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Executive summary

This Incident Management Team (IMT) report presented the investigations and conclusions in relation to an outbreak of wound botulism among people who had a history of injecting drugs between December 2014 and June 2015 in Scotland. A total of 40 confirmed and probable cases were recorded during the outbreak, making this the largest outbreak of wound botulism among people who inject drugs in Scotland to date.

The outbreak began on the 24th of December 2014, when two cases of wound botulism among patients who had a history of injecting drugs were admitted to hospital within a week of each other, the first cases in Scotland since 2009. The identification of two probable cases of wound botulism in a one week period suggested the contamination of a batch of heroine and the possibility of further cases. The outbreak continued for 24 days, with a peak in the epidemic curve in week 4. In response to the outbreak, a national IMT led by Health Protection Scotland (HPS) which included representatives from NHS boards, Police Scotland, the Scottish Drugs Forum (SDF) and Public Health England (PHE) was convened to manage and investigate the outbreak.

An epidemiological outbreak investigation, led by HPS, collated information on personal and medical details, source of drugs and drug use prior to the onset of illness from all cases reported using an established national enhanced surveillance form (designed by PHE). Microbiological investigations were carried out primarily to establish a diagnosis and further specialist molecular investigations of laboratory confirmed cases were also carried to confirm if the cases were linked.

The epidemiological outbreak investigation was supported by a parallel criminal investigation undertaken by Police Scotland. Their objective was to determine the source of the suspected contaminated heroin with a view to removing or reducing the amount of the contaminated drugs on the street. Microbiological investigations were also undertaken on samples of heroin seized during the parallel police investigation.

The outbreak affected people who inject drugs (PWID) in NHS Greater Glasgow and Clyde (NHS GG&C) and neighbouring NHS boards. The epidemiological evidence obtained during the investigation linked the source of the contaminated heroin to
Glasgow and molecular typing of *Clostridium botulinum* type B isolated from 12 of the patients indicated a common source of infection. The investigators did not isolate spores from any heroin seized; however it seems likely that the contaminated heroin was the vehicle of the spores.

The IMT took a pragmatic, risk reduction approach to the management of the outbreak. Given the challenges of eliminating the source of infection, the focus was on reducing harm and raising awareness among those at risk and front line workers. Interventions and advice which was recommended by members of the IMT included: advice on reducing or eliminating drug use altogether and accessing opiate substitution therapy; advice on switching to safer route of drug user (e.g. smoking rather than injecting; provision of foil to encourage an alternative to injecting; provision of injecting equipment; advice on safer injecting behaviour (ensuring they inject into a vein); education on awareness raising of the signs and symptoms (for both front line staff and potential cases). Furthermore, in response to the increased demand of botulinum antitoxin, the quantities of stock held across Scotland was increased. The addiction needs of the cases admitted to hospital were also recognised to discourage early self discharge. To reduce the risk of this occurring, local addiction services visited cases as soon as possible.

The outbreak was declared over on 10th of July 2016. Many of the recommendations from this outbreak have been addressed in the Scottish Health Protection Network Guidance on the “*Public health management of tetanus, botulism or anthrax among people who use drugs*”\(^1\).
1. **Background**

   1.1. *Clostridium botulinum*
   Botulism is a serious and potentially fatal condition caused by a toxin produced by the anaerobic bacterium *Clostridium botulinum*. Toxin is produced when spores of the bacterium contaminating a wound germinate in the anaerobic environments that can be found in the wounds that occur when people inject intramuscularly or subcutaneously. Intramuscular or subcutaneous injections among people who inject drugs (PWID) usually happen as a result of someone missing a vein when trying to inject intravenously. The germinated botulism spores cause a local infection and toxin production.

   Patients with botulism may present with blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth and muscle weakness. If left untreated the illness may progress to cause paralysis and death. Botulism is treated by prompt administration of an anti-toxin close to onset of symptoms and subsequent appropriate antibiotic therapy.

   1.2. **Epidemiology of wound botulism in Scotland and the UK**
   People who inject drugs are known to be at risk of wound botulism. Clusters and isolated cases of wound botulism have been reported in PWID. Between 2000 and 2013, there were 167 cases of wound botulism amongst PWID in the UK (2). The last probable (though unconfirmed) case in Scotland was reported in 2009. The identification of two probable cases of wound botulism in a one-week period suggested the contamination of a batch of heroin with *Clostridium botulinum* spores, and the possibility of an outbreak.
2. Outbreak investigation

The investigation and management of this outbreak was carried out across the multiagency membership of the IMT.

On Wednesday 24th December 2014, NHS Greater Glasgow and Clyde (NHS GG&C) Public Health Protection Unit (PHPU) were notified that a 39 year old female Glasgow resident had been admitted to one of the hospitals in Glasgow with neurological symptoms suggestive of botulism. The patient had a history of injecting drug use (heroin).

One week later (Wednesday 31st December), NHS GG&C was notified of a further suspected case in a 35 year old male Glasgow resident admitted to a second hospital in Glasgow. The second patient also gave a history of injecting opioids. At this point, the results of the microbiology testing of samples by Gastrointestinal Bacteria Reference Unit (GBRU), Public Health England (PHE) Colindale, taken from the first case on the 24th December, was equivocal with further testing awaited.

On the afternoon of Monday 1st January, NHS GG&C PHPU convened an Incident Management Team (IMT) with representation from Health Protection Scotland (HPS), Pharmaceutical services, and Police Scotland. The purpose of the meeting was to review the information that was available, assess its significance and to agree the next public health steps with particular consideration around local awareness raising with both clinicians and frontline workers on the signs and symptoms of infection in order to ensure prompt diagnosis of further cases (should they occur).

Over the next 4 weeks, 13 cases of suspected cases of wound botulism were reported from a further four NHS Boards (Ayrshire & Arran, Lanarkshire, Forth Valley and Shetland), and in keeping with national guidance, a national IMT was convened led by HPS to co-ordinate the investigation and management of the outbreak across the country. The national IMT met first on 29th January and included representatives from: NHS Boards; Police Scotland, the Scottish Drugs Forum (SDF), PHE (Appendix 2).
Between 24th December 2014 and 30th May 2015 a total of 47 cases of suspected wound botulism were reported across six NHS Boards. Further cases of botulism were also reported in England (n=1) and Norway (n=6) though at the time there was no information to suggest a link with the Scottish cases.

The IMT met for a final time on 23rd June 2015, and agreed in the absence of a further case within six weeks from the last case reported, the incident could be closed. This duly happened on 10th July 2015.

The timeline for the events in the outbreak are presented in Appendix 3.
3. Case definitions

The IMT adapted the European Centre for Disease Control (ECDC) definitions for the outbreak, which included clinical, epidemiological and microbiological criteria (Table 1) (3).

