

Anthrax

The following information is taken directly from the provisional guidelines recently released by the Public Health Laboratory Service and Communicable disease Surveillance Centre, London.

The full guidelines can be found at <http://www.phls.co.uk>

BACKGROUND

These guidelines are intended to guide clinical and public health action in the event of a deliberate release of anthrax.

Introduction

Anthrax is an acute infection caused by the Gram-positive, spore forming, bacteria *Bacillus anthracis*. Anthrax naturally infects many species of grazing mammals such as sheep, cattle and goats, which are infected through ingestion of soil contaminated by *B. anthracis* spores. Human infection is acquired by skin contact with, inhalation or ingestion of *B. anthracis* spores, usually from infected animals or animal products. In over 95% of cases the infection is cutaneous, due to inoculation of spores into small abrasions on the skin.

Deliberate release of anthrax

The threat of a deliberate release of anthrax is of the release of large quantities of spores in an aerosol. This threat is considered serious because:

- The organism is relatively easy to cultivate from environmental sources.
- The inhalation form of disease has a high mortality rate.

Despite this, the creation of an infective anthrax aerosol is not easy – particles need to be between 1 and μm in size and sufficient energy is required to disperse them. It is unlikely therefore that contact with letters and packages, which sometimes claimed to be contaminated, constitutes a significant exposure risk.

Epidemiology

Anthrax is a zoonosis to which most mammals, especially grazing herbivores, are susceptible. 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.**

Transmission

The spores of *B. anthracis* are extremely durable. Modes of transmission include:

- Cutaneous contact with spores, spore contaminated materials or infected skin lesions. Infection required an existing break in the skin.
- Inhalation of spores.
- Ingestion of contaminated meat.
- Transmission of anthrax infection from person to person is highly unlikely.
- Contact with skin lesions can result in subsequent cutaneous infection.
- Airborne transmission from person to person does **not** occur.

Mortality

Human anthrax can occur in three forms: inhalation/pulmonary, cutaneous or gastrointestinal, depending on the route of exposure.

Systemic infection resulting from inhalation of the organism has a mortality rate approaching 100%, with death usually occurring within a few days after the onset of symptoms. Cutaneous anthrax, the most common form, is usually curable with antibiotics. The mortality rate among people with infection resulting from ingestion is variable, but may also approach 100%.

Organism survival

Anthrax endospores do not divide, have no detectable metabolism, and are resistant to drying, heat, UV light, gamma irradiation and many disinfectants. In some types of soil, anthrax spores can remain dormant for decades.

Treatment susceptibilities

Most naturally occurring anthrax strains are sensitive to penicillin which historically has been the preferred therapy for the treatment of anthrax.



Infection control practice

2.3.1 Decontamination of exposed persons

The risk for re-aerosolization of *B. anthracis* spores from the clothing of those exposed is extremely low. However even a low numbers of spores could potentially lead to cutaneous infection.

In situations where the threat of exposure to *B. anthracis* spores exists, cleansing of skin and potentially contaminated fomites such as clothing, personal possessions or environmental surfaces should be considered in order to reduce the risk of the cutaneous form of the disease. Decontamination of persons exposed to anthrax includes:

- Removal of contaminated clothing and possessions – it should be stored in double abelled plastic bags until exposure to anthrax has been ruled out.
- If anthrax is confirmed, all contaminated material must be incinerated or autoclaved.
- Minimal handling of clothing and fomites to avoid agitation.
- Instructing exposed persons to shower thoroughly with soap and water.
- Instructing attending personnel to wear appropriate barrier protection – Universal Precautions - when handling contaminated clothing and other fomites.

Cleaning, disinfection and sterilisation of equipment and environment

Contaminated environmental surface should be cleaned with 0.5% hypochlorite solution (one part household bleach added to nine parts water).

Immunisation

In certain circumstances, in addition to antimicrobial prophylaxis, post-exposure immunisation may also be indicated. This consists of 5 doses of vaccine at 0, 3 and 6 weeks, then at 6 months and 1 year after exposure.

