Zimbabwe Anthrax Control Guidelines in Humans and Animals
Zimbabwe Anthrax Control Guidelines in Humans and Animals

2nd Edition

May 2012
Foreword

Anthrax is an acute infection caused by a spore forming bacterium called *Bacillus anthracis*, affecting both humans and animals. It is one of the most important zoonotic diseases, (from animals to humans) in the world because of its effects on public health, agriculture, occupational health, and the environment. It remains a problem in developing countries such as Zimbabwe where control efforts are poorly funded, despite having well developed animal and human public health programs. Globally approximately 2,000 - 20,000 human cases of anthrax occur each year. Most common cases are cutaneous while inhalation and gastrointestinal ones are less frequent.

Common in wild and domesticated herbivorous animals, the majority of anthrax cases reported in Zimbabwe are in grazing mammals such as sheep, cattle and goats. Human cases usually follow disease occurrences in domestic and wild ruminants. Control of anthrax therefore requires close collaboration and communication between the wildlife, veterinary and human health experts under the “One Health Approach”. To this end, the already existing multi-sectoral disease control, zoonotic and integrated rapid response teams need revitalization and strengthening in order to rise to the challenge of increasing outbreaks of anthrax. During outbreaks experienced in recent years, there have been challenges in both animal and human public health management, prevention and control efforts. Given the continued vulnerability of Zimbabwe to outbreaks of communicable diseases including anthrax, it is against a background of limited resources, the coordinated approach becomes essential as it is more cost effective. While anthrax prone areas in the country are known, adequate covering of these with vaccination has not been possible due to resource limitations. Meanwhile communities are reluctant to forgo the opportunity to consume meat from animals that have died from unknown causes, and therefore continually put themselves at risk of anthrax.

These Guidelines are intended to inform all animal and human health workers on the effective detection and management of anthrax. This will enable them to better inform communities, raising awareness of anthrax disease and improve their own competencies towards these. Hence we have jointly commissioned the production of the National Anthrax Control Guidelines to provide technical and standardized guidance to all health providers on how to successfully control anthrax in Zimbabwe. We are grateful to all those who contributed to the provision of resources and technical guidance and expert input for the development of these national anthrax control guidelines. Meanwhile for these guidelines to make significant impact, it is important that critical resources are made available especially to the frontline health workers.
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List of Abbreviations

BRIDH     Beatrice Road infectious Disease Hospital
CFR       Case Fatality Rate
CSF       Cerebral Spinal Fluid
DPC       Disease Prevention and Control
DPR       Disaster Preparedness and Response
DMO       District Medical Officer
DNO       District Nursing Officer
DVFS      Division of Veterinary Field Services
ECHO      Humanitarian Aid department of the European Commission
EDC       Epidemiology and Disease Control
EHS       Environmental Health Specialist
FA        Fluorescent Antibody
IHR       International Health Regulations
IM        Intra Muscular
MOHCW     Ministry of Health and Child Welfare
NIHR      National Institute of Health Research
NTDs      Neglected Tropical Diseases
OIE       World Organization for Animal Health
PCR       Polymerase Chain Reaction
PEDCO     Provincial Epidemiologist and Disease Control Officer
PEHO      Provincial Environmental Health Officer
PHEIC     Public Health Emergency of International Concern
PMD       Provincial Medical Director
PPE       Personal Protective Equipment
SCD       Standard Case Definition
SEHO      Senior Environmental Health Officer
SIC       Sister in Charge
WHO       World Health Organization
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1. Introduction

1.1 Background

Anthrax is an acute infection caused by a soil-borne spore forming bacterium called *Bacillus anthracis*. The spores can survive in the environment specifically at animal burial and skinning sites, in the hides and wool of anthrax infected carcasses, for a period ranging from 30 to 90 years. Spores in dusty environments can also be inhaled and cause the disease. Anthrax spores continue to be documented to occur throughout the world.

The disease affects both humans and animals. However, it is more common in wild and domesticated herbivorous animals. Anthrax naturally infects many species of grazing mammals such as sheep, cattle and goats, which are infected through ingestion of soil contaminated by *Bacillus anthracis* spores while grazing or drinking from mud pools. Carnivores living in the same environment may become infected by consuming infected animals. Transmission may occur in human through direct contact with infected animal materials (e.g. animal hides, inoculation of infected blood to broken skin) and consumption of infected meat.

Anthrax remains one of the most important zoonotic diseases (from animals to humans) in the world because of its effects on public health, agriculture, occupational health, and on the environment. The disease is more common in developing countries without well-developed widespread veterinary or human public health programs. Globally approximately 2000 - 20 000 human cases of anthrax occur each year. Most common cases are cutaneous while inhalation and gastrointestinal ones are less frequent. Human cases usually follow disease occurrences in ruminants and are most prevalent in Africa, the Middle East and parts of Southeast Asia.

In Zimbabwe anthrax is a Notifiable Disease. Notification to WHO is universally required in the event an outbreak fulfills the Decision Instruments in terms of the International Health Regulation (2005).

1.2 History of anthrax in the world

The earliest known description of anthrax was made in 1491 BC in writings from Egypt and in the Old Testament's description of the Fifth Plague killing the Egyptians' cattle. The first pandemic in Europe known as "Black Bane" was recorded in 1613 and caused more than 60,000 human deaths. The first epidemic in the United States occurred in the early 18th century. Outbreaks of occupational cutaneous and respiratory anthrax were reported from Industrial European countries in the mid-1800.

Until the development of an effective veterinary vaccine and introduction of antibiotics, historical records indicated that the disease was one of the leading causes of uncontrolled mortality in cattle, sheep, goats, horses and pigs worldwide. Both live attenuated and killed vaccines have been developed in many countries. The French scientist Louis Pasteur developed the first effective vaccine for anthrax in 1881. Sterne reported the development of an animal vaccine from the spore suspension of a virulent, non-capsulated live strain of *Bacillus anthracis* in 1939. The human vaccine for anthrax became available in 1954. The improved cell free anthrax vaccine for humans, a sterile filtrate of cultures from a virulent non-capsulated strain that elaborates protective antigen, was licensed in the United States in 1970. In the former Soviet Union, the human live anthrax vaccine has undergone many field trials.

1.3 Overview of anthrax situation in Zimbabwe

Anthrax remains a Public Health (human and animal) problem in Zimbabwe resulting in animal deaths and in some instances human deaths. Cutaneous types of anthrax are most common in Zimbabwe. The disease is now occurring in many parts of the country. Without proper prevention and control measures more outbreak are more likely to occur in the country.
In Zimbabwe the disease was first diagnosed in 1898 in the Matabeleland region. The largest recorded outbreak of anthrax in humans and possibly the largest among animals occurred in Zimbabwe in 1978-1980 during the peak of the Liberation War. The disease spread over time from area to area, until six of the eight provinces were affected and over 10,000 human cases and 182 human deaths were documented in Zimbabwe. Human cases were secondary to an unprecedented outbreak in cattle. The large number of human cases was particularly unusual in light of the historically low incidence of anthrax in Zimbabwe. In the 29-year period preceding the epidemic (1950-1978), the period for which records are available, a total of 334 human cases were reported in Zimbabwe. Clearly, anthrax was a rare disease in the country. Since then sporadic outbreaks have been reported in many parts of the country. Over the years, compulsory dipping of cattle in the rural (communal) areas led to early detection of outbreaks. Frequently human cases that were reported first brought the disease to the attention of the authorities, since most animals, which died, were consumed by the people.

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Source: NIHR; Key: Susp. cases= suspected cases; Con. case= confirmed cases

Figure 1: Trend of anthrax cases in animal, Zimbabwe, 2000-2011

Source: Division of Veterinary Field Services
2. Microbiology of anthrax

2.1 Infectious agent

*Bacillus anthracis*, the causative agent of anthrax, is a Gram positive, encapsulated, spore-forming, rod shaped bacterium. The spores of *Bacillus anthracis*, which are abundant in endemic areas, are very resistant to adverse environmental conditions, low temperature, heat, desiccation, and disinfection. The spores germinate under warm, humid, anaerobic conditions to produce a square-ended rod shaped encapsulated organism that produces an exotoxin. Spores form once the vegetative forms are exposed to oxygen in the atmosphere, once outside the body or carcass.

2.2 Ecology of anthrax spores

When the host animal dies, anaerobic bacteria from the gastrointestinal tract start to rapidly decompose the carcass eliminating the vegetative cells of *Bacillus anthracis* through antagonistic interactions. After 72 hours it is virtually impossible to isolate viable anthrax bacteria from an unopened decomposing carcass. Opening of the carcass exposes the vegetative bacteria to an aerobic environment, promoting drying of tissues and aerosolization of body fluids which leads to nutrient depleted microenvironments, and this causes sporulation of the bacilli.

In nature carcasses are rarely left undisturbed long enough for putrefaction to eliminate all the vegetative forms of *B. anthracis*. Scavengers open carcasses and expose the vegetative forms to conditions favoring spore formation. Birds of prey can spread spores further afield and onto tree branches for animal species such as giraffes which forage higher on vegetation. Water and wind action can also contribute to the dispersion of spores from carcasses and other infected materials. Calcium levels in the soil have been shown to be an important factor in both germination of spores and the maintenance of dormancy.