Table 1 Clostridium botulinum outbreak case definitions

<table>
<thead>
<tr>
<th>Clinical</th>
<th>Any person with at least one of bilateral cranial nerve impairment (e.g. diplopia, blurred vision, dysphagia, bulbar weakness) or peripheral symmetric paralysis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epidemiological</td>
<td>Use of illicit drugs by any route within the two weeks prior to onset of symptoms.</td>
</tr>
<tr>
<td>Microbiological</td>
<td>Isolation of Clostridium botulinum from infected wound and/or detection of botulinum toxin in a clinical specimen.</td>
</tr>
</tbody>
</table>

The case definition was categorised by the degree of certainty regarding the diagnosis as “probable” or “confirmed”.

**Probable case** – a high clinical suspicion and epidemiological evidence consistent with botulism.

**Confirmed case** – clinical, epidemiological and microbiological evidence consistent with botulism.

A “possible” case classification was used, when dealing with the initial report of suspected cases that merited further investigated. This provisional classification was given following review of the case by the Consultant Microbiologist of the GBRU and the treating physician. Thereafter cases were formally classified as “probable” or “confirmed” when further corroborating information became available to do so. On a few occasions, corroboration was never achieved and the case(s) remained “possible”.

To ensure as many cases as possible was identified, it was agreed that the case definition would include any cases (confirmed, probable or possible) arising since 24th December 2014, in Scotland.

---

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4. Descriptive Epidemiological Investigation - Methods

4.1. Case finding
Botulism (and its causative agent) is statutorily notifiable by a registered medical practitioner and diagnostic laboratories under the Public Health Act (Scotland) 2008. Possible cases should be notified urgently to the local NHS Board and thereafter HPS. Information on the signs and symptoms of botulism was cascaded to frontline workers across Scotland who were asked to report any possible cases to the local NHS board health protection unit.

For all “possible” cases identified, information on personal and medical details, source of drugs and drug use prior to the onset of illness, was collected using the established national enhanced surveillance form (designed by, and available from PHE) (4). Copies of the completed forms were sent to HPS and collated on a copy of an Access database utilised by PHE for the national (UK) surveillance of botulism associated with people who inject drugs. This was later merged with that from elsewhere in the UK to ensure the collation of the information at the UK level.

HPS maintained a line listing to track daily case status. This collated information from the enhanced surveillance form and microbiological investigations. Regular updates were provided to the IMT members.

4.2. Microbiological investigation
Botulism is a clinical diagnosis that is supported by laboratory conformation. Confirmation requires the timely collection of appropriate biological samples before anti-toxin administration. The early collection of samples following onset of symptoms maximises the opportunity for toxin detection. The organism can also be detected in material from wounds by a rapid polymerase chain reaction (PCR) assay. Routine laboratory tests are not considered helpful and specimens were therefore sent to, and following discussion with, the GBRU. To facilitate and maximise the opportunity for diagnosis the contact details of the Medical Microbiologists at the GBRU was cascaded to frontline workers by HPS.
Microbiological investigation was undertaken primarily to establish a diagnosis. Further specialist molecular investigations of laboratory confirmed cases was also undertaken to establish if the cases were linked.

Microbiological investigation was also undertaken on samples of heroin seized during the parallel police investigation.

### 4.3. Police investigation

The public health investigation of this outbreak was supported by a parallel criminal investigation undertaken by Police Scotland. Police officers conducted investigations using standard police interview methods. The objective of their investigation was to determine the source of the suspected contaminated heroin with a view to removing, or reducing the amount of the contaminated drugs in circulation thereby maximising the safety of all individuals involved in the outbreak.
5. Descriptive Epidemiological Investigation – Results

5.1. Number of cases
A total of 47 individuals presented to hospital, between 21st December 2014 and 29th May 2015, with symptoms indicative of botulism. Seventeen cases were confirmed microbiologically as botulism and 23 cases were classed as probable. Two cases were classified as (and will remain as) possible, with the remaining five cases discounted. Of the two possible cases and five discounted cases, four received antitoxin and one individual died. Only cases considered as confirmed and probable are included in the following analysis (n=40).

5.2. Epidemic curve
The first case was admitted to hospital on the 21st December 2014. Twelve more cases were admitted over the six weeks following, resulting in the initial peak (six cases) of the outbreak, during w/c 26th January. A further 15 cases were admitted over the next four weeks giving rise to a second peak (five cases) during the week commencing 23rd February. After this date the number of cases reported each week decreased to between one and two until the 2nd April. Two further cases were admitted over the next six weeks with the last case of the outbreak admitted on 29th May 2015 (Figure 1)

Figure 1. Date of hospital admission of cases (n=40)
5.3. Demographics of confirmed cases

The cases were spread across the central belt of Scotland, with the majority residing in the area covered by NHS GG&C (63%). Other boards with cases were Lanarkshire, Forth Valley, Fife and Ayrshire and Arran (Table 2).

Table 2. Cases of wound botulism (and deaths) by NHS board of residence, case definition and mortality (n=40)

<table>
<thead>
<tr>
<th>NHS board</th>
<th>Confirmed (deaths)</th>
<th>Probable (deaths)</th>
<th>All Cases (deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayrshire and Arran (AA)</td>
<td>1 (1)</td>
<td>0</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Borders (BR)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dumfries &amp; Galloway (DG)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fife (FF)</td>
<td>1 (0)</td>
<td>0</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Forth Valley (FV)</td>
<td>3 (0)</td>
<td>3 (0)</td>
<td>6 (0)</td>
</tr>
<tr>
<td>Greater Glasgow &amp; Clyde (GGC)</td>
<td>8 (0)</td>
<td>17 (2)</td>
<td>25 (2)</td>
</tr>
<tr>
<td>Grampian (GR)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Highland (HI)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lanarkshire (LN)</td>
<td>4 (1)</td>
<td>3 (0)</td>
<td>7 (1)</td>
</tr>
<tr>
<td>Lothian (LO)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Orkney (OR)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shetland (SH)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tayside (TY)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Western Isles (WI)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Scotland</td>
<td>17 (2)</td>
<td>23 (2)</td>
<td>40 (4)</td>
</tr>
</tbody>
</table>

The majority of cases were in males (68%) and the mean age among males and females was 44 years and 38 years respectively (Figure 2). There was over a thirty year difference between the oldest and youngest case in the outbreak. All confirmed cases were aged older than 30 years old, while three probable cases were aged 30 years old or younger.
5.4. Clinical presentation
Details on clinical symptoms upon presentation at the hospital were available for all cases. All presented with classical symptoms of oculomotor and bulbar palsy. Symptoms ranged from mild facial weakness and blurring of vision, to descending paralysis and respiratory distress. Twenty cases also suffered from at least one gastrointestinal related symptom (Figure 3 summarises the available clinical information). All cases were promptly treated with trivalent botulinum antitoxin. Surgical debridement was performed on 18 cases (45%) and all received antibiotics. The respiratory function of 22 (55%) cases deteriorated requiring them to be placed on a ventilator. There were four deaths, during the outbreak with botulism considered a contributory cause in two.
### 5.5. Risk information

While a history of injecting drugs was reported for all confirmed and probable cases, detailed information on the history of drugs taken and route of administration (derived from the enhanced surveillance form) was available for 34 of the 40 cases.