Environmental decontamination

The greatest risk to human health following a release of anthrax spores occurs during the period in which anthrax spores remain airborne, called primary aerosolisation. The duration and scale of the infectious risk depends on the duration for which spores remain airborne and the distance they travel before they fall to the ground. This depends on meteorological conditions and aerobiological properties of the dispersed aerosol. The aerosol is likely to be fully dispersed within hours to 1 day at most, well before the first symptomatic cases would be seen. An **exposed zone** will be defined according to the time and place of release in order to identify all persons exposed to primary aerosolisation. The area surrounding the site of release will remain designated as an exposed zone until sufficient time has elapsed and the risk of infection has subsided. Expert advice will be provided to determine the time after release for which spores are likely to remain airborne. Once they have settled, although they remain infectious for long periods, the risk to human health is much lower. Decontamination of small areas may be achieved with 0.5% hypochlorite solution (one part household bleach added to nine parts water).



Protection of frontline workers

This includes all emergency staff involved in management at the scene of a release, as well as those involved in treating patients with anthrax.

Protective clothing

Following an overt release of anthrax spores, the area affected by primary aerosolisation will depend on the time and place of release. This **exposed zone** (see section 4) presents a high risk of infection, and anyone entering it should wear full protective equipment including high-efficacy air filter masks conferring full biological protection.

Exposed persons will normally be moved from the exposed zone, through decontamination, and into a holding area (see section 4.3.1) for medical assessment and administration of prophylactic treatment. Those involved in decontamination, and others who have who have any contact with contaminated clothing and fomites should observe standard Universal Precautions - gloves, masks, gowns, eye protection and hand washing.

Emergency staff who attend exposed persons after decontamination has been completed do not need to take any special precautions. For healthcare workers involved in the management of hospitalised patients with all forms of anthrax, Universal Precautions provide sufficient protection, and mortuary staff should use similar barrier protection. More sophisticated countermeasures for airborne protection such as high-efficacy air filter masks airborne protection are **not** required for the management of anthrax patients.

Antibiotic prophylaxis and immunisation

Prophylactic treatment may be considered for frontline workers involved in other activities including:

- Decontamination of exposed persons.
- Handling exposed persons.
- Management of patients or disposal of bodies infected with anthrax.

Decisions about whom should receive prophylaxis should be taken on an individual basis according to duration and degree of potential exposure, and taking into account the availability and side effects of prophylactic treatments.



PUBLIC HEALTH PROCEDURES

4.1 Surveillance and detection of deliberate releases of anthrax

A deliberate release may be overt with an announcement and/or confirmation by environmental sampling. However, it is also possible that a deliberate release may be covert and will not be identified until the first cases of disease arise. Anthrax is a rare disease. Approximately 10 cases present each year in the UK. These are mainly cutaneous and are due to handling hides imported from countries with endemic disease (and thus often associated with the leather industry).

Deliberate release should be considered in the event of:

- Single **confirmed** cases of inhalation anthrax.
- Single **confirmed** cases of cutaneous anthrax arising in individuals who do not routinely have contact with animals or animal hides.
- Two or more **suspected** cases of anthrax that are linked in time and place, especially geographical related groups of illness following a wind direction pattern (analogous to legionnaire's disease).

Definitive diagnosis in the reference laboratory

The definitive test for *B. anthracis* is polymerase chain reaction (PCR). This test can be applied to cultures sent from local laboratories, in which case results will be available in 3 hours from receipt of specimen. It can also be applied to isolates and other clinical samples, but this will normally require overnight culture at the reference laboratory, so the result will take 24 hours.

Post-exposure prophylaxis

There are 2 groups of individuals for which prophylaxis is indicated:

I **Individuals who have been present in the exposed zone** should be offered post-exposure prophylaxis as outlined in Table 2.

II **Healthcare workers** may require prophylaxis.

4.3.3 Preventing secondary spread

As previously mentioned, person to person spread of anthrax is negligible, and therefore there is no specific treatment or advice is required for secondary contacts. There is no requirement for quarantine of infected patients. However those contaminated with Anthrax spores will need to be decontaminated as described in section 2.4.2.



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