

Infection with *Bacillus anthracis* – Injecting Drug Users Potential Presentations and Case Definitions

(Adapted from Clinical presentations and case definitions - anthrax in heroin users HPA, London)

Background

In Scotland in December 2009, an outbreak of anthrax was identified among injecting drug user (IDUs) centred in Glasgow. The initial Scottish cluster of infection in IDUs began in 2009 and resulted in 119 patients being classed as having anthrax, with 47 of these being confirmed. Fourteen of these cases died. In addition, there were three related cases in England. The responsible isolates had an indistinguishable genetic signature (Ba4599 single-nucleotide polymorphism genotype).

In investigating strain origin, it was subsequently determined that this clone was prevalent in Turkey. Initial UK police and Europol investigations suggested that hide bags used to transport raw opium from production areas in Afghanistan to processing plants (most likely in Turkey) were the source of the anthrax spores.

After a lull, in summer 2012, a cluster of five anthrax bloodstream infection cases was identified in Germany, Denmark and France (this cluster was suspected as being caused by illegal importation of heroin from Scotland to Germany). This low-grade outbreak is continuing; to date (March 2013) 13 cases now identified since early June 2012. Seven cases have been affected in the UK - five in England (including four fatalities), one in Scotland and one in Wales. The causative strain of this cluster was again indistinguishable from that responsible for the Scottish cluster. To date, there have been no similar cases in Ireland.

The aim of this guidance is to assist clinicians in Ireland in clinical and microbiological assessment of suspected cases of infection with *B. anthracis* in IDUs.

Clinical Presentations of Anthrax

Prior to the 2009/2010 outbreak which occurred primarily in Scotland, anthrax had only been described once in an IDU. In the Scottish outbreak, the pattern of presentation was rather mixed. Cases did not generally present with typical features of cutaneous anthrax; few had lesions that resembled the classical black crusted eschar of cutaneous exposure. The following were the broad categories of presentation:

- a) *Soft Tissue infection/Swelling*: Many cases presented with soft tissue infections and/or localised swelling, or features reminiscent of necrotising fasciitis. Swelling was the commonest reported feature across all case types, followed (in confirmed cases) by pain, malaise and fever.
- b) *Disseminated infection/toxaemia*: Other cases presented with little or no localised signs of infection but with generalised symptoms suggesting disseminated infection and toxaemia.
- c) *Abdominal Pain*: Some presented with marked abdominal pain, sometimes with other GI symptoms (nausea, vomiting, diarrhoea or rectal bleeding).
- d) *CNS Features*: Still others presented with predominantly cerebral/CNS symptoms; severe headache, hallucinations, fitting, collapse, coma. Some died very rapidly after hospital admission or were found dead at home.

NB: it is important to bear in mind that smoking or snorting (insufflation) of heroin can potentially lead to infection with *Bacillus anthracis* – particularly inhalational anthrax.

Due to the nature of the infection in heroin users, clinicians should consider the following as possible presentations of anthrax and discuss the case immediately with their local microbiologist.

1) Injection Anthrax

Where there is a history of recent injection use of heroin the following should be considered as possible presentations: Any IDU who presents with:

- Severe soft tissue infection, including necrotizing fasciitis and cellulitis/abscess particularly if associated with oedema (often marked)
- Signs of severe sepsis even without evidence of soft tissue infection
- Meningitis (especially haemorrhagic meningitis). Also, be suspicious of heroin users who present clinically and/or with CT evidence suggestive of a subarachnoid haemorrhage or intracranial bleed.

2) Inhalation anthrax

Inhalational anthrax is an unusual form of classical presentation for anthrax associated with direct inhalation of spores into the lungs. There is a potential risk of inhaling anthrax spores from snorting or smoking heroin contaminated with anthrax spores. Symptoms may begin with a flu-like illness followed by respiratory difficulties and shock after 2-6 days. The signs and symptoms of inhalational anthrax include:

- Initial flu-like illness, progressing to severe respiratory difficulties and shock
- Chest X-Ray signs – mediastinal widening, paratracheal fullness, hilar fullness, pleural effusions, parenchymal infiltrates
- Progressively enlarging, haemorrhagic pleural effusions are a consistent feature. The disease is often biphasic, with a prodrome of general malaise for 2-3 days, followed by a day or two of apparent remission before the full blown picture develops.

Respiratory symptoms may also be accompanied by signs and symptoms suggesting meningitis or intracranial bleeding in the rapidly advancing stages of the disease process due to haematogenous spread.

3) Cutaneous Anthrax

Few cases in the 2009-2010 outbreak had signs of classical cutaneous anthrax (normally the most common form of infection with *B. anthracis*). However, such typical skin lesions resulting from injection of spores remain a possibility, as do such lesions occurring from simply handling the contaminated heroin itself.

