



Public Health  
England

Protecting and improving the nation's health

# Managing outbreaks of Sexually Transmitted Infections

Operational guidance

# About Public Health England

Public Health England exists to protect and improve the nation's health and wellbeing, and reduce health inequalities. We do this through world-class science, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health, and are a distinct delivery organisation with operational autonomy to advise and support government, local authorities and the NHS in a professionally independent manner.

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Resources for supporting STI outbreak management can be found at:  
[www.gov.uk/government/publications/sexually-transmitted-infections-stis-managing-outbreaks](http://www.gov.uk/government/publications/sexually-transmitted-infections-stis-managing-outbreaks)

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# 1. Introduction, purpose and scope

The primary objective of outbreak management is to protect public health by identifying the source of infection and implementing control measures to prevent further spread or recurrence. Detailed guidance on the multidisciplinary expertise and collaboration required to investigate, manage and control communicable disease outbreaks is provided by Public Health England<sup>1</sup>. Supplementary infection-specific guidance is published on gastrointestinal infections, VTEC and shigellosis<sup>2-4</sup>. 'Managing Outbreaks of Sexually Transmitted Infections' is a further supplement.

Since 2000, STI epidemiology has changed significantly, influenced by behavioural change, social media, population flow, and advances in diagnostic techniques and therapeutic agents. There has been an overall increase in diagnoses, and outbreaks of syphilis, gonorrhoea, lymphogranuloma venereum (LGV), HIV, hepatitis B, hepatitis C and sexually transmissible enteric infections (STEI)<sup>\*</sup>, such as *Shigella flexneri*, *S. sonnei* and verocytotoxin-producing *Escherichia coli* (VTEC) O117, have become more frequent<sup>5-7</sup>.

As with all outbreaks, early identification and intervention is crucial for successful control but this is particularly challenging for STI outbreaks<sup>8</sup>. STI epidemiology is strongly influenced by sexual network structures and outbreaks may develop unnoticed over several months. The treatment of patients and sexual contacts, many of whom may be anonymous, is important to prevent re-infection and onward transmission. However, STIs are often associated with shame, social stigma and intolerance. Concerns over confidentiality may restrict participation in partner notification (PN), patient interviews and access to data held by sexual health and other clinic settings.

This guidance revises previous guidance produced by the Health Protection Agency (now PHE)<sup>9</sup>. Development of the guidance has been informed by a stakeholder consultation workshop (Appendix 1) and the many outbreak investigations supported by PHE and its predecessor organisations since 2001. Wherever possible, previous investigations have been cited. Supporting resources, including a question bank for questionnaire development, are available through the PHE 'STI: managing outbreaks' web page<sup>10</sup>. The guidance is provided primarily for Health Protection professionals at local, regional and national level including Consultants in Communicable Disease Control (CCDC), Consultants in Health Protection (CHP), PHE Deputy Directors of Health Protection (DDHP), PHE Centre Directors (CD), Directors of Public Health (DsPH), Consultant Epidemiologists (CE), Regional Microbiologists (RM), Field Epidemiology Service (FES) or the HIV & STI Department in the National Infection Service (NIS), Genitourinary Medicine (GUM) clinic and other sexual health service staff, other public health professionals, and sexual health service commissioners in local authorities (LA) or within sexual health commissioning groups.

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<sup>\*</sup> For simplicity, STEIs are included within the term STIs throughout the document.

## 2. What is an outbreak?

The general definitions of an outbreak or incident used by PHE are<sup>1</sup>:

- two or more people experiencing a similar illness that are linked in time or place
- a greater than expected rate of infection compared with the usual background rate for the place and time
- a single case for certain rare diseases
- a suspected, anticipated or actual event involving microbial or chemical contamination of food or water

STI outbreaks are challenging to investigate and control because they are strongly associated with sexual contact and sexual network structures.

## 3. Planning a STI outbreak prevention and control strategy

### 3.1 Capacity and resources

Effective STI outbreak control is based on the provision of adequately commissioned sexual health services<sup>1</sup>. Sexual health commissioners should ensure that the capacity to respond to and manage an outbreak in line with PHE guidelines is included in the appropriate contracts, particularly in relation to data collection and sharing. Examples of local outbreak plans are given in Appendix 14 of the PHE guidelines<sup>1</sup>. Outbreak investigation plans should be developed locally. Specifically, the plan should aim to identify the financial resources and contingency funds that may be called upon if financial help is needed in supporting disease control interventions such as additional GUM or other sexual health services, increased laboratory diagnostic tests and capacity, health promotion initiatives and outreach work.

### 3.2 Professional roles and responsibilities

DsPH should ensure that there are local sexual health networks which facilitate regular, preferably twice yearly, contact between the multidisciplinary team involved in STI outbreak responses to maintain communication and review local outbreak contingency plans. This will facilitate effective investigation in the event of an outbreak.

A variety of professional groups and agencies play important roles in STI prevention and control and should be involved in outbreak investigations (Appendix 2). It is critical to involve GUM, HIV and/or infectious disease (ID) or sexual health clinicians, sexual health advisors, the CCDC/CHP, the FES CE, microbiologists, LA sexual health lead, DsPH, STI epidemiologists, sexual health facilitators, a communications lead and third sector organisations in outbreak investigations. Environmental health officers may play a central role in the investigation of outbreaks of enteric infections associated with sexual transmission. Local and national experts in drugs and alcohol misuse and child protection services should be involved in an outbreak response when necessary. Local sexual health networks could form the basis for coordinating sexual health promotion activities, particularly when outbreaks affect more than one LA.

### 3.3 Systems for identifying an outbreak

Local intelligence is essential for detecting outbreaks: Outbreaks are often detected by clinicians or health protection teams (HPTs) who observe changes in the numbers or clinical and demographic presentation of cases. Exceedance reporting tools, which detect a higher than expected number of diagnoses, can supplement local intelligence

and provide a more systematic approach for detecting outbreaks. Exceedance tools use national surveillance data (laboratory reports) held in the Second Generation Surveillance System (SGSS) at PHE and are available for PHE users on the PHE intranet.

PHE has also introduced automated spatiotemporal detection tools based on SaTScan and *R* to monitor diagnoses of gonorrhoea recorded in the Genitourinary Medicine Clinic Activity Dataset (GUMCAD)<sup>12,13</sup>. This tool, which is available to public health professionals through the PHE HIV & STI department web portal (contact [HIVSTI@phe.gov.uk](mailto:HIVSTI@phe.gov.uk) for details), is used by local services as part of their outbreak detection strategy to increase awareness of existing and emerging sexual health challenges and inform service planning. The production of more timely GUMCAD data is being investigated to increase the value of these resources for outbreak detection.