All cases reported using heroin, either alone (52%) or in combination with another drug (most commonly methadone (30%)). Of the four deaths, three reported using heroin only, and one individual reported using heroin and cocaine; separately and in combination. One female, aged 24 years old, reported very high risk drug behaviour; using heroin, crack, heroin and cocaine together and heroin and crack together over nine years. This information is further summarised in Table 4.

**Symptoms categorised as Gastro Intestinal (AP = Abdominal Pain, N = Nausea, V = Vomiting, D = Diarrhoea, C = Constipation), Vision (BV = Blurred Vision, D = Diplopia), Speech (SS = Slurred Speech, TT = Thick Tongue, CV = Change in sound of Voice, H = Hoarseness, DM = Dry Mouth, DS = Difficulty Swallowing), Respiratory (SB = Shortness of Breath) and Non-Specific (SW = Subjective Weakness, DIZ = Dizziness, F = Fatigue, P = Paraesthesia)**
Table 4. Drug use by case definitions and mortality (n=40)

<table>
<thead>
<tr>
<th>Drugs Injected</th>
<th>Confirmed (deaths)</th>
<th>Probable (deaths)</th>
<th>All Cases (deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heroin only</td>
<td>10 (1)</td>
<td>11 (2)</td>
<td>21 (3)</td>
</tr>
<tr>
<td>Heroin &amp; Methadone</td>
<td>4 (0)</td>
<td>8 (0)</td>
<td>12 (0)</td>
</tr>
<tr>
<td>Heroin &amp; Cocaine</td>
<td>0</td>
<td>1 (0)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Heroin, Methadone &amp; Cocaine</td>
<td>1 (0)</td>
<td>0</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Heroin, Methadone &amp; Antidepressants</td>
<td>1 (0)</td>
<td>0</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Heroin, Cocaine &amp; Heroin/Cocaine together</td>
<td>1 (1)</td>
<td>0</td>
<td>1 (1)</td>
</tr>
<tr>
<td>Heroin, Crack, Heroin/Cocaine together &amp; Heroin/Crack together</td>
<td>0</td>
<td>1 (0)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Heroin &amp; Suboxone</td>
<td>0</td>
<td>1 (0)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>Heroin &amp; Diazepam</td>
<td>0</td>
<td>1 (0)</td>
<td>1 (0)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17 (2)</td>
<td>23 (2)</td>
<td>40 (4)</td>
</tr>
</tbody>
</table>

*Three confirmed cases, and three probable cases (two who have died), are known to have used heroin, and one probable case is known to have injected methadone also; however it is not possible to investigate other drugs these individuals may have used due to missing drug information/questionnaires.

Of those who reported the length of their drug use behaviour (N=29), 50% used drugs for over ten years (Table 5), with twelve cases reporting drug use for twenty years or more.

Table 5. Duration of drug use (years) by case definition – asked ‘how long have you been using these drugs?’ (n=40)

<table>
<thead>
<tr>
<th>Duration (years)</th>
<th>Confirmed (deaths)</th>
<th>Probable (deaths)</th>
<th>All Cases (deaths)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1</td>
<td>1 (0)</td>
<td>1 (0)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>1-5</td>
<td>1 (0)</td>
<td>1 (0)</td>
<td>2 (0)</td>
</tr>
<tr>
<td>6-10</td>
<td>4 (0)</td>
<td>6 (0)</td>
<td>10 (0)</td>
</tr>
<tr>
<td>&gt;10</td>
<td>7 (1)</td>
<td>8 (0)</td>
<td>15 (1)</td>
</tr>
<tr>
<td>NK*</td>
<td>4 (1)</td>
<td>7 (2)</td>
<td>11 (3)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17 (2)</td>
<td>23 (2)</td>
<td>40 (4)</td>
</tr>
</tbody>
</table>

*Three confirmed cases, and three probable cases (two who have died) are known to have used Heroin, and one probable case is known to have injected methadone also; however it is not possible to investigate other drugs these individuals may have used due to missing drug information/questionnaires.
In terms of the method of drug use reported, which for the purpose of this report are categorised as intravenous, skin/muscle popping and smoking/snorting, 62% of individuals used a combination of methods. Figure 4 breaks down the method of drug use by gender and no one reported that they only smoked or snorted drugs. One male stated that he smoked drugs frequently and rarely injected drugs, but had injected five days prior to the onset of symptoms. One female informed the health protection nurse that she had snorted heroin (and hadn’t injected) in the days before she became symptomatic. It was noted, however, on her questionnaire that she had injected into the muscle as well as snorting, and had a history of smoking and injecting into the skin and intravenously.

Figure 4. Method of drug use by gender in the outbreak of wound botulism

5.6. Microbiology
A total of seventeen (42%) cases were microbiologically confirmed including 11 cases by PCR detection of *Clostridium botulinum* type B in pus or wound tissue and 6 cases by detection of botulinum neurotoxin in serum, 3 of which were shown to be caused by type B neurotoxin. Molecular typing of *Clostridium botulinum* type B isolated from 11 of the patients gave an indistinguishable fAFLP profile indicating a common source of infection. *Clostridium botulinum* type B with a highly similar fAFLP profile was first seen in the UK from a wound botulism case in England in February 2014.

All heroin seized by Police Scotland tested negative for *Clostridium botulinum*. 
6. Control measures

Epidemiological information derived from the first cases, suggested that neither were a result of intoxication associated with ingestion of contaminated food. Instead, on the basis of knowledge of risk and previous experience of incidents of spore forming bacteria among people who inject drugs, the NHS GG&C IMT hypothesised that the source of Clostridium botulinum was likely contaminated heroin or a cutting agent.

Therefore, in the absence of intelligence on which, or even how many, batches of heroin in circulation were potentially contaminated, the IMT considered all individuals who injected drugs to be at risk of exposure and potentially infection. Information from the initial cases on the source of their drugs used prior to symptoms, also suggested a focus on heroin obtained in, or sourced via Glasgow thus interventions to manage the incident were targeted in NHS GG&C and the surrounding NHS Boards. The IMT was however, acutely aware of the role Glasgow plays in the distribution of drugs throughout Scotland, and the potential for contaminated heroin to be re-distributed across the country or elsewhere in the UK therefore, resources developed to manage the incident were shared with colleagues across the country.

6.1. Public health management

When considering the interventions, the IMT first acknowledged that while the police investigations of drug dealers and suppliers identified, and any drug seizures would disrupt supply networks, it was not a realistic expectation to be able to remove all contaminated drugs (or cutting agents) from the market, and therefore the overall goal of the public health intervention to manage the outbreak was to prevent further harm. In addition, from previous experiences of managing outbreaks of spore forming bacteria among people who inject drugs, the IMT were also aware of the significant challenges associated with preventing cases of severe infection when the source may be contaminated heroin or a cutting agent. Therefore, a pragmatic risk reduction approach was taken. This approach, while recognising that the only way to eliminate risk of infection was to stop using drugs, also deployed interventions to reduce risk, in so far as possible, for those who continued to inject, and for those who had already become infected, reduce the risk of progression to serious illness through early recognition of the signs and symptoms, enabling prompt treatment.
Of note, there was consensus in the IMT, that smoking heroin posed a lower risk of infection than injecting, and in the absence of intelligence to suggest that the heroin on the market was contaminated with anthrax, this was the first outbreak to encourage smoking as an intervention to prevent infection with *Clostridium botulinum*; this was facilitated through the provision of foil.