The spores may survive for many years in contaminated soils (beyond 90 years), pond water and muddy pools as well as in animal products such as bones and hides. At burial sites of anthrax-infected carcasses, spores have been known to have re-infected animals over 70 years afterwards. Anthrax needs very specialized conditions to grow vegetatively in soil. Alkaline soil containing adequate nitrogen, calcium, and organic matter is required, in conjunction with extreme weather changes, such as drought followed by heavy rains. When these conditions are met, the organisms are thought to undergo a vegetative cycle in soil and then re-sporulate. This process could generate sufficiently high soil concentrations of anthrax spores, increasing the risk of disease in grazing animals, thereby producing the occasional outbreaks.

3. Epidemiology of anthrax

Anthrax is a zoonotic disease to which most warm-blooded animals are susceptible. The disease is more common in animals and humans are incidental hosts. Human infections usually result from contact with infected animals or animal products. Direct exposure to secretions from cutaneous anthrax lesions may result in secondary cutaneous infection, but there have been no known cases of person-to-person transmission of inhalation disease.

3.1 Anthrax in humans

The disease in humans is acquired by contact with anthrax-infected animals and carcasses or contaminated animal products or through

- consumption of Anthrax-infected animal meat or
- Inhaling anthrax spores from dried products such as skins, dried meat and wool.
There are different forms of human disease depending on how infection is acquired: cutaneous, inhalation, ingestion and injection. Anthrax is not contagious; the illness cannot be transmitted from person to person. Three main forms of anthrax infection in human exist, depending on where anthrax spores enter the body:

- Cutaneous (or skin): due to spores entering a cut or break in the skin (about 95% of cases)
- Inhalation: from breathing airborne spores into the lungs (about 5% of cases)
- Gastrointestinal: from ingesting spores in raw or undercooked food (negligibly rare)

**Figure 2: Cycle of anthrax infection**


### 3.1.1 Standard case definitions

**Suspected case**
In an area where there has been an animal death, any person exposed to an infected animal or materials and presenting 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. **Gastro-intestinal**: Any person with abdominal distress characterized by nausea, vomiting, anorexia and followed by fever

c. **Pulmonary (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
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:

a. Isolation of B. anthracis from an affected tissue or site; or
b. 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.

3.1.2 Clinical manifestations of anthrax in humans

In humans, anthrax mainly affects the skin (cutaneous anthrax), the gastrointestinal system, and the chest (pulmonary disease), but may rarely affect the central nervous system. The incubation period ranges from a few hours to 7 days, with most cases occurring within 48 hours of exposure. The disease is an acute illness and clinical symptoms vary depending on the type of infection:

- Fever (38-40°C), being the only systemic symptom, may be accompanied by chills or night sweats.
- Flu-like symptoms
- Cough, usually non-productive
- Chest discomfort, shortness of breath
- Fatigue
- Muscle aches
- Sore throat, followed by difficulty swallowing, enlarged lymph nodes, headache, nausea, loss of appetite, abdominal distress, vomiting or diarrhea
- A sore, especially on the face, arms or hands, that starts as a raised bump and develops into a painless ulcer with a black area in the center known as an eschar
- Mortality among the cases of the disease is largely due to septicemic shock

Note:

How do I know my cold or flu is not anthrax?

Many human illnesses begin with what are commonly referred to as “flu-like” symptoms, such as fever and muscle aches. However, most cases of anthrax can be distinguished from the flu because the flu has additional symptoms. Early symptoms of anthrax usually do not include a runny nose, which is typical of the flu and common cold.

Cutaneous anthrax

This form represents about 95% of all anthrax infections in humans. It occurs when the bacterium enters a cut or abrasion on the skin during handling contaminated meat, wool, skins or other products of infected animals. It is the most common form in Zimbabwe.

- A lesion develops at the site of infection, which is most likely to be on the hands, arms, neck and face. Multiple lesions can occur
- Lesion starts as an itchy red papule, which becomes vesicular, and in 2-6 days develops into a depressed black eschar surrounded by a ring of small vesicles
- The lesion is usually painless and is surrounded by an extensive area of moderate to severe swelling, and the bacilli can be identified from the vesicular fluid by staining
- Swelling appears to be less prominent among the younger age groups. The infection either remains localized, or spreads to regional lymph nodes, which can lead to septicemia.
- The eschar begins to resolve after 10 days and takes 6 weeks to resolve completely (leaving a scar) regardless of treatment
- The lesion evolves through typical changes even after the initiation of antibiotic therapy
- Scarring may be severe and serious and may require plastic surgery, for example eyelid damage
The Case Fatality Rates (CFR) is less than 1% with appropriate and early antimicrobial therapy. However, about 20% of untreated cases of cutaneous anthrax will result in death.

**Gastrointestinal infection**
The intestinal disease form of the disease may follow the consumption of contaminated meat and is characterized by an acute inflammation of the intestinal tract.

- This is analogous to cutaneous anthrax but affects the mucosa and sub-mucosa of the gastrointestinal tract.
- The lesions are commonly located in the terminal ileum or the caecum, and may be big enough to cause hemorrhage into the gut lumen.
- It is the most difficult to recognize and it tends to occur in explosive outbreaks of food-poisoning type.
- After ingestion of (inadequately cooked) infected meat, nausea, vomiting, abdominal pains, haematemesis, bloody diarrhea, and intestinal obstruction may occur.
- The major symptoms occur in the terminal phases of the disease and are due to the release of bacilli from the spleen resulting in rapid spread through the bloodstream.
- This is followed by, fever, septicemia, and death within a few hours.
- The mortality from this type of anthrax is between 25-50%.

**Pulmonary anthrax**
The pulmonary anthrax is also known as Inhalation Anthrax or Wool-sorters Disease. It results from inhalation of spores in dust from animal products, especially in high risk industrial processes such as tanning of hides, wool and bone processing. This form of the disease usually results from biological warfare. The disease follows deposition of spore-bearing particles into alveolar spaces. Macrophages ingest spores resulting in their lysis and destruction. Surviving spores are transported to mediastinal lymph nodes. Germination may occur up to 60 days and then the disease follows rapidly.

- The course of disease is typically in two stages, an initial insidious onset followed by a second rapidly progressive phase
- Initial symptoms of inhalation anthrax are mild and non-specific, resembling a common upper respiratory tract infection, with malaise, mild fever, fatigue, myalgia, chest discomfort, and non-productive cough
- This initial stage typically lasts for several days. The victim may improve transiently only to get suddenly worse with, acute respiratory distress and stridor, high fever, cyanosis, edema of chest wall and shock
- Chest radiograph shows mediastinal widening, consolidation and pleural effusion
- Neck lesions may cause severe swelling needing a tracheotomy to relieve the obstruction
- Death invariably occurs within 24 hours of this acute second phase, even with treatment, however if antibiotic treatment is initiated during the incubation period of 1-6 days before the manifestations of symptoms, mortality can be decreased to 1%
- This form of anthrax is usually fatal with extremely high CFR, approximately 80-90%, even with all possible supportive care including appropriate antibiotics

**Note:** The progression to death in severe disease is very rapid without timely treatment

**Note: Central Nervous System Disease (CNS)**
Infection of the central nervous system is through the blood stream, usually as a sequel to the other forms of the disease. Hemorrhagic meningitis occurs in less than 5% of all cases either alone or as a complication of the above types of anthrax infections
3.1.3 Mode of transmission

Anthrax can enter the human body through

- The skin (cutaneous) contact with spores, spore contaminated materials or infected skin lesions
- Infection usually requires an existing break in the skin to initiate infection, though in many cases this may be so small as to be unnoticed
- The lungs: inhalation of spores
- The intestines: ingestion of contaminated meat

In general, an infected human will be quarantined. However, anthrax does not usually spread from an infected human to a non-infected human. But, if the disease is fatal to the person's body, its mass of anthrax bacilli becomes a potential source of infection to others and special precautions should be used to prevent further contamination. Inhalational anthrax, if left untreated until obvious symptoms occur, may be fatal. Anthrax can be contracted in laboratory accidents or by handling infected animals or their wool or hides. It has also been used in biological warfare agents and by terrorists to intentionally infect as exemplified by the 2001 anthrax attacks in the United States of America (USA) where letters containing the spores were sent through the postal system.

3.1.4 People at risk of getting anthrax disease

Human cases usually occur in industrial or agricultural environments. The most vulnerable groups to anthrax include

- Pastoralists
- Farmers
- Herdsman
- Butchers and skinners
- Tanners
- Abattoir workers: e.g. meat inspectors, packers and graders
- Veterinary workers
- Wool shearers and sorters
- Leather/skin handlers
- Consumers of uninspected meat
- Food handlers

In Zimbabwe, most cases are not related to occupation. People are unwilling to forego the chance of eating meat or selling the hide even if it is from an infected animal. In places where religious prohibitions (such as the apostolic sect in Zimbabwe) may prevent people handling and eating meat of animals that are sick or animals that die on their own, anthrax is uncommon.

3.2. Anthrax in animals

Most warm blooded species are susceptible to anthrax. The anthrax disease commonly occurs in wild and domesticated herbivorous animals that ingest or inhale the spores while grazing or foraging. Carnivores are secondarily infected when they are exposed to anthrax carcasses. Ingestion is thought to be the most common route by which herbivores contract anthrax. Direct spread of infection from one animal to another is unlikely. Cattle, sheep and goats are the most susceptible domesticated animals. Arthropods have been shown to mechanically transmit the disease in animals, and these include biting flies, ticks and mosquitoes. Prior to the advent of animal vaccine and antibiotics, the disease was one of the foremost causes of uncontrolled mortality in cattle, sheep, goats, horses and pigs worldwide. Preventive animal vaccination programs have drastically reduced animal mortality.

