Elizabeth	079 529 5092
Grahamstown	082 779 7118
Mthatha	079 529 5056
East London	079 529 5065
Queenstown	079 529 5060
Gauteng - Regional Office	082 778 9652
Pretoria	079 529 3446
Brits	079 529 5152
Krugersdorp	082 572 0768
Germiston	082 312 1651
Soweto	079 529 3420
Johannesburg	079 529 3420
Vereeniging/Sasolburg	082 575 1805
KwaZulu-Natal - Regional Office	079 529 5091
Durban	079 529 5083 / 079 529 5074
Pietermaritzburg	079 529 5086
Port Shepstone	079 529 5071
Newcastle	079 529 5072
Empangeni	079 529 5080
Limpopo - Polokwane	079 529 3443
Modimolle	079 529 3395
Musina	082 565 6511
Thohoyandou	082 414 7064
Tzaneen	079 529 3418
Mpumalanga - Secunda	079 529 5097
Middelburg	079 529 5093
Nelspruit	079 529 5110
North West/Free State - Regional Office	082 778 9726
Welkom	079 529 3387
Bloemfontein	079 529 3432
Potchefstroom	079 529 3423
Rustenburg	082 779 8630
Mafikeng	082 778 9727
Western Cape/Northern Cape - Regional Office	082 778 9251
Cape Town	079 529 5130
Mossel Bay	079 529 5148
Paarl	079 529 5142
Kimberley	082 495 5462
Vryburg	079 529 5157
Kuruman	079 529 5049
Upington	082 495 5443
Springbok	082 495 5404
De Aar	082 495 5421