Outbreak of wound botulism in people who inject drugs, Norway, October to November 2013

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In October and November 2013, four cases of wound botulism were confirmed in people who inject drugs (PWID) in Norway. Two additional cases are suspected. Because of the international distribution pathways for heroin – the likely source of the outbreak – healthcare workers and public health authorities in other countries should remain vigilant for wound botulism in PWID. This outbreak serves as a reminder that countries should ensure access to botulinum antitoxin in case of outbreak situations.

Outbreak alert

On 18 October 2013, the Norwegian Institute of Public Health (NIPH) was notified by the Department of Public Health of the Municipality of Oslo of a suspected case of wound botulism. A man in his 40s with a history of injecting drugs sought medical attention on 17 October at a medical clinic at a hospital in Oslo. He had several abscesses and neurological symptoms including dysphagia, dysarthria and dyspnea. He discharged himself from the hospital against medical advice but was readmitted the following day. Botulism was suspected and following readmission he was transferred to the intensive-care unit (ICU) in a second hospital in Oslo. Upon admission to the ICU, he was mentally alert and had classic signs and symptoms of botulism, which at that point also included ptosis, ocular muscle paralysis and dry mouth. He was placed on a mechanical ventilator due to respiratory failure and was treated with botulinum antitoxin, incision of abscesses and antibiotics. The patient receives opiate substitution therapy but acknowledged long-term intramuscular injection of heroin and had injected on 18 October.

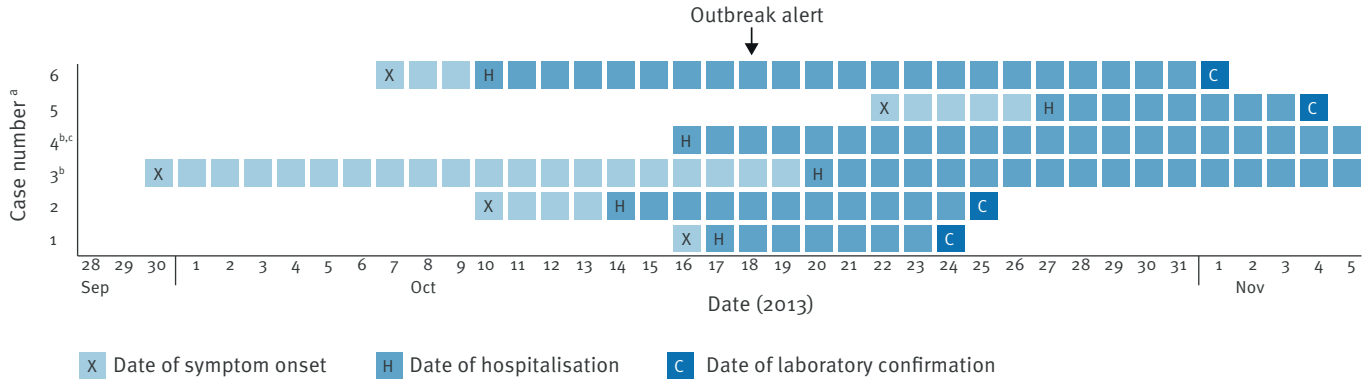
Later on 18 October, a second case of suspected botulism in a person who injects drugs was notified by a hospital in a municipality near Oslo. A man in his 30s was first admitted to the hospital on 14 October, discharged himself on 15 October and was readmitted on 16 October. He displayed neurological symptoms that included dysphagia, ptosis and dry mouth. He also had abscesses that had been incised by a friend before hospital admission. This patient was treated with botulinum antitoxin and antibiotics. The patient is enrolled in an opiate substitution therapy programme and stated that he had recently injected heroin intramuscularly only once, on 7 October.

For this outbreak, a suspected case was defined as a person who injects drugs living in Norway with clinical symptoms consistent with botulism with onset after 1 October 2013. A confirmed case was defined as a suspected case with laboratory confirmation of botulism by mouse bioassay. As of 6 November, a total of four confirmed and two suspected cases have been reported. Cases were between the ages of 35 and 55 years and two were women. All cases have a history of injecting drugs and reside in Oslo or one of two neighbouring counties. Onset of symptoms among cases was from 30 September to 22 October. The number of days from hospitalisation to laboratory confirmation ranged from 8 to 22 days (Figure 1).