### 3.4 Safeguarding

If there are any indications that children and/or vulnerable adults are part of, or connected to, the sexual network under investigation the OCT chair must discuss these concerns immediately with senior management in the LAs including the DsPH and local risk assessment and safeguarding professionals<sup>14</sup>. The Gangmasters Licensing Authority publishes a variety of resources concerned with recognising and addressing human trafficking, forced labour and modern slavery<sup>15</sup>.

### 3.5 Time-scales over which outbreaks can be controlled

The timeframe over which STI outbreaks can be investigated and controlled is usually substantially longer than for outbreaks of other infections such as food borne infection. Experience from recent investigations suggests that the time from detection to control could take from between three to 18 months. The earlier the outbreak is detected, the quicker and more effective interventions are likely to be.

### 3.6 Tailoring interventions

The interventions used to control STI outbreaks are dependent on the characteristics of the infection, the epidemic phase and the population affected. It is unlikely that a published evidence-base at the same local level will be available to an OCT. This emphasises the role of experts within the OCT to formulate a bespoke action plan. However, in general the identification of sexual contacts through partner notification and intelligence on sexual networks will be crucial to effective intervention. Health promotion may need to be targeted at specific sub-populations, or more widely, and will need to include primary and secondary prevention strategies.

### 3.7 Confidentiality, data sharing and management in an STI outbreak investigation

PHE has the authority to collect and process confidential patient-level data for communicable disease surveillance and control under Section 251 of the NHS Act 2006. However, this does not negate anyone's obligation to process data securely and appropriately under the Data Protection Act and Caldicott Principles.

Patient confidentiality is central to STI management. Existing legislation allows patient information to be shared with other health professionals in the interests of controlling spread, including during an outbreak (NHS [venereal diseases] regulations 1974 (S.1.1974/29); NHS trusts and primary care trusts (sexually transmitted diseases) Directions 2000). The policy states that people should use the sexual health services mentioned in paragraph one of the Directions 2000 with assurance that information on STI testing, diagnosis and treatment will not be included in their shared patient records without their consent.

If concerns are raised on the need to process confidential patient data these can be discussed with the local associate Caldicott guardian.

### 3.8 Infection-specific considerations

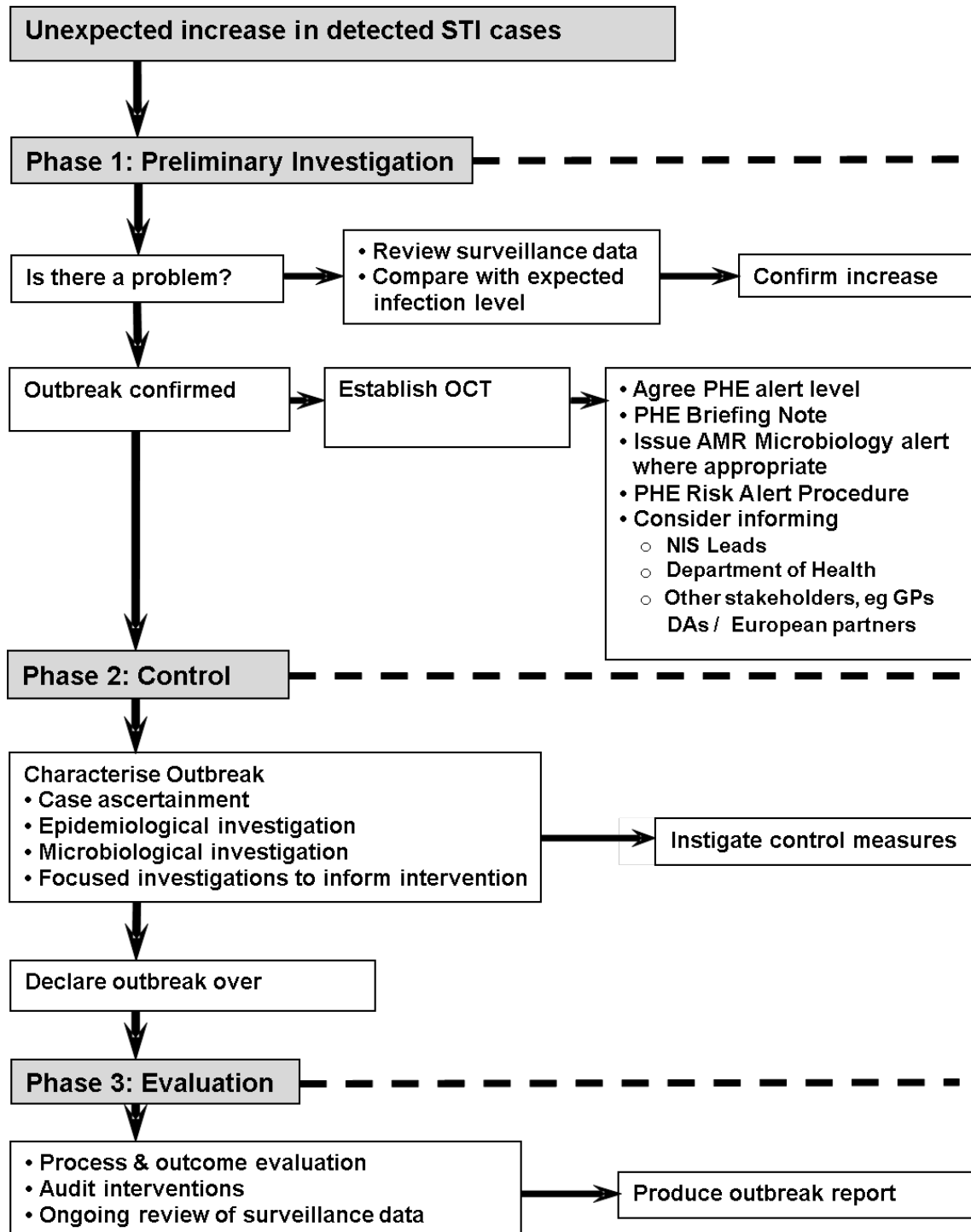
STIs, and the risk groups they affect, are diverse, and this can influence how the outbreak is detected, monitored, managed and controlled. Important infection-specific considerations are described in Appendix 3.



# 1. Investigating an outbreak

The identification, management and control of a localised outbreak can be divided into three phases (Figure 1).

**Figure 1: Management of local STI outbreaks**



## 4.1 Phase 1: Preliminary investigation

### 4.1.1 Is it an outbreak?

Identification and initial investigation of potential outbreaks may be made by any of a number of staff (including GUM or sexual health service providers, the CCDC, microbiologists and FES) either by direct observation of unusual patterns or through analysis of routine surveillance data. Typically a health care professional would discuss unusual observations with HPTs and local NHS/LA Public Health staff within the context of collective local knowledge and experience. Advice may also be sought from FES or the national team in the HIV & STI Department. Before an outbreak is declared, it is important to exclude other potential causes of increases in disease reports, such as a reporting or laboratory diagnostic artefacts or changes.