Drought, lack of fodder, overstocking, intensive pasture rotation and dusty crowded pens are proven risk factors for animals to contract anthrax. Mortality rate is usually very high in cattle, sheep and goats, ranging between 70-100%. A seasonal pattern in the occurrence of the disease in animals has been
demonstrated. Prolonged drought generally results in depletion of pasture, forcing animals to graze closer to the soil that is potentially infested with spores. Spores also concentrate in mud pools and on the banks of water bodies in the dry season as water recedes. Early rain showers, at the beginning of the rainy season, also exposes spores loosely embedded in the soils. Heavy rains excavate shallow anthrax graves resulting in spore formation. Infected animals especially herbivores shed bacilli in terminal hemorrhages or spilt blood at death, thereby contaminating the soil with the resulting spores.

3.2.1 Clinical manifestations of anthrax in animals

The signs and symptoms of the diseases include
- Cease feeding and drinking
- Staggering and falling
- Tremor, convulsions
- Massive oedema
- Swollen neck region lymph nodes in dogs and pigs
- Difficulty in breathing
- Bleeding from all orifices due to failure of blood clotting
- Sudden death in cattle, sheep and goats

Note: Most infected animals die within a few days after infection

The characteristic findings on dead animals include
- A rapidly decomposing carcass with a blotted abdomen
- Dark tarry blood stained exudates from all natural openings
- Absence of rigor mortis
- Un-clotted intravenous blood
- Septicemia indicated by small petechial hemorrhages throughout the body
- Enlargement and softening of the spleen, and
- Subcutaneous swelling (mainly neck and throat)

Note:
Since intense bacteraemia precedes death all the organs in the animal are infected. Even sun-dried bones from a rotten carcass remain an important source of infection. Meat and milk from infected animals should not be consumed. Carcasses suspected of anthrax should NEVER be opened as this precipitates spore formation and contamination of the environment

3.2.2 Sources of animal anthrax

- Grazing in “incubator areas” (soil contaminated with Bacillus anthracis spores and organisms)
- Excreta and saliva from dying or dead animals.
- Bone meals
- Wool, skins wastes from infected animals.
- Cleanings used in fertilizers
- Tannery effluents
- Blood-sucking flies.
- Carrion eaters: e.g. vultures, hyenas
- The foliage frequented by birds of prey

3.2.3 High risk transmission areas in Zimbabwe

- Areas where previous outbreaks have occurred
- Drought prone areas (Region IV and V)
- Areas with Calcium rich soils
- Overstocked areas, mainly over-populated communal farming areas
- Flood plains, low lying areas along major rivers and muddy pools and banks of water bodies
- Newly germinating pastures

**Figure 3:** Map of anthrax risk areas in Zimbabwe

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**3.2.4 Seasonal variation in transmission of anthrax disease**

The seasonal variation in the transmission of the disease has been well documented. In Zimbabwe, anthrax disease occurs usually during the following periods:

- **Dry period:** July to October
- **Early to mid-wet summer period:** November to February

During the dry season (July to October) cattle in communal areas are left to wander over large distances in search of grass and water. At the end of winter, most watering points are drying out and animals are forced to drink from mud pools likely to have concentrated anthrax spores. During the early wet season animals feed on the short green grass that is very close to the ground. Cattle and other herbivores are more likely to pick up anthrax spores as they graze close to the ground. During mid-summer period, heavy rains are likely to excavate/open shallow anthrax graves and expose livestock.
4. Laboratory diagnosis of anthrax

Laboratory diagnosis is done by demonstrating the presence of the organism in blood, lesions, sputum, cerebro-spinal fluid, and discharges by Gram stain and Giemsa stain to show the capsulated bacilli. In appropriate blood or tissue specimens collected within a few hours of death from animals or humans with anthrax, *B. anthracis* is readily detected in capsule-stained (M.Fadyean.stained) smears. The bacterium is also readily isolated in pure culture on blood or nutrient agar plates. The same applies to smears of fluid from cutaneous lesions of humans prior to treatment. The diagnosis is confirmed by staining with direct polychrome methylene blue (M.Fadyean.stained). Stained smears show chains of large gram positive rods.

In Zimbabwe it is a requirement that all human specimens for anthrax culture are sent to the National Microbiology Reference Laboratory (NMRL) based at Harare Central Hospital. NMRL handles all human specimens for anthrax diagnosis. All animal specimens for anthrax laboratory confirmation must be sent to the Central Veterinary Laboratory in Harare. (Refer to the flow chart on collection and transportation of specimens in Figure 5).

**Courier Services:**
- NMRL is based at Harare Central Hospital and the **SWIFT account** is 113588
- The Central Veterinary Laboratory: the **SWIFT account** is 170463

4.1 Diagnosis of anthrax in human

**Cutaneous**
- **Vesicular stage:** vesicular fluid from skin lesion
  Aseptically collect vesicular fluid on sterile swabs from previously unopened vesicles, and then culture it. The anthrax bacilli are most likely to be seen by Gram stain in the vesicular stage.
- **Eschar stage:** Collect eschar material by carefully lifting the eschar’s outer edge; insert a sterile swab, then slowly rotate for 2-3 sec beneath the edge of the eschar without removing it and then culture it.

**Gastrointestinal**
- **Biopsy** - histopathology and culture
- **Blood cultures:** Collect appropriate blood volume and number of sets per usual laboratory protocol. In later stages of disease (2-8 days post-exposure) blood cultures may yield the organism, especially if obtained before antibiotic treatment.
- **Stool:** Transfer =5 g of stool directly into a clean, dry, sterile, wide-mouth, leak-proof container
- **Rectal swab:** For patients unable to pass a specimen, obtain a rectal swab by carefully inserting a swab 1 inch beyond the anal sphincter.

**Inhalational**
- **Chest X-ray** - widened mediastinum
- **Blood cultures:** Collect appropriate blood volume and number of sets per laboratory protocol. Gram stain and culture
- **Biopsy** - histopathology and culture
- **Sputum:** Collect >1 ml of a lower respiratory specimen into a sterile container. Inhalational anthrax usually does not result in sputum formation.
**Figure 4:** Flow diagram of suggested procedure for isolation, identification and confirmation of *B. anthracis* in human specimen

- **Human Specimen**
  - **Fluids** (Fluid aspirate from eschar, CSF)
    - Stain: Gram stain, M. Fadyean (Methylene Blue)
    - Transport to NMRL for confirmation
  - **Blood**
    - Culture on Blood Agar and on Enriched Nutrient Agar (0.8% Sodium Bicarbonate + 5% CO₂)
    - Test suspected colonies for lack of haemolysis, lack of motility, sensitivity to diagnostic Gama phage and sensitivity to penicillin
  - **Biopsy**
    - To be send to the histology laboratory at Parirenyatwa Hospital
    - Transport in appropriate transport media to NMRL for culture at Harare Central Hospital
Figure 5: Flow diagram of suggested procedure for isolation, identification and confirmation of B. anthracis in animal specimen

4.2 Diagnosis of anthrax in animals

Suspect anthrax cases should not be subjected to a full post-mortem. The recommended diagnostic procedure is to nip the ear to squeeze peripheral blood onto a glass slide to be fixed with alcohol for staining and microscopy.

Unless the necessary biosafety levels are available, no culture should be attempted.

In old or decomposed animal specimens, or processed products from animals that have died of anthrax, or in environmental samples, detection is likely to involve a search for relatively few Bacillus anthracis within a background flora of other bacteria, many of which will probably be other Bacillus species, in particular, the closely related B. cereus. In this case, selective culture techniques are necessary.
4.3 Laboratory procedures for proper specimen collection and diagnosis of anthrax

Collection of specimens may not be necessary if diagnosis has been confirmed in animals from the area of the outbreak. There is high risk of contamination and transmission of the bacteria if specimens are not handled properly.

- Specimens should be collected by qualified staff under strict infection control measures and sealed in plastic containers to avoid leakage.
- The commonest specimen that can easily be taken is a microscope slide smear of fluid from cutaneous lesions or secretions or sputum from victims of the disease.
- All specimens should be sealed in plastic containers and immediately sent to the National Microbiology Reference Laboratory in Harare.
- Collection of specimens should be done in consultation with the Provincial Medical Director and the advice of the local Laboratory Scientist.

**Figure 6:** Specimen collection procedure following for old animal specimens or environmental samples

Source: WHO 3rd Edition of the guidelines for surveillance and control of anthrax in humans and animals
5. Treatment of anthrax

5.1. Treatment of Anthrax in Animals

The clinical signs of the disease are rarely noticed in domesticated animals. The disease is characterized by sudden death, blotted carcasses and unclothed tarry blood. Treatment of sick food animals for anthrax is rare. Quick antibiotic treatment may be effective in other animals like dogs, pigs and cats though the cause of death is mainly due to toxins as opposed to bacteraemia.