Laboratory testing and contact tracing to establish a possible connection between the confirmed and suspected cases is ongoing. Preliminary results from interviews with the patients suggest that only two of

Figure 1

Dates of symptom onset, hospitalisation and laboratory confirmation for cases of wound botulism in people who inject drugs, Norway, 30 September–5 November 2013 (n=6)



[a] Cases are listed in order of notification.

[b] Cases 3 and 4 have not been laboratory confirmed.

[c] Case 4 is unable to provide information regarding the date of onset of symptoms.

the cases knew each other but none had shared heroin or injecting paraphernalia.

Laboratory diagnosis

Botulism was confirmed in four of the six cases by mouse bioassay using serum specimens between 24 October and 4 November. The laboratory diagnosis was performed at the Norwegian School of Veterinary Science according to the current Nordic Committee on Food Analysis method [1]. For all four sera that were confirmed positive with the bioassay, the mice developed classic symptoms of the effect of botulinum neurotoxins [2] within one day after injection.

Complete results of subtyping of the botulinum toxin are pending, although the specimens were not positive for type E and inconclusive for type B. Bacteriological tests from abscess specimens are also ongoing. Nerve conduction studies have provided supporting evidence of botulism for one confirmed case and one suspected case. Two cases had heroin remaining, which is currently undergoing testing by cultivation at the NIPH and at a regional medical microbiological laboratory.

Investigation and control measures

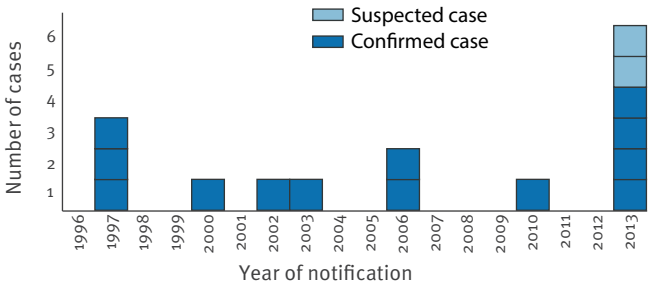
On 18 October, the Department of Public Health of the Municipality of Oslo distributed information regarding the possible circulation of contaminated heroin and symptoms of botulism to emergency departments, hospital infectious disease and neurology departments and the ambulance service in order to increase vigilance among clinicians. For at least one case, botulism was only considered following the dissemination of information. This reinforces the importance of increasing awareness among clinicians of botulism linked to drug injection in order to avoid delays in diagnosis, especially in countries where it is rarely identified. The police and relevant low-threshold centres for people who inject drugs (PWID), including supervised drug consumption facilities and treatment services, were also notified, in order to encourage PWID to avoid intramuscular and subcutaneous injection and to seek treatment promptly upon development of symptoms consistent with botulism. Information was published on the Municipality of Oslo website, the NIPH websites and MikInfo, a web-based platform for information-sharing for microbiologists hosted by the NIPH. Other European countries were alerted via the European Early Warning and Response System on 19 October and the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) was informed 20 October. On 31 October, the European Centre for Disease Prevention and Control and EMCDDA published a joint rapid risk assessment of the situation in Norway, recommending increased awareness among healthcare workers and public health authorities regarding the possibility of cases in other European Union/European Economic Area countries [3]. Systematic interviews to collect extensive demographic, clinical and drug-use data in order to identify links between the cases in terms of residence, social networks and drug supply are being organised by local public health authorities in collaboration with clinicians.