### 4.1.2 Convening an outbreak control team

After a suspected outbreak has been identified by the preliminary investigation an OCT should be convened at the earliest opportunity. Membership, roles and responsibilities of the OCT are summarised in Appendix 2. The response should be coordinated and managed by a single OCT so joint decisions on key issues are reached and a clear agreed action plan established. The relevant DsPH, PHE CDs, and PHE FES and the HIV & STI Department CEs will usually be informed that an OCT has been convened and, where appropriate, invited to join. The OCT chair would be appointed at the first meeting but would usually be the CCDC. It is important that the roles and responsibilities of OCT members are made explicit to avoid possible confusion and duplication of effort. Expert groups should be invited to the OCT when necessary. Involvement of third sector organisations is particularly important when dealing with marginalised communities.

Close communication and collaboration between GUM and sexual health clinic staff, microbiologists, CCDCs, HPTs, CDs, DsPH, FES, the HIV & STI Department and, where appropriate, STI Reference Microbiologists is crucial to outbreak management. FES and national teams will discuss and agree whether the Department of Health (DH) sexual health team should be informed and if so, who should lead on briefing DH. The CCDC must alert their communications manager of a potential outbreak. The national PHE Communications Team leading on sexual health, reproductive health and HIV should also be informed via the local communications manager of any outbreaks which could cause national media interest so that briefings can be prepared for PHE directorate leads and the press.

### 4.1.3 Outbreak control team objectives

The objectives of the OCT are:

- to determine whether an outbreak or incident has occurred or is occurring
- establish and confirm the correct diagnosis and nature of the challenge
- determine the immediate steps needed to identify cases and contacts
- plan and implement control measures to bring the outbreak under control.

The initial investigation should also establish whether the incident warrants special arrangements for investigation, management and control and should set out how infection control will be evaluated.

### 4.1.4 Case definition

A working case definition should be established as early as possible in the investigation based on the characteristics of those people primarily affected and, if appropriate, the possible source of infection. The definition should distinguish outbreak-associated cases from those cases not associated with the outbreak in terms of, for example, risk groups, risk factors, or socio-demographic, microbiological or whole genome sequence characteristics. As the investigation progresses the case definition should be reviewed by the OCT and revised as necessary.

### 4.1.5 Specimen referral, microbiological confirmation and statutory notification

Depending on the nature of the incident, the STI or gastrointestinal reference microbiologist or virologist at NIS could be contacted to discuss the referral of specimens for confirmation or additional testing such as molecular typing or extended antimicrobial susceptibility testing. This would add further information to identify cases and could be used to inform the control strategy. The PHE Standards for Microbiology Investigations (SMI) should be consulted<sup>16</sup>. If the outbreak involves STEIs then the appropriate national standards for outbreak investigation and statutory notification procedures should be followed<sup>2-4</sup>. If the outbreak is associated with antimicrobial resistance (AMR), relevant colleagues in the AMR & Healthcare Associated Infections Unit should also be consulted.

### 4.1.6 PHE incident response: types and levels

PHE identifies three different overall types of incidents and outbreaks requiring the implementation of the National Incident and Emergency Response Plan (NIERP):

- geographically defined
- widely dispersed
- national, international or global<sup>17</sup>

For each type of incident PHE will operate two levels of response:

- standard
- enhanced

An initial dynamic risk assessment will be undertaken by the appropriate incident/case manager to establish the appropriate type and level of response. Depending on the scale of the incident, this process may be repeated until the notification reaches director level for assessment.

#### 4.1.7 Descriptive epidemiology, investigation, audit and evaluation

A simple, brief Situation Report summarising data relating to process and outcome measures, including a current epidemic curve, is a key part of the decision making process, particularly during OCT meetings and should be regularly updated throughout the outbreak. Information describing case characteristics should be presented in simple tabulations and maps that show the distribution of cases. This should be produced by the local FES team with support from the local GUM sexual health provider and PHE HPT.

Where possible, initial investigations and subsequent audit or evaluation should be undertaken using locally available data from sexual health service providers or laboratories, as this will be the most relevant and timely. In parallel, the most recent data available from national surveillance systems such as GUMCADv2, SGSS or the PHE Gastro data warehouse (GDW) should be analysed regularly to give perspective and context. The question bank resource should be referred to when developing locally focused questionnaires<sup>10</sup>. Questionnaires should be reviewed and updated as new information or issues come to light to ensure that the information base remains relevant to the investigation and control and evaluation measures.

#### 4.1.8 Analytical epidemiology

Analytical studies may be conducted to test hypotheses generated during the investigation but the decision to commit the required resources will be dependent on the objectives of the investigation and resources available to the OCT. The rationale for undertaking analytical studies is given in Appendix 8 of the PHE guidelines.<sup>1</sup>

#### 4.1.9 Communicating, alerting and briefings: the role of the communications team

The delicacy of issues surrounding STI management is such that a communications lead needs to be part of the OCT from the beginning of the investigation. Local circumstances and the nature of the outbreak will determine which organisation's press officer will take the lead (PHE or LA), and the most appropriate form of media management. In the case of large outbreaks, particularly where they involve several

regions or complex multi-agency collaborations, a multi-agency media sub-group including the national PHE Communications Team leading on sexual health, reproductive health and HIV may be needed to ensure a coordinated media response.

At the start of the outbreak the communications lead should draft a reactive statement that can be issued if the outbreak attracts press interest. A spokesperson should be identified to answer media queries. Caution should be applied before releasing a proactive press statement. STI investigations are based on engaging with the individuals affected and proactive statements have historically had an adverse effect on such relationships. Any proactive statement would need to be approved by the OCT, in consultation with the CD and/or DsPH where necessary.

Effective communications between PHE local and national teams, PHE directorate leads, DsPH, the DH (including the Chief Medical Officer's office) and the Devolved Administrations (DAs) are vital to ensure an effective and coordinated response and to avoid reputational damage. This can be especially important if the outbreak attracts media attention. The OCT communications lead should ensure that effective lines of communication are in place from the outset.

#### 4.1.10 Collaboration across LA boundaries

Depending on the geographic area affected, HPT leads, Deputy directors of Health Protection on behalf of CDs, PHE regional directors and/or national leads should ensure effective collaboration in dealing with outbreaks which cross LA boundaries. In most cases a single OCT is recommended for effective co-ordination. Usually, the PHE area which is most affected will take the lead role.

#### 4.1.11 Nationwide outbreaks

When local, regional or national outbreaks are detected through routine regional or national surveillance, the relevant CE in FES, the HIV & STI Department, or the consultant microbiologist/virologist at the national reference laboratory, may initiate the investigation and immediately inform and collaborate with the relevant FES, CEs and DDHP. A senior staff member of the HIV & STI Department will discuss the outbreak with the relevant FES lead, CCDC and/or OCT Chair where ongoing specialist input is required.