Summary of the hierarchy of objectives and advice/interventions deployed

| Eliminate risk of infection | • Advice on reduce or eliminate drug use altogether.  
|                           | • Information on access to opiate substitution therapy services |
| Reduce risk of infection   | • Advice on switching to safer route of drug use  
|                           | • Provision of foil to encourage alternative to injecting  
|                           | • Provision of injecting equipment  
|                           | • Advice on safer injecting behaviour (ensuring they inject into a vein) |
| Reduce risk of severity    | • Education an awareness raising of the signs and symptoms of illness and where to seek help |

### 6.2. Clinical management

Guidance on microbiological sampling and the management of cases was provided by colleagues in the GBRU and circulated from the IMT to the relevant clinical areas.

In Scotland, information on the amount of, and how to obtain, botulism antitoxin can be found on the Rarely Used Urgent Medicines List (available on TOXBASE, [www.toxbase.org](http://www.toxbase.org)). At the onset of the outbreak, antitoxin was available from pharmacy departments in the Glasgow Royal Infirmary; Raigmore Hospital, Inverness; Ninewells Hospital, Dundee; Aberdeen Royal Infirmary and the Western Isles Hospital, Stornoway. In response to the increased demand on stocks of botulinum antitoxin during the outbreak, the quantities of stock held at each of the designated holding sites was increased, and an additional holding site was also established in St John’s Hospital, Livingston. NHS colleagues were advised that in
the event that a supply of botulinum antitoxin was required for patient treatment, pharmacy colleagues in each Board could obtain a supply from one of the designated holding centres.

6.3. **Management of the addiction needs of cases**
The IMT were cognisant of addressing the addiction needs of cases admitted to hospital to discourage early self discharge. To reduce the risk of this occurring, a member of the local addiction services visited cases as soon as possible to address their drug problem including pain management, providing overdose awareness information and supplying naloxone.
7. Communications

A proactive approach was taken throughout the incident by the IMT. Communications messages were targeted at the following populations.

7.1. Drug users
Experience from previous outbreaks of spore forming bacteria suggested that there was limited benefit of using conventional press or mass media as outlets for awareness raising activities. Information was therefore targeted at those at risk through the development of a postcard (see Appendix 4), by NHS GG&C IMT and the SDF early in the outbreak which contain information on risk reduction measures and signs and symptoms of infection. This was distributed widely through frontline and addictions services and was available to all NHS Boards if required. The postcard was also adapted by PHE colleagues for use in England and Wales in the event that they had any cases.

7.2. Front line workers
The IMT recognised that a variety of professional and occupational groups may come into contact with individuals who inject drugs and are key to recognising individuals at risk. This group also played an important role in identifying infected individuals and supporting them access appropriate medical services for prompt treatment and care. The SDF developed a booklet for frontline workers with workshops being provided to reinforce the learning.

Diagnosis of botulism is not difficult when it is strongly suspected. However, with early cases of an outbreak, diagnosis may be delayed or even missed. Furthermore, the similarity with symptoms of drug overdose may also complicate the diagnosis. As practical experience of managing individuals infected with botulism was limited, and because early diagnosis and treatment improves outcome and risk of death (especially when administration of immunoglobulin or antitoxin is required), the IMT alerted frontline workers to the presenting symptoms and the appropriate diagnostic procedures, including the samples to be obtained prior to treatment commencing. Periodic reminders were circulated throughout the duration of the outbreak with information on where to find guidance to support the early recognition and management of botulism and guidance on how to obtain botulism antitoxin.
7.3. **NHS board HPTs across Scotland**

NHS Scotland staff across all NHS Boards, were alerted via two HPS Public Health Alerts released during the outbreak period (on 5\(^{th}\) February and 5\(^{th}\) March) (Appendix 5), giving a general update on the investigation progress, and background information on where to find guidance to support the early recognition and management of botulism and guidance on how to obtain botulism antitoxin. Local public health units were asked to cascade information to both healthcare professionals and frontline workers in addictions and injecting equipment provision services.

7.4. **Colleagues in the UK and Europe**

Given the nature of the drug supply network and the potential for contaminated drugs to be in circulation elsewhere in Europe, an alert notice was posted through the European Union’s (EU) Early Warning and Response System (EWRS) on 2\(^{nd}\) January.

Further opportunities were taken to discuss the ongoing incident with colleagues elsewhere in the devolved administrations on two occasions when a UK stocktake meeting was convened (and chaired) by PHE on 24\(^{th}\) February and 9\(^{th}\) April (membership of the UK stocktake group can be found in Appendix 6).

7.5. **Public**

Media communication during this outbreak was managed initially managed by NHS GG&C communication department and thereafter HPS. Three media statements (on 1\(^{st}\), 9\(^{th}\) and 26\(^{th}\) January) (Appendix 7), were released by NHS GG&C Department of communications notifying all injecting heroin users to be extremely alert and to seek urgent medical attention from accident and emergency services if they experienced any early symptoms such as blurred or double vision, difficulty in swallowing and speaking and/or inflammation at the injection site. Heroin users were advised to avoid injecting heroin into their muscles. The advice was that injecting heroin into a vein or smoking reduced the risk of botulism, although not using heroin at all was by far the best course of action.
Given that there was no ongoing risk to the general, non-injecting public, no pro-active media statements were released after the initial communications in January.
8. Discussion and conclusion

A multi NHS board outbreak of *Clostridium botulinum* among people who had a history of injecting drugs resulted in 40 confirmed and probable cases of wound botulism, making this the largest outbreak of wound botulism among people who inject drugs to date.

The outbreak was identified following the appearance of two cases admitted to hospital within a week of each other, the first cases reported in Scotland since 2008. The outbreak continued for 24 days with a peak in the epidemic curve in week 4. In addition to the epidemiological evidence obtained during the investigation linking the source of heroin to Glasgow, molecular typing of *Clostridium botulinum* type B isolated from 12 of the patients gave an indistinguishable fAFLP profile indicating a common source of infection. The outbreak remained focused on people who had a history of injecting drugs in NHS GG&C and neighbouring NHS Boards, and unlike a previous outbreak of anthrax, we did not see waves of infection spreading throughout the country and south of the border as a consequence of the drugs being redistributed away from the “hot zone”.

Although the investigators did not isolate spores from any heroin seized it seems likely that contaminated heroin was the vehicle of the spores. The similarity of isolates reported during the outbreak and cases in England reported since, possibly suggests related contamination events at some point higher up the distribution chain e.g. from a particular source and/or location that effects some batches of heroin.

