Mandatory enhanced MRSA, MSSA and Gram-negative bacteraemia, and *Clostridioides difficile* infection surveillance

Protocol version 4.3

This protocol supersedes version 4.2 dated April 2019
About Public Health England

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1. Amendments to the protocol in this version

The following changes have been made to the protocol in this version. A full list of changes can be found in 13.14 Appendix 14. Changes to the mandatory surveillance protocol

- Amendedment of definitions
- Update of prior trust exposure algorithm flow diagrams
- Update to CCG attribution algorithm
2. Glossary

CCG Clinical Commissioning Group. The main commissioners of services funded by the NHS in England. CCGs replaced Primary Care Trusts (PCTs) in April 2013

CDC Centers for Disease Control and Prevention The national health protection agency for the USA

CDI Clostridioides difficile infection (previously Clostridium difficile)

CDRN Clostridium difficile ribotyping network service. A network of nine participating laboratories that uses ribotype analysis to investigate clustering of CDI cases.

CEO Chief Executive Officer. In the context of the HCAI DCS this is the individual responsible for confirming that their Trust’s MRSA, MSSA and Gram-negative bacteraemias and CDI figures are correct by signing off the data each month

CMO Chief Medical Officer

CPE Carbapenemase-producing Enterobacteriaceae

CQC Care Quality Commission. The CQCs role is to regulate, inspect and review all adult social care services in the public, private and voluntary sectors in England

DBS Demographics Batch Service. The service used to trace data

DH The Department of Health. The government department responsible for public health issues. PHE collects the surveillance data described in this protocol on behalf of the DH

DPH Director of Public Health. DPHs carry out public health duties of their local authority. All MRSA, MSSA and Gram-negative bacteraemia and CDI reports are mapped to a DPH from January 2009 onwards based on the patient’s mapped CCG

DoB Date of Birth

ECDC European Centre for Disease Prevention and Control The European Union agency aimed at strengthening Europe’s defences against infectious diseases.

EIA Enzyme immunoassay

GDH Glutamate dehydrogenase. An antigen produced by C. difficile which can be used as a diagnostic indicator in conjunction with other tests

GRE Glycopeptide resistant enterococci (sometimes referred to as VRE)

HCAI Healthcare associated infections

HCAI DCS Healthcare associated infections data capture system. The web-based system where patient-level mandatory surveillance data on MRSA, MSSA and Gram-negative
bacteraemia and *C. difficile* infection are collected. Aggregate-level quarterly mandatory laboratory returns (see QMLR below) are also entered on this site.

**HES** Hospital Episode Statistics. Maintained by NHS Digital and contains details of all admissions, outpatient appointments and A&E attendances at NHS hospitals in England. The HCAI DCS has used the same definitions for many fields as those found on HES.

**IS** Independent Sector. Privately run healthcare facilities which may, or may not, treat NHS patients. This term is used in this protocol to refer to the sector as a whole, rather than a specific hospital or group. The term IS facility is used to refer to specific hospital or group of hospitals. See section 3 for a definition.

**ISP** Independent Sector Provider. A non-NHS organisation providing secondary healthcare through hospital sites.

**ISS** Independent Sector Site. A hospital site operated by an Independent Sector Provider.

**KH03** A quarterly return managed by NHS England, which provides data on the average occupied overnight beds for all NHS Trusts in England; providing an indication of how busy NHS Trusts were for a specific period in time. As there is no population data for NHS Trusts, as their services are not geographically restricted, KH03 data are used as a proxy for the denominator in the calculation of NHS acute trust rates.

**MRSA** Meticillin resistant *Staphylococcus aureus*

**MSSA** Meticillin susceptible *Staphylococcus aureus*

**NAAT** Nucleic acid amplification techniques. A family of molecular diagnostic techniques that rely on the amplification of genetic material.

**NHS** National Health Service

**NHS Digital** The national provider of information, data, and IT systems for health and social care. Reports are traced against the NHS Spine via NHS Digital and the Demographics Batch Service. NHS Digital also holds most of the administrative codes required for unambiguous identification of NHS and Independent Sector organisations.

**NHS Improvement** The NHS body responsible for regulating NHS trusts.

**NHS Patient Safety** A group within the NHS Commissioning Board Special Health Authority which receives confidential reports of patient safety incidents. [http://www.nrls.npsa.nhs.uk/](http://www.nrls.npsa.nhs.uk/) From 1 April 2016, NHS Patient Safety became part of NHS Improvement.

**ODS** [https://digital.nhs.uk/organisation-data-service](https://digital.nhs.uk/organisation-data-service). Provided by NHS Digital and is responsible for the publication of all organisation and practitioner codes. These codes form part of the NHS data standards.

**PII** Identifiable Information. This refers to any data that allows an individual to be unambiguously identified.
**PIR** Post Infection Review. A review process applied to all MRSA bacteraemia reports made to the mandatory surveillance scheme between 1st April 2013 and 1st April 2018. The aim of the PIR was to determine lessons learned from each MRSA bacteraemia report.

**PHE** Public Health England

**PHEC** Public Health England Centre. Local PHE teams responsible for supporting local areas to deliver health and wellbeing strategies and co-ordinating local PHE activities.

**QMLR** Quarterly Mandatory Laboratory Returns. The monthly aggregate totals of various laboratory results which are entered onto the DCS.
3. List of definitions and useful terms

**Acute renal failure**
Where kidney failure develops suddenly rather than after long term kidney disease

**Assignment**
The process of assigning MRSA bacteraemia reports only to an acute trust, CCG, or ‘third party’ as part of the PIR process. Reports were provisionally assigned based on the apportionment algorithm (
13.7 Appendix 7. Algorithms to determine the onset status of cases) and finally assigned to the reporting trust, attributed CCG or a ‘third party’, once the PIR process had been finalised. Trust assigned reports were always assigned to the trust reporting the specimen, CCG assigned reports were always assigned to the CCG to which the report is attributed. ‘Third party’ reports were not assigned to any specific organisation and included cases in patients resident in England but who had received care from a third party organisation (i.e. neither the reporting organisation nor the commissioning CCG), cases in patients resident outside England or intractable cases. Further details of assignment for MRSA bacteraemia can be found in the MRSA PIR toolkit.

**CCG attribution**

All MRSA, MSSA, and Gram-negative bacteraemia and CDI reports are attributed to a CCG. This is regardless of whether the report is Hospital-onset. Reports are attributed to a CCG by a tracing algorithm which matches the patient to a record on the NHS Spine and then attributing to a CCG based on information (or lack thereof) on the NHS Spine. Further information on CCG attribution can be found in section 13.6 Appendix 6. CCG Attribution Process.

**Commissioning Pathway**

Refers to a way of mapping reports on the system that reflects which organisations were involved in the commissioning of the patient’s care. The primary organisations that are part of this pathway are: CCGs; NHS local offices, DPHs and NHS Commissioning Regions. The Commissioning Pathway for each report is determined by the CCG to which the report is attributed. Based on the CCG, the report is mapped up to a DPH, NHS Area Team and Commissioning Region. Note that PHECs and PHE Regions are entitled to view reports mapped to CCGs within their geographic boundary although PHE organisations are not strictly part of the Commissioning Pathway. Note that PHECs and PHE Regions are able to view Reporting and Commissioning Pathways.

**Commissioning Region**

The NHS England region (London, Midlands and East of England, North of England, South of England) within which the CCG that each MRSA, MSSA, Gram-negative bacteraemia and CDI report is mapped to, based on the CCG attribution process. Each MRSA, MSSA, Gram-negative bacteraemia and CDI report has a Commissioning Region associated with it, however QMLR records cannot have a Commissioning Region associated with them as they are an aggregate-level data collection and do not undergo the CCG attribution process. For any given report of MRSA, MSSA, Gram-negative bacteraemia and CDI the Commissioning Regions (above) and Reporting (below) may be the same or may be different; please refer to the example below under ‘Reporting Region’.

**Day case**

A patient admitted electively during the course of a day with the intention of receiving care who does not require the use of a hospital bed overnight. If this original intention is not fulfilled and the patient stays overnight, such a patient should be counted as an ordinary admission.

**Established renal failure**

A loss of kidney function to a point where it becomes life threatening. Haemodialysis is one of the treatments for this condition. In contrast to acute renal failure, established renal failure usually develops slowly.
Emergency assessment (type of hospital episode)
A patient admitted to an Emergency Assessment Unit (EAU).

Inpatient A patient admitted to an acute trust for care and is expected to stay overnight

Independent Sector (IS) provider
Independent Sector healthcare provider. The provider may be a single hospital/site or a large group with many hospitals/sites

IS group
A collection of two or more IS hospitals owned by the same provider

IS provider site
A single location from which an IS provider operates. A site may be a hospital or a site within a hospital

Line listings
Patient-level data downloaded from the DCS that can be opened in spreadsheet software. Only specific users have access to line listings. The line listing may or may not include PII

Lockdown
When the QMLR dataset is automatically locked by the DCS. After this happens, the dataset is locked and cannot be amended by users without first contacting PHE. The QMLR dataset is automatically locked down 6 weeks after the end of the reporting quarter

Locked dataset
A dataset that has been signed off and is locked. Such datasets cannot be amended by users without first contacting PHE. See the DCS user guide for method for requesting unlocks

NHS Spine
An information system that connects essential national services including summary care records and patient demographic information. NHS Spine is provided by NHS Digital.

Onset Status
The term ‘trust-apportioned’ has change to ‘Hospital-onset’ and non-trust apportioned has changed to ‘Community-onset’.
The process whereby reports from NHS acute trusts of bacteraemia and Clostridioides difficile infection (CDI) are separated into Hospital-onset and Community-onset reports. Hospital-onset cases represent reports that are thought to most likely be the responsibility of the acute trust which reported the infection episode, whilst Community-onset’ refers to those reports that are not determined to be Hospital-onset. The sum of the number of Hospital-onset and Community-onset reports adds up to the total number of reports made by the NHS to PHE for a given time period. All bacteraemia and CDI cases are subject to this algorithm which is given in section
13.7 Appendix 7. Algorithms to determine the onset status of cases

**Outpatient (type of hospital episode)**
An attendance at an outpatient clinic in an acute trust. This attendance is not recorded in the HES admitted patient care database.

**PHE National infections Service (NIS)**
The directorate within PHE that is responsible for microbiology and epidemiology of infectious diseases. It aims to protect the population in England from infectious disease and reduce the burden of infectious disease.

**PHE Regions**
Provide local support and guidance to NHS organisations within their region.

**Record Owner**
A term used to refer to users who enter and save records onto the HCAI DCS. These are NHS acute trust users or IS provider/IS site users.

**Regular day attender (type of hospital episode)**
A patient admitted electively during the day, as part of a planned series of regular admissions for an on-going regime of broadly similar treatment and who is discharged the same day. If the intention is not fulfilled and one of these admissions should involve a stay of at least 24 hours, such an admission should be classified as an ordinary admission. The series of regular admissions ends when the patient no longer requires frequent admissions.

**Regular night admission (type of hospital episode)**
A patient admitted electively for the night, as part of a planned series of regular admissions for an on-going regime of broadly similar treatment and who is discharged in the morning. If the intention is not fulfilled and one of these admissions should involve a stay of at least 24 hours, such an admission should be classified as an ordinary admission. The series of regular admissions ends when the patient no longer requires frequent admissions.

**Reporting Pathway**
Refers to a way of mapping reports on the system to the organisations associated with the reporting organisation, i.e. the NHS acute trust or IS Provider making the report. Organisations involved in this pathway are the reporting trust or IS Provider, PHEC and PHE Region. Reports are mapped to a PHEC and PHE Region based on the reporting trust or IS Provider. Note that PHECs and PHE Regions are able to view Reporting and Commissioning Pathways.

**Reporting Region**
The PHE Region (London, Midlands and East of England, North of England, South of England) within which the Reporting Organisation (NHS acute trust or IS Provider Site) is located. Each MRSA, MSSA, Gram-negative bacteraemia and CDI report, and each QMLR record has a Reporting Region associated with it. For any given report of MRSA, MSSA, Gram-negative bacteraemia and CDI the Reporting and Commissioning Regions may be the same or may be different. For example a report of MRSA could be made by a trust in London for a patient presenting at a London Reporting Organisation. If the patient was also traced to a CCG in the
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London Commissioning Region then the Reporting and Commissioning Regions would be the same. However, if the patient was traced to a CCG in another Commissioning Region (e.g. if the patient lived in Manchester and was visiting London when presenting to a London Reporting Organisation) then the Reporting and Commissioning Regions would differ.

**Reporting Organisation**

The organisation reporting the case of MRSA, MSSA, Gram-negative bacteraemia or CDI or QMLR data. The Reporting Organisation is associated with each of the records entered onto the system based on the user’s login details, thus by default each record on the HCAI DCS has a Reporting Organisation associated with it. All cases are currently reported by NHS acute trusts or IS Provider sites.