#### 4.1.12 Incident level: escalation and de-escalation

Escalation or de-escalation through incident levels need not occur sequentially; rather it will be driven by the risk assessment of the outbreak. Any incident response level can be changed following a review of strategic direction and operational management.<sup>1</sup>

The PHE risk alert procedure allows internal and external risk alerts to be identified and communicated within PHE, a process that is coordinated by the PHE Alert System Administrator ([riskalertsystem@PHE.org.uk](mailto:riskalertsystem@PHE.org.uk))<sup>18</sup>.

#### 4.1.13 Briefing organisations

For larger outbreaks affecting multiple areas, the OCT should consider preparing a PHE Briefing Note in consultation with the relevant CEs and microbiologists at the NIS and PHE communications. For high profile outbreaks, and, in close consultation with PHE communications, the non-confidential contents of the briefing paper should also be disseminated to the British Association for Sexual Health and HIV (BASHH), sexual health and AMR policy leads at the DH (as appropriate), sexual health commissioners, and to the relevant public health contacts in the DAs.

If appropriate, the OCT should request that a PHE national resistance alert be prepared by the head of the AMR & Health Care Associated Infection (HCAI) laboratory at PHE and disseminated to primary diagnostic laboratories across the UK.

OCTs should consider whether there is an international perspective to the investigation. It may be necessary to consider a European-wide alert, either informally through the Epidemic Intelligence Information System (EPIS) STI system (which can be facilitated through the STI Lead at the HIV & STI Department)<sup>19</sup> or, if the relevant notification criteria under Decision Number 1082/2013/EU on serious cross-border threats to health are met, more formally via the European Early Warning Response System (EWRS). If the outbreak fulfils the criteria for a potential public health emergency of international concern under Annex 2 of the International Health Regulations (IHR) 2005<sup>20</sup>, notification to WHO may also be required. Contact the UK IHR National Focal Point ([ihrnfp@phe.gov.uk](mailto:ihrnfp@phe.gov.uk)) for advice on both IHR and EWRS notifications<sup>21</sup>.

## 4.2 Phase 2: Control

After the OCT has been formed and the preliminary investigation completed the investigation will move into the control phase. The aim is to develop and implement strategies geared towards interrupting onward transmission to prevent further cases amongst the affected population. Consideration of the epidemic phase may help target interventions and the surveillance tools for monitoring disease trends. The OCT should ensure that the interventions being implemented are appropriate to the outbreak. Production of the situation report instigated at the start of the preliminary investigation should continue throughout the investigation, adapted in response to operational requirements (see section 4.1.7).

### 4.2.1 Active case finding and surveillance

A range of routine and enhanced surveillance activities may be undertaken to better characterise the outbreak, and to guide and assess the intervention strategy. Activities

may include timely collection of detailed case information from local GUM clinics or other health services, supplementary testing of patient specimens in reference laboratories, undertaking case interviews, monitoring the effectiveness of partner notification and investigations of social and sexual networks. In addition, routine GUMCADv2 and SGSS data in combination with other open access demographic resources can be used to provide important contextual information to further guide and assess the intervention strategy.

OCTs may wish to introduce enhanced surveillance of cases using electronic or paper questionnaires. A bank of standardised questions is available through the PHE 'STI: managing outbreaks' web page to support questionnaire development and enable comparability of case characteristics locally and nationally.<sup>10</sup> OCTs may wish to incorporate the electronic collection of enhanced surveillance data into the evaluation phase and potentially adopt it as part of local infectious disease surveillance. The collection of comprehensive electronic patient behavioural information was piloted in GUMCADv3 (page 16 of technical specification)<sup>22,†</sup>. However, OCTs need to consider whether enhanced surveillance is needed and that the cost placed on the investigative team and clinical services can be justified.

#### 4.2.2 Focused investigations and in-depth interviews

Specifically commissioned investigations, including in-depth interviews with cases and case-control studies, may be undertaken to understand the social context driving the local outbreak and may be particularly useful with marginalised populations<sup>7</sup>.

#### 4.2.3 Primary prevention activities: modifying sexual risk taking behaviour

The Sexual and Reproductive and HIV team in the Health and Wellbeing directorate should be approached to provide advice before developing health promotion activities and/or materials to ensure consistent messaging and avoid duplication of effort. A number of activities can be considered.

##### 4.2.3.1 Outreach targeting key venues

Many local authorities commission HIV prevention and sexual health promotion services from a variety of providers, including sexual health clinics or non-governmental and community based organisations. These services often provide a significant part of outreach work in venues and settings which may play a key role in continued transmission or where the target population can be accessed including schools and youth services.<sup>23</sup> Outreach services can offer awareness raising, provision of information and advice, signposting to clinical services, condom provision and diagnostic and clinical services.

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<sup>†</sup> It may be possible for some clinics to deploy the GUMCADv3 pilot module in their clinic software – this can be explored with the national team in the HIV & STI Department.



#### 4.2.3.2 Promotion through media and social media

Sexual health promotion campaigns can include placing public health messages in different media channels (eg local press or radio, social media) or on public transport. They typically include one or more of the following: information on the infection, key message to avoid acquisition or transmission, promotion of safer behaviour, and signposting to further information and local sexual health services.<sup>23</sup>

Before undertaking local sexual health campaigns a clear plan should be established by the local PHE communications leads and the OCT. The following key areas should be considered:

**Messages:** Identify the main actions that should be undertaken by the target groups

**Audiences:** Although the main activity should target the identified risk groups, it may also be beneficial to inform key professional groups and the wider public

**Delivery:** Identify the main channels for the communication of key messages such as letters to key professionals, local or specialist press, leaflets in social media, etc.

**Monitoring and evaluation:** Build in measures to monitor and evaluate campaign activity, such as monitoring click through rates to resources, to refine and develop the campaign

**Community involvement:** Pilot key messages and materials with individuals and/or community based organisations from key target groups to ensure that the character of the materials is appropriate

Available resources from national and local sexual health campaigns may be useful to promote safer sexual behaviour and to encourage those at risk to come forward for testing, diagnosis and management. Links to current and recent campaigns are available on the PHE 'STI: managing outbreaks' webpage<sup>24-28</sup>.

#### 4.2.3.3 Social media

Social media facilitates the development of online social networks and is used widely by individuals or companies to create, share, or exchange information on interests, ideas, and pictures/videos in virtual communities and networks. Some geo-spatial applications are used for meeting sex partners and have emerged as likely factors influencing STI transmission amongst MSM and heterosexuals<sup>29,5</sup>. Both sexual and social networking apps and sites provide useful communication routes to target populations. For example, as sex parties are generally held in private homes, public health messages sent via sexual networking websites can be used to reach sex party hosts. Targeted messaging on Twitter and Facebook can also be used to raise awareness among those at risk as well as GPs and other health professionals. Such initiatives have been used by PHE and Terrence Higgins Trust<sup>30</sup>.