The management of the outbreak was pragmatic, bearing in mind the challenges of eliminating the source, and focused on reducing harm and raising awareness among those at risk and frontline workers, about approaches to reduce risk of infection and signs and symptoms of illness, in order to seek medical care if required. The effect of this approach on reducing harm and limiting the morbidity and mortality associated with the outbreak is unknown though the small number of deaths in which botulism was a contributing factor, and the mild nature of many infections suggest that the
majority of cases promptly sought, and received appropriate care limiting the severity of intoxication. An evaluation of awareness of the postcard and its message has been undertaken as part of the Needle Exchange Surveillance Initiative which was recruiting its study sample during the outbreak period; a report of this evaluation will be available in due course.
9. Recommendations

A debrief meeting was held in June 2015 with representation from HPS, PHE, NHS Boards, and Police Scotland. Participants were asked to consider what went well, areas that could be improved and to make recommendations to improve any identified shortfalls. The following key learning points were identified and related recommendations made:

9.1. Risk reduction approach

Learning point

Given that it was not considered feasible to remove the hypothesised source of infection (i.e. contaminated heroin or cutting agent) from the market, the IMT took a pragmatic approach that advocated eliminating drug use, where possible, and deploying interventions to reduce the risk, and limit the consequences, of infection, where stopping drug use was not possible. This approach allowed frontline workers to develop, and engage individuals with, a harm reduction message that was more meaningful, and potentially achievable.

Recommendation

Future outbreaks of botulism associated with the contamination of heroin (or a cutting agent) should be managed using a pragmatic risk reduction approach.

9.2. Communication between NHS organisations

Learning point

The diagnosis of botulism can be particularly challenging as it can be confused with non-infectious alternatives such as an overdose. Notification of a case of botulism is usually made at a point when it is suspected clinically and investigations are ongoing (i.e. a possible case). Confirmation requires the appropriate biological sample to be taken and the appropriate tests performed by the GBRU. Local microbiology services have a key role to play in ensuring that clinical colleagues are familiar with the correct protocols to obtain and forward specimens without delay. Discussion with the GBRU also enables a provisional classification of the case as per the case definition
in use and the degree of clinical certainty.

**Recommendation**
Given the rarity of these cases, local microbiology services should discuss all suspected cases of botulism with the GBRU who can give advice on diagnosis, clinical interpretation of results and the management of infection.

**Learning point**
Health protection teams who are tasked with leading the public health response locally (or nationally) need to be continually updated on the status of the case. Microbiological investigations by the GBRU are routinely reported back to the local microbiology service and the treating clinician, but may not be communicated to the health protection team leading to possible confusion around the total number and status of cases (confirmed, probable, possible and even those discounted).

**Recommendation**
Good communication between the reference laboratory and the NHS organisation leading the public health response must be established, and maintained throughout the incident to ensure that provisional classification of cases are updated when corroborating information becomes available; this will ensure an up-to-date line listing of all cases.

**Learning point**
Individuals, who continue to inject drugs, may come into contact with a variety of services and professional groups. Frontline workers play a key role in early recognition of symptoms and signposting those who require treatment to the appropriate medical services. Given that experience of botulism among frontline workers is limited, and because early diagnoses and treatment improves outcomes, the SDF developed educational resources for frontline workers to heighten and maintain awareness of the clinical presentation of botulism; the SDF supported this resource with workshops (available on request) to reinforce learning.

In addition to the more established routes of information distribution to frontline workers in primary and secondary care, the IMT used the NEO system to cascade
consistent information across all addiction and IEP services that use it. The IMT also expanded the routes of information distribution to include locations such as hostels, in order to ensure that the message is passed to marginalised individuals who are not in contact with services.

**Recommendation**

During an outbreak, IEP and addictions staff may require specific training in relation to the causative agent and the interventions being deployed to manage the incident. Consideration should also be given to i) expand the audience to include those who have contact with marginalised individuals, and ii) routes of information distribution to ensure the cascade of consistent and timely information.

**9.3. Communication between NHS and Police Scotland**

**Learning point**

NHS organisations are bound by a number of legal, statutory and guidance documents when sharing information for public health purposes (5-8). There is however, within the Data Protection Act, provision for the legitimate processing and sharing of personal data with non-NHS organisations, provided a number of criteria are met for the legitimate. Consent is an important but not absolute criterion.

The need to share sensitive information and explore all options for intervention and enforcement strategies to reduce the risk posed from contaminated heroin was discussed by the IMT, and to support the national response (both the public health and police investigations), it was agreed by the IMT that if a new case of botulism was notified to HPS, HPS would inform Police Scotland of such a case, though no identifying information would be forwarded; individual NHS Boards could opt out of this process if so desired. Police Scotland thereafter approached the NHS Board to obtain further information about the case through the appropriate processes. NHS Boards thus retained the freedom to decide, on a case by case basis, whether or not to share patient identifiers with the police, with or without patient consent.

**Recommendation**
There are legitimate reasons for sharing and processing personal information to manage a public health incident. Future IMTs should discuss and reach agreement on the approach to sharing information between NHS organisations and non-NHS organisations.

**Learning point**

While the IMT acknowledged that it was not a realistic expectation to be able to remove all contaminated drugs from the market, the police investigations of suppliers identified, and subsequent drug seizures may however, disrupt supply networks and potentially reduce the risk of exposure to *Clostridium botulinum* spores. Therefore, to support the parallel criminal investigations and facilitate engagement with the hospitalised cases being interviewed, Police Scotland produced a postcard, which was given to cases by NHS colleagues. The postcard explained the focus of the police investigation, and aimed to provide reassurance that the purpose of the interview was to obtain information to help locate and remove the source of contaminated heroin.

**Recommendation**

Future IMTs should consider on a case by case basis, supporting the criminal investigations through facilitating the distribution of Police Scotland materials to cases explaining the focus of the police investigation and purpose of the police interviews. This should be considered on a case by case basis balancing any possible negative consequences for the individual case.

**9.4. Communication between NHS and the at risk population**

**Learning point**

While there is no evidence published in the scientific literature that providing risk reduction advice and promoting awareness of the signs and symptoms of botulism among those at risk has an impact on risk or health seeking behaviour, the management of the outbreak employed a multidisciplinary and multi-sector approach to proactively develop and distribute resources for frontline IEP and addiction services and users. A key plank of this approach was a postcard distributed to individuals who were in contact with frontline services.
**Recommendation**

Information on awareness of the postcard and its contents, collected as part of the Needle Exchange Surveillance Initiative (undertaken during the outbreak), should be analysed to determine the impact of the postcard on any risk reduction behaviour taken by those who were using heroin at the point it was considered to be contaminated.

**Learning point**

Apart from initial interest from the general media at the beginning of the outbreak, the IMT did not take a proactive approach to use these outlets as a means of raising awareness among the social networks/peers of those injecting, and who may support or encourage those with symptoms to seek care.