**Sign-off**

When the Reporting Organisation’s CEO/Sign-off authority declares that the data submitted on the DCS is correct by using the sign-off feature on the HCAI DCS. After data is signed-off it is ‘locked’ and cannot be amended by users without first contacting PHE, as per the Unlock Request User Guide

**Soundex**

Encrypted version of a surname. A soundex takes the form of a letter followed by 3 numbers. In the context of the HCAI DCS, when a patient’s surname is entered onto the system it is automatically converted into a soundex

**STP (Sustainability and Transformation Partnership)**

NHS organisations responsible for collaborating between local NHS organisations and local government

**Unlock request**

A request made by a record owner (Reporting Organisation) to unlock records which have been signed-off in order to make amendments, or add or delete records. See CEO sign-off and unlock requests
4. Introduction

Public Health England (PHE) maintains an enhanced reporting system for Meticillin Resistant Staphylococcus aureus (MRSA) bacteraemia, Meticillin Susceptible Staphylococcus aureus (MSSA) bacteraemia, Gram-negative (Escherichia coli, Klebsiella spp. and Pseudomonas Aeruginosa) bacteraemia and Clostridioides difficile infection (CDI).

A series of letters from the Chief Medical Officer (CMO) introduced the mandatory requirements for National Health Service (NHS) acute trusts to report each case of MRSA bacteraemia (effective from 1st of October 2005), MSSA bacteraemia (effective from 1st January 2011), E. coli bacteraemia (effective from 1st June 2011) and CDI (effective from 1st April 2007) that fulfil the case definitions (see Inclusion criteria for reporting to the surveillance system) to this system.\(^1\)\(^-\)\(^5\) The Health and Social Care Act 2008 and the Code of Practice on the prevention and control of infections and related guidance provided a requirement for NHS trust Chief Executives to report all cases of MRSA, MSSA, CDI and E. coli to PHE.\(^6\)\(^7\)

From April 2010 Independent Healthcare Sector (IS) Providers treating NHS patients were mandated to report cases of MRSA bacteraemia and CDI fulfilling the same case definitions. MSSA bacteraemia (effective from 1st January 2011) and E. coli bacteraemia (effective from 1st June 2011) surveillance was added later. From October 2010 all IS Providers required to register with the Care Quality Commission were obliged to undertake surveillance of Health Care Associated Infections (HCAI). These requirements were reinforced in the Competition and Markets Authority Order 2014 which reiterated the requirement to provide patient-level information on facility-acquired infection rates.\(^8\) These providers can report cases to PHE.

From April 2017 a government initiative extended the surveillance of bacteraemias caused by Gram-negative organisms to include Klebsiella species and P. aeruginosa in addition to the existing E. coli collection with the intention of reducing such infections by 50% by 2021.
5. The HCAI Data Capture System

The enhanced surveillance system, hereafter HCAI Data Capture System (HCAI DCS), captures information on each MRSA, MSSA and Gram-negative bacteraemia, and CDI case in order to give trusts and IS Providers a more accurate picture of their situation allowing targeted intervention in problem areas and to contribute to building a better evidence base regarding risk factors for infection.

The HCAI DCS allows the following:

- Reports to be entered in ‘real time’ as they occur;
- Authorised trust/IS Provider users to download patient level data for cases they have entered;
- All users to download tables of aggregated data on the system;
- All bacteraemia and CDI cases to be separated into ‘Hospital-onset’ (i.e. cases that are considered to have been acquired in that trust during that admission) and ‘Community-onset’ (i.e. cases that are not thought to have been acquired in that trust during that admission). See
• 13.7 Appendix 7. Algorithms to determine the onset status of cases for more information.

• All cases to be attributed to a CCG via the tracing process. The HCAI DCS does not currently require patient CCG details to be recorded for any MRSA, MSSA, Gram-negative bacteraemia or CDI cases. To obtain these data, patient name, sex, NHS number and date of birth are submitted to the Health and Social Care Information Centre on a daily basis to identify patient GP details and patient residential postcode, and patients are attributed to a CCG based on this process. More details about CCG attribution can be found in 13.6 Appendix 6. CCG Attribution Process

• Enhanced data (e.g. data on risk factors and causes) on these HCAIs to be collected. This enables better understanding of the epidemiology behind these infections and helps to develop and monitor interventions to reduce their incidence. More details on the risk factor data collected can be found in 13.2 Appendix 2: Risk factor data to be collected

Please note that the quarterly mandatory laboratory return (QMLR) surveillance scheme, collecting aggregate information, continues to operate independently of this enhanced scheme and as such this information must also be completed using the facility within the HCAI DCS. Details of the QMLR surveillance scheme are provided in 13.9 Appendix 9. Quarterly mandatory laboratory returns (QMLRs).
Mandatory Enhanced MRSA, MSSA and Gram-negative bacteraemia, and *C. difficile* surveillance

Figure 1: The front page of the HCAI DCS
6. Inclusion criteria for reporting to the surveillance system

This reporting guidance applies to English NHS acute trusts and the Independent Sector.

Acute trusts are responsible for ensuring that all specimens tested at their trust and meeting the inclusion criteria are reported to the DCS. This includes specimens taken from other trusts or in community settings. Where one acute trust or associated pathology laboratory tests specimens for another trust, local service level agreements should be in place to allow the trust where the specimen was taken to report the case to the DCS. In the case of specimens taken in the community, cases should be reported by the trust where the testing laboratory is located, except where local service level agreements exist. The trust where a laboratory is located is determined by the Parent Organisation Code for the testing laboratory in the ODS file eplab.

6.1 Changes to microbial taxonomy

Over time, the understanding of how bacterial species are classified changes as diagnostic methods improve. As a general principle, the surveillance will start to include cases of bacteraemia if a bacterial species in one genus is reclassified to a genus under surveillance. Organisms under surveillance which are reclassified to a different taxon will remain under surveillance to maintain consistent time trends.

The following changes in taxonomy have occurred during the period of surveillance:

- In 2015, two species of *Staphylococci* (*Staphylococcus schweizeri* and *Staphylococcus argenteus*) which are phenotypically identical to *S. aureus* were identified. The three species together form the *S. aureus*-related complex and all are covered by the surveillance.  

- In 2016, *Clostridium difficile* was reclassified as *Clostridoides difficile*. Although *Clostridium difficile* remains in widespread use in the scientific literature other organisations performing surveillance of *C. difficile* have adopted the new name (including the ECDC in Europe and the CDC in the USA). We have therefore adopted the new name.  

- In 2017, *Enterobacter aerogenes* was reclassified to *Klebsiella aerogenes*. *K. aerogenes* was eligible for surveillance from April 2017 and trusts which identify isolates on or after 01/04/2017 are expected to report them as *K. aerogenes*.

6.2 MRSA bacteraemia

The following blood cultures positive for *S. aureus*-related complex organisms (*S. aureus*, *S. argenteus* and *S. schweizeri*) must be reported to PHE:

- All cases of bacteraemia caused by *S. aureus*-related complex bacteria resistant to meticillin, oxacillin, cefoxitin or flucloxacillin
- All cases of bacteraemia caused by *S. aureus*-related complex bacteria which are positive for *mec*-A or *mec*-C.

Exclusions

- Cases identified post-mortem are excluded
6.3 MSSA bacteraemia
The following blood cultures positive for *S. aureus*-related complex bacteria must be reported to PHE:

- All cases of bacteraemia caused by *S. aureus*-related complex bacteria which are not resistant to meticillin, oxacillin, cefoxitin, or flucloxacillin i.e. not subject to MRSA reporting

Exclusions
- Cases identified post-mortem are excluded

Notes
Isolates that are highly resistant to meticillin but are mec-A or mec-C-negative are an anomaly and should be investigated with possible referral to the national reference laboratory.

6.4 Gram-negative bacteraemia
Blood cultures positive for the following organisms must be reported to PHE

- All laboratory confirmed cases of *E. coli* bacteraemia
- All laboratory confirmed cases of *Klebsiella* spp. (including *Klebsiella aerogenes* formerly in the *Enterobacter* genus) bacteraemia
- All laboratory confirmed cases of *P. aeruginosa* bacteraemia

Exclusions
- Cases identified post-mortem are excluded

6.5 *C. difficile* infection
Any of the following defines a *C. difficile* infection in patients aged 2 years and above and must be reported to PHE:

- Diarrhoeal stools (Bristol Stool types 5-7) where the specimen is *C. difficile* toxin positive*

- Toxic megacolon or ileostomy where the specimen is *C. difficile* toxin positive*

- Pseudomembranous colitis revealed by lower gastro-intestinal endoscopy or Computed Tomography

- Colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea or toxin detection) on a specimen obtained during endoscopy or colectomy
• Faecal specimens collected post-mortem where the specimen is \textit{C. difficile} toxin positive or tissue specimens collected post-mortem where pseudomembranous colitis is revealed or colonic histopathology is characteristic of \textit{C. difficile} infection

Please note: In contrast to other collections, \textit{C. difficile} infections identified post-mortem are included.

Current guidelines* recommend a combination of two tests (first; toxin gene detection by NAAT or GDH EIA, second; a sensitive toxin EIA test) for the diagnosis of CDI.

* DH/ARHAI guidance which incorporates \textit{C. difficile} testing recommendations

For additional information, please refer to the Frequently Asked Questions (13.11 Appendix 11. Frequently Asked Questions).

6.6 Episode categories
The DCS allows for three different episode types; new infection, continuing infection, a repeat infection or relapsing infection.

• \textbf{New infection} – Infection in patient with no known history of bacteraemia or CDI caused by organism of interest,
  or
  Patient has previously had an episode of bacteraemia (or CDI as appropriate) but more than three months have elapsed since its resolution and there have been no positive specimens in the intervening time
• \textbf{Continuing infection} – New episode of infection (> 14 for bacteraemia or 28 days for CDI since first positive specimen) without negative tests in between samples
• \textbf{Repeat/relapsing infection} – New episode of infection (> 14 for bacteraemia or 28 days for CDI since first positive specimen) with negative tests between first positive sample and most recent positive sample

6.7 Quarterly Mandatory Laboratory Returns
The following must be reported to PHE:
• Total number of blood culture sets examined
• Total number of positive blood culture sets
• Total number of \textit{S. aureus}-positive blood culture sets
• Total number of Glycopeptide-Resistant Enterococci (GRE) positive blood culture episodes
• Total number of stool specimens examined
• Total number of stool specimens tested for diagnosis of \textit{C. difficile} infection. A two-stage test of GDH and toxin counts as a single test, as does a NAAT for toxin gene followed by a toxin EIA
• Total number of \textit{C. difficile} toxin positive reports in people \( \geq 65 \) years old
• Total number of *C. difficile* toxin positive reports in people between 2 and 64 years old
• Total number of faecal specimens and rectal swabs taken for CPE screening

Table 6.1: Definitions of data items for Quarterly Mandatory Laboratory Returns

<table>
<thead>
<tr>
<th>Laboratory finding</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of blood culture sets</td>
<td>A sample arising from a single venipuncture, irrespective of number of bottles tested</td>
</tr>
<tr>
<td>Total number of positive blood culture sets</td>
<td>All samples positive for bacterial growth, including repeat specimens and contaminants</td>
</tr>
<tr>
<td>Total number of <em>S. aureus</em>-positive blood culture sets</td>
<td>Excludes repeat specimens within a 14-day episode</td>
</tr>
<tr>
<td>Total number of Glycopeptide-Resistant Enterococci (GRE) positive blood culture episodes</td>
<td>Excludes repeat specimens within a 14-day episode. GRE episodes should be reported at a genus level and concurrent reports of different species within the Enterococcus genus do not constitute separate episodes</td>
</tr>
<tr>
<td>Total number of stool specimens examined</td>
<td>All stools, not limited to those that can be classified according to Bristol Stool Chart. Also includes those stool samples used for <em>C. difficile</em> toxin testing.</td>
</tr>
<tr>
<td>Total number of <em>C. difficile</em> toxin tests carried out</td>
<td>All <em>C. difficile</em> tests performed, positive and negative. Includes duplicates</td>
</tr>
<tr>
<td>Total number of <em>C. difficile</em> toxin positive reports in people ≥ 65 years old</td>
<td>Total number of <em>C. difficile</em> episodes in people ≥ 65 years old. Excludes multiple samples within same 28-day episodes</td>
</tr>
<tr>
<td>Total number of <em>C. difficile</em> toxin positive reports in people between 2 and 64 years old</td>
<td>Total number of <em>C. difficile</em> episodes in people 2 to 64 years old. Excludes multiple samples within same 28-day episodes</td>
</tr>
<tr>
<td>Total number of faecal specimens and rectal swabs taken for CPE screening</td>
<td>The total number of faecal specimens and rectal swabs taken at a trust with the purpose of identifying CPE carriage. If not possible to distinguish rectal and perineal swabs, report total number of swabs.</td>
</tr>
</tbody>
</table>

6.8 Method of reporting data on the HCAI DCS

The HCAI DCS is a web portal designed by PHE to facilitate the collection of the enhanced data set.
The HCAI DCS can be accessed at the following URL: https://hcaidcs.phe.org.uk/WebPages/GeneralHomePage.aspx
For complete guidance on the HCAI DCS please refer to the User Manuals which are available using the link above under the section 'Help & Support'. A password to the HCAI DCS is not required to view the documentation.