This is a fast developing field. The applications used by at risk populations change rapidly and are highly location specific. If social media is being considered as part of an



outbreak response it is suggested that advice should be sought from colleagues with recent experience before planning the intervention. The national team at the HIV & STI Department ([HIVSTI@phe.gov.uk](mailto:HIVSTI@phe.gov.uk)) and the Sexual and Reproductive Health and HIV Team in the Health and Wellbeing directorate will be able to provide advice and contact information.

#### 4.2.4 Secondary prevention: find and treat additional cases

##### 4.2.4.1 Partner notification (PN)

PN is crucial for identifying people who have been exposed to infection and gaining information about sexual networks. Successful PN early in the outbreak response is likely to attenuate infection spread. OCTs should ensure sufficient resources are available to manage increasing demands for PN during an outbreak. PN can be challenging where the affected groups report high numbers of anonymous or uncontactable sexual partners. PN performance should be closely monitored throughout the investigation and, where necessary, the OCT should develop strategies to improve PN outcomes within local services.

##### 4.2.4.2 Case finding and venue based screening

Active case finding could be considered if initial control measures fail. Options for expanding testing through pre-existing sexual health programmes, such as the National Chlamydia screening programme, could be explored, although the implications for patient consent and clinical pathways should be considered carefully<sup>31</sup>. Screening initiatives in social venues or in settings frequented by specific target groups within outbreak areas could be considered (section 4.2.3.1).

##### 4.2.4.3 Increasing provision of clinic sessions

It is crucial that clinical services have sufficient staff capacity to accommodate the demand generated by increased attendances, PN and outreach work during outbreaks. The public response to outbreak initiatives aimed at increasing awareness is unpredictable and may vary with the organism and context of the outbreak.

### 4.3 Phase 3: Evaluation

This phase is concerned with the evaluation of both process and outcome to determine the effectiveness of the interventions instigated in the control phase.

#### 4.3.1 Key process measures

Key process measures should be agreed at the start of the investigation. A variety of measures could be used such as:

- number, range, coverage and type of health promotion interventions
- awareness among the target population of health promotion interventions
- proportion of the target population engaging with the intervention
- frequency and coverage of the intervention
- intervention uptake by the target population
- proportion of the target population offered STI screening tests
- uptake and coverage of STI screening tests by the target population

Measuring awareness and engagement can be especially challenging, but could involve undertaking brief surveys of clinic attendees before and after the intervention, web-based surveys disseminated through social media, or counting numbers of ‘click-throughs’ from banner ads or website hits. Uptake and coverage of interventions such as immunisation and STI testing in sexual health clinics can be measured using routine surveillance such as GUMCADv2 or may require extraction of more detailed local data. For example, some NCSP areas offer dual screening for chlamydia and gonorrhoea and may be able to provide additional data on gonorrhoea testing in the affected areas. Interpretation and assessment of changes in uptake and coverage should include an analysis of changes in attendance patterns and the case mix at local services.

Process measures can evolve during the investigation, reflecting changes to intervention strategies and case definitions. The investigation of gonorrhoea in young heterosexuals described by Foster et al. 2016 explores the selection of process measures in detail, particularly in relation to awareness raising strategies<sup>23</sup>.

#### 4.3.2 Primary outcome measure: a reduction in the number of cases

The OCT should define how the primary outcome will be measured at the start of the investigation. The number of reported cases would usually be monitored through regular review of the epidemic curve for evidence of a decline. Numbers of reported cases could be assessed through locally enhanced surveillance from clinical services, routine laboratory reports, or reference laboratory reports. Exceedance reporting tools, most commonly used for detecting outbreaks, can also be used to determine when cases numbers have returned to expected levels, and can supplement local intelligence and provide a more systematic approach (see Section 3.3 for further details).

However, determining the reasons for a decline in cases may prove difficult. Interpretation should take account of any changes in awareness, service access and intervention coverage, and specifically to assess whether a reduction in attendance patterns or testing coverage may explain the decline in reported cases. If case finding initiatives such as the expansion of STI screening were introduced, case numbers may initially remain stable or even increase. In this case, a reduction in infection positivity within the target population may be a useful additional primary outcome measure. However, consideration should also be given to the impact of changing service access, testing coverage and case mix of the tested population.

In some instances, case reports may never return to the pre-outbreak baseline. This could be due to an overall increase in the general population or may indicate the infection has become endemic in the target population.

## 5. Declaring an outbreak over

Heightened surveillance should be maintained to monitor the effectiveness of interventions introduced by the OCT. There are no agreed criteria to be met before a STI outbreak can be declared over, but a variety of situations may apply which include:

- stabilisation and/or decline in outbreak case reports (although with STIs an endemic phase may develop at a higher level than was previously observed)
- decline in case reports to expected levels (measured using exceedance tools based on the epidemic curve)
- decrease in reports to levels which can be managed within existing resources
- high coverage of interventions (screening, vaccination) has been achieved in target groups
- high awareness and uptake of intervention among target groups

The outbreak should be declared over in consultation with the appropriate DsPH and should be in the form of written communication from the Chair of the OCT to the DsPH.

## 6. Report writing

At the conclusion of the outbreak a report should be prepared by the OCT and circulated to the LA, PHE and other agencies involved in line with the structure suggested in Appendix 11 of the PHE guidelines<sup>1</sup>. The dissemination of information and experience from outbreaks is an important process as it extends the knowledge base and informs future intervention strategies and training.

Investigation reports should be stored centrally (currently the PHE Field Epidemiology Service Portal Library of Incidents and Outbreaks available to PHE users of the PHE SharePoint site)<sup>32</sup>. It is helpful to publish key findings from the outbreak in a peer-reviewed scientific journal including (where possible) an evaluation of the interventions deployed, as this helps to improve the evidence base for improved outbreak control.

## 7. References

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## 8. Outbreak list

The following summarises publications of outbreaks investigations that have been undertaken within the past decade. Experience elicited from these and unpublished investigations together with the results of analyses of routine surveillance data have been used in the formulation of the guidance given in this document.