5.2. Treatment of anthrax in human

Anthrax disease can be prevented after exposure with prompt antibiotic treatment. Symptomatic anthrax disease is treated by antibiotics. Vaccination against anthrax is not recommended for the general public. Prompt antibiotic therapy in both humans and animals usually results in dramatic recovery of the infected. In the event of bio-terrorism, treat for at least 60 days because of risk of delayed germination of spores as shown in Table 2. The treatment of cutaneous anthrax does not alter the evolution of eschar but prevents systemic disease. Most strains of Bacillus anthracis are

- Highly sensitive to Penicillin which is the drug of choice in treating the disease.
- Also sensitive to many broad-spectrum antibiotics including Chloramphenicol, Gentamicin, Tetracycline family (e.g. Doxycycline), Quinolone family (e.g. Ciprofloxacin), Erythromycin, Streptomycin, and first generation Cephalosporin. Sensitivity to antibiotic should be advised

Severe cases are treated with intravenous or intramuscular Benzyl Penicillin for 7-10 days. Treat secondary bacterial infection with appropriate broad spectrum antibiotics. The commonly used drugs are

- Doxycycline and Erythromycin
- Other important drugs include Chloramphenicol, Gentamycin, Tetracycline

Table 2: Anthrax treatment guidelines for adult, Zimbabwe, EDLIZ 2011

<table>
<thead>
<tr>
<th>Form of anthrax disease</th>
<th>Treatment</th>
<th>Route</th>
<th>Dosage</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild Cases</td>
<td>Doxycycline</td>
<td>Oral</td>
<td>200mg</td>
<td>first dose</td>
</tr>
<tr>
<td>Moderate Cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>THEN Doxycycline</td>
<td>Oral</td>
<td>100mg once daily</td>
<td>for 7 days</td>
</tr>
<tr>
<td>Severe Cases</td>
<td>Benzyl penicillin</td>
<td>IM/IV</td>
<td>1-2 Mega Units 4 times a day</td>
<td>initially</td>
</tr>
<tr>
<td></td>
<td>THEN Procaine Penicillin</td>
<td>IM</td>
<td>3 grams once a day</td>
<td>for 7-10 days</td>
</tr>
</tbody>
</table>
### Table 3: Treatment guidelines for anthrax in human during a bio-terrorism attack

<table>
<thead>
<tr>
<th>Form of anthrax in human</th>
<th>Categories</th>
<th>Treatment</th>
<th>Route</th>
<th>Dosage</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cutaneous</td>
<td>Adults</td>
<td>Ciprofloxacin and Doxycycline</td>
<td>Oral</td>
<td>500 mg 2 X daily and 100mg Twice daily</td>
<td>For at least 60 days</td>
</tr>
<tr>
<td></td>
<td>Pregnant women*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Children*</td>
<td>Varies based on age and weight</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inhalational or Gastrointestinal</td>
<td>Adults</td>
<td>Ciprofloxacin or Doxycycline and 2 additional antimicrobials (Rifampin, Penicillin, chloramphenicol, ampicillin, vancomycin)</td>
<td>Initial therapy IV when clinically appropriate switch to Oral</td>
<td>500mg Twice daily or 100mg Twice daily</td>
<td>Continue IV or oral therapy for 60 days</td>
</tr>
<tr>
<td></td>
<td>Pregnant women*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Children*</td>
<td>Ciprofloxacin or Doxycycline and 1 or 2 of the previously mentioned antimicrobials</td>
<td>Oral</td>
<td>10-15mg/kg Twice daily or &gt;8 years &amp; ≤45kg: .2mg/kg &gt;8 yrs &amp; &gt;45 kg: 100mg &lt;8years: 100mg Twice daily</td>
<td>Continue IV or oral therapy for 60 days</td>
</tr>
</tbody>
</table>

*Although Ciprofloxacin and certain Tetracyclines are not recommended for children and/or pregnant women, in life threatening circumstances their use would be warranted. Source: CDC

### 5.3 Immunization and prophylaxis

Vaccination of susceptible animals using the Anthrax Spore vaccine has been found to be effective in controlling anthrax in animals. In Zimbabwe, government used to carry out national annual vaccination campaigns but now vaccinations are restricted to high risk areas only. Livestock producers are however advised to ensure that farm animals are covered by vaccination annually.

The use of anti-anthrax serum was abandoned years ago in most western countries as of negligible value, but it is apparently still done in China and the Russian Federation. With the availability of modern plasmapheresis techniques, specific human gamma-globulin from vaccinated individuals could well be of life-saving value in an emergency. Post exposure vaccination following a biological attack with anthrax is recommended to protect against residual retained spores after chemoprophylaxis. This approach may also reduce the duration of antibiotic prophylaxis to 30 - 45 days.

The disease is readily responsive to early antibiotic treatment but, as has been pointed out before, death is due to the toxin and delayed treatment may sterilize the blood and tissues while not preventing death. Thus, if initiated after 24-36 hours following clinical onset, antibiotic treatment may fail to save life in pulmonary, intestinal or complicated cutaneous cases. In these cases, specific gamma-globulin containing anti-toxin antibodies may be life-saving.
6. Anthrax prevention and control measures

The prevention and control of anthrax is based on:
- education to the public
- outbreak-site management
- Disinfection of infected animal products and materials
- Vaccination of animal

In general the following activities should be considered:
- Environmental decontamination as spores can persist and remain viable for more than 90 years
- Surface decontamination - 5% hypochlorite (stock solution out of HTH or chloride of lime)
- or 5% phenol
- Forbidding the sale and consumption of meat from animals sick or dying from unknown causes
- Control of anthrax in animals – Vaccination and reporting of disease
- Industrial hygiene - Dust collecting equipment and effective environmental clean-up procedures including personal protective equipment
- Meat inspection

6.1 Control measures during an epidemic

Human anthrax is usually secondary to an outbreak in domesticated animals like cattle and goats and to a lesser extent as a result of industrial exposure (hides and abattoirs/butchers). It is important to note that mysterious animal deaths may precede human cases of anthrax by many weeks and even months.

Control of an outbreak should be vigorously implemented once the focus is identified. Carcasses must either be burnt or buried, all livestock in surrounding areas vaccinated and movement of livestock or livestock products prohibited. These measures successfully limit the disease. However, previous outbreaks experienced by the country revealed that inadequate financial resources for mass vaccinations of animals in communal areas are affecting the effective control and prevention of the disease by the Department of Veterinary Services. In addition, there is need for coordination between all the concerned stakeholders in the control of the disease at all levels.

Steps in epidemic control
- Reporting of the suspected disease to Veterinary Department and MOHCW
- Investigation of the outbreak by RRT: MOHCW, Veterinary Department
- Confirmation of outbreak – usually done by Veterinary Department or NMRL
- Initial Rapid Health Assessment
- Notification of the disease: in term of the Public Health Act (T1 and T2 notification forms shown in Annexes 1 and 2) and the Animal Health Act (epidemic report form shown in Annex 3)
- Community mobilization: community leadership, local authorities
- Zoonotic committee: technical stakeholders
- Activation of the inter-sectoral taskforce: Epidemic Preparedness committee/Department of Civil Protection
- Resource mobilization: supplies, equipment, drugs, food, detergents/disinfectants
- Human resource mobilization: Health, Veterinary, security and support staff
- Consider setting up of treatment centres or mobile clinics where necessary

Anthrax Rapid Response Team

In the concept of “One Health” approach there is need for the formation of the Rapid Response Teams (RRT) for Anthrax composed of both Veterinary and Human health professionals at different levels (province, district, wards, village) to carry out joint disease investigations, confirmation of infectious agent(s), infection source(s) identification, routes of disease spread, public health education and implementation of control measures. All the responsibilities for Medical and Veterinary Teams will be combined to form the Terms of References of the Joint Anthrax Rapid Response Team.
Appointment of RRT leader is critical as outlined in the technical guidelines for Integrated Disease Surveillance and Response (IDS).

**Table 4: Roles and responsibilities of human health and veterinary team members**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Roles and responsibilities</th>
</tr>
</thead>
</table>
| Human Health Team    | • Investigation of all suspected anthrax deaths in the community  
• Patient screening and case management using standard guidelines  
• Notification of all suspected cases  
• Supervised disposal of all infected carcasses, meat and contaminated materials  
• Disinfection of contaminated sites  
• Surveillance  
  o Active case finding in the community and contact tracing  
  o Maintain a line list and spot map  
  o Laboratory confirmation  
• Inspection of all meat outlets/butcheries  
• Meat inspection  
• Health Education at gatherings  
• Taskforce meetings  
• Regular (daily) updates  
• Monitor the public vending of meat  
• Advocacy and communication  
• Monitor importation and exportation of animal products  
• Supervise burial  |
| Veterinary Team      | • Carrying out confirmatory investigations  
• Carrying out laboratory tests on animal specimens  
• Issuing quarantine orders including closing of meat processing and distribution outfits and outlets (Quarantines are only lifted at least 28 days after the last case or the last vaccination.)  
• Monitoring livestock movements  
• Cattle mass vaccination  
• Surveillance in animals  
• Animal inspections  
• Meat inspection  
• Veterinary Public Health Education to communities  
• Mass vaccination of cattle aims to vaccinate at least 80% of the animals in the affected area for effective herd immunity. This is critical to prevent further transmission of the disease in the animals  
• Monitor importation and exportation of animal products  
• Monitor disposal of carcasses of animals |

**Disposal of Carcasses**

- Deep burial of carcass (at least 2m) with disinfection with Chloride of Lime  
- Burning of carcass in a pit with firewood or fuel (if available), followed by disinfection with Chloride of Lime  
- Disinfection of all areas contaminated by carcass using chloride of lime  
- Burying heavily contaminated soil in a deep pit with the carcass  
- Effort must be made to destroy or bury all identified animal products since these can spread disease through environmental contamination or through scavengers and carnivores.  
- Anthrax grave must be marked to prevent accidental excavation

**Note:** Infection control procedures must be adhered to during this process
6.2 Prevention and control in animals

Vaccination
This is the most widely used control method in the world. The vaccines currently in use, are live attenuated spores, and only offer protection for a year. Annual mass vaccination is usually more effective in cattle. However, sheep and goats may also be vaccinated during outbreak.
- Vaccinate animals within 12 kilometers radius from the nucleus of the outbreak area
- Annual cattle vaccinations are recommended for high risk areas

Animal product sterilization
Wool, hair, hides and bone meal can be sterilized by various methods such as, autoclaving bone products, steam sterilization with benzene, soaking wool and hides in formaldehyde solution.