Access to the HCAI DCS is regulated by a system of differing user roles which grant different levels of access, as described in the user roles and permissions user guide. Access to the HCAI DCS can be requested by following the ‘Request’ link on the front page of the HCAI DCS. Local administrators will approve account requests for all users in their organisation. User accounts will be requested based on different roles which will give the user different permissions on the system. User roles are detailed in Table 4.2 below:

<table>
<thead>
<tr>
<th>Role</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Administrator</td>
<td>Full access to the system. Able to authorise requests for local administrator accounts. National team responsible for mandatory surveillance only.</td>
</tr>
<tr>
<td>Local Administrator</td>
<td>Able to authorise local accounts. Unable to perform data entry or export line listing reports</td>
</tr>
<tr>
<td>Sign Off Authority</td>
<td>Able to sign off monthly data collections. Unable to perform data entry.</td>
</tr>
<tr>
<td>Data Entry</td>
<td>Creates new cases on system. Can edit saved cases. Only role that can view ‘Find duplicates’ report.</td>
</tr>
<tr>
<td>Read Only (PII)</td>
<td>Read access only, PII not visible.</td>
</tr>
<tr>
<td>Read Only (No PII)</td>
<td>Read access only, PII visible.</td>
</tr>
<tr>
<td>Renal Data Entry</td>
<td>Able to edit data on cases shared with renal unit</td>
</tr>
<tr>
<td>Renal Read Only (No PII)</td>
<td>Able to view data on cases shared with renal unit. PII not visible.</td>
</tr>
<tr>
<td>Renal Read Only (PII)</td>
<td>Able to view data, including PII on cases shared with renal unit.</td>
</tr>
<tr>
<td>PIR Data Entry User</td>
<td>Can edit PIR tabs on existing cases. Unable to view PIR case summary.</td>
</tr>
<tr>
<td>PIR Assignment</td>
<td>Able to perform assignment of PIR case. Unable to enter or edit PIR data. Can view PIR case summary.</td>
</tr>
<tr>
<td>PIR Arbitrator</td>
<td>Able to perform arbitration of PIR case. Unable to enter or edit PIR data. Can view PIR case summary.</td>
</tr>
<tr>
<td>PIR View Only</td>
<td>Can view PIR case summary. Unable to enter or edit PIR data.</td>
</tr>
<tr>
<td>CCG Data Entry Role</td>
<td>Can view PIR case summary. Unable to enter or edit PIR data.</td>
</tr>
<tr>
<td></td>
<td>Can edit the Risk Factors tab only on existing Gram-negative cases.</td>
</tr>
</tbody>
</table>

DPH and Local Authority roles do not have PII privileges and are unable to view PII on the HCAI DCS.

Trusts using the website have access to all the data they have entered, which enables them to assess their burden of these HCAIs. This allows trust-to-trust comparisons. CCGs, Local Authorities, Directors of Public Health (DPH), NHS Area Teams, Field Epidemiology, PHE Region and PHE Centres are also able to have accounts and will be able to view cases mapped to their organisations.
7. Data collection question layout

The HCAI DCS separates common questions/fields into groups on separate tabs within a record i.e. questions about the source of bacteraemia can be found on the risk factors tab (see Figure 2). Fields and tabs vary between organism collections; e.g. Gram-negative bacteraemia and CDI have different fields in the Risk Factors tab.

Fields regarding the infection episode itself are grouped together on the Episode Details tab, which is common across all organism collections. Within this tab, there are fields that are mandatory for completion and optional for completion. Mandatory fields are further subdivided into mandatory for sign-off and mandatory for saving. Fields that are mandatory for saving must be completed in order for a record to be saved. Fields that are mandatory for sign-off must be completed in order for the CEO/sign-off authority to complete the sign-off. Further details about data items can be found in 13.1 Appendix 1. Episode details to be collected and 13.2 Appendix 2: Risk factor data to be collected and also in the Case Capture User Guide.

Figure 2: HCAI DCS showing tabs for MRSA data collection.
8. Renal records

The HCAI DCS is designed to allow capture of data on patients with established renal failure and receiving dialysis. The data model provides for two modes of access to data. A record is ‘owned’ by the reporting organisation, and then ‘shared’ with the renal unit responsible for providing renal care. Renal units can enter data on the ‘Renal’ tab within a case screen but will not be able to add or edit data on any of the other tabs.

Once a record has been shared with a renal unit, registered users within the unit will receive an email notification that the record has been shared with the unit.

Details about the data items collected under the renal tab are described in 13.5 Appendix 5: Renal data items. Instructions on sharing and entering renal data can be found in the Case Capture Renal User Guide.
8. Deadline for entering and signing-off data

The deadline for entering and signing-off data is the same for both the NHS and Independent Sector. All cases with specimen dates during a specific month must be entered onto the website by the 15th of the following month. The month’s data must then be signed-off by the an individual who has sufficient authority and the correct user role (usually a trust’s Chief Executive Officer (CEO) or senior individual other than the CEO for Independent Sector organisations) by the 15th of every month. For example, data concerning specimens collected in October must be entered and signed-off by the 15th of November.

QMLR data for each 3 month period must be submitted within 6 weeks of the end of the data collection period (up to and including 14th). After this point the dataset is automatically locked and it is not possible to enter further data.

Once a period has been signed-off, it will not be possible to edit the episode details and renal tabs of a record, or to add or remove cases from the system. It is possible to request that a period or record is unlocked. The process for requesting an unlock is described in the Unlock Request User Guide.
9. CEO sign-off and unlock requests

9.1 CEO sign-off

The mandatory surveillance data for healthcare associated infections must be signed-off on a monthly basis. This is the responsibility of the Chief Executive Officer (CEO) of an NHS acute trust or the ‘authorised person’ for Independent Sector Healthcare Providers (where the ‘authorised person’ is defined as a senior manager within the organisation who has been given the responsibility to sign off the data).

This process was introduced in order to make sure the data has been verified and is accurate. It is the personal responsibility of the CEO or ‘authorised person’ to make sure that the data returns are accurate, complete and that they are submitted on time, as mandated by the Chief Medical Officer (CMO) and the Department of Health.

This process provides reassurance that data that are included in a period which has been signed-off by an NHS acute trust’s CEO or an Independent Sector Healthcare Provider’s ‘authorised person’ are valid. Features within the new HCAI DCS allow you to differentiate between signed-off and unsigned-off periods of data, by filtering data returned in various reports and in the Summary dashboard ‘Summary’ and ‘Trends’ graphical elements.

Figure 3: Sign-off history in the Summary dashboard of the DCS
9.2 Identification of duplicate records

Prior to sign-off records should be check to ensure duplicate entries have not been made. The ‘Find duplicates’ report will identify duplicated records based on a configurable selection of criteria including NHS number, date of birth, surname soundex, specimen date, specimen number and hospital number. Identified duplicates should be double checked and deleted prior to sign-off if the records are confirmed as true duplicates. Note, for users using manual data entry the system will also flag possible duplicate entries for cases reported by their organisation on attempting to save a record.

9.3 Sign-off process

In order to be able to sign-off a data period, all of the records within that period need to be complete. This means that every record for a data collection that you wish to sign-off needs to have every mandatory field completed. Mandatory fields are denoted in the DCS with a red * or # symbol.

Once all of the records for the data collection(s) to be signed-off have had all of their mandatory fields completed, users will be able to sign-off the data for the period. The CEO or sign-off authority should then log in to the DCS and use the ‘Sign-Off Episodes’ functionality to approve the data for the month. The sign-off process is detailed in the Sign-off User Guide. Once a reporting period has been signed-off for an organisation it will become locked, i.e. signing off a month will lock it no additional cases will than be able to be added to that month nore will cases be able to be removed with out requesting an unlock.

9.4 Unlock requests

Unlock requests serve two purposes:
- To allow the modification of a record, such as to add data to or amend mandatory fields in the record, and
- To allow the reporting of additional cases or deletion of incorrectly reported cases.

Unlock requests should be sent by email to mandatory.surveillance@phe.gov.uk. Requests should come from the reporting organisation and should copy in the CEO for amendment requests, or come from the CEO for deletion/addition requests. The email should detail the organism, month, type of change and reason for unlock and the case id generated by the HCAI DCS.

Unlock requests should not include any PII such as patient name, date of birth or NHS number in unlock requests.

Unlock requests for QMLR data do not need to come from the CEO/sign-off authority and do not need to copy in the CEO/sign-off authority.

Detailed guidance on the unlock process, can be found in the Unlock Requests User Guide.
10. Denominator data

10.1 NHS

NHS acute trust-level population data does not currently exist in England as NHS acute trusts do not treat patients within defined geographical boundaries. Therefore, a suitable proxy for population is required in order to calculate Hospital-onset rates. The occupied overnight beds (from the national KH03 dataset) provides the daily average overnight bed occupation for a specific time period; full financial years for 2007/08 to 2009/10 and by quarter for financial years 2010/11 to 2014/15. This dataset is an open access return published by NHS England and provides a measure of clinical activity in each trust. Data for the most recently published quarter may be used to substitute values for the current surveillance quarter in instances where later data is yet to be released/published (e.g. substituting data from 2014/15 for 2015/16).

If any KH03 data for an individual trust is more than 20% higher or lower than both the previous quarter and the same quarter in the previous year, then NHS Patient Safety will be informed.

If any KH03 data are missing, the same quarter in the previous year are used.

In the Official Statistics published from the surveillance the specific quarter is used to get the most accurate results. In contrast, the DCS needs to be able to calculate rates over any time period and the denominator data is therefore slightly different. For definitive rates and counts always refer to the official statistics not DCS reports.

KH03 data is downloaded from the NHS England website, as it is for the Official Statistics reports; however, data is then scaled up to the total number of occupied overnight beds for a given financial year. This is then uploaded to the HCAI DCS. Then, in order for the system to calculate a rate for a specific time period, the total occupied overnight beds for the financial year is divided by the number of days in the financial year and then multiplied by the number of days in the time period in question. For example, in order to calculate the number of occupied overnight beds for January 2014 you would follow equations (1) and (2):

\[
\text{Number of occupied overnight beds for January 2014} = \left( \frac{\text{Total occupied overnight beds in financial year 2013/14}}{ \text{Total number of days in financial year 2013/14}} \right) \times \text{Total number of days in January 2014} \quad (1)
\]

\[
\text{Number of occupied overnight beds for January 2014} = \frac{34327781}{365} \times 31 \text{ days} = 2915510 \quad (2)
\]

As the data starts off as a financial year as opposed to a quarter, any seasonal differences in bed day values are removed and so the rates will be slightly different.
NB. The rates produced by the HCAI DCS should be used as an estimate only, please see the official outputs on the PHE gov.uk pages for the actual infection rates. In addition, if you wish to use rates from the DCS for organisations other than your own please contact us at mandatory.surveillance@phe.gov.uk for confirmation that the rates are accurate and suitable to be used for more than an estimate.

10.2 Independent Sector

The denominator used for IS providers is a combination of bed days per year plus the number of discharges per year. This denominator is more appropriate for short-stay facilities with higher numbers of day patients. Further information on IS denominator calculation can be found in Appendix 13.12.

Data on bed days and discharges are directly supplied by IS providers to PHE on an annual basis for the most recent financial year. Currently the IS site-based denominators are not collected.

10.3 Geographic population denominators

Various organisations (CCGs, NHS local offices, NHS regional teams) have defined geographical boundaries. As a result, patient populations can be estimated for each of the geographical organisations. The Office for National Statistics provides mid-year population estimates and so rates can be calculated per 100,000 population for these organisations.
11. Analysis of data

11.1 NHS Official Statistics

Different reports can be obtained from the HCAI DCS on demand, depending on the user’s role. Please note PHE publish data tables on a regular basis. These outputs are classed as ‘Official Statistics’ and as such constitute the final monthly/annual position. These reports should be used as the benchmark against which individual numbers can be compared.

11.1.1 Monthly report outputs

The following NHS data are produced by PHE each month:

**MRSA bacteraemia:**
- Monthly MRSA counts by onset status

**MSSA bacteraemia:**
- Monthly MSSA counts by onset status

**E. coli bacteraemia:**
- Monthly counts of E. coli bacteraemia by onset status

**Klebsiella species bacteraemia:**
- Monthly counts of Klebsiella spp. bacteraemia by onset of infection

**Pseudomonas aeruginosa bacteraemia:**
- Monthly counts of P. aeruginosa bacteraemia by onset of infection

**CDI:**
- Monthly CDI counts in patients aged 2 years and over by prior healthcare trust exposure

11.1.2 Quarterly report outputs

The following data are produced by PHE each quarter:

- Epidemiological commentaries on MRSA, MSSA and Gram-negative bacteraemia and CDI by financial quarter, from the start of surveillance for each collection. The exact content of these commentaries will differ each quarter; however the following standard analyses will be produced
  - Count and rate of total cases over time for bacteraemia and CDI
  - Counts and rates of ‘Hospital-onset’ cases over time for all bacteraemia and CDI
11.1.3 Annual report outputs

The following outputs using NHS data are produced by PHE annually:

- Annual epidemiological commentary on MRSA, MSSA, Gram-negative bacteraemia and *C. difficile* infection.
- Annual counts and rates by financial year for MRSA, MSSA and Gram-negative bacteraemia and CDI. Data are presented at both trust and CCG level.