In classical cutaneous anthrax, a lesion normally appears on the skin: on the head, neck, forearms or hands. In injecting users it may be nearer to an injection site on a limb or in the groin area. This lesion starts as a small bump and develops into a characteristic ulcer with a black centre. Marked swelling (oedema) associated with the lesion is a classical finding. It is rarely painful, but if untreated, the infection can spread to cause blood poisoning. If untreated, the disease can be fatal in 5% of cases, but recovery is possible with prompt antibiotic treatment.

Other presentations:

4) **Gastrointestinal Anthrax**

A very rare form of anthrax usually associated with ingestion of contaminated food, resulting in severe gastrointestinal disease, fever and blood poisoning. This form usually has an incubation period of 1-7 days.

- *Initial phase:* symptoms include nausea, anorexia, vomiting and fever progressing to severe abdominal pain; haematemesis and diarrhoea that is almost always bloody; acute abdomen picture with rebound tenderness may develop; mesenteric adenopathy on CT scan likely. Mediastinal widening on Chest X-Ray has been reported.
- *Subsequent phase:* 2-4 days after onset of symptoms, ascites develops as abdominal pain decreases. Shock and death within 2 to 5 days of onset.

5) **Oropharyngeal Anthrax**

This is the rarest form of anthrax. It usually has an incubation period of 1 to 7 days.

- *Initial phase:* fever and marked unilateral or bilateral neck swelling caused by regional lymphadenopathy; severe throat pain and dysphagia; ulcers at the base of the tongue, initially oedematous and hyperaemic.
- *Subsequent phase:* ulcers may progress to necrosis; swelling can be severe enough to compromise the airway.

Case Definitions

A national case definition/case classification already exists for anthrax (see [Case Definitions for Notifiable Diseases, Version 1.1](#)). This amended case definition is designed specifically for use in the case of an IDU presenting with symptoms of possible anthrax infection.

Confirmed Case

A drug user (either one who injects or who smokes heroin) with one of the clinical presentations compatible with anthrax* (see clinical presentation above)

AND **one** or more of the following:

- Isolation of *B. anthracis* from a clinical specimen
- Detection of *B. anthracis* nucleic acid in a clinical specimen

(NB: Positive nasal swab without clinical symptoms does not contribute to a confirmed diagnosis of a case.)

Probable Case

A person with a clinical syndrome compatible with anthrax

AND **one** or more of the following:

- Single clearly positive result (raised titre) on a single serology specimen
- Paired serology results with either the same or decreasing titres
- Demonstration of specific anthrax toxin in the blood in the absence of any other toxin or reasonable clinical or microbiological explanation for such toxin being present

Possible case

A person with a clinical syndrome compatible with anthrax including symptomatic individuals with an epidemiological link to a known confirmed or probable case.

Negative case

A case where all the epidemiological and microbiological investigations have been completed and no evidence was found to substantiate *Bacillus anthracis* as the cause of their illness.

Appendix A – Clinical Criteria from Irish Case Definition Booklet *[included for information only**]***

Cutaneous anthrax

At least **one** of the following two:

- Papular or vesicular lesion
- Depressed black eschar with surrounding oedema

Gastrointestinal anthrax

- Fever or feverishness

AND at least **one** of the following two:

- Severe abdominal pain
- Diarrhoea

Inhalational anthrax

- Fever or feverishness

AND at least **one** of the following two:

- Acute respiratory distress
- Radiological evidence of mediastinal widening

Meningeal/meningoencephalitic anthrax

- Fever

AND at least **one** of the following three:

- Convulsions
- Loss of consciousness
- Meningeal signs

Anthrax septicaemia

Epidemiological criteria

At least one of the following three epidemiological links:

- Animal to human transmission (only for person meeting clinical criteria for cutaneous case)
- Exposure to a common source
- Exposure to contaminated food/drinking water

Case classification

A. Possible case

NA

B. Probable case

Any person meeting the clinical criteria and with an epidemiological link

C. Confirmed case

Any person meeting the clinical and the laboratory criteria

Appendix B– UK Case Definition (2012) [*included for information only***]**

Confirmed Case

A drug user with a clinical syndrome compatible with anthrax* (see clinical presentation above)

AND one or more of the following:

- Growth of *Bacillus anthracis* from a clinical isolate confirmed by the reference laboratory
- Evidence of *Bacillus anthracis* DNA by PCR on three target genes
- Demonstration of *Bacillus anthracis* in a clinical specimen by immunohistochemistry (IHC)
- Positive serology with a rising titre, on paired specimens, of antibodies to anthrax antigens consistent with seroconversion.

Probable case

A person with a clinical syndrome compatible with anthrax

AND one or more of the following:

- Single clearly positive result (raised titre) on a single serology specimen
- Paired serology results with either the same or decreasing titres
- Demonstration of specific anthrax toxin in the blood in the absence of any other toxin or reasonable clinical or microbiological explanation for such toxin being present

Possible case

A person with a clinical syndrome compatible with anthrax including symptomatic individuals with an epidemiological link to a known confirmed or probable case.

Negative case

A case where all the epidemiological and microbiological investigations have been completed and no evidence was found to substantiate *Bacillus anthracis* as the cause of their illness.