Treatment of sick animals
- Isolation and treatment of all symptomatic animals will be done using Penicillin or Tetracycline followed by immunization of the animals on completion of treatment
- The animals should not be used for food until a few months have passed

Note: Opportunities to treat may exist for dogs and pigs which do not succumb quickly to the disease. Ruminant animals usually die suddenly before treatment can begin

6.3 Prevention and control in humans

Any practice known to spread the disease should be discouraged
- Avoid eating meat and milk from affected areas
- If anthrax is suspected people should be urged to avoid contact, skinning the animals and avoid contaminating the areas with animal products.
- If necropsy is inadvertently performed, autoclave, incinerate or chemically disinfect/fumigate all the instruments or materials.
- Proper disposal of carcasses is essential because spores survive for decades. Carcasses of animals dying of anthrax are the main source of soil contamination and spores from the soil are the main source of infection in animals. Thus interruption of this cycle is critical in the control of the disease. The preferable disposal technique is supervised complete burning and burial of the carcass at the site of death if possible. When these methods are impossible, deeply bury the carcass (at least 2 metres) at the site of death if possible, and apply a layer of quicklime (anhydrous calcium hydroxide) on the covering soil. Carcasses should not be burnt on open fields.
- The soil seeded by the carcasses or discharges should be decontaminated with 5% lye, quicklime, or buried deeply with the carcass
- Education should be given to workers handling potentially contaminated articles on the modes of transmission of the disease, care of skin abrasions and personal hygiene
- Human vaccines have little application in the control of anthrax, being used mainly for people in risk occupations
- Maintain continuous medical examination of employees in hazardous industries, and prompt medical treatment of suspicious skin lesions. Workers at risk should wear protective clothing

6.4 Patient care and hospital infection control

- Notification of all suspected cases is mandatory
- Antibiotic therapy sterilizes the lesion within 24 hours
- Investigation of contacts and source of infection
  - search for history of exposure to infected animals or animal products and trace place of origin
  - People known to be exposed should be given prophylactic antibiotics like penicillin
• Notify National Microbiology Reference Laboratory
• In hospitals, old bedding and clothes should be used for admitted patients, and burnt after use
• Contact isolation for draining lesions
• Standard barrier precautions for all forms of anthrax
• Disinfection of discharges from lesions and articles soiled should be done as soon as possible to avoid spore formation and contamination
  o Hypochlorite, hydrogen peroxide, per-acetic acid, glutaldehyde, ethylene oxide, and formaldehyde can be used as disinfectants
  o Spores require steam sterilization: autoclaving or incineration to assure complete destruction
  o Fumigation and chemical disinfection may be used for valuable equipment
• Decontamination of surfaces
• Autopsy related instruments and materials autoclaved or incinerated
• Proper burial or cremation of the decease

6.5 Education to the public

Health workers must intensify public health education on the following:
• Avoid skinning and opening up the carcasses as this releases the bacteria and promotes spore formation which contaminates the environment
• Protect carcasses of suspect cases from scavenging animals
• Report all cases of animal sudden death to the police, Veterinary Department or Health Workers
• In the event that the Veterinary Officer cannot be found, bury the carcass 2 metres deep with quick lime or burn with paraffin/fire wood
• Seek early treatment if one develops unexplained wound during the time when animals are dying mysteriously
• Allow mass vaccination of animals by the Veterinary Officers
• Discourage buying meat from vendors
• Avoid handling of carcasses and products of suspected infected animals: hides, milk, dried meat, etc...
• Do not consume, sell nor process meat and other products from suspect infected animals

Message design for anthrax health education should cover the following aspects:
• Community case definition – Cutaneous Anthrax :- non traumatic skin lesion which starts as an itchy blister which develops into a painful papular and vesicular lesion before becoming a depressed black eschar in 2-6 days
• Transmission methods – direct contact through handling and skinning infected animals, ingestion of infected meat
• Risk factors for contracting the disease
• Signs and symptoms (both animals and humans)
• Effects of infection (outcome)
• What to do in an outbreak
• Role of the community in disease surveillance

Note: The basic information on anthrax for the public is highlighted in Annex 3

6.6 Management of the outbreak site and environmental control

• Report animal cases to veterinary staff for confirmation
• Do not open up carcasses of suspect infected animals
• Protect the carcass from scavengers
• Dig a pit (2 meters deep and one meter wide) for burial of carcass and all contaminated soil, and cover pit with soil
• Bury the carcass and disinfect with 10% formalin or 5-10% sodium hydroxide
• Search for animal products in the community and destroy through burning or deep burying
• Stop any movement of susceptible animals, meat, milk and other products from the area
• Issue a quarantine order for closure of all abattoirs and butcheries
• Halt the sale of meat and other products of susceptible animals
• Vaccinate and treat surviving animals
• Thorough dust control and ventilation in hazardous industries, especially those that handle raw animal materials. Vaporized formaldehyde has been employed for terminal disinfection of textile mills contaminated with B. anthracis.
• Adequate washing and changing facilities after work should be available
• Control of effluents and waste from rendering plants handling potentially infected animals and those factories that manufacture products from wool, hair, bones, or hides likely to be contaminated.

6.7 Decontamination of infected materials

The decontamination of infected surfaces and materials is an integral part in the disruption of the epidemiological cycle of anthrax:

• **Physical:** the bacterial spores can be inactivated using gamma or electron rays, ultraviolet radiation, and by heat application (autoclaving).
• **Chemical:** using sporcidal chemicals including chloride of lime and HTH to destroy spores. Fumigation using chemicals like ethylene and formaldehyde is another way to kill spores.

Soil decontamination poses a big challenge in the eradication of anthrax. Infected areas should be mapped, and when possible, these should only be used for crop production (melioration). Where this is not practical domestic animals in the areas should be vaccinated annually.

6.8 Destruction of spores

Even though anthrax spores are highly resistant, heat of 150 degrees Celsius for 1 hour or boiling at 100 degrees Celsius for 30 minutes will destroy the spores. However the only reliable method to effectively kill spores is by:

• Autoclaving at 121 degrees Celsius for 15 minutes
• Oxidizing detergents such as Potassium permanganate 4% for 15 minutes, Hydrogen Peroxide 4% for 1 hour; or Formaldehyde have successfully been used in commercial disinfection of spore contaminated products

Soil contaminated with spores may be disinfected using one of the following solutions, 10% caustic soda, 4% formaldehyde, 5% slaked lime, and 10% calcium hypochlorite.

7. Anthrax threat

7.1. Anthrax as a biological weapon

The anthrax bacillus can be used as a biological warfare agent. Amongst the numerous germs that may be used as weapons of bioterrorism, only a limited number could cause disease and deaths in sufficient quantities to seriously affect a population. Anthrax is one of the most serious of these diseases and the most likely agent for large-scale biological attack. Research on anthrax as a biological weapon started more than 80 years ago. Today about 17 nations are believed to have offensive biological weapons programs,
The deliberate release of anthrax would be by release of large quantities of spores in an aerosol to be efficient, and cause the more severe form of the disease, i.e. pulmonary anthrax. This requires technical skills and special equipment. This threat is considered serious because:

- The organism is relatively easy to cultivate from environmental sources
- it is relatively easy to acquire in vitro growth (any laboratory media at 37°C and induction of sporulation is easy
- Aerosol release would be difficult to establish as anthrax spores are odorless and invisible and have potential to travel many kilometers before dissipating. The spores of the bacillus can be produced and stored in a dry form and remain viable for decades, making them one of the top choices of weapons for biological warfare
- When released, spores are easily dispersed in air for inhalation by unprotected people and contaminate large areas on the ground. Outdoor aerosol release could be a threat to people indoors
- the inhalation form of disease has a high mortality rate
- The World Health Organization estimated that an aircraft release of 50 kg of anthrax over a 5000 000 people in urban area would incapacitate 250,000 people and 100,000 of whom would if untreated would die.

7.2. General response to an anthrax threat

The main points of the response to an anthrax threat are:

- Avoid any kind of contact with the content of any suspicious letter or package.
- Determine if this content includes anthrax spores. This step requires access to appropriate laboratory services. Countries without such an access will need to have an alternative way to deal with the threat until such access is provided.
- In all cases in which the exposure to anthrax is confirmed or cannot be ruled out: give an appropriate preventive treatment to the persons having been in contact with the powder, decontaminate the premises where the exposure happened.
- Investigate the threat, i.e. try to determine who did it.
- International collaboration should be encouraged, especially for the investigation of suspected anthrax threats. In particular, international collaboration for laboratory testing of suspected samples should be facilitated, i.e. between countries or territories with adequate laboratory facilities and those without.
- In Zimbabwe the procedure for notification for a suspected anthrax letter/parcel involves:
  - Police/Army
  - Fire Brigade
  - Department of Civil Protection
  - Department of Veterinary Services
  - Department of EDC, MOHCW

7.3. Teams involved in response to an anthrax threat

Department of Civil Protection
Main function is coordination of various sectors and resource mobilization for response to the attack as they have legal mandate to enforce all sectors to participate in the response efforts.

Police/Army
As any anthrax threat is a criminal act to individuals and the population, the police or army should lead the response. They should seal off the involved area, make sure the appropriate measures are taken, and do the investigations.

Fire Brigade
They might be the ones sealing off the possibly infected area before the arrival of the police for instance. They should be responsible for handling the suspected materials, and dispatching them to
the relevant laboratory. They should also be the ones responsible of decontaminating the possibly infected area whenever the need arises.