11.2 Independent Sector report outputs

The following IS data are produced by PHE every year:

- Counts and rates of MRSA, MSSA and Gram-negative bacteraemia and CDI by IS organisation
12. Contact us

If there are any outstanding queries after reading this protocol or the user guides please contact us:

For queries regarding the surveillance or its’ outputs from PHE and NHS organisations please email: mandatory.surveillance@phe.gov.uk

For questions regarding the use of the DCS, please email support.hcaidcs@phe.gov.uk

For questions regarding the PIR process, please email pir.hcai@phe.gov.uk

For queries from the Independent Sector please email: independentsector@phe.gov.uk

Telephone: 020 8327 7000 – ask to be put through to the HCAI department

Please note that automatic emails generated by the HCAI DCS come from the hcai.dcs@phe.gov.uk email address. Emails to this address are not monitored and will not be replied to.
13. Appendices

13.1 Appendix 1. Episode details to be collected

The following table provides detailed information about the data items to be collected regarding the details of the infection episode, including whether the data are mandatory and the rationale for including the data collection on the system. Details about the risk factor data collected are in the next section (13.2 Appendix 2: Risk factor data to be collected).

Table 13.1: Properties of data items included in core data set.

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisation Details</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting organisation</td>
<td>Automatic</td>
<td>Identifies the organisation (trust) reporting the case.</td>
</tr>
<tr>
<td>Attributed Organisation</td>
<td>Automatic</td>
<td>CCG responsible for commissioning the patient’s care</td>
</tr>
<tr>
<td><strong>Specimen Details</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specimen Date</td>
<td>Mandatory</td>
<td>When the specimen was taken or was received in the laboratory. Useful when assessing timing of detection. Date specimen taken is preferred over date received in laboratory.</td>
</tr>
<tr>
<td>Type of Specimen Date</td>
<td>Mandatory</td>
<td>Specifies whether the specimen date refers to when the sample was take or received in the laboratory.</td>
</tr>
<tr>
<td>Specimen No</td>
<td>Optional</td>
<td>A unique identifier for the specimen.</td>
</tr>
<tr>
<td>Laboratory where specimen processed</td>
<td>Optional</td>
<td>Laboratory providing diagnostics on specimen. Provides a useful identifier.</td>
</tr>
<tr>
<td><strong>Patient Details</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NHS Number</td>
<td>Mandatory</td>
<td>Unique identifier for each individual patient. Allows tracing and attribution to a CCG. Can be used to identifying duplicate records for the same individual.</td>
</tr>
<tr>
<td>Forename</td>
<td>Mandatory</td>
<td>Useful Patient Identifiable Information. Allows tracing. Can be used to identifying duplicate records for the same individual.</td>
</tr>
<tr>
<td>Surname</td>
<td>Mandatory</td>
<td>Useful Patient Identifiable Information. Allows tracing. Used to create soundex. Can be used to identifying duplicate records for the same individual.</td>
</tr>
<tr>
<td>Date of Birth</td>
<td>Mandatory</td>
<td>Useful Patient Identifiable Information. Allows tracing. Allows age calculation and associated age related analyses. Where date of birth is not available the date 01/01/1900 should be</td>
</tr>
</tbody>
</table>
### Field

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Mandatory</td>
<td>Important for epidemiologic analysis</td>
</tr>
<tr>
<td>Hospital Number</td>
<td>Optional</td>
<td>Unique local hospital identifier specific for patient and particular admission, useful in identifying duplicate records for the same individual where other information is missing.</td>
</tr>
<tr>
<td>Episode Category</td>
<td>Optional</td>
<td>Information on whether a particular record is a new infectious episode, a continuing infection or a repeat infection/relapse. Useful for epidemiological categorisation</td>
</tr>
</tbody>
</table>

**Admission Details**

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Location</td>
<td>Mandatory</td>
<td>Where the patient was when the specimen was taken. Used in the algorithm to determine the onset status for bacteraemia and CDI. Also historically used in the algorithm for establishing which organisation should lead on a PIR for a MRSA.</td>
</tr>
<tr>
<td>Trust/Provider</td>
<td>Mandatory</td>
<td>Organisation providing care at time of specimen collection. Only triggered if patient location is NHS acute trust, Non-Acute NHS Provider, Independent Sector Provider, Mental Health Provider.</td>
</tr>
<tr>
<td>Hospital Site</td>
<td>Mandatory</td>
<td>Allows stratification of cases by site. Triggered if Patient Location is any of NHS acute trust, Non-acute NHS Provider, Independent Sector Provider, Mental Health Provider.</td>
</tr>
<tr>
<td>Patient Category</td>
<td>Mandatory</td>
<td>Admission status of patient at time of specimen. Used in the onset status algorithm. See section Patient Categories below for further information. Only triggered if patient location is NHS acute trust, Non-acute NHS Provider, Independent Sector Provider or Mental Health Provider.</td>
</tr>
<tr>
<td>Other Patient Category</td>
<td>Mandatory</td>
<td>Allows completion of detail in other patient categories. Triggered only when Patient Category is Other. Free text field</td>
</tr>
<tr>
<td>Date admitted</td>
<td>Mandatory</td>
<td>Allows calculation of time between admission and onset. Only triggered if patient category is one of</td>
</tr>
<tr>
<td>Field</td>
<td>Completion</td>
<td>Rationale for inclusion</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Mandatory Enhanced MRSA, MSSA and Gram-negative bacteraemia, and <em>C. difficile</em> surveillance</td>
<td>inpatient, outpatient, day patient or emergency assessment.</td>
<td></td>
</tr>
<tr>
<td>Admission Method</td>
<td>Mandatory where triggered</td>
<td>Allows stratification of rates by method of admission. Only triggered where Patient Category is inpatient, day patient, emergency assessment or other.</td>
</tr>
<tr>
<td>Provenance</td>
<td>Optional</td>
<td>Where the patient was prior to arriving at the healthcare facility. Useful for data analysis involving patient history.</td>
</tr>
<tr>
<td>Trust/Provider admitted from</td>
<td>Optional</td>
<td>Allows epidemiological analysis of risk of infection by originating organisation. Only triggered when provenance is Hospital (UK or abroad), Non-Acute NHS Provider, Independent Sector Provider, Mental Health Provider.</td>
</tr>
<tr>
<td>Non-UK Country</td>
<td>Optional</td>
<td>Allows epidemiological analysis of risk of infection by originating country. Only triggered when provenance is Non-UK resident.</td>
</tr>
<tr>
<td>Treatment details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admitted any time during episode</td>
<td>Optional</td>
<td>Provides information on if the patient was admitted at any point during the episode. Useful for data analysis.</td>
</tr>
<tr>
<td>On dialysis</td>
<td>Mandatory</td>
<td>Provides information on whether the patient was on dialysis. Allows record to be shared with renal units.</td>
</tr>
<tr>
<td>Main Specialty</td>
<td>Mandatory where triggered</td>
<td>Allows stratification of counts and rates by Main Specialty. Triggered when Patient Location is NHS acute trust, Non-Acute NHS Provider, Independent Sector Provider or Mental Health Provider.</td>
</tr>
<tr>
<td>Treatment Specialty</td>
<td>Mandatory where triggered</td>
<td>Allows stratification of counts and rates by Treatment Specialty. Triggered when Patient Location is NHS acute trust, Non-Acute NHS Provider, Independent Sector Provider or Mental Health Provider.</td>
</tr>
<tr>
<td>Augmented Care</td>
<td>Mandatory where triggered</td>
<td>Allows stratification of counts and rates by type of augmented care unit. Triggered when Patient Location is NHS acute trust, Non-Acute NHS Provider, Independent Sector Provider or Mental Health Provider.</td>
</tr>
</tbody>
</table>
Mandatory Enhanced MRSA, MSSA and Gram-negative bacteraemia, and C. difficile surveillance

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comments</td>
<td>Optional</td>
<td>Free text field for comments regarding case, please refrain from putting patient identifiable information in this field.</td>
</tr>
</tbody>
</table>

**Patient categories**

- **Inpatient** – a patient admitted to hospital with the intent to stay overnight at the time the specimen was taken.
- **Outpatient** – a patient who is not admitted and was receiving outpatient care at the time the specimen was taken.
- **A&E only** – a patient who was receiving care in an A&E department when the specimen was taken irrespective of whether they were subsequently admitted.
- **Emergency assessment** – a patient admitted to an Emergency Assessment Unit (EAU).
- **Regular attender** – a patient admitted electively, as part of a planned series of regular admissions for an on-going regime of broadly similar treatment and who is discharged the same day.
- **Day patient** – patients who were attending a hospital as a day case when the specimen was taken. A day patient is a patient admitted electively during the course of a day with the intention of receiving care who does not require the use of a Hospital Bed overnight. If this original intention is not fulfilled and the patient stays overnight, such a patient should be counted as an Inpatient.
- **Other** - Any subsequent location of the patient after the sample was taken is not relevant here (for example if the patient was admitted after having a sample taken in A&E, the patient category is still “A&E only”)

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### 13.2 Appendix 2: Risk factor data to be collected

The following table provides detailed information about the risk factor data to be collected using the HCAI DCS, including whether the data are mandatory and the rationale for including the data collection on the system. Details about the episode details data collected are in the preceding section (13.1 Appendix 1. Episode details to be collected).

Table 13.2: Risk factor fields for CDI

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Best estimate of date of onset of diarrhoea</td>
<td>Optional</td>
<td>Allows analysis of time between onset of diarrhoea, admission, date sample taken etc.</td>
</tr>
<tr>
<td>Was patient on antimicrobials when specimen was taken?</td>
<td>Optional</td>
<td>Antibiotic therapy is an important risk factor for <em>C. difficile</em> infection.</td>
</tr>
<tr>
<td>Select antimicrobials when specimen was taken</td>
<td>Mandatory if triggered</td>
<td>Allows analysis of which antimicrobials result in increased risk of <em>C. difficile</em> infection.</td>
</tr>
<tr>
<td>Was patient on any other antimicrobials in the preceding 7 days</td>
<td>Optional</td>
<td>Antibiotic therapy is an important risk factor for <em>C. difficile</em> infection.</td>
</tr>
<tr>
<td>Select antimicrobials in the preceding 7 days</td>
<td>Mandatory if triggered</td>
<td>Allows analysis of which antimicrobials result in increased risk of <em>C. difficile</em> infection.</td>
</tr>
<tr>
<td>Was the specimen sent for typing?</td>
<td>Optional</td>
<td>Allows linkage with Clostridium difficile ribotyping network (CDRN) data.</td>
</tr>
<tr>
<td>Specimen category</td>
<td>Mandatory if triggered</td>
<td>Allows linkage with Clostridium difficile ribotyping network (CDRN) data.</td>
</tr>
</tbody>
</table>
Table 13.3: Risk factor fields for Gram-negative collections (*E.coli, Klebsiella, P. aeruginosa*)

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary focus of bacteraemia</td>
<td>Mandatory</td>
<td>Provides information about organ system in which bacteraemia arose.</td>
</tr>
<tr>
<td>Urinary catheter in last 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Urinary catheter inserted, removed or manipulated 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Vascular device inserted, removed or manipulated 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Intubated (ET or PT) or extubated 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Surgery (30 days or 12 months prosthetic material) prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Minimally invasive surgery</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Hepatobiliary procedure (ERCP or MRCP) 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>UTI treatment 28 days prior to onset</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Open wounds or ulcer in prior 28 days</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Open wounds or ulcer prior 28 days</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Diabetic foot ulcer or infection 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Absolute neutrophil count less than 500 (0.5) at time</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Has the patient been on anti-cancer chemotherapy in 28 days prior</td>
<td>Voluntary</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors. Defined as Systemic Anti-Cancer treatments (SACT) including all forms of chemotherapy agents, plus any biological therapies, used in the treatment of cancer. Biological therapies include immunotherapies and monoclonal antibodies. There are several monoclonal antibodies used outside of cancer treatment which are not included in this group</td>
</tr>
<tr>
<td>Prostate biopsy in 28 days prior</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Number of antibiotic</td>
<td>Mandatory, if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
</tbody>
</table>
Completing primary focus of bacteraemia will trigger further risk factor questions. These risk factor questions are all mandatory dropdown boxes when triggered and are defined in 13.2.2 Definitions of risk factors for Gram-negative collections (E. coli, Klebsiella, P. aeruginosa).