Botulism in people who inject drugs in Norway and Europe

Infections of spore-forming bacteria among PWID, such as botulism, tetanus, *Clostridium novyi* infection and anthrax, have been previously reported in several European countries, most notably the United Kingdom (UK) [4,5]. A review of UK cases from 1990 to 2009 indicated that while cases of tetanus, *C. novyi* infection

Figure 2

Cases of wound botulism in Norway in people who inject drugs, 1996–2013 (n=15)



and anthrax most often occur in clusters, botulism tends to occur as sporadic cases [5]. Outside the UK, few clusters of wound botulism have been reported in European countries, including Ireland in 2008 [6], Germany in 2005 [7] and Switzerland in 1998 [8].

Notification of botulism has been mandatory in Norway since 1975. Between 1990 and 2012, 40 cases of botulism were reported. Although the most common cause of botulism in Norway is the consumption of home-made fermented fish (rakefisk), nine cases of wound botulism among PWID have been reported previously (Figure 2). All cases were sporadic, with the exception of one cluster of three cases in 1997 [9]; before the 2013 outbreak, the most recent case of wound botulism reported through the Norwegian Surveillance System for Communicable Diseases associated with injection drug use was reported in 2010.

Contamination of heroin with *C. botulinum* spores or other substances mixed with the drug are the most likely sources of wound botulism among PWID [10]. The distribution of cases – occurring primarily in north-western Europe – may reflect regional differences in heroin distribution, heroin preparation practices and injecting drug use practice, including the type and method of injecting [5]. Most of the cases in this Norwegian outbreak reported intramuscular injection of heroin ('muscle popping'), due to obliteration of peripheral veins following many years of intravenous injection. This practice can result in formation of wounds and abscesses with anaerobic conditions, which can lead to germination of *C. botulinum* spores and subsequent production of toxin [10]. Several cases reported using heroin that was brownish in colour and had a powdery consistency. Use of black tar heroin is also reported to be a risk factor for wound botulism due to increased sclerosis of veins in black tar users and the nature of the substance, which leads to increased use of intramuscular and subcutaneous injections [11].

Availability of botulinum antitoxin

The NIPH is responsible for maintaining the country's supply of botulinum antitoxin. Shortage of antitoxin has recently been a problem in several European countries [12,13]. At the time the first cases were notified, the NIPH had only a limited supply of botulism antitoxin available. The NIPH was already in negotiations with a supplier to receive additional vials at the time of the outbreak, but accelerated the process in order to have the shipment sent from a producer outside Europe within four days. To address the acute need for antitoxin, other public health institutes in the Nordic countries were contacted. A limited amount of heptavalent antitoxin botulism was obtained within 24 hours from the Finnish National Institute for Health and Welfare. However, the procurement from Finland was complicated by agreements that prevented sharing between countries and approval from the supplier was necessary in order to receive the antitoxin. The transfer of antitoxin from Finland to Norway also required the development of a contract to regulate responsibility and liability issues. Although sufficient doses of botulinum antitoxin have now been acquired, this outbreak has demonstrated that agreements to share antitoxin should be in place between national public health institutes. This may require negotiating contracts with vendors to allow for transfer of the antitoxin between countries in outbreak situations. This is especially important as delays in obtaining antitoxin can affect length of stay in an ICU [14].

Conclusion

Contaminated heroin is suspected as the source of infection in this cluster of cases of wound botulism. Investigation into links between cases, such as shared social networks and drug suppliers, is ongoing but preliminary results suggest that contaminated heroin was distributed in south-east Norway in the Oslo area. Improving awareness of the outbreak will increase the likelihood that PWID may promptly seek treatment or avoid intramuscular or subcutaneous injection. This outbreak also serves as a reminder for public health authorities to ensure emergency plans are in place for rapid access to antitoxin.

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Conflict of interest

None declared.

Authors' contributions

All authors contributed to the writing of this manuscript and approved the final version. EM drafted the manuscript and contributed to the epidemiological investigation. TMA and KR contributed to the epidemiological investigation. ABB, BL, PG and BÅH conducted interviews and took part in the clinical management of the patients. MG and JMS coordinated the investigation at the municipal level. KJ coordinated the antitoxin procurement. HM and DFV were central in the laboratory investigation. LV coordinated the investigation at the national level.

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