**Recommendation**

Future IMTs might wish to consider alternative media outlets as a means of tapping into and raising awareness amongst the social network/peers of those at risk.

9.5. **Addressing the addiction and harm reduction needs of those admitted to hospital**

**Learning point**

While the awareness raising interventions were targeted on frontline services in the community setting, the IMT were also cognisant of the needs of those admitted to hospital (whether as part of the outbreak or for another reason) during the period of the outbreak. Addiction services sought to visit individuals admitted as soon as possible to address their drug problem (primarily to prevent early discharge) and prior to discharge, to provide information on the signs and symptoms of botulism, and overdose awareness information including supplying naloxone.

**Recommendation**

IMTs should consider the addiction and harm reduction needs, alongside the clinical needs, of individuals who continue to use drugs and are admitted to hospital during
the period of the outbreak and ensure that addiction services visit as soon as possible following their admission.

9.6. Collation of epidemiological and risk information

Learning point:

Throughout the outbreak, the investigation of cases reported was undertaken by local health protection units who collected clinical and risk information on all cases using the UK enhanced surveillance form. In the absence of an operational data entry system to collate and analyse the information in real time, a small number data items were used to augment and/or confirm information held on the line listing maintained by HPS. While the operational system developed during the course of the outbreak is available for future investigations, the content of the surveillance form and its utility for the immediate management of the outbreak is limited. On reflection, and given the number of challenges encountered when trying to complete the surveillance form with the population affected by this outbreak, one can question the value of the information given that it did not impact greatly on the course of action decided by the IMT.

Recommendation:

HPS should work with PHE colleagues to review the utility of the enhanced surveillance form taking on boards the challenges presented in the outbreak and issues raised during the analysis of the data.
# Appendix 1: Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>NHS GG&amp;C</td>
<td>Greater Glasgow and Clyde NHS Board</td>
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<tr>
<td>PHPU</td>
<td>Public Health Protection Unit</td>
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<tr>
<td>GBRU</td>
<td>Gastrointestinal Bacteria Reference Unit</td>
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<td>PHE</td>
<td>Public Health England</td>
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<tr>
<td>IMT</td>
<td>Incident Management Team</td>
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<td>HPS</td>
<td>Health Protection Scotland</td>
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<td>Scottish Drugs Forum</td>
<td>SDF</td>
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<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>PWID</td>
<td>People who inject drugs</td>
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<tr>
<td>ECDC</td>
<td>European Centre for Disease Control</td>
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<tr>
<td>CPHM</td>
<td>Consultant in Public Health Medicine</td>
</tr>
<tr>
<td>NHSGG&amp;C</td>
<td>Greater Glasgow and Clyde NHS Board</td>
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<tr>
<td>PCR</td>
<td>Polymerase Chain Reaction</td>
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<tr>
<td>fAFLP</td>
<td>Fluorescent Amplified Fragment Length Polymorphism</td>
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<tr>
<td>EU</td>
<td>European Union’s</td>
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<td>EWRS</td>
<td>Early Warning and Response System</td>
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<td>ScotGov</td>
<td>Scottish Government</td>
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</table>
## Appendix 2: Membership of IMTs (GG&C led and national IMT)

| NHS Greater Glasgow & Clyde Health Protection Unit | Dr Gillian Penrice, CPHM (IMT Chair)  
Vincent McKeown, Health Protection Nurse Specialist  
Jacqui Shookhye-Dickson, Health Protection Nurse Specialist  
Dr Ash Deshpande, Consultant Glasgow Royal Infirmary  
Dr Catriona Milošević, CPHM  
Dr Ron Gray, CPHM  
Liz McGovern, Specialist Pharmaceutical Public Health  
Val Reilly, Specialist Pharmaceutical Public Health  
Carol Hunter, Specialist Pharmaceutical Public Health  
John Campbell, Improvement and Development Manager, Addiction Services  
Dr Saket Priyadarshi, Associate Medical Director, Addiction Services |
| NHS Greater Glasgow & Clyde Media Relations | Emma Edwards, Press Officer  
Mark Dell, Press Officer |
| NHS Lanarkshire | John Logan, CPHM  
Lindsey Guthrie, CPHM  
Jim White, Health Protection Nurse Specialist  
Duncan Hill, Substance Abuse Pharmacist  
Ruth Mellor, SpR in Public Health  
Maureen Woods, Harm Reduction Lead |
| NHS Ayrshire & Arran | Elvira Garcia, CPHM  
Hazel Henderson, CPHM  
Kate McDade, Health Protection Nurse  
Kay Cooper, Health Protection Nurse  
Fiona McKinnan, Health Protection Nurse  
Luanne Johnstone, Communications Officer |
| NHS Forth Valley | Jennifer Champion, CPHM  
Jane Bray, Health Protection Nurse  
Henry Prempeh, CPHM  
Robert Seremani, Health Protection Nurse |
| NHS Tayside | Chris McGuigan, CPHM |
| NHS Shetland | Susan Laidlaw, CPHM  
Wendy Hatrick, Public Health Specialist |
| Gastrointestinal Bacteria Reference Unit (GBRU) | Gauri Gadbole, Consultant Microbiologist  
Corrine Amar, Consultant Microbiologist  
Kathy Grant, Head of GBRU |
| Health Protection | Kirsty Roy (National IMT Chair), Strategic Lead |
| Scotland          | David Goldberg, Consultant Epidemiologist  
|                  | Amanda Weir, Principal Information Analyst  
|                  | Andy McAuley, Senior Epidemiologist  
|                  | Dr Syed Ahmed, Clinical Director  
|                  | Anne Weir, Administrator  
| Scottish Government Health Directorates | Duncan McCormick, Senior Medical Officer  
|                  | Janice McKenzie, Principal Pharmacist  
|                  | Mary Stewart, Branch Head, Environmental Risks and Infections  
|                  | Fatim Lakha, Acting Senior Medical officer  
|                  | Lynsey MacDonald, Policy Officer  
| Public Health England | Viv Hope, Senior Epidemiologist  
|                  | Fortune Ncube, Consultant Epidemiologist  
| Scottish Drug Forum | David Liddell, Director  
|                  | Emma Hamilton, National Training and Development Officer  
|                  | Austin Smith, Policy and Practice Officer  
| Police Scotland  | Michael Millar, National Drug Co-ordinator  
|                  | Jim Bradley, Detective Inspector  
|                  | Andrew Gunn, Detective Superintendent  
|                  | Kenny Simpson, STOP co-ordinator  
|                  | Stuart McKenzie, Sergeant, Safer Communities  
|                  | Martin Clark, Detective Constable, Safer Communities  
|                  | Tomasina How, Emergency Planning Officer  
|                  | Lisa Smith, Communications Officer  
|                  | Caroline Coole, Communications Officer  