* Up to 5 sets of antibiotics can be entered against each case.
## Table 13.4: Risk factor and treatment fields for MRSA and MSSA

<table>
<thead>
<tr>
<th>Field</th>
<th>Completion</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Were there any pre-disposing risk factors for the bacteraemia</td>
<td>Optional</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Peripheral IV device</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Central IV device</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Surgical wound</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Assisted ventilation</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Assisted ventilation (Current)</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Assisted ventilation (Past 7 days)</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Urinary catheter</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Liver disease</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Prosthesis</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Person who injects drugs</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Immunosupressed</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Diabetic</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Other</td>
<td>Mandatory if triggered</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Prior S. aureus history</td>
<td>Optional</td>
<td>Allows assessment of risk posed by prior history of S. aureus infection</td>
</tr>
<tr>
<td>When</td>
<td>Mandatory if triggered</td>
<td>Allows classification of prior S. aureus infection</td>
</tr>
<tr>
<td>Has the patient been on anti-cancer chemotherapy in 28 days prior to specimen date?</td>
<td>Voluntary</td>
<td>Allows epidemiologic analysis of trends behind infection risk factors</td>
</tr>
<tr>
<td>Treatment of bacteraemia</td>
<td>Optional</td>
<td>Allows assessment of trends in S. aureus bacteraemia treatements. Includes an ‘Other’ option, which will trigger a free-text field.</td>
</tr>
<tr>
<td>If Other treatment</td>
<td>Mandatory if triggered</td>
<td>Provides opportunity to identify other risk factors for bacteraemia</td>
</tr>
</tbody>
</table>
13.2.1 Definitions of risk factors for MRSA or MSSA

Vascular device: Any device inserted into peripheral or central vascular sites, up to 14 days prior to infection, with the intention of being left in situ for >1 hour. Excludes intravenous injections or venepuncture for blood samples.

Surgical wound: The patient had an unhealed wound at time of onset of bacteraemia.

Assisted ventilation: Any mechanical ventilation through a tracheostomy or by endotracheal intubation.

Note: Lung expansion devices such as intermittent positive-pressure breathing (IPPB); nasal positive end-expiratory pressure (PEEP); and continuous nasal positive airway pressure (CPAP, hypoCPAP) are not considered ventilators unless delivered via tracheostomy or endotracheal intubation (e.g., ET-CPAP).

Neutropaenia: absolute neutrophil count < 1500 per microliter.

Wound/ulcer: A break in the skin or mucus membrane of sufficient depth to have caused bleeding. Ulcers are wounds that have failed to heal with necrosis of involved tissues.

Urinary catheter: Urinary catheter inserted and left in for any duration up to 14 days prior to the date of onset of infection.

Prosthesis: Prosthesis or implant intended to be left in for >1 day, inserted within 1 year of onset of infection. e.g. pacemaker, surgical mesh or patch, aortic valve replacement, surgical drain.

Person who injects drugs: Patient injects non-medically sanctioned psychoactive, including but not limited to, opioids, amphetamines and cocaine. Injection may be through intravenous, intramuscular, subcutaneous or other routes. Does not include injectors of non-psychoactive drugs such as steroids for body shaping or improving athletic performance.

Immunosuppressed: The patient has received therapy that suppresses resistance to infection, e.g. immunosuppression, chemotherapy, radiation, long-term or recent high dose steroids, or has a disease that is sufficiently advanced to suppress resistance to infection, e.g. leukaemia, lymphoma, AIDS.

Diabetic: Patient has ever had a diagnosis of type I or type II diabetes.
13.2.2 Definitions of risk factors for Gram-negative collections (*E. coli*, *Klebsiella*, *P. aeruginosa*)

Urinary catheter: Urinary catheter present in the 28 days prior to the onset of infection.

Urinary catheter manipulated in last 28 days: Whether urinary catheter had been manipulated for clinical purpose in 28 days prior to the onset of infection.

Intubated or extubated in 28 days prior to onset: Whether endotracheal or PT intubation was inserted or removed in last 28 days.

Surgery: The patient has undergone surgery in the past 30 days (if no implant was inserted), or past year if an implant was inserted.

Surgical methods used (multiselect, tick all that apply):
- Open, including endoscopy-assisted procedures, not involving implant in last 30 days
- Open, including endoscopy-assisted procedures, involving implant in last 12 months
- Solely endoscopic not involving implant in last 30 days
- Solely endoscopic involving implant in last 12 months
- Unknown details of surgery

Hepatobiliary procedure 28 days prior: Any procedure performed on hepatobiliary organs, such as Magnetic Resonance Cholangiopancreatography (MRCP) or Endoscopic Retrograde Cholangio-Pancreatography (ERCP)

UTI treatment 28 days prior: Patient has received medical care in 28 days prior to onset of bacteraemia with intention of treating a urinary tract infection.

Open wounds or ulcers: Patient has an unhealed wound or ulcer in 28 days prior to onset of bacteraemia

Diabetic foot ulcer or infection: Patient has had an unhealed diabetic ulcer or diabetes-related infection of the foot in the 28 days prior to onset of bacteraemia.

Absolute neutrophil count < 500 (0.5) cells/μl: Patient has an absolute neutrophil count of less than 500 cells/μl at time of onset of bacteraemia.

Number of antibiotic courses prescribed in 28 days prior: Number of antibiotic courses patient has received in 28 days prior to onset of bacteraemia

Has the patient been on anti-cancer chemotherapy in 28 days prior to specimen date?:

Systemic Anti-Cancer treatments (SACT) include all forms of chemotherapy agents, plus any biological therapies, used in the treatment of cancer. Biological therapies include immunotherapies and monoclonal antibodies. There are several monoclonal antibodies used outside of cancer treatment which are not included in this group'
13.3 Appendix 3: Source of bacteraemia & associated infections

Data items on this tab are limited to MRSA and MSSA only.

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of bacteraemia</td>
<td>No</td>
<td>If ‘Yes’ triggers appearance of field ‘Source of bacteraemia’</td>
</tr>
<tr>
<td>Source of bacteraemia</td>
<td>Mandatory if triggered</td>
<td>Provides options for recording source of bacteraemia. Allows epidemiological analyses of sources of bacteraemia</td>
</tr>
<tr>
<td>Certainty</td>
<td>Mandatory if triggered</td>
<td>Clinical judgement on degree of certainty. Only triggered by certain responses to ‘Source of bacteraemia’ question</td>
</tr>
</tbody>
</table>

**Associated Clinical Infections**

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associated clinical infection</td>
<td>No</td>
<td>Provides information on infection site, when patient has co-infection with the same organism</td>
</tr>
<tr>
<td>Certainty</td>
<td>Mandatory if triggered</td>
<td>Clinical judgement on degree of certainty</td>
</tr>
</tbody>
</table>

**Inpatient details**

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Rationale for inclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>For inpatients, what speciality was the infection thought to have been acquired in (Augmented Care)?</td>
<td>No</td>
<td>Allows specification of an augmented care unit in which the infection is believed to have been acquired</td>
</tr>
<tr>
<td>Date from</td>
<td>No</td>
<td>Date admitted to ward. Allows cross-checking with date of specimen</td>
</tr>
<tr>
<td>Date to</td>
<td>No</td>
<td>Date discharged or transferred from ward. Allows cross-checking with date of sample</td>
</tr>
</tbody>
</table>
13.4 Appendix 4: Healthcare Interactions

All collections have a tab to complete prior trust exposure. This asks whether a patient had been discharged from the reporting trust within a certain time period prior to the specimen date. For bacteraemia cases, this is 28 days, for *C. difficile* infection cases, this is 84 days. Outpatient appointments are not included for discharges.

### Table 13.6: Details of prior trust exposure data items

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Has the patient been discharged from an elective or emergency hospital admission in the reporting trust in the last 28/84 days?</td>
<td>Yes, for sign-off</td>
<td>Triggers date picker if ‘Yes’. Allows apportioning according to prior trust exposure.</td>
</tr>
<tr>
<td>Please provide the date of discharge for the most recent elective or emergency hospital admission prior to the patient’s positive specimen</td>
<td>Yes, to save</td>
<td>Date picker field.</td>
</tr>
</tbody>
</table>

In addition, for MRSA, MSSA and CDI, users have the option to provide information on prior healthcare interactions, which might provide information on sources of infection and risk factors. Four health care interactions can be provided per Healthcare Interaction tab. Further Healthcare Interaction tabs can be added by selecting ‘Yes’ for the final ‘Do you want to add another interaction’, up to a maximum of nine tabs for MRSA and MSSA, and five for CDI.

### Table 13.7: Details of prior healthcare interaction data items for MSSA and MRSA.

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>When</td>
<td>Yes</td>
<td>Allows specification of when prior healthcare interaction occurred</td>
</tr>
<tr>
<td>Type of interaction</td>
<td>Yes</td>
<td>Type of patient care provided (i.e. inpatient, outpatient, A&amp;E only, Emergency assessment, Regular attender, Primary care, Day patient or Other)</td>
</tr>
<tr>
<td>Where</td>
<td>Yes</td>
<td>Specification of type of organisation providing care</td>
</tr>
<tr>
<td>Date from</td>
<td>Yes</td>
<td>First day of prior healthcare interaction</td>
</tr>
<tr>
<td>Date to</td>
<td>Yes</td>
<td>Last day of prior healthcare interaction</td>
</tr>
<tr>
<td>Reason for interaction</td>
<td>Yes</td>
<td>Choice of medical specialty of prior healthcare interaction</td>
</tr>
<tr>
<td>Admission method</td>
<td>Yes</td>
<td>Admission method for prior healthcare interaction</td>
</tr>
</tbody>
</table>
13.5 Appendix 5: Renal data items

Table 13.8: Definitions of renal data items

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Renal provider</strong></td>
<td></td>
</tr>
<tr>
<td>Usual provider of renal care (Mother Unit)</td>
<td>The renal unit that normally provides care</td>
</tr>
<tr>
<td>Usual provider of renal care (Satellite Unit)</td>
<td>Any other unit that provides care. Free text field</td>
</tr>
<tr>
<td>Other (incl. non-UK) mother &amp;/or satellite unit</td>
<td>Any other unit that provides care. Free text field</td>
</tr>
<tr>
<td><strong>Dialysis</strong></td>
<td></td>
</tr>
<tr>
<td>Dialysis details (Modality)</td>
<td>The method by which dialysis was delivered.</td>
</tr>
<tr>
<td>Type of access being used</td>
<td>Access to bloodstream through which dialysis is delivered.</td>
</tr>
<tr>
<td>Other type of access being used</td>
<td>Only triggered if 'Type of access being used' is 'Other'. Free text field.</td>
</tr>
<tr>
<td>Catheter last 28/7</td>
<td>Whether an intravenous catheter was used in seven days prior to blood culture or 28 days prior to positive stool specimen.</td>
</tr>
<tr>
<td>What type of catheter</td>
<td>Triggered if ‘Catheter last 28/7’ was ‘Yes’. Drop-down options for type of venous catheter.</td>
</tr>
</tbody>
</table>
13.6 Appendix 6. CCG Attribution Process

All cases of MRSA, MSSA and Gram-negative bacteraemia and CDI are attributed to a CCG. Cases are attributed to a CCG by tracing patient identifiers (name, NHS number, sex and date of birth) via the Demographics Batch Service (DBS). To obtain these data, identifiers are automatically passed from the DCS to NHS Spine managed by NHS Digital, via DBS, to identify patient GP registration details and patient residential postcode. As such, it is important for data providers to ensure they enter correct patient identifiers for all cases entered onto the HCAI DCS. This is different to apportionment.

13.6.1 Overview of CCG attribution

All records are attributed to a ‘Responsible’ CCG based on the patient’s registered GP practice which are provided through the DBS. A responsible CCG is the CCG with which the patient’s GP practice is listed. In cases where an English patient has no registered GP listed in the NHS Spine, the ‘Responsible’ CCG will be the one covering the catchment area of the patient’s registered residential address. The responsible CCG is identifiable by querying the NHS Spine database, which contains GP practice codes and patient postcodes for all patients registered in the NHS. NHS Digital’s Organisation Data Service (ODS) provides mappings for organisational relationships between GP practice and CCGs.

If neither the patient’s GP practice nor patient’s postcode is populated in the NHS Spine, then the patient is attributed to the ‘lead’ CCG. The ‘lead’ CCG is the main commissioning organisation for the acute trust which reported the case. It is possible a single CCG is ‘lead’ to one or more acute trusts but a trust can only have one lead CCG.

13.6.2 CCG attribution algorithm

Attribution to a CCG relies on a patient being traced through the NHS spine. Spine tracing is a two stage process using the following rules:

1. Matching NHS Number and date of birth when they are present.
2. If the NHS Number is not present or is not a valid NHS number, an alphanumeric trace is performed. At a minimum, surname, given name, gender and date of birth must be provided. This searches both current and historical information held on the Spine. Wildcard searching is not performed in this case.

The algorithm, below, attributes infection cases to a CCG in the following order:

1. If the GP code where a patient is registered is identified through DBS tracing and is based in England, the case will be attributed to the CCG at which the patient’s GP is listed;
2. If the patient GP code is not identified through DBS tracing, but the patient is known to reside in England and a residential postcode has been obtained, the patient case will be attributed to the Residence CCG based on the patient’s residential postcode;
3. If any of the above are not available or valid, then then patient is attributed to a CCG based on the postcode of the trust’s headquarters (trust HQ) address. For example, patients registered to GPs outside England who have had specimens processed by laboratories based in English trusts are attributed to English lead CCGs. Similarly, any foreign patients who have no NHS number are attributed to lead CCGs.