### *Neisseria gonorrhoeae*

- Foster K, *et al.*. How to do it: lessons identified from investigating and trying to control an outbreak of gonorrhoea in young heterosexual adults. *Sex Transm Infect* 2016;0:1–6. doi:10.1136/sextrans-2015-052303.
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### Lymphogranuloma venereum (LGV)

- Ward H, *et al.*. Lymphogranuloma venereum in the United Kingdom. *CID* 2007;44:26-32.
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### *Shigella flexneri*, *S. sonnei*, VTEC 0117 and Chemsex

- Simms I, *et al.*. Intensification of a shigellosis epidemic associated with sexual transmission between men - diagnoses of *Shigella flexneri* and *S. sonnei* in England, 2004 to end of February 2015. *Euro Surveill* 2015;20(15):pii=21097.
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## Syphilis


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- Morgan EI, Blume A, Carroll R. A cluster of infectious syphilis among young heterosexuals in south-east Hampshire. *Int J STD AIDS* 2011;22(9):512-3. Acheson P, McGivern M, Frank P, *et al.*. An ongoing outbreak of heterosexually acquired syphilis across Teesside, United Kingdom. *Int J STD AIDS* 2011;22(9):514-6.
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## 9. Acknowledgements

We would like to thank Dr Amy Mikhail, Dr Nigel Field, Matt Hibbert, Hemanti Patel, Dr Torshie Annan, Dr Barry Evans, Professor Cathy Ison, Dr Sam Bracebridge, Dr Roberto Vivancos, Matt Hibbert, Dr Anthony Nardone, Dr Sarah Woodhall, participants in the 2015 PHE STI outbreak seminar day and everyone else who contributed to this revision of the guidelines.

# 10. Appendices

## Appendix 1: Poster of PHE Stakeholder Consultation Workshop: Strengthening the response to sexually transmitted infection outbreaks

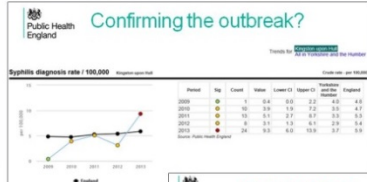


### Strengthening the response to sexually transmitted infections outbreaks

L Emmett<sup>1</sup>, I Simms<sup>2</sup>, G Hughes<sup>2</sup>, P Crook<sup>3</sup>

<sup>1</sup>Eastern Field Epidemiology Unit, Cambridge, <sup>2</sup>HIV and STI Department, CIDSC, <sup>3</sup>Field Epidemiology Services - Victoria

Protecting and improving the nation's health

INTRODUCTION	METHODS																																													
<p>The basic principles for investigating STI outbreaks are the same as those for other infectious diseases but these infections present unique challenges.</p> <p>An increasing number of STI outbreaks, particularly syphilis and gonorrhoea, are investigated each year. Translating the knowledge and experience from these outbreaks into revised guidance<sup>1</sup> is key to providing up to date clear advice for the investigation, management and control of STI outbreaks.</p>	<p>A one day internal workshop, organised by CIDCS and FES, was held in January 2015. Updated draft guidance was circulated prior to the event.</p> <p>Key objectives:</p> <ul style="list-style-type: none"> <li>To review recent outbreaks - share experiences</li> <li>To investigate developments in surveillance and microbiological techniques</li> <li>Identify revisions for the guidance</li> </ul>																																													
RESULTS																																														
<ul style="list-style-type: none"> <li>65 delegates attended from across FES, CIDSC and the PHE Centres.</li> </ul> <p><b>Suggested revisions to the guidance:</b></p> <ul style="list-style-type: none"> <li>Detail challenges of identification and control</li> <li>Outline importance of good local links and partnerships for early detection and action</li> <li>Include resource toolkit including description of available surveillance methods</li> <li>Include more guidance on what works - links to previous reports, lessons learnt, use of new technology</li> <li>Outline clear evaluation criteria</li> </ul>	<ul style="list-style-type: none"> <li>The day consisted of a mixture of presentations and group discussion.</li> </ul> <p><b>Selection of slides from the presentations;</b></p> <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;">  <p style="font-size: x-small;">Syphilis diagnosis rate / 100,000</p> <table border="1" style="font-size: x-small; border-collapse: collapse;"> <thead> <tr> <th>Year</th> <th>Rate</th> <th>Lower CI</th> <th>Upper CI</th> <th>Engaged</th> </tr> </thead> <tbody> <tr><td>2008</td><td>0.4</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2009</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2010</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2011</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2012</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2013</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2014</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> <tr><td>2015</td><td>0.5</td><td>0.0</td><td>2.2</td><td>0.0</td></tr> </tbody> </table> </div> <div style="width: 45%; font-size: x-small;"> <p>Detecting outbreaks and supporting investigations at a local level. Dr Simon Padfield, FES Leeds</p> </div> </div>	Year	Rate	Lower CI	Upper CI	Engaged	2008	0.4	0.0	2.2	0.0	2009	0.5	0.0	2.2	0.0	2010	0.5	0.0	2.2	0.0	2011	0.5	0.0	2.2	0.0	2012	0.5	0.0	2.2	0.0	2013	0.5	0.0	2.2	0.0	2014	0.5	0.0	2.2	0.0	2015	0.5	0.0	2.2	0.0
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<div style="display: flex;"> <div style="width: 45%;"> <p><b>Shigella communications activity</b></p> <p>Develop and disseminate messages to reinforce PHE prevention work, &amp; increase awareness of Shigella among MSM.</p> <ul style="list-style-type: none"> <li>PHE letter to GPs in key regions</li> <li>New awareness poster &amp; leaflets online</li> <li>10,000 leaflets &amp; 1,000 posters to THT &amp; sexual health clinics</li> <li>Press releases to MSM media, with case study</li> <li>Latest information and resources to key 2<sup>nd</sup> parties</li> <li>Newsletters e.g. Me4FASH, HPE, PHE</li> <li>Facebook &amp; Twitter activity</li> <li>Banner advert on RECON (300 MSM in 6 weeks)</li> <li>Internal communications to Centre Directors, sexual health &amp; comms tea</li> </ul> </div> <div style="width: 45%;"> <p>Syphilis in Brighton. Ben Tooke THT</p> <p><b>Summary</b></p> <ul style="list-style-type: none"> <li>Inter-agency partnership working</li> <li>NetReach and online platforms</li> <li>Increasing knowledge and making it accessible</li> <li>Treatment as prevention</li> </ul> </div> </div>	<div style="display: flex;"> <div style="width: 45%;"> <p><b>GUMCADv2</b></p> <p>The Genitourinary Medicine Clinic Activity Dataset (GUMCADv2)</p> <ul style="list-style-type: none"> <li>Collection of electronic anonymised patient-level data                             <ul style="list-style-type: none"> <li>Provides rates of testing and diagnosis by area of residence</li> <li>Enables informative epidemiological analyses</li> <li>Provides timely and representative data</li> </ul> </li> </ul> <p>GUMCADv2 updates. Dr Hamish Mohammed, CIDSC</p> </div> <div style="width: 45%;"> <p><b>Norfolk County Council</b></p> <p><b>Conclusion</b></p> <ul style="list-style-type: none"> <li>Availability of HIV, Syphilis and Hepatitis B self sampling testing is a useful strategy to target high risk groups who do not access main sexual health services for testing</li> </ul> </div> </div>																																													
<p>Planning and developing communications for STI outbreaks. Iain Mallett, Communications Manager East and East Midlands</p>	<p>Being proactive in reactive circumstances: Dr Augustine Pereira, Norfolk County Council</p>																																													
<p><b>Benefits</b></p> <ul style="list-style-type: none"> <li>Quick and easy to run 5 mins per PHEC for gonorrhoea.</li> <li>Only using 2 freeware software packages for the whole process.</li> <li>Minimal data handling required.</li> <li>Local validation appears to show true clusters.</li> <li>Enhance outbreak detection / and timeliness of investigation.</li> <li>Core areas identified could be used to inform targeted commissioning.</li> <li>Tool can be used for other infectious diseases with minor adjustments.</li> </ul> <p>Spatio-temporal cluster detection tool Dr Roberto Vivancos, FES Liverpool</p>	<p><b>Evaluation</b></p> <ul style="list-style-type: none"> <li>Short Select Survey questionnaire sent to all attendees</li> <li>Completed by 37% (n=24)</li> <li>Over 95% rated the workshop as very good or good.</li> </ul> <p><i>"Really good event. Hope you hold another one"</i></p> <p><i>"Great scientific overview/update"</i></p> <p><i>"Really useful to hear 'real life' examples of the challenges faced and possible solutions for outbreak investigation and management"</i></p> <p><i>"It was great to meet some of the national team as well as other colleagues within local PHE teams."</i></p>																																													
DISCUSSION	CONCLUSIONS																																													
<ul style="list-style-type: none"> <li>Identification of outbreaks is difficult but new tools available</li> <li>Evidence base for managing STIs is limited</li> <li>Evaluation of control measures is challenging</li> <li>Guidelines need to be adapted further to meet needs of key stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>Workshop provided an excellent opportunity to learn, share experience and network and provided a good example of joint working between CIDSC and FES</li> <li>A systematic review of available evidence on outbreak management could improve guidance effectiveness</li> </ul>																																													
REFERENCES	ACKNOWLEDGEMENTS																																													
<p>1. HPA. 2010. Guidance for managing STI outbreaks and incidents</p>	<p>Thank you to all speakers who presented at the workshop.</p>																																													