Appendix 3: Timeline of events

1st case admitted to hospital on 24th Dec 2014
2nd IMT held on 1st Jan 2015, chaired by NHSGG&C
3rd IMT held on 9th Jan 2015, chaired by NHSGG&C
4th IMT held on 14th Jan 2015, chaired by NHSGG&C
5th IMT held on 26th Jan 2015, chaired by NHSGG&C; 1st national IMT held on 29th Jan 2015, chaired by HPS
2nd national IMT held on 5th Feb 2015, chaired by HPS
3rd national IMT held on 25th Feb 2015, chaired by HPS
4th national IMT held on 12th May 2015, chaired by HPS
5th national IMT held on 23rd June 2015, chaired by HPS
10th July 2016 outbreak declared over
Appendix 4: Awareness raising postcard distributed to people who inject drugs during the outbreak

**Front**

**CONTAMINATED HEROIN WARNING**

There have been a number of cases where people have contracted Botulism after using contaminated heroin

Botulism can kill if not treated quickly

If you experience any of these symptoms go to A&E immediately

- Blurred or double vision
- Slurred speech, difficulty speaking
- Difficulty swallowing
- Difficulty with tongue and lip movements
- Drooping or falling of the upper or lower eyelid
- Extreme weakness
- Possible inflammation at the injection site
- Paralysis that can affect the arms and legs
- Difficulty breathing

**Back**

MISSED HITS, MUSCLE OR SKIN POPPING PUT YOU MOST AT RISK

Reduce your risk by:

- Stopping heroin use altogether
- Smoking heroin
- Making sure you hit a vein

For local drug services see: www.scottishdrugsservices.com
Appendix 5: Health Protection Scotland Alerts
Situation

There is an ongoing outbreak of botulism in people who inject drugs (PWID). The source of the infection is believed to be heroine contaminated with *Clostridium botulinum* spores. To date, there have been 19 people in Scotland admitted to hospitals between 21st December 2014 and 5th February 2015 (five since 29th February 2015), with illness where botulism has been suspected. Four of these have been confirmed microbiologically to be botulism and in three, they have been confirmed as type B. In 13 cases, there is clinical evidence to support a diagnosis of wound botulism and laboratory results are pending (n=10) or negative (n=3); these cases have been classified as probable cases. In the last two cases, botulism was thought not to be the cause of the illness; these cases have been discounted. Where information is available, all have obtained their drugs in, or their drugs were sourced via, Glasgow.
Background

Botulism is a rare condition caused by a toxin produced by the anaerobic bacterium *Clostridium botulinum*. Clusters and isolated cases of wound botulism have been reported in people who inject drugs. (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370707/Shooting_Up_2014.pdf). These are thought to be due to environment contamination of injectable drugs, usually heroin, with bacterial spores. Botulism spores can germinate in the anaerobic environments that can be found in the wounds that occur when people inject intramuscularly or subcutaneously. Intramuscular or subcutaneous injections among PWID usually happen as a result of someone missing a vein when trying to inject intravenously. The germinated botulism spores cause a local infection and toxin production.

Patients with botulism may present with blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth and muscle weakness. If left untreated the illness may progress to cause paralysis and death. Botulism is treated using appropriate antibiotics and through the administration of an anti-toxin.

In Scotland, botulinum antitoxin can be obtained from pharmacy departments in the Royal Infirmary, Glasgow; Raigmore Hospital, Inverness; Ninewells Hospital, Dundee; Aberdeen Royal Infirmary and the Western Isles Hospital, Stornoway. In response to the ongoing increased demand on stocks of botulinum antitoxin across NHS Scotland, the quantities of stock held at each of the designated holding sites has been increased. An additional holding site has also been established in St Johns Hospital, Livingston. In the event that a supply of botulinum antitoxin is required for patient treatment, pharmacy colleagues in each Board can arrange to obtain a supply from one of the designated holding centres.

Botulism is a clinical diagnosis that is supported by laboratory conformation. Confirmation requires the timely collection of appropriate biological samples before anti-toxin administration. The early collection of samples following onset of symptoms maximises the opportunity for toxin detection. The organism can also be detected in material from wounds by a rapid PCR assay. Microbiologists should consider botulism among their differential diagnosis as appropriate, for severe illnesses where a patient reports injecting drug use. Guidance on the clinical and public health management of cases of wound botulism is available at:
All possible cases of wound botulism among PWID should be discussed with either Gauri Godbole (020 8327 7142, Gauri.Godbole@phe.gov.uk) for clinical advice, or Corinne Amar (020 8327 7341, Corinne.Amar@phe.gov.uk) to discuss diagnostic testing prior to administration of antitoxin.

Assessment

A national IMT, attended by NHS Ayrshire and Arran, NHS Fife, NHS Forth Valley, NHS Greater Glasgow and Clyde, NHS Lanarkshire, NHS Shetland, Scottish Government, Scottish Drug Forum, Health Protection Scotland and Police Scotland was held on 5th February 2015. Future IMTs will be held as required.

Summary of current situation:

- Only individuals who use heroin are affected
- Public health colleagues are working with Police Scotland to investigate the source of the infection
- Further cases of botulism have been reported in England (n=1) and Norway (n=6); there is no information at this point to suggest a link with the Scottish cases.
- Due to the nature of heroin distribution, there is a potential for cases of wound botulism to arise anywhere in Scotland. The outbreak is ongoing, and more cases are expected.

Communications

Awareness raising activities have been undertaken with both healthcare professionals and frontline workers in addictions and injecting equipment provision services. The Scottish Drugs Forum (SDF) has produce a booklet for frontline workers (Available at: http://www.sdf.org.uk/index.php/download_file/view/793/755/), and a postcard for drug users (also available from SDF), to raise awareness of the signs and symptoms of botulism and the ways to reduce the risk of exposure.

Recommendations

All NHS Boards should be aware of the outbreak and inform appropriate frontline workers who may encounter a case of wound botulism.
Any possible cases of wound botulism should be notified to Kirsty Roy (Kirsty.Roy@nhs.net or 0141 300 2273) or Amanda Weir (Amanda.Weir@nhs.net or 0141 300 1418) at Health Protection Scotland.
**Health Protection Scotland Briefing Note - 5th March 2015**

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<td>Action required of initial recipients</td>
<td>Cascade information to appropriate frontline workers in healthcare and addiction services</td>
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<tr>
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<tr>
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<tr>
<td>Contact</td>
<td>Dr Amanda Weir (<a href="mailto:Amanda.Weir@nhs.net">Amanda.Weir@nhs.net</a> or 0141 300 1418)</td>
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<tr>
<td></td>
<td>Dr Kirsty Roy (<a href="mailto:Kirsty.Roy@nhs.net">Kirsty.Roy@nhs.net</a> or 0141 300 1173)</td>
</tr>
<tr>
<td>Authorised by</td>
<td>Dr Kirsty Roy</td>
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**Situation**