**Health Services**
They should be responsible for prophylaxis (preventive treatment) of exposed cases, laboratory testing of suspected powder (if possible), and diagnosis and treatment of any case suspected of anthrax.

**Veterinary Services**
They should be responsible for disease surveillance in the animal population, preventive vaccination, and safe disposal of carcasses.

7.4. Flow of events following suspected exposure through handling parcel/mail

**At home**
- Do not panic
- Enclose parcel/letter in a non-leaking plastic bag and isolate in a secure room/corner beyond reach of children
- Wash your hands thoroughly with soap and running water
- All soiled clothes/materials should be removed and sealed in a plastic bag and isolated as above. The person with soiled clothes must take a shower/bath using soap after removing the clothes
- Seek medical attention immediately at your nearest clinic or hospital.

**At clinic/hospital**
- At the health centre appropriate prophylaxis will be given (add the drugs used for prophylaxis)
- Health workers must re-assure the suspect
  - Environmental health Officers will be informed and he/she will in-turn inform the nearest police station
  - A policeman will accompany the officer and the victim to collect the suspect parcel
  - At district, provincial, and city health levels the District Medical Officer (DMO), Provincial Medical Director (PMD), and Director of Health Services are the contact persons and MUST be informed immediately.

**Handling/Transportation of parcel**
- All public institutions, private couriers, police and security departments handling suspect parcels MUST have the following in place: washing facilities for staff and linen, appropriate protective gear (plastic aprons, masks, gloves and gum-shoes)
- Suspect parcel will be sent to the designated laboratories through police channels
- Samples from districts and provinces will be handled by police up to the central level
- Fumigate with vaporized formaldehyde at the level where opening of the parcel takes place
- The Public Health laboratory will in collaboration with the Central Veterinary Laboratory take appropriate measures on the parcel
- Results from analysis will be communicated through the proper channels/protocol

**Surveillance**
- A taskforce shall be in place made up of all stakeholders
- Daily updates from reporting site
- Listing and tracing of all possible contacts
8. Conclusion

Anthrax is widely endemic in most pastures in the country and continues to spread to new areas due to compromised control programs during the last decade. The control of anthrax is however feasible in Zimbabwe, provided that financial and material support from central government is availed on a sustainable basis to ensure the resumption of the routine preventive vaccination program for domestic ruminants, as opposed to the current outbreak control approach. In addition, improved laboratory capacity at the National Microbiology Reference and the Central Veterinary Laboratories now enable the culture and confirmation of both human and animal anthrax. These guidelines therefore supersede what is provided in IDSR technical guidelines and EDLIZ on diagnosis and treatment of anthrax in Zimbabwe.

Public health interventions in the control of anthrax can be enhanced by following these guidelines in ensuring joint surveillance and outbreak management, improved community risk perception and behavior change, and availability of medicines, other medical supplies and relevant logistics.
Annex 1: Notification Form (T1)

**Notification of Infectious Diseases Ministry of Health and Child Welfare T1**
Section 19 of the Public Health Act (Chapter 15:09)

**Note:** All suspected cases of notifiable diseases listed on the cover must be notified to the DMO or Officer In-Charge of a district by telephone and then followed up with copies of this form to the DMO and PMD/City MOH

<table>
<thead>
<tr>
<th>From:</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of clinic/hospital/area</td>
<td>MOH City: -------------------------------------</td>
</tr>
<tr>
<td></td>
<td>DMO District: ----------------------------------</td>
</tr>
<tr>
<td></td>
<td>PMD Province: ----------------------------------</td>
</tr>
</tbody>
</table>

I hereby notify to you that the under-mentioned person is suffering/has died from -------------------

**Diagnosis**

Confirmed by laboratory test: Yes / No

**Type of test**

**Date of onset:**

**Date of admission/Detention:** case number ------

**Name:**  
(First name) (Surname)

**Age:**  
**Date of birth:**  
Sex: 

**Identification particulars:**

**Physical address on admission/disease detection:**

**Length of stay (at the above address):**

**Communal land:** Chief/Chairman

**Headman/Ward:** Kraal/Village:

**Nearest dip-tank/school:**

**Next of kin:**

**Usual residential address if different from above:**

**Name and address of employee/school:**

Give physical addresses of places visited during last month and length of stay

**Place of probable infection:**

**Probable source of infection:**

**Transferred to:**

**Notifying officer:** Title: (in capitals)

Date: Signature:
Instructions for completing the T1 notification of infectious diseases

For all levels of care

T1 is the form for notification of Infectious Disease. The list of notifiable diseases is as follows:

- Anthrax
- Chicken pox
- Cholera
- Diphtheria
- Hepatitis (all forms)
- Human African Trypanosomiasis
- Meningococcal Meningitis
- Pandemic influenzas (H5N1, H1N1)
- Plague
- Poliomyelitis
- Rabies
- SARS
- Typhoid
- Typhus
- Viral Haemorrhagic fever
- Yellow fever
- Tuberculosis (TB) and Leprosy are also notifiable, but they continue to be notified on TB Form 4 and TB Form B for TB, and the Leprosy form for leprosy.

Purpose

It has been found necessary to notify the above diseases because:

- the way in which they spread needs closer monitoring if they are to be controlled;
- It is important that the Provincial Medical Directors (PMDs), City Health Directors and other local authorities know what action has been taken to control the spreading of the diseases;
- It is a statutory requirement that Zimbabwe reports cases and deaths from these diseases to the World Health Organization.

Who fills in the T1

Any clinician who makes diagnosis of any of the notifiable diseases should complete the Form T1 in triplicate immediately after the diagnosis is made.

When to fill in the T1

All suspected and laboratory confirmed cases of the above should be notified immediately to the District Medical Officer by the fastest means possible (telephone if available). The notifying clinician should then complete a T1 form in triplicate.

How to fill in the T1

T1 forms are provided to be filled out in triplicate. Ensure that all the copies are legible. Most entries on T1 are self-explanatory, but a few notes may be useful:

- **CAPITAL LETTERS** should be used on all entries made.

- **Double-wording:** Whenever alternatives are given for example ( “suffering from” or “has died” or confirmed by laboratory test” or “suspected cases”) the inapplicable words should be carefully crossed out, or the appropriate box should be ticked.

- **Age or/ and Date of Birth:** it is important to record the date of birth as well as the age to confirm that the age is accurate because in many cases these do not match. If the age is not known, the estimated age should be given.

- **Physical address:** This refers to the village name, village head, and chief of the area if it’s in rural area and, farm name and number or house number, street name and suburb if it’s in an urban area.
Annex 2: Summary of Notification Information T2

National Health Information System  T2
Ministry of Health and Child Welfare
Month Return on Notifiable Diseases

District: ................................................................. Month and year: ........................................

<table>
<thead>
<tr>
<th>Disease</th>
<th>Suspected cases</th>
<th>Laboratory confirmed cases</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chicken pox</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cholera</td>
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<td></td>
<td></td>
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<tr>
<td>Diphtheria</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis (all forms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human African Trypanosomiasis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leprosy</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Meningococcal meningitis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pandemic influenzas (H5N1, H1N1)</td>
<td></td>
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<tr>
<td>Plague</td>
<td></td>
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<tr>
<td>Poliomyelitis</td>
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<tr>
<td>Rabies</td>
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<tr>
<td>SARS</td>
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<tr>
<td>Tuberculosis</td>
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<tr>
<td>Typhoid</td>
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<tr>
<td>Typhus</td>
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<tr>
<td>Viral Haemorrhagic fever</td>
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<tr>
<td>Yellow fever</td>
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</tbody>
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Remarks: _________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________
______________________________________________________________________________

Date reported: ___________________ Reported by: ___________________

Name: ___________________________ Title: _________________________
Annex 3  Line lists - Reporting during outbreaks

Line list of reported cases: .................................................................................................................................

| Province: ............................................................................................................................................... |
| District: ............................................................................................................................................... |
| Health Facility: ....................................................................................................................................... |

<table>
<thead>
<tr>
<th>Case no</th>
<th>Out/ In patient</th>
<th>Name</th>
<th>Physical address</th>
<th>Sex</th>
<th>Age</th>
<th>Date seen</th>
<th>Date of onset</th>
<th>Signs and symptoms</th>
<th>Treatment given</th>
<th>Specimen taken</th>
<th>Lab result</th>
<th>Outcome</th>
<th>Date</th>
<th>Place of death</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
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Note:
- Line list must be filled in as soon as the number of cases reach five and it should capture the cases already reported on the T1 and T2 notification forms.
- Line list should include all community deaths with information on where they had occurred and a brief history.
- Comments to include information on re-admitted cases, possibility of co-morbidities among others.
### Annex 4: Field Disease Report Form

**Ministry of Agriculture, Mechanisation and Irrigation Development**  
**Division of Veterinary Field Services**  
**Field, Epidemiology And Report Form No.**

#### 1. General

- **Type of Observation**: Initial, Followup
- **Date of Observation**: 
- **Sender Ref.**: 
- **Prov Ref No.**: 
- **Attending Officer**: 
- **Reviewing Vet.**: 
- **Rank**: VET ANI VEA LAY
- **Outbreak Status**: Continuing, Ended
- **Date ended**: 

#### 2. Locality

- **Province**: 
- **District**: 
- **Farm Dip tank name**: 
- **Census**: 
- **Type of Locality**: AQ, Dip tank, Village, Abattoir, Urban, Other
- **Grid Ref**: 
- **Latitude**: 
- **Longitude**: 
- **Owner's name**: 
- **Farming system**: Dairy, Beef, Mixed, Piggery, Wildlife, Other