Please see Figure A1 for a detailed schematic regarding the attribution of cases to CCGs.
13.6.3 Overview of timescales
Acute trusts must ensure they enter all their infection cases on to the HCAI DCS. New or amended cases are traced twice daily via DBS and are usually loaded on to the DCS the following day.

Timely input of data is encouraged, as this will ensure accurate linkage of data through the batch tracing. The tracing procedure used to gain GP code and/or residential postcode relies on linking patient information from the Spine to our HCAI DCS. In the unfortunate situation of a deceased patient, the Spine information for that patient is sometimes moved to a historical section which is inaccessible to us. In such cases the postcode of the trust HQ is used to identify the attributed CCG.

Organisations may request a re-trace when patients’ information have been updated on the NHS Spine. However, retraces will only be performed up to 45 days after the initial trace.

13.6.4 Attribution of IS cases
Cases reported by the IS are traced in the same batch as those reported by the NHS. As per the NHS, the tracing results are available on the DCS. However, as not all patients treated within the IS will have an NHS number it is possible that more IS cases will have a C code of zero, compared to the NHS.

‘C codes’
Once patients have been traced, details of the trace (including CCG type, CCG code, and C Code) are loaded onto the DCS. If a patient has been traced on the basis of their GP practice, their record will have a C code 20 or 30 (see Table 13.9: for C Code definitions).

If a case has NOT been attributed based on the patient’s GP, i.e. CCG type is not “GP CCG”, then the trust may want to verify that the patient’s NHS number and other identifiers such as date of birth, forename, surname and gender are correct.

Please note that with the exception of code 30, these codes do NOT correspond with either the former NSTS tracing codes, or with the current DBS tracing codes.
**Table 13.9: Definitions of 'C-Code' field in DCS**

<table>
<thead>
<tr>
<th>CCG attribution</th>
<th>C code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trust CCG</td>
<td>0</td>
<td>Cases with an invalid NHS number and patient details *</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>1</td>
<td>Cases with valid NHS number or patient details, but patient not listed on Spine</td>
</tr>
<tr>
<td>GP CCG</td>
<td>20</td>
<td>Cases with valid details (forename, surname, DoB and gender) and traced to GP practice in England</td>
</tr>
<tr>
<td>GP CCG</td>
<td>30</td>
<td>Cases with a valid NHS Number and date of birth are successfully traced via DBS to an English GP</td>
</tr>
<tr>
<td>Residential CCG</td>
<td>122</td>
<td>Cases which are traced via patient postcode (only when GP code is not available)</td>
</tr>
<tr>
<td>Residential CCG</td>
<td>123</td>
<td>Cases which are traced through Step 2 of DBS tracing (i.e. forename, surname, DOB, gender), via patient postcode (only when GP code is not available and postcode is in England)</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>124</td>
<td>Cases with valid NHS number and date of birth are traced to a GP or postcode outside England</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>125</td>
<td>Cases with invalid NHS number however traced through Step 2 of DBS tracing (i.e. first name, surname, DOB, gender) are traced to a GP or postcode outside of England</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>126</td>
<td>Cases which have been successfully traced against Spine, but patient details (i.e. residential postcode or registered GP code) are not available</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>127</td>
<td>Cases which have been successfully traced against Spine, but patient details (i.e. residential postcode or registered GP code) are not available</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>321</td>
<td>Cases without valid NHS number, but successfully traced through second stage and GP practice closed or is not in England and residence postcode not available</td>
</tr>
<tr>
<td>Residential CCG</td>
<td>322</td>
<td>Cases without valid NHS number, but successfully traced through second stage and GP practice closed or is not in England</td>
</tr>
<tr>
<td>Trust CCG</td>
<td>331</td>
<td>Cases traced successfully, but GP practice closed and patient postcode not available or not in England</td>
</tr>
<tr>
<td>Residential CCG</td>
<td>332</td>
<td>Cases successfully traced but GP practice closed and patient postcode is available and in England</td>
</tr>
</tbody>
</table>

*Note: Patients with C code 0 or 1 may potentially be traced if either NHS number and/or date of birth, forename, surname and gender are added/corrected and re-traced.*
13.3.5 Figure A1. Summary of the CCG attribution process

1. A new case is reported OR a "re-trace" is triggered for an existing case
2. Record is sent to NHS Digital for tracing

Was the patient’s details traced to the NHS SPINE?

Yes

No

Trust CCG
C-Codes
0 & 2

Is there a registered GP for the patient?

Yes

No

GP CCG
C-Codes
20 - Invalid NHS no.
30 - Valid NHS no.

Is it in England?

Yes

No

Residential CCG
C-Codes
123 - Invalid NHS no.
122 - Valid NHS no.

Is the registered address in England?

Yes

No

Residential CCG
C-Code
322 - Invalid NHS no.
332 - Valid NHS no.

Is the registered GP open?

Yes

No

Trust CCG
C-Codes
125 - Invalid NHS no.
124 - Valid NHS no.

Is the patient deceased?

Yes

No

Trust CCG
C-Codes
321 - Invalid NHS no.
331 - Valid NHS no.

Trust CCG
C-Codes
126 & 127
13.6.6 Appeals against attribution
Cases may only be appealed within 45 days of tracing and only if the patient’s postcode or GP practice code listed in the Spine was incorrect at time of tracing. Cases will only be retraced once PHE has been informed by the acute trust or CCG that the discrepant details have been amended in the Spine and the amendments are made within the 45 day window of the initial trace.

13.6.7 Contacts/information
Any queries regarding case allocation should in the first instance be directed to mandatory.surveillance@phe.gov.uk
13.7 Appendix 7. Algorithms to determine the onset status of cases
Please note that the algorithm applied to bacteraemia cases differs to that used for CDI in terms of the number of days between specimen collection and admission used to determine the onset status of the cases. The underlying principle is, however, the same. The algorithm used to determine the onset status of the cases is outlined below (see also Figure A2). Please note the onset status of cases is different to the prior trust exposure algorithm, which is covered in section 13.7.3

Please note that the algorithm to determine the onset status is not applied to IS data.

It is not possible for PHE to change the onset status of a case as it is based on the data entered by the acute trust and the algorithm is applied to the entire dataset not on a case-by-case basis; a case may only change from one category to another if the relevant case details are incorrect and require amendment by the trust.

In addition to being identified by the location of onset, all cases are also attributed to a CCG (see Appendix 3). All cases regardless of whether they are hospital-onset or community-onset cases are attributed to a CCG.

In the development of the new DCS, some of the data values used in the old algorithm changed. Previously, users could leave the patient location blank and the patient location would be recorded as null. This is no longer possible, and has been replaced with the data value ‘Unknown’. Similarly, it was possible for users to leave patient category blank and the patient category would be recorded as null. This has also been replaced with ‘Unknown’. The old algorithm was applied to records entered prior to the launch of the new DCS (26/10/2015). The new algorithm has been applied to records entered after this date.

13.7.1 Bacteraemia

Hospital-onset:
Any NHS patient specimens taken on the third day of admission onwards (e.g. day 3 when day 1 equals day of admission) at an acute trust (including cases with unspecified specimen location) for Inpatients, Day-patients, Emergency Assessment, or Unknown patient category.

Records with an unknown admission date (where the specimen location is acute trust or unknown and the patient category is Inpatient, Day patient, Emergency Assessment, or unspecified) are also included.

Community-onset:
Any NHS patient specimens not determined to be hospital-onset. This will typically include the following groups:
- Any acute trust specimens taken on either the day of admission or the subsequent day (e.g. days 1 or 2, where day 1 equals day of admission)
- Any specimens from patients attending an acute trust who are not Inpatients, Day patients or under Emergency Assessment.
- Any specimens from patients attending an identifiable healthcare location except an acute trust. This includes GP, nursing home, non-acute NHS provider, Independent Sector Provider, Mental Health Provider, residential home, penal establishment, unknown or other.
A summary of how bacteraemia cases are determined to be hospital or community onset is illustrated in Figure A2. below.

13.7.2 *Clostridioides difficile* infection

**Hospital-onset:**

Any NHS patient specimens taken on the fourth day of admission onwards (e.g. day 4 when day 1 equals day of admission) at an acute trust (including cases with unspecified specimen location) for Inpatients, Day-patients, Emergency Assessment, or unspecified patient category.

Records with an unknown admission date (where the specimen location is acute trust or missing and the patient category is Inpatient, Day-patient, Emergency Assessment, or unspecified) are also included.

**Community-onset:**

Any NHS patient specimens not determined to be hospital-onset. This will typically include the following groups:

- Any acute trust specimens taken on either the day of admission or the subsequent day (e.g. days 1 - 3, where day 1 equals day of admission)
- Any specimens from patients attending an acute trust who are not Inpatient, Day-patient or under Emergency Assessment.
- Any specimens from patients attending an identifiable healthcare location except an acute trust. This will typically include GP, nursing home, CCG hospital and private patients.

A summary of how CDI cases are determined to be hospital or community onset is illustrated in Figure A2.
13.7.3 Prior trust exposure

From April 2017, the HCAI DCS was updated for all collections so that information on a patient’s prior admission to the reporting trust could be added to the record of the current infection. This was included to align the surveillance more closely with that of the European Centre for Disease Prevention and Control and the Center for Disease Control and Prevention in the USA.

A new tab, the prior healthcare exposure tab, asks whether the patient has been admitted to the reporting trust, prior to the current infection episode. The prior exposure questions were made mandatory for CDI in 2017 and for all other collections in 2019.

**CDI prior trust exposure categories**

Hospital-Onset, Healthcare Associated (HOHA)
Any NHS patient specimens taken on the third day of admission onwards (i.e. ≥ day 3 when day of admission is day 1) at an acute trust (including cases with unspecified specimen location) for Inpatients, Day-patients, Emergency Assessment, or unspecified patient category.

Records with a missing admission date (where the specimen location is acute trust or missing and the patient category is Inpatient, Day-patient, Emergency Assessment, or unspecified) are also included.

Community-Onset Healthcare-Associated
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient was discharged from the reporting organisation within 28 days prior to the current specimen date (where date of discharge is day 1).

Community-Onset, Indeterminate Association (COIA)
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient was discharged from the reporting organisation within 28 days prior to the current specimen date (where date of discharge is day 1).

Community-Onset, Community Associated (COCA)
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient has not been discharged from the reporting organisation within the past 84 days, to the current specimen date (where date of discharge is day 1).

**Bacteraemia prior trust exposure categories**

Hospital-Onset, Healthcare Associated (HOHA)
Any NHS patient specimens taken on the third day of admission onwards (i.e. ≥ day 3 when day of admission is day 1) at an acute trust (including cases with unspecified specimen location) for Inpatients, Day-patients, Emergency Assessment, or unspecified patient category.

Records with a missing admission date (where the specimen location is acute trust or missing and the patient category is Inpatient, Day-patient, Emergency Assessment, or unspecified) are also included.

Community-Onset Healthcare-Associated (COIA)
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient was discharged from the reporting organisation within 28 days prior to the current specimen date (where date of discharge is day 1).
organisation within 28 days prior to the current specimen date (where date of discharge is day 1).

Community-Onset, Community Associated (COCA)
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient has not been discharged from the reporting organisation within the past 28 days, to the current specimen date (where date of discharge is day 1).

Cases are then allocated according to figure A3 for CDI and A4 for bacteraemia. Note, the DCS currently only calculates the prior trust exposure categories for CDI only, for the other collection either calculate these yourself or refer to the national statistics.

Additional categories applicable to all collections:

Missing
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the information on the patient prior discharge was not reported. As of Apr 2019, it is no longer possible to leave these questions blank.

Unknown:
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the information on the patient prior discharge was reported as 'Don't know'.
Figure A3: Prior trust exposure of CDI cases

*Referring to days between current hospital admission and specimen date. With day 1 as day of admission. Not applicable to community/non acute trusts

** With date of discharge being counted as Day 1

NB All prior healthcare exposure questions must still be completed even if a case fits the criteria for a HOHA. Also community/non-acute trust specimens should also complete the prior exposure questions, the same criteria for prior exposure apply.
Figure A4: Prior health trust exposure of bacteremia cases

- **Patient is inpatient** in acute trust and ≥ 3 days between admission and specimen

  - **Yes** → HOHA

  - **No**

    - **Has the patient been discharged from an elective or emergency hospital admission in the reporting trust in the last 28 days?**

      - **Yes** → COHA
      - **No** → COCA
      - **Don’t know** → Unknown

*Referring to days between current hospital admission and specimen date. With day 1 as day of admission. Not applicable to community/non acute trusts

**With date of discharge being counted as Day 1

NB All prior healthcare exposure questions must still be completed even if a case fits the criteria for a HOHA. Also community/non-acute trust specimens should also complete the prior exposure questions, the same criteria for prior exposure apply.
Cases for which the answer to the question ‘has the patient previously been admitted to the reporting trust’ is “Don't know” will be allocated to the ‘Unknown’ category (previously allocated to the COHA category), cases where the answer was missing will be allocated to the ‘Missing information’ category (previously COCA category) It is no longer possible to not answer this question.
13.8 Appendix 8. The Post Infection Review process (PIR)

The Post-Infection Review of MRSA cases ran from 1 April 2013 to 31 March 2018. From 1 April 2018, the PIR process became local-only and is no longer administered through the DCS. Only trusts with the highest rates of MRSA bacteraemia are required to complete a PIR. Further details on the updated PIR process are available at https://improvement.nhs.uk/documents/2512/MRSA_post_infection_review_2018_changes.pdf. The information below is retained for the purposes of historical context and interpreting previously published results.