There is an ongoing outbreak of botulism in people who inject drugs (PWID). The source of the infection is believed to be heroin contaminated with *Clostridium botulinum* spores. To date, there have been 32 people in Scotland admitted to hospitals between 21st December 2014 and 5th March 2015, with illness where botulism has been suspected (Fig 1). In two of the 32 cases botulism was thought not to be the cause of the illness; these cases have been discounted. Of the remaining 30 cases, 11 have been confirmed microbiologically to be botulism and in eight, they have been confirmed as type B. In 12 cases, there is clinical evidence to support a diagnosis of wound botulism and laboratory results are pending (n=1) or negative (n=11); these cases have been classified as probable cases. The remaining seven cases are under investigation; these cases have been classified as possible cases. Two of the 30 cases have died, the cause of death in these individuals being under investigation.
To date:

- Illnesses have been reported across six NHS Boards
- Median age is 41 years (range 24-57). Sixty per cent of cases are male
- Only individuals who use heroin are affected; all report using heroin obtained either in, or sourced via, Glasgow.
- From the information collected to date, all but one case reported injecting drug use (intravenously and/or muscle/skin popping). The remaining case reported only snorting heroin prior to symptom onset.
- All but one case have received antitoxin.
- Public health colleagues are working with Police Scotland to investigate the source of the infection. Samples of heroin obtained by Police Scotland to date, have tested negative for *Clostridium Botulinum*.
- A pragmatic risk reduction approach has been taken, advising users to make sure they inject their drugs into a vein, smoke drugs as an alternative to injecting, or if possible stop use altogether.
- Awareness raising activities have been undertaken with both healthcare professionals and frontline workers in addictions and injecting equipment provision services.

To aid the national coordination of the incident response, it was agreed by the national IMT that if a new case of suspected botulism was notified to HPS, HPS would inform Police Scotland of such a case, though no identifying information would be forwarded; NHS Boards can opt out of this process if so desired. Police Scotland thereafter may approach the NHS Board to obtain further information about the case.
through the appropriate processes. NHS Boards retain the freedom to decide, on a case by case basis, whether or not to share patient identifiers with the police, with or without patient consent.

Police Scotland have produced a postcard, which they have requested, be given to cases by Health Protection colleagues. The postcard explains the focus of the police investigation, and that cases may be interviewed to obtain information to help locate and remove the source of contaminated heroin. Copies of the postcard can be obtained from Anne Weir at Health Protection Scotland. (0141 300 1936, Anne.Weir@nhs.net)

Background

Botulism is a rare condition caused by a toxin produced by the anaerobic bacterium *Clostridium botulinum*. Clusters and isolated cases of wound botulism have been reported in people who inject drugs. [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370707/Shooting_Up_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/370707/Shooting_Up_2014.pdf). These are thought to be due to environment contamination of injectable drugs, usually heroin, with bacterial spores. Botulism spores can germinate in the anaerobic environments that can be found in the wounds that occur when people inject intramuscularly or subcutaneously. Intramuscular or subcutaneous injections among PWID usually happen as a result of someone missing a vein when trying to inject intravenously. The germinated botulism spores cause a local infection and toxin production. Rarely, botulism cases may be associated with snorting or smoking drugs.

Patients with botulism may present with blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth and muscle weakness. Wounds sites where *C. botulinum* is growing may not be obvious and may not necessarily look infected. Thus, they can be missed on initial examination of the patient. If left untreated the illness may progress to cause paralysis and death. Botulism is treated using appropriate antibiotics and through the administration of an anti-toxin.

In Scotland, botulinum antitoxin can be obtained from pharmacy departments in the Royal Infirmary, Glasgow; Raigmore Hospital, Inverness; Ninewells Hospital, Dundee; Aberdeen Royal Infirmary and the Western Isles Hospital, Stornoway. In response to the ongoing increased demand on stocks of botulinum antitoxin across NHS Scotland, the quantities of stock held at each of the designated holding sites has been increased. An additional holding site has also been established in St John’s Hospital, Livingston. In the event that a supply of botulium antitoxin is required for patient treatment, pharmacy colleagues in each Board can arrange to obtain a supply from one of the designated holding centres. B
Botulism is a clinical diagnosis that is supported by laboratory conformation. Confirmation requires the timely collection of appropriate biological samples before anti-toxin administration. The early collection of samples following onset of symptoms maximises the opportunity for toxin detection. The organism can also be detected in material from wounds by a rapid PCR assay. Microbiologists should consider botulism among their differential diagnosis as appropriate, for severe illnesses where a patient reports injecting drug use. Guidance on the clinical and public health management of cases of wound botulism is available at:

https://www.gov.uk/government/publications/botulism-clinical-and-public-health-management/botulism-clinical-and-public-health-management. All possible cases of botulism among PWID should be discussed with either Gauri Godbole (020 8327 7142, Gauri.Godbole@phe.gov.uk) for clinical advice, or Corinne Amar (020 8327 7341, Corinne.Amar@phe.gov.uk) to discuss diagnostic testing prior to administration of antitoxin.

A booklet for frontline workers (Available at: http://www.sdf.org.uk/index.php/download_file/view/793/755/), and a postcard for drug users, to raise awareness of the signs and symptoms of botulism and the ways to reduce the risk of exposure has been produced by the Scottish Drugs Forum (SDF). Workshops on botulism for frontline workers can also be arranged directly with Emma Hamilton, SDF (0141 221 1175, emma@sdf.org.uk)

Assessment

Due to the nature of heroin distribution, there is a potential for cases of wound botulism to arise anywhere in Scotland. The outbreak is ongoing, and more cases are expected.

Recommendations

All NHS Boards should be aware of the outbreak and inform appropriate frontline workers who may encounter a case of botulism.

Any possible cases of botulism associated with drug use should be notified to Kirsty Roy (0141 300 1173, Kirsty.Roy@nhs.net) or Amanda Weir (0141 300 1418, Amanda.Weir@nhs.net) at Health Protection Scotland.
## Appendix 6: Membership of UK Stocktake group

<table>
<thead>
<tr>
<th>Public Health England</th>
<th>Health Protection Scotland</th>
</tr>
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<tbody>
<tr>
<td>Fortune Ncube, Chair*</td>
<td>Kirsty Roy*</td>
</tr>
<tr>
<td>Vivian Hope*</td>
<td>Amanda Weir*</td>
</tr>
<tr>
<td>Katelyn Cullen*</td>
<td>John Schofield</td>
</tr>
<tr>
<td>Kathie Grant</td>
<td>Patrick Hochedez</td>
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<tr>
<td>Corinne Amar</td>
<td><strong>Public Health Wales</strong></td>
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<tr>
<td>Gauri Godbole</td>
<td>Christopher Williams</td>
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<tr>
<td>Craig Swift</td>
<td><strong>Public Health Agency Northern Ireland</strong></td>
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<tr>
<td>Steve Taylor</td>
<td>Lucy Jessop</td>
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<tr>
<td>Robert Wolstenholme</td>
<td><strong>Department of Health</strong></td>
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<tr>
<td>Louise Brown</td>
<td>John McCracken</td>
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<tr>
<td>Charlotte Tyler</td>
<td>Oliver Standing</td>
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</tbody>
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Appendix 7: Media Communications

NHS GG&C communications released three media statements on:


References