#### 3. Animals Affected

- **Species**: (Check one) Cattle, Goat, Sheep, Chickens, Pigs, Donkeys, Cats, Dog, Horses, Other
- **Date of onset**: 
- **Predominantly Affected**: 
  - Age: All, Adult, Juvenile, Sub adult, Neonate
  - Sex: All, Male, Female, Castrated, Unknown
  - (Humans Affected, number)

#### 4. Observations

- **Clinical Signs** (please describe)
- **Post Mortem** (please describe)

#### 5. Epidemiology

- **Infection Source**: Airborne, Wildlife, Fomites, Endemic Focus, Vectors, Animal movement, Animal products

#### 6. Diagnosis

- **Tentative Diagnosis**: 
- **Lab Diagnosis**: 
- **Date for Lab Diagnosis**: 
- **Basis for Diagnosis**: Owner's claim, Rumour,Clinical Signs, Post-mortem, Laboratory, Unknown

#### 7. Disease Control Measures

- **Vaccine used**: 
- **Number vaccinated**: 
- **Number treated**: 

#### 8. Samples

- **Type of Sample(s)**: Carcass, Tissue, Faeces, Serum, Blood
- **Date samples collected**: 
- **Date samples sent**: 
- **Verified by** 
- **Signature**: 
- **Date**: 

---

**Note**: This form is used for reporting field diseases in veterinary field services. It captures various details related to the outbreak, locality, animals affected, observations, epidemiology, and disease control measures.
Annex 5: Basics Information on Anthrax

1. Introduction

Anthrax is a disease that occurs widely in Zimbabwe. All provinces of the country are affected and the disease is increasing in incidence.

Anthrax is a disease of animals that can be transmitted to humans. Animals that are mainly infected are cattle, sheep, goats and pigs although other domestic and wild animals can be infected. The disease presents a serious threat to human and animal health and therefore requires preventive efforts from everyone concerned.

2. What is Anthrax?

Anthrax is a serious disease caused by a bacterium called Bacillus anthracis. The bacterium is found in meat, hides and droppings of infected animals. When exposed to air the organism changes into spores which can survive in the environment/soil for many decades. Animals get infected when grazing contaminated pastures and people become infected if they eat meat or handle meat, hides, wool, bones and other products from infected animals.

3. In what forms does the disease present?

In humans there are 3 known types namely
- Anthrax of the skin
- Anthrax of the lungs
- Anthrax of the bowels

Of the three forms above, skin anthrax is the most common, making up about 95% of reported cases. This is followed by the anthrax of the lungs which makes up about 5% of the cases. Anthrax of the bowels is almost negligible.

4. How does the disease spread?

People get the disease by:
- Skinning or handling meat from infected animals.
- Skin contact with infected animals (usually dead animals) especially if one has a sore or a cut
- Eating meat from animals dying of anthrax
- Handling or using hides and wool from infected animals
- Inhalation or breathing of anthrax bacteria from contaminated materials

Animals get the disease by:
- Grazing contaminated pastures
- Consumption of infected meat

5. What are the clinical signs of anthrax?

5.1 Signs of anthrax in humans

Anthrax of the Skin
- Early Stage - A blister at the site of infection
- Later stage - A black sore with a rotting middle area
- Extensive painless swelling
- The infection is capable of spreading to other parts of the body including the blood system
- Fever in some cases
Anthrax of the lungs
- Early Stage - Fever, pain and difficult breathing
- Later Stage - Serious breathing problems
  - Rapid progression to death

Anthrax of the bowels
- Early Stage - Vomiting and watery diarrhoea sometimes with blood
- Later Stage - Fever and sepsis

5.2 Signs of anthrax in animals

Signs in live animals
It is rare to see signs in cattle and other animals as the infection builds up very fast resulting in sudden death. If seen, these include:
- High fever up to 42°C
- Difficulty in breathing
- Animals are weak and depressed
- Difficulty of grazing
- Drooping head and ears
- Eyelids and gums are blood stained
- Swollen neck
- Staggering and falling/collapse
- Convulsions and sudden death

Signs in dead animals
- Rapid distention of the abdomen
- Dark tarry blood discharging from natural openings (blood does not clot)
- Softening and enlargement of the spleen if accidentally opened
- Swelling of the neck and throat area (especially in pigs)
- Rigor mortis (the stiffening of the body that normally follows death) is absent

6. Can anthrax be treated?

6.1. Treatment of anthrax in Animals
Preventive Treatment
Because of the rapid course of the disease, animals are often found dead or too sick for effective treatment. In rare cases animals that are found sick are given treatment but success is minimal. Preventive antibiotic treatment can be offered to animals screened on the basis of morning temperatures under outbreak conditions.

Vaccination
Where there is a history of anthrax outbreaks, animals are vaccinated annually for at least 5 years. Vaccine is free in outbreak conditions. Subsequent vaccinations are not free for commercial farms.

6.2 Treatment of anthrax in Humans
If you notice signs of anthrax, seek treatment from your nearest health centre. People in contact with the sick also need to visit the clinic for purposes of monitoring. The disease is treated with antibiotics. The most vulnerable groups to anthrax include pastoralists, farmers, herdsmen, butchers and skinners, tanners, abattoir workers (meat inspectors, packers and graders), veterinary workers, wool shearers and sorters, leather/skin handlers, food handlers (people who prepare the food)

Vaccination
Ideally all people at higher risk should be vaccinated, however due to resource limitations it is important to target those who work in anthrax endemic areas or under outbreak conditions.
7. Can anthrax be prevented or controlled?

Since anthrax is an important and highly fatal disease the Department of Veterinary Services and Ministry of Health (using Public Health and Animal Health legislation) are working together to minimize the spread of the infection. In line with the legal framework above, the following interventions are mandatory:

- Suspected outbreaks of anthrax should be reported to the veterinary department immediately
- The farm or dip tank is placed into movement quarantine for 28 days
- Vaccination of all susceptible animals every year and during an outbreak
- Dead animals must be burnt or buried at least 2m in the ground in quicklime on site under supervision
- Confiscation and destruction of meat and animal products suspected to be anthrax infected during outbreaks
- The public must not touch, cut or skin any animal suspected of having died of anthrax. They must protect the carcass from dogs and scavengers until the veterinarian has confirmed the cause of death.
- Disinfect the area around which the animal died using 4% Formaldehyde or 5% Chloride of lime in solution
- The soil, animal houses, bedding, vehicles, tools and clothing used during the outbreak should be disinfected
- Treatment of infected people
- Inspection of all meat offered for sale
- Vaccination of high risk groups, e.g. workers in animal or hides handling industry
- Strictly disinfect all skins and hides in leather processing industries

While acknowledging that the disease is a serious threat on human and animal health and lives, we are fortunate that the disease can be prevented. It is the responsibility of every citizen to ensure that measures that minimize the occurrence of the disease are taken.
Annex 6: Flow chart for clinical evaluation and management of persons with possible cutaneous anthrax

Health Professional suspects Cutaneous Anthrax

**Typical lesion:**
**Major features**
- Surrounded by extensive oedema
- Painless and non-tender (although may be pruritic or accompanied by a tingling sensation)

**Minor features**
- Development of black eschar
- Progresses over 2-6 days through papular, vesicular and ulcerated stages before eschar appears
- Most commonly affects hands, forearms, face and neck
- Discharge of serous fluid
- Local erythema and induration
- Local lymphadenopathy
- Associated with systemic malaise including headache, chills and sore throat; but afebrile

**Take detailed exposure history:**
- Details of all movements in the 2 weeks prior to first noticing the lesion
- Ask specifically about risk factors:
  - Working with animals or animal hides
  - Consumption of uninspected meat
  - Making, owning or playing animal hide drums
  - Drug use (particularly heroin use)
  - Travel
  - Working in postal sorting offices or handling large volumes of mail
  - Received threatening letter or package containing white powder

**Cutaneous anthrax unlikely:**
- Observe Closely
- Investigate as appropriate
- Reassure
- Treat other conditions
- Reassess if necessary

**Cutaneous anthrax strongly suspected:**
- Notify Public Health Authorities:
  - Immediately contact Local Health Department
  - Inform Hospital Infection Control Team/Environmental Health Office
- Take initial diagnostic tests*1:
  - Swab from lesion for stain and culture
  - Blood cultures (prior to antimicrobial use, if possible)
- Start antibiotic treatment to cover B. anthracis
  - Ciprofloxacin orally until sensitivity testing is available
- Refer urgently to Infectious Disease Physician or Dermatologist for opinion and further diagnostic tests if indicated*2:
  - Biopsy of skin lesion (base and rolled edge if present) for Immunohistochemical staining and/or PCR
  - Serology
- Take detailed exposure history:
  - Details of all movements in the 2 weeks prior to first noticing the lesion
  - Ask specifically about risk factors:
  - Working with animals or animal hides
  - Making, owning or playing animal hide drums
  - Drug use (particularly heroin use)
  - Travel
  - Working in postal sorting offices or handling large volumes of mail
  - Received threatening letter or package containing white powder

*Gloves should be worn when microbiological specimens are taken. Samples should be labeled as ‘High Risk’ and handled according to local protocols. The microbiology laboratory and reference laboratory should be notified of the suspected diagnosis and told to expect the sample.