13.8.1 The purpose of the Post Infection Review

The NHS Commissioning Board’s NHS planning guidance ‘Everyone counts: Planning for Patients 2013/14’ set out a zero tolerance approach to MRSA bacteraemia. As such a requirement was initiated on 1 April 2013 to institute a Post Infection Review in all cases of MRSA bacteraemia in order to identify any possible failings in care and the organisation best placed to ensure improvements are made. As of 1 April 2014, cases could be assigned to a third party if the outcomes suggested that there have been no possible failings in care and that neither the acute trust or the CCG are best placed to ensure improvements are made.

13.8.2 Aim of the PIR process

The PIR process aimed to:

- help identify factors that may have contributed to a MRSA bacteraemia;
- help to identify any parts of the patient’s care pathway which may have contributed to the infection, in order to prevent a similar occurrence;
- help providers of healthcare and CCGs to identify any areas of non-optimal practice that may have contributed to the MRSA bacteraemia;
- help to promptly identify the lessons learned from the case, thereby improving practice for the future;
- identify the organisation best placed to ensure that any lessons learnt are acted on.

Previously, when an MRSA bacteraemia was entered onto the HCAI DCS, the system would automatically provisionally assign an organisation with the responsibility for leading the PIR process. This does not necessarily assume that the provisionally assigned organisation was responsible for the bacteraemia, but considers that they are best placed to lead and coordinate the PIR process. Provisional assignment was based on the following:

**Provisionally trust assigned**
Any patients who were admitted (e.g., inpatients, day-patients, or emergency assessment) in an acute trust and the MRSA bacteraemia sample was taken from the patient on or after the third day of admission (where the day of admission is Day 1).

**Provisionally CCG assigned**
Patients not assigned as above, in particular, any patients not admitted at the time the specimen was taken, for example those in Accident and Emergency or outpatients.
13.8.3 Assigning MRSA bacteraemia cases

The lead organisation was responsible for completing the PIR within fourteen working days of being notified that a PIR is required. This involved making a decision (an assignment) of the organisation best placed to learn from the occurrence (acute trust or CCG) or Third Party if there were no learning outcomes identified for either the reporting acute trust or attributed CCG.

If the duly assigned organisation was the same as the organisation leading the PIR this would end the process. If the duly assigned organisation was different from the organisation leading the PIR, a notification will be sent to the assisting organisation who would be provided a further two working days, plus any days left from stage 1, to indicate whether they agreed or disagreed with the outcome of the PIR.

If the PIR outcome suggested that there had been no possible failings in care and that neither the acute trust or the CCG were best placed to ensure improvements are made then Third Party assignment may have been considered and finalised as such by the arbitrator.

If the lead provisional organisation and the assisting organisation were unable to come to an agreement over the final assignment or if a Third party case was been indicated, a notification would be sent to the arbitrating NHS England Regional Medical Director or Regional Director of Nursing who would be provided with a further 28 working days to define the outcome of the PIR and establish the organisation to which the MRSA bacteraemia should be finally assigned (either acute trust, CCG or Third party).

If an organisation failed to respond within the set time period at ether stage one or stage two, the final assignment of the case would remain with that organisation, unless:

1. The organisation was a third party, in which case the PIR would have gone to arbitration
2. The case was a contaminant case (non-third party) where the case was automatically assigned to the organisation responsible for taking the sample (i.e. the acute trust if the sample was taken in an acute trust, or CCG if the sample was taken elsewhere)

Contaminated blood cultures should continue to be reported as part of mandatory reporting and the PIR would have been completed indicating any agreed contaminants. In these circumstances the organisation at which the blood culture specimen was taken would be assigned the case as they were best placed to ensure that any lessons learned are acted upon.
13.9 Appendix 9. Quarterly mandatory laboratory returns (QMLRs)

NOTE: The mandatory reporting scheme described below is distinct from the enhanced surveillance system described above.

On a quarterly basis NHS acute trusts are mandated to report the following data, aggregated for a three-month period (definitions below):

- Total number of blood culture sets examined
- Total number of these that were positive
- Total number of *S. aureus* positive blood culture episodes
- Total number of glycopeptide resistant enterococci (GRE) blood culture episodes
- Total number of stool specimens examined
- Total number of stool specimens tested for diagnosis of *Clostridioides difficile* infection
- Total number of *Clostridioides difficile* toxin positive reports in people aged > 65 years
- Total number of *Clostridioides difficile* toxin positive reports in people aged 2 - 64 years
- Total number of faecal specimens and rectal swabs taken for CPE screening

Data for each 3-month period must be submitted within 6 weeks of the end of the data collection period (up to and including 14<sup>th</sup>). After this point, the dataset is automatically locked and it is not possible to enter further data. Organisations must contact the PHE mandatory surveillance team if data needs to be entered after this point in time.

<table>
<thead>
<tr>
<th>Data collection period</th>
<th>System lockdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>October – December</td>
<td>23.59 on 14 February</td>
</tr>
<tr>
<td>January – March</td>
<td>23.59 on 14 May</td>
</tr>
<tr>
<td>April – June</td>
<td>23.59 on 14 August</td>
</tr>
<tr>
<td>July – September</td>
<td>23.59 on 14 November</td>
</tr>
</tbody>
</table>

These data are also entered via the HCAI DCS. Please see Table 13.11: below for a list of fields required for the QMLR.

---

<sup>1</sup> Voluntary as of 2013.
Table 13.11: Details of fields included in QMLR

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of blood culture sets examined</td>
<td>Yes</td>
<td>This is referring to a sample arising from a single venepuncture, irrespective of the number of bottles tested</td>
</tr>
<tr>
<td>Total number of positive blood culture sets</td>
<td>Yes</td>
<td>This is referring to all positive results for bacterial growth, including repeat specimens and contaminants</td>
</tr>
<tr>
<td>Total number of <em>S. aureus</em>-related complex positive blood culture episodes</td>
<td>Yes</td>
<td>This does not include duplicate episodes*; i.e. when the same patient has more than one sample taken which are less than 14 days apart</td>
</tr>
<tr>
<td>Total number of GRE positive blood cultures</td>
<td>No</td>
<td>This does not include duplicate episodes*; i.e. when the same patient has more than one sample taken which are less than 14 days apart</td>
</tr>
<tr>
<td>Total number of stool specimens examined</td>
<td>Yes</td>
<td>This is referring to ‘all stools’ not just the ones that fit the Bristol Stool Scale; it also includes the number of stool specimens used for <em>C. difficile</em> toxin testing</td>
</tr>
<tr>
<td>Total number of stool specimens tested for diagnosis of <em>C. difficile</em> infection</td>
<td>Yes</td>
<td>This is referring to all <em>C. difficile</em> toxin tests done that have been found positive and negative and it will include duplicate records. However, two-stage testing on a single sample should be counted as a single test.</td>
</tr>
<tr>
<td>Total of <em>C. difficile</em> toxin positive results for ≥65 years</td>
<td>Yes</td>
<td>This is referring to the total number of <em>C. difficile</em> toxin-positive stool samples in patients aged 65 years and above; it should not include duplicates i.e. when the same patient has more than one sample taken which are less than 28 days apart</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If single-stage testing is employed, this will include all positive samples. However, if two-stage testing is employed, only samples that are positive for both tests should be included.</td>
</tr>
</tbody>
</table>
### Mandatory Enhanced MRSA, MSSA and Gram-negative bacteraemia, and *C. difficile* surveillance

<table>
<thead>
<tr>
<th>Field</th>
<th>Mandatory?</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total No. of <em>C. difficile</em> toxin positive results for 2-64 year olds</td>
<td>Yes</td>
<td>This is referring to the total number of <em>C. difficile</em> toxin-positive stool samples in patients aged 2-64 years; it should not include duplicates i.e. when the same patient has more than one sample taken which are less than 28 days apart.</td>
</tr>
<tr>
<td>Total number of faecal specimens and rectal swabs taken for CPE screening</td>
<td>No</td>
<td>This field will collect denominator data for the surveillance of Carbapenemase-producing Enterobacteriaceae. Collecting this data will allow PHE to understand which trusts are doing screening for CPE and will set cases of CPE in context. If not possible to distinguish rectal and perineal swabs, report total number of swabs.</td>
</tr>
</tbody>
</table>

* For calculating duplicates, episode duration is 14 days from preceding sample for bacteraemia and 28 days from preceding sample for CDI.
13.10 Appendix 10. Organisation mappings in the DCS

Organisation hierarchies are mapped according to the hierarchies provided by the NHS Digital’s ODS (https://digital.nhs.uk/services/organisation-data-service). Cases are mapped upwards to higher level health geographies (NHS local office, NHS Region, PHE Centre and PHE region) in one of three ways: by the reporting pathway, commissioning pathway or resident pathway.

13.10.1 Reporting pathway
Direct mappings are available from trust to NHS local office and NHS region. Trusts are mapped to local authorities based on the postcode of the trust headquarters. Local authorities are then mapped to PHEC.

13.10.2 Commissioning pathway
CCGs are mapped to a local authority based on the postcode of the CCG HQ. The postcode of the CCG headquarters office is determined from the data provided by NHS Digital ODS. This is mapped onto the local authority boundaries provided by the ONS. Direct mappings are available for CCG to local office and to NHS region.

13.10.3 Resident pathway
The patient’s postcode is used to map to local authority and then PHEC and PHE Region

13.10.4 Director of Public Health mappings
Directors of Public Health are embedded within local authorities. CCGs are mapped to Directors of Public Health in the same way as CCGs are mapped to local authorities.

13.10.5 Trust site mappings
Sites are mapped to trusts based on information provided by NHS Digital. The ODS provides direct mappings.

13.10.6 Maintenance of organisation mappings
Comma-separated values of organisation relationships are maintained by NHS Digital. New versions of the files are released quarterly. (https://digital.nhs.uk/services/organisation-data-service/data-downloads) The most recent version of each mapping file is downloaded from the website and changes are incorporated into the system. Post code mappings to local authorities are performed by PHE’s GIS team.
13.11 Appendix 11. Frequently Asked Questions

13.10.1 MRSA bacteraemia reporting: Frequently Asked Questions

Q. How long is an episode?
A. The episode length of MRSA bacteraemia is 14 days with day 1 being the date of specimen collection.

Q. Do all positive blood samples need to be reported, even if the patient wasn’t treated?
A. Yes, all positive blood samples must be reported, whether clinically significant or not and whether the patient was treated or not. This includes cultures from intravenous catheters even if blood culture from venipuncture is negative or has not been performed.

Q. Do I need to report mecA-negative isolates?
A. mec-A negative isolates should be reported if they are mec-C positive. Where isolates are mec-A and mec-C negative they are not regarded as MRSA in this instance, and need not be reported as MRSA bacteraemia cases, irrespective of their level of meticillin resistance. Such cases should, however, be reported as MSSA bacteraemia. Please note, that this distinction is only with respect to the submission of isolates to the surveillance scheme and should not affect patient treatment decisions. NB Isolates that are highly resistant to meticillin but are mecA-negative are an anomaly and should be investigated with possible referral to the national reference laboratory.

Q. Do I need to report positive specimens from deceased patients?
A. No, positive specimens from taken from patients after death should not be reported. However, positive specimens taken from a live patient who subsequently dies should be included.

Q. Do I need to report positive specimens that come from patients not located within a hospital at the time of testing, or taken on admission?
A. Yes, all cases of MRSA bacteraemia that conform to the case definition must be reported, regardless of where or when the specimen was collected.

Q. Do I need to report positive specimens from Welsh patients diagnosed in English laboratories?
A. Yes, all cases of MRSA bacteraemia that conform to the case definition must be reported even if they are from Welsh patients tested/diagnosed in an English laboratory.

Q. Do I need to report positive specimens sent from the Independent Sector (private hospital)?
A. Yes, all cases of MRSA bacteraemia that conform to the case definition must be reported, regardless of where the specimen originated from.

Q. Should positive specimens from the same patient and the same episode be reported?
A. No, only report a second positive from the same patient if it is defined as a new episode.

Q. If a single specimen cultures more than one S. aureus Related Complex species, which should I report?
A. Both species should be reported separately.
13.10.2 MSSA bacteraemia reporting: Frequently Asked Questions

Q. How long is an episode?
A. The episode length of MSSA bacteraemia is 14 days with day 1 being the date of specimen collection.

Q. Do all positive blood samples need to be reported, even if the patient wasn’t treated?
A. Yes, all positive blood samples must be reported, whether clinically significant or not and whether the patient was treated or not. This includes cultures from intravenous catheters even if blood culture from venipuncture is negative or has not been performed.