## Appendix 2: Summary of key professional roles and responsibilities for identifying and managing STI outbreaks

### Outbreak Control Team (OCT) Chair (usually CCDC/ CHP)

- direct and co-ordinate overall management of outbreak
- chair the OCT and ensure every member of the OCT understands their role
- be available throughout the investigation for consultation and advice
- with support from the communications lead, ensure there is timely communication between members of the OCT and other organisations
- ensure any safe-guarding issues are addressed by informing appropriate safeguarding lead
- with advice from the OCT, decide when to declare the outbreak over
- ensure an outbreak report is produced and experiences from the investigation are shared through health protection conferences and learning events and, where possible, published in peer reviewed journals
- be responsible for communications such as media interviews and press statements, with support from the communications lead

### PHE CCDC/CHP (or HPT Sexual Health Lead depending on local arrangements)

- provide expert advice on the identification of potential outbreaks
- provide epidemiological support throughout the investigation alongside PHE FES
- keep PHE Centre Directors informed and seek their support as required
- highlight the importance of the outbreak to commissioners and, if necessary, advocate for additional resources to provide an adequate response
- together with PHE FES, maintain heightened surveillance of the infection to evaluate intervention effectiveness
- facilitate the collaboration between sexual health services and the PHE FES CE
- audit the management of the outbreak
- identify lessons learnt and develop necessary training resources

### PHE FES

- monitor routine surveillance data for possible outbreaks.
- provide epidemiological expertise and support to the OCT.
- assist in audits undertaken as part of outbreak investigations.
- where appropriate, support enhanced surveillance
- advise on whether an observed increase in cases is an outbreak or data artefact

### PHE Sexual Health Facilitators

- provide support to the outbreak response as required by PHE FES teams and OCT chair, which includes:
  - coordinating tasks and facilitating communication
  - identifying the evidence-base and resources required for health promotion
  - encouraging outbreak evaluation and documentation

### GUM and sexual health physicians, nurses & health advisors

- alert HPT to any unexpected increase in diagnoses of STIs or cases of rare infection
- provide expert clinical advice to the OCT on the presentation and infection management
- provide local data, where appropriate
- provide the OCT with contextual information concerning sexual behaviour and patterns of service attendance
- undertake partner notification and, with the assistance of the local PHE FES team, identify sexual network characteristics
- where requested by the OCT, undertake in-depth interviews to provide contextual information required to inform intervention strategies
- assess the capacity of local services to respond to the outbreak
- with members of the OCT, identify and implement control measures

### PHE HIV&STI Department, NIS

- provide specialist advice and context on STI epidemiology and risk populations
- advise on whether an observed increase in cases is an outbreak or data artefact
- provide scientific information/resources to inform the OCT and advice on research studies that may be undertaken
- assist in the development of investigative tools
- provide personnel/expertise to assist with specialist microbiological or epidemiological investigation
- develop methods to evaluate control measures

### NHS Consultant Microbiologist and/or PHE Consultant Microbiologist (regional or national)

- alert CCDC to any unexpected increase in diagnoses of STIs or cases of rare infection
- provide expert advice on investigative methods, specimen collection and infection control
- provide expert advice on specialist diagnostic methods
- arrange prompt analysis of clinical samples and reporting of diagnostic results
- arrange further testing within reference laboratories as requested



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### PHE Sexual & Reproductive Health Promotion Team, Health and Wellbeing

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- provide advice on health promotion activities and available tools and resources
- liaise with third sector organisations regarding public health messages and/or outbreak-related campaigns
- support the development of health promotion materials

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### Third (voluntary) sector organisations

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- provide an essential link to population groups that the initial investigation has highlighted as being at increased risk of infection
- represent the views and interests of the population groups affected
- contribute knowledge and expertise to facilitate communication between health services and the groups they represent

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### Service commissioners

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- ensure sufficient funding for any surge capacity or change to service delivery recommended by the OCT, where full responsibility has not been given to the service providers
- ensure availability of experts in sexual health promotion who can contribute to intervention and control activities
- ensure prevention activities are commissioned
- depending on contractual agreements, use findings and experience from outbreak investigations to inform future sexual health needs assessments and promotion activities

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### Communications Manager (PHE, Local Authority and/or service provider)

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- lead on discussions to ascertain the most appropriate form of media management of the outbreak, including whether proactive or reactive
  - draft all media messages in close contact with appropriate sexual health leads and ensure the chair of the OCT signs these off
  - liaise with relevant stakeholder communications managers
  - liaise with the national PHE Communications Team leading on sexual health, reproductive health and HIV if national media interest is anticipated.
  - advise on all internal communications and use of social media
  - support the OCT chair to ensure timely communications between the OCT and external stakeholders
-

## Appendix 3: Infection specific considerations in STI outbreaks

### Syphilis

Diagnosis of infectious syphilis should be based on a combination of microbiological tests, such as paired sera, nucleic acid amplification tests (NAATs) and clinical presentation. This information is required to accurately ascertain the stage of infection, which in turn is needed to inform the most appropriate intervention strategies (see next paragraph). The result of a single serological test is unlikely to provide an accurate diagnosis as there is wide inter-laboratory variation in testing methods and result interpretation. Biological false positives may also occur.