1. Microbiological specimens to local laboratory; if Gram-positive bacilli are isolated, or bacterial colonies are grown, these should be sent to the special pathogens reference unit (NMRL)
2. Microbiological specimens NMRL

Review Diagnosis and Therapy when Test Results are Available
Annex 7: Decision instrument for the assessment and notification of events that may constitute a public health emergency of international concern

(Algorithm below should be read with explanatory notes on the next page)

Events detected by national surveillance system under IHR 2005

A case study of the following disease is unusual and unexpected and may have serious public health impact and thus shall be notified

1. Smallpox
2. Poliomyelitis due to wild type poliovirus
3. Human influenza caused by a new

Any event of potential international public health concern including those of unknown causes or sources and those involving other events or diseases than those listed in the box on the left and the right shall

An event involving the following diseases shall always lead to utilization of the algorithm, because they have demonstrated the ability to cause serious public health impact and to spread rapidly internationally

- Cholera
- Pneumonic plague
- Yellow fever
- Viral Haemorrhagic Fever (e.g. Ebola, Lassa, Marburg)
- West Nile Fever
- Other diseases that are of special national and regional concern e.g. dengue fever, rift valley fever and meningococcal disease

Is the public health impact of the event serious?

Yes

Not notified at this stage. Reassess when more information becomes available

No

Is the event unusual or unexpected?

Yes

Yes

Is there a significant risk of international spread?

Yes

Not notified at this stage. Reassess when more information becomes available

No

Is there a significant risk of international travel or trade restriction?

Yes

No

No

No

No

Event shall be Notified to WHO under the International Health Regulations (2005)

Source WHO: Algorithm adapted from Annex 2 of the International Health Regulations 2005
Examples for the application of the IHR Decision Instrument for the assessment and notification of events that may constitute a PHEIC

The examples appearing in this Annex are not binding and are for indicative guidance purposes to assist in the interpretation of the decision instrument criteria.

Does the event meet at least two of the following Criteria?

<table>
<thead>
<tr>
<th>Is the public health impact of the event serious?</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Is the public health impact of the event serious?</td>
</tr>
<tr>
<td>1. Is the number of cases and/or number of deaths for this type of event large for the given place, time or population?</td>
</tr>
<tr>
<td>2. Does the event have the potential to cause a high public health impact?</td>
</tr>
</tbody>
</table>

The Following are Examples of Circumstances that Contributed to High Public Health Impact:

- Event caused by a pathogen with high potential to cause epidemic (infectiousness of the agent, high case fatality, multiple transmission routes or healthy carrier).
- Indication of treatment failure (new or emerging antibiotic resistance, vaccine failure, antidote resistance or failure).
- Event represents a significant public health risk even if no or very few human cases have yet been identified.
- Cases reported among health staff.
- The population at risk is especially vulnerable (refugees, low level of immunization, children, elderly, low immunity, undernourished, etc.).
- Concomitant factors that may hinder or delay the public health response (natural catastrophes, armed conflicts, unfavourable weather conditions, multiple foci in the State Party).
- Event in an area with high population density.
- Spread of toxic, infectious or otherwise hazardous materials that may be occurring naturally or otherwise that has contaminated or has the potential to contaminate a population and/or a large geographical area.

3. Is external assistance needed to detect, investigate, respond and control the current event, or prevent new cases?

The Following are Examples of When Assistance May be Required:

- Inadequate human, financial, material or technical resources – in particular:
- Insufficient laboratory or epidemiological capacity to investigate the event (equipment, personnel, financial resources)
- Insufficient antidotes, drugs and/or vaccine and/or protective equipment, decontamination equipment, or supportive equipment to cover estimated needs
- Existing surveillance system is inadequate to detect new cases in a timely manner.

**IS THE PUBLIC HEALTH IMPACT OF THE EVENT SERIOUS?**

Answer “yes” if you have answered “yes” to questions 1, 2 or 3 above.
II. Is the event unusual or unexpected?

4. Is the event unusual?
The Following are Examples of Unusual Events:
- The event is caused by an unknown agent or the source, vehicle; route of transmission is unusual or unknown.
- Evolution of cases more severe than expected (including morbidity or case-fatality) or with unusual symptoms.
- Occurrence of the event itself unusual for the area, season or population.

5. Is the event unexpected from a public health perspective?
The Following are Examples of Unexpected Events:
- Event caused by a disease/agent that had already been eliminated or eradicated from the State Party or not previously reported.

<table>
<thead>
<tr>
<th>IS THE EVENT UNUSUAL OR UNEXPECTED?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer “yes” if you have answered “yes” to questions 4 or 5 above.</td>
</tr>
</tbody>
</table>

III. Is there a significant risk of international spread?

6. Is there evidence of an epidemiological link to similar events in other States?

7. Is there any factor that should alert us to the potential for cross border movement of the agent, vehicle or host?
The Following are Examples of Circumstances that May Predispose to International Spread:
- Where there is evidence of local spread, an index case (or other linked cases) with a history within the previous month of:
  - international travel (or time equivalent to the incubation period if the pathogen is known)
  - participation in an international gathering (pilgrimage, sports event, conference, etc.)
  - close contact with an international traveller or a highly mobile population.
  - Event caused by an environmental contamination that has the potential to spread across international borders.
  - Event in an area of intense international traffic with limited capacity for sanitary control or environmental detection or decontamination.

<table>
<thead>
<tr>
<th>IS THERE A SIGNIFICANT RISK OF INTERNATIONAL SPREAD?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer “yes” if you have answered “yes” to questions 6 or 7 above.</td>
</tr>
</tbody>
</table>

IV. Is there a significant risk of international travel or trade restrictions?

8. Have similar events in the past resulted in international restriction on trade and/ travel?

9. Is the source suspected or known to be a food product, water or any other goods might be contaminated that has been exported/imported to/from other States?

10. Has the event occurred in association with an international gathering or in an area intense international tourism?

11. Has the event caused requests for more information by foreign officials or international media?

<table>
<thead>
<tr>
<th>IS THERE A SIGNIFICANT RISK OF INTERNATIONAL TRADE OR TRAVEL RESTRICTIONS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer “yes” if you have answered “yes” to questions 8, 9, 10 or 11 above.</td>
</tr>
</tbody>
</table>

Notification to WHO under Article 6 of the International Health Regulations
States Parties that answer “yes” to the question whether the event meets any two of the four criteria (I-IV) above, shall notify WHO under Article 6 of the International Health Regulations.

**Event Risk Assessment**

**Definition**

Risk assessment is a recurring process that continues from the time the event is first detected by MOHCW, to the time the event is “closed”.

**IHR Core Requirements**

- Nominate a district level authority responsible for risk assessment
- Set up a risk assessment committee composed of
  - a medical clinician,
  - a public health microbiologist/laboratory scientist,
  - an environmental health officer
- Ensure that the committee is reachable 24 hours every day by all means of communications
- Initiate assessment within 24 hours after the verification of the event, the short brief by the Rapid Response Team (RRT) and then the investigation report
- Notify immediately concerned authorities once a signal is considered as a PHEIC

**Tools for Risk Assessment**

The main tool for risk assessment is the Decision Instrument. The following list of risk questions does not intend to be exhaustive but rather enable rapid event assessment. These questions supplement Annex IV. In addition, once the aetiology of the event is known, further refinement of the risk assessment may be required.

- Does the event fulfill the minimum criteria for notification in accordance with the decision instrument?
- Has sufficient information been provided to adequately assess the event? What additional information is required to predict disease/hazard spread and event impact?
- Is there evidence that international spread of the hazard and/or disease has already occurred?
- Do other States need to know about this event in order to prevent or prepare for similar occurrences?
- What is the reported incidence, prevalence, morbidity and mortality, if available?
- In what context is this event occurring (vulnerability assessment - population at risk, technical [e.g. diagnostic capacity], response and support infrastructure, socio-political, ecological/environmental, etc.)?
- Do WHO guidelines indicate the need for international contact tracing or food/product recall? Has there been a request for WHO’s assistance in international contact tracing?
- Have similar events in the past resulted in the international spread of disease?
- Are evidence-based prevention and control measures available, and can they be implemented in the affected State without assistance?
- Does the event pose a threat to the routine safety and sanitary environments for travelers, or constitute a public health emergency at designated ports of entry?
- What is the public perception of risk, level of community reaction and level of media interest?
- What will happen if WHO does nothing?
- Should WHO make recommendations for the international control of this event? (consequence - Senior Management will be notified and briefed, options will be presented)
- What might be the unintended consequences of WHO involvement (legal, political, economic etc.)?
- Is the response to the event by other State Parties commensurate to the risk?
Outcome of Risk Assessment
Although the risk assessment is on-going and iterative, at any point in time an event can be at one of the following risk levels, with the noted consequent actions:

Discard
No international risk and no international risk expected close the event, document the assessment in EMS

Monitor
The event is currently of no international public health importance but requires continuous assessment;

Disseminate
Transmit event information to the international community to prepare or prevent similar events:

Escalate
To senior management as Event Management Group (EMG) and/or other WHO units cannot reconcile their differences in the technical assessment of an event or for information dissemination;

Recommend: to senior management to invoke PHEIC procedure.
References

3. Anthrax: Bacteriology, Clinical Presentations and Management. SIU School of Medicine, Department of Internal Medicine, Division of Infectious Diseases. Springfield, Illinois, USA. Date accessed: 19 February 2012, source: http://www.siumed.edu/medicine/id/anthrax.htm.
29. Meryl Nass. Anthrax Epizootic in Zimbabwe, 1978 – 1980: Due to Deliberate spread. Wing Memorial Hospital, Department of Internal Medicine, University of Massachusetts Medical School, Worcester, MA USA.


51. Zimbabwe. The Veterinary Record 1980 July 26; 84-85.