Q. Do I need to report positive specimens from deceased patients?
A. No, positive specimens from taken from patients after death should not be reported. However, positive specimens taken from a live patient who subsequently dies should be included.

Q. Do I need to report positive specimens that come from patients not located within a hospital at the time of testing, or taken on admission?
A. Yes, all cases of MSSA bacteraemia that conform to the case definition must be reported, regardless of where or when the specimen was collected.

Q. Do I need to report positive specimens from Welsh patients diagnosed in English laboratories?
A. Yes, all cases of MSSA bacteraemia that conform to the case definition must be reported even if they are from Welsh patients tested/diagnosed in an English laboratory

Q. Do I need to report positive specimens sent from the Independent Sector (private hospital)?
A. Yes, all cases of MSSA bacteraemia that conform to the case definition must be reported, regardless of where the specimen originated from.

Q. Should positive specimens from the same patient and the same episode be reported?
A. No, only report a second positive from the same patient if it is defined as a new episode.

Q. If a single specimen cultures more than one S. aureus Related Complex species, which should I report?
A. Both species should be reported separately.
13.10.3 Gram-negative bacteraemia reporting: Frequently Asked Questions

Q. How long is an episode?
A. The episode length of Gram-negative bacteraemia is 14 days with day 1 being the date of specimen collection.

Q. Do all positive blood samples need to be reported, even if the patient wasn’t treated?
A. Yes, all positive blood samples must be reported, whether clinically significant or not and whether the patient was treated or not. This includes cultures from intravenous catheters even if blood culture from venipuncture is negative or has not been performed.

Q. Do I need to report positive specimens from deceased patients?
A. No, positive specimens from taken from patients after death should not be reported. However, positive specimens taken from a live patient who subsequently dies should be included.

Q. Do I need to report positive specimens that come from patients not located within a hospital at the time of testing, or taken on admission?
A. Yes, all cases of Gram-negative bacteraemia that conform to the case definition must be reported, regardless of where or when the specimen was collected.

Q. Do I need to report positive specimens from Welsh patients diagnosed in English laboratories?
A. Yes, all cases of Gram-negative bacteraemia that conform to the case definition must be reported even if they are from Welsh patients tested/diagnosed in an English laboratory.

Q. Do I need to report positive specimens sent from the Independent Sector (private hospital)?
A. Yes, all cases of Gram-negative bacteraemia that conform to the case definition must be reported, regardless of where the specimen originated from.

Q. Should positive specimens from the same patient and the same episode be reported?
A. No, only report a second positive from the same patient if it is defined as a new episode.

Q. If more than one Klebsiella species is identified in a single culture specimen, how many cases should be reported?
A. One record per species should be reported to the DCS.

Q. Is Enterobacter aerogenes subject to mandatory reporting?
A. In 2017, E. aerogenes was reclassified to Klebsiella aerogenes. Trusts which identify isolates from 01/04/2017 onward are expected to report them as K. aerogenes.
13.10.4 *C. difficile* Infection Reporting: Frequently Asked Questions

Q. How long is an episode?
A. An episode of CDI is 28 days, with day 1 being the date of specimen collection.

Q. Do I need to report positive specimens from deceased patients?
A. Yes, unlike other collections positive specimens from deceased patients should be reported. Unlike bacteraemias, CDI testing is less likely to be affected by contamination during sample collection.

Q. Do I need to report positive specimens that come from patients not located within a hospital at the time of testing, or taken on admission?
A. Yes, all cases of CDI that conform to the case definition must be reported, regardless of where or when the specimen was collected.

Q. Do I need to report positive specimens from Welsh patients diagnosed in English laboratories?
A. Yes, all cases of CDI that conform to the case definition must be reported even if they are from Welsh patients tested/diagnosed in an English laboratory.

Q. Do I need to report positive specimens sent from the Independent Sector (private hospital)?
A. Yes, all cases of CDI that conform to the case definition must be reported, regardless of where the specimen originated from.

Q. Should positive specimens from the same patient and the same episode be reported?
A. No, only report a second positive from the same patient if it is defined as a new episode.

Q. What stools should be tested for CDI?
A. If a patient has diarrhoea (Bristol Stool Chart types 5-7) that is not clearly attributable to an underlying condition (e.g. inflammatory colitis, overflow) or therapy (e.g. laxatives, enteral feeding) then it is necessary to determine if this is due to *C. difficile*. The stool sample must take on the shape of the container and ideally be at least ¼ filled (to indicate the patient has diarrhoea) before it is sent to the laboratory for testing. If in doubt please seek advice for example from your microbiologist, Director of Infection Prevention and Control or your Infection Prevention and Control Team. All diarrhoeal samples from hospital patients aged ≥2 years and, as a minimum, all diarrhoeal samples from those aged ≥65 years in the community where clinically indicated. Ideally, samples from community patients ≤ 65 years old should also be collected.

In suspected cases of ‘silent CDI’ such as ileus, toxic megacolon or pseudomembranous colitis without diarrhoea, other diagnostic procedures, such as colonoscopy, white cell count (WCC), serum creatinine and abdominal computerised tomography (CT) scanning, may be required, potentially with referral to a gastroenterologist or gastrointestinal surgeon.

Q. Do I need to report cases in patients aged under 2 years?
A. Cases in patients aged under 2 years need not be reported; however trusts may use the system to record these cases if they so wish. These will be excluded from data for publication.

Q. The current primary care PHE advice on the definition of diarrhoea is: 3 or more episodes a day, <14 days apart (NB this should not be confused with the definition of an episode of CDI for
the purposes of mandatory reporting to the PHE which is 28 days) and the sample takes the shape of the container. Can you have a ‘diarrhoeal illness’ after just one episode?
A. The frequency of diarrhoea varies in definitions of CDI. Usually, definitions cite the need for at least 3 episodes of diarrhoea, for at least 2 consecutive days. Such a stringent definition is appropriate for clinical trials, but less so in a setting where transmission of infection is a concern. In primary care (excluding institutions such as nursing homes), it is reasonable to use the more stringent definition of CDI; in practice, patients would very rarely consult their GP for diarrhoea comprising 1-2 episodes per day, unless perhaps this continued for several days. Conversely, in the healthcare setting, using a single episode of unexplained diarrhoea as the threshold to instigate testing and pre-emptive patient isolation is reasonable. Whichever the scenario, some flexibility is required to ensure that unexplained diarrhoea is appropriately investigated and managed, especially in high risk individuals.

Q. Should all patients with diarrhoea in the community setting be tested?
A. The current PHE guidance adequately covers when to investigate patients in the community with unexplained diarrhoea. Whenever a diarrhoeal sample is submitted, relevant clinical details should be supplied, e.g. antibiotic, travel, diarrhoea contact histories. Without such information it cannot be assumed that laboratories will test a faecal sample from a person in the community for evidence of CDI.

Q. Is it acceptable to use a cytotoxin test instead of a sensitive toxin EIA.
A. Yes it is acceptable to use a cytotoxin test instead of a sensitive toxin EIA as part of the recommended two-stage algorithm. In DH/PHE evaluations, the cytotoxin test was more sensitive than the toxin EIAs. Clearly, the cytotoxin assay yields slower results than the toxin EIA, and this needs to be accounted for when making management and infection prevention decisions regarding suspected CDI cases.

Q. Are samples takes for research or assessing patients’ response to treatment eligible for mandatory reporting?
A. Stool samples taken for research, from non-symptomatic patients (i.e. less than 5 (i.e. 1-4) on the Bristol Stool Chart), but are C. difficile toxin positive should not be reported. For example, a stool sample taken from a non-symptomatic patient to determine C. difficile carriage should not be reported even if C. difficile toxin positive. However, if this result is subsequently used for a clinical diagnosis, it becomes subject to mandatory surveillance and should be reported. If there is no record of the patient being symptomatic at time of sample it must be assumed that they were and a positive case must therefore be reported.
13.12 Appendix 12. Independent Sector denominator data calculations

The denominator used, which is more appropriate for shorter stay hospitals is

\[ \text{Bed days in year} + \text{discharges in year} \]

Instead of counting the number of midnights the patient was resident for, this counts the number of different days on which they were in the hospital. A day case will count 1, a one night stay in the year will count 2.

**Bed days in the financial year 2014/15**

This is the sum of the number of occupants in a bed each midnight during the year:

\[ \text{Those in a bed at midnight at the end of the day 1 April 2014} + \]
\[ \ldots + \text{those in a bed at midnight at the end of the day 31 March 2015} \]

If it is being derived from admission dates and discharge dates, you work out the contribution that each patient makes to the year's bed days by a formula.

The only patients who can contribute a bed day to the year are those who are admitted strictly before 1 April 2015 and discharged strictly after 1 April 2014. That is, the latest date they could have been admitted was 31 March 2015 and the earliest date they could have been discharged was 2 April 2014.

For these we work out

\[ \text{Discharge date or 1 April 2015, whichever is earlier} \]
\[ \text{MINUS} \]
\[ \text{Admission date or 1 April 2014, whichever is later} \]

then add up over all the patients.

This counts the number of bed days the patient contributes to the year.

If the patient is still in hospital and does not yet have a discharge date then the first expression should be taken as 1 April 2015.

**Discharges in the financial year 2014/15**

This is the number of patients with a discharge date between 1 April 2014 and 31 March 2015 i.e.

\[ \text{number of patients discharged on 1 April 2014} + \]
\[ \ldots + \text{number of patients discharged on 31 March 2015} \]

It should include any day cases that took place during the year.

**Examples of bed day calculation**
If a patient was admitted on 17 March 2014 and discharged on 1 April 2014 they will contribute no bed days to 2014/15.

If a patient was admitted on 17 March 2014 and discharged on 2 April 2014 they will contribute 1 bed day to 2014/15.

If a patient was admitted on 17 March 2014 and discharged on 1 April 2015, they will contribute 365 bed days to 2014/15.

If a patient was admitted on 23 April 2014 and discharged on 23 April 2014 they will contribute no bed days (however they will contribute one discharge).

If a patient was admitted on 1 March 2015 and is still in hospital today (12 July 2015) they will contribute

\[
\text{Minimum of (discharge date, 1 April 2015) - maximum of (admission date, 1 April 2014)}
\]

\[
= 1 \text{ April 2015} - \text{maximum (1 March 2015, 1 April 2014)}
\]

\[
= 1 \text{ April 2015} - 1 \text{ March 2015}
\]

\[
= 31 \text{ Days}
\]
13.13 Appendix 13. List of hyperlinks

New DCS

Updated guidance on the diagnosis and reporting of *Clostridioides difficile*

**MRSA bacteraemia:**
Monthly MRSA bacteraemia counts by location of onset

MRSA bacteraemia by PIR status - archived data

Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**MSSA bacteraemia:**
Monthly MSSA bacteraemia counts by location of onset

Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**E. coli bacteraemia:**
Monthly counts of *E. coli* bacteraemia by location of onset

Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**Klebsiella species:**
Monthly counts of *Klebsiella* spp. bacteraemia location of onset
Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**Pseudomonas aeruginosa**
Monthly counts of *P. aeruginosa* bacteraemia split by location of onset

Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**Clostridioides difficile infection:**
Monthly *C. difficile* counts in patients aged 2 years and over and prior healthcare exposure

Annual data tables – counts and rates, by acute trust and CCG, by quarter and year

**Epidemiological commentaries on all collections**
Quarterly Epidemiological commentaries on MRSA, MSSA and Gram-negative bacteraemia and *C. difficile*


Annual data for independent sector healthcare organisations

Six monthly commentary for Independent Sector MRSA, MSSA, *E. coli* bacteraemia and *C. difficile*

**DCS User Guides**
User guides for the DCS can be found at:
https://hcaidcs.phe.org.uk/WebPages/InternalContentPage.aspx?gjvD2ZhVtrnMlb222Qn7yyv+1xgGCdd9b
### 13.14 Appendix 14. Changes to the mandatory surveillance protocol

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Changes</th>
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<tbody>
<tr>
<td>January</td>
<td>4.3</td>
<td>• Update of prior trust exposure algorithm flow diagrams</td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td>• Update to CCG attribution algorithm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Amendments to CCG attribution flow diagram</td>
</tr>
<tr>
<td>April</td>
<td>4.2</td>
<td>• Added prior trust exposure apportioning for <em>C. difficile</em> infection</td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td>• Added surveillance of <em>S. argenteus</em> and <em>S. schweizeri</em></td>
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<tr>
<td></td>
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<td>• Included <em>K. aerogenes</em> (previously <em>Enterobacter aerogenes</em>) in surveillance</td>
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<td>• Data collection on prior trust exposure expanded to include all collections, based on discharge within past 28 days for bacteraemia and 84 days for CDI</td>
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<td>• Added new question to QMLR data regarding CPE screening</td>
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<tr>
<td></td>
<td></td>
<td>• Added chemotherapy question to risk factor data for all collections</td>
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</tbody>
</table>
References

1. Chief Medical Officer. Reporting MRSA data: overview of arrangements. 
2. Chief Medical Officer. Changes to the mandatory healthcare associated infection surveillance system for Clostridium difficile associated diarrhoea from April 2007. 