The relative proportions of primary, secondary and early latent syphilis provides insight into the development of the local outbreak. A high proportion of primary and secondary relative to early latent infection indicates that: (i) the outbreak is relatively recent, and (ii) sexual health services are finding and treating most of the cases. In contrast, an outbreak consisting of a large proportion of early latent cases suggests that: (i) the outbreak has been established in the area for some time, and (ii) case finding efforts need to be improved. Most outbreaks seen outside major urban areas in England consist of a high proportion of diagnoses of primary syphilis, so if a high proportion of early latent cases are seen it is good practice to check the surveillance data.<sup>33</sup>

### Congenital syphilis

Where cases have been identified the Consultant Microbiologist, GUM physician and attending paediatrician should establish whether the case represents a failure of clinical care or lack of access to clinical services. Appropriate action can then be undertaken on the basis of this information.

### Gonorrhoea

While widespread opportunistic screening for gonorrhoea in community-based settings is not usually recommended, during an outbreak the introduction of opportunistic screening in selected settings can help improve case detection and may be a useful component of the infection control strategy developed by the OCT. Consideration could be given to introducing dual assays for gonorrhoea and chlamydia using nucleic acid amplification tests (NAATs) in the National Chlamydia Screening Programme (NCSP) in LAs affected by the outbreak (if not already done). However, there is a strong possibility of false positive gonorrhoea test results when screening in lower prevalence populations and supplementary testing using a different test target is strongly advised when dual testing is introduced<sup>31,34,35</sup>. The OCT will need to assess the implications of changing the testing strategy and ensure robust care pathways are in place.

Although recommended, a supplementary test to confirm a reactive gonorrhoea test may not always occur before results are issued to patients and recorded in medical



records. If a sudden increase in diagnoses of gonorrhoea is seen in a local area, investigators must therefore check that it is not associated with the introduction of dual NAATs. If so, the OCT will need to undertake an urgent review of testing practice together with a look back of reported diagnoses to determine whether they were confirmed by supplementary testing<sup>34,35</sup>.

## Sexually Transmitted Enteric Infections (STEI) and hepatitis

### *Shigella flexneri*, *S. sonnei* and other STEIs

The emergence of *Shigella* infections in MSM coincided with increased diagnoses of gonorrhoea, LGV, infectious syphilis and a cluster of verocytotoxin-producing *Escherichia coli* O117:H7, particularly those co-infected with HIV<sup>36-39</sup>. The characteristics of men affected by these overlapping outbreaks are very similar, suggesting intensification of sexual networking among predominantly HIV-positive MSM engaging in HIV sero-adaptive behaviours, possibly facilitated by geo-spatial apps. *Shigella* readily acquires antimicrobial resistance and rapid intercontinental dissemination through sexual transmission in MSM of a *S. flexneri* 3a lineage with an azithromycin-resistance conferring plasmid has been demonstrated<sup>37</sup>. Similarly in England a cluster of *Shigella sonnei* isolates which produced extended-spectrum  $\beta$ -lactamases and exhibited macrolide resistance were identified in MSM in 2015. The isolates were phylogenetically clustered, and harboured a plasmid conferring this multi drug-resistance phenotype<sup>40</sup>.

Identifying that an increase in cases of gastrointestinal pathogens is associated with sexual transmission in MSM is complicated by a lack of information on recent sexual exposure on outbreak questionnaires. A revised outbreak questionnaire for *Shigella flexneri* including questions on recent sexual exposure has recently been piloted in the South east of England, and is available for use in other areas. It is also helpful to monitor the gender ratio of cases among adults which are not associated with foreign travel: an excess of adult male cases may be indicative of transmission among MSM and should prompt further investigation. FES and the HIV & STI Department are developing an exceedance tool to detect possible gastrointestinal infection outbreaks among MSM.

MSM with symptoms of enteric pathogens may present to a range of healthcare settings including primary care, emergency departments, and specialist sexual health and gastroenterology services. To limit missed diagnostic opportunities, facilitate prompt diagnosis and appropriate management, including appropriate antibiotic stewardship, healthcare professionals need to recognise the potential for STEIs in MSM and sensitively ascertain sexual history. Public health actions for shigellosis cases are described but for MSM they should additionally include advice about when to resume sexual activity, partner notification, preventative advice about risky sexual behaviours, and screening for STI co-infection<sup>2,39</sup>.

## Hepatitis A, B and C

MSM are at increased risk of hepatitis A, B and C infection. Immunisation against hepatitis A is recommended for MSM with multiple sexual partners particularly during periods when outbreaks occur<sup>41,42</sup>. Hepatitis A vaccine can also be given as post-exposure prophylaxis to contacts of a case if administered within 14 days of onset of jaundice in the index case (*The Green Book*, Chapter 17)<sup>41</sup>. Immunisation against hepatitis A is also available for individuals travelling to countries where the disease is common.

Immunisation against hepatitis B is recommended for all MSM in addition to other high-risk groups and is routinely available in GUM clinics. Sexual partners of individuals with acute or chronic hepatitis B, or individuals potentially exposed to hepatitis B-infected blood should be offered post-exposure prophylaxis ('The Green Book', Chapter 18)<sup>41,42</sup>. A recent audit indicated that recording of hepatitis B immunisation status in GUMCADv2 is often incomplete suggesting that local audits may therefore be required in an outbreak situation<sup>43</sup>.

Currently there is no vaccine to prevent hepatitis C infection. Patients diagnosed with hepatitis C positive should be referred to a liver specialist for assessment.

Men with hepatitis A, B or C infection are likely to present in settings other than GUM clinics, such as GP surgeries and Accident and Emergency and, for hepatitis C, prisons and drug centres. Individuals may not be forthcoming about sexual exposure/history. Ensuring links between GUM services, settings where infections are diagnosed and managed and the OCT is particularly important for the purposes of expert advice, case recognition, partner notification and/or post-exposure prophylaxis.

Communication strategies should consider messaging tailored to specific groups affected, and incorporate information on the importance and availability of immunisation for hepatitis A and B (where implemented) and testing and treatment for hepatitis C. Where cases of hepatitis B, C (or HIV) are thought to have been transmitted from an infected healthcare worker, advice should be sought from the UK Advisory Panel on Healthcare Workers Infected with Bloodborne Viruses (UKAP)<sup>44</sup>.