



UK Health
Security
Agency

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

Protocol version 4.5

September 2026

This protocol supersedes version 4.4 published in December 2021

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1. Amendments to the protocol in this version

The following summarises protocol changes made in each version, including the most recent update (Table 1):

Table 1: Summary of the changes made to each published protocol version

Date	Version	Changes
July 2026	4.5	• Update the CDI hospital-onset criteria from 4 days to 3 days • Update of prior trust exposure algorithm flow diagrams • Update from 'CCG' to 'sub-ICB' locations • Update to sub-ICB attribution algorithm flow diagram • Clarifications to definitions and wording based on frequently asked questions • Addition of virtual wards and intermediate care facilities • Clarification of QMLR field names and definitions • Attention drawn to MRSA and MSSA representing <i>Staphylococcus aureus</i>-related complex organisms (<i>S. argenteus</i> & <i>S. schweitzeri</i> as well as <i>S. aureus</i>) • Clarification on date to input for specimen dates for CDI cases without a stool sample but with CT or pathology results • For prior trust exposure algorithm description – date of discharge changed from Day 1 to Day 0 (to align with how the algorithm is defined and calculated on the DCS)
December 2021	4.4	• Amendment of definitions • Update of prior trust exposure algorithm flow diagrams • Update to CCG attribution algorithm
January 2020	4.3	• Amendment of definitions • Update of prior trust exposure algorithm flow diagrams • Update to CCG attribution algorithm

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April 2019	4.2	• Added prior trust exposure apportioning for <i>C. difficile</i> infection • Added surveillance of <i>S. argenteus</i> & <i>S. schweizeri</i> • Included <i>K. aerogenes</i> (previously <i>Enterobacter aerogenes</i>) in surveillance • 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 • Added new question to QMLR data regarding CPE screening • Added chemotherapy question to risk factor data for all collections
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2. Definitions

A&E Accident and Emergency

C. difficile *Clostridioides difficile* (previously known as *Clostridium difficile*)

CCG Clinical Commissioning Group. The main commissioners of services funded by the NHS in England between April 2013 to June 2022. CCGs replaced Primary Care Trusts (PCTs) in April 2013. They were replaced by sub-ICB locations (defined [below](#)) from 1 July 2022

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

CDI *Clostridioides difficile* infection

CDRN *Clostridioides 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 bacteraemia and CDI figures are correct by signing off the data each month

CMO Chief Medical Officer for England

CPE Carbapenemase-producing *Enterobacterales*

CPO non-*Enterobacterales* Carbapenemase-producing Gram-negative organisms

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 used to trace individual details

DCS See HCAI DCS [below](#)

DHSC The Department of Health and Social Care. The government department responsible for public health issues. UKHSA collects the surveillance data described in this protocol on behalf of the DHSC

DOB Date of birth

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 sub-ICB location

E. coli *Escherichia coli*

ECDC [European Centre for Disease Prevention and Control](#). The European Union agency aimed at strengthening Europe's defences against infectious diseases

EIA Enzyme immunoassay

ERCP Endoscopic Retrograde Cholangio-Pancreatography

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 DCS [Healthcare associated infections data capture system](#). The web-based system where patient-level mandatory surveillance data on MRSA, MSSA and Gram-negative

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bacteraemia and *C. difficile* infection are collected. Aggregate-level quarterly mandatory laboratory returns (see [QMLR](#) below) are also entered on this site

HCAI Healthcare associated infections

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 uses the same definitions for many fields as found on HES. Unless specified, the HES data collection commonly refers to HES APC (Admitted Patient Care)

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, rather than a specific hospital or group. The term IS facility is used to refer to specific hospital or group of hospitals. See Independent Sector provider [below](#) 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 and day admissions for all NHS Trusts in England; providing an indication of how busy NHS Trusts were for a specific quarter. As the services of NHS Trusts are not geographically restricted, there is no population data for them and KH03 data are used as a proxy for the denominator in calculating hospital-onset NHS acute trust rates

Klebsiella spp. *Klebsiella* species including *Klebsiella aerogenes* (formerly in the *Enterobacter* genus), but excluding *K. ornithinolytica*, *Raoultella ornithinolytica* & *K. ornithinolytica*

MRCP Magnetic Resonance Cholangiopancreatography

MRSA Meticillin-resistant *Staphylococcus aureus*-related complex organisms (*S. argenteus* & *S. schweitzeri* as well as *S. aureus*)

MSSA Meticillin-sensitive *Staphylococcus aureus*-related complex organisms (*S. argenteus* & *S. schweitzeri* as well as *S. aureus*)

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

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. On 1 February 2023, NHS Digital was merged into NHS England, and its functions now sit within the Data Services directorate

NHS Improvement This was a body that oversaw provider regulation, performance, and improvement for NHS Trusts and Foundation Trusts, and previously incorporated the functions of Monitor and the Trust Development Authority. On 1 July 2022, NHS Improvement merged with NHS England creating a single organisation responsible for commissioning, regulation, and improvement functions across the NHS

NHS National Health Service

NHS Patient Safety A group within the NHS Commissioning Board Special Health Authority which receives confidential reports of patient safety incidents. From 1 April 2016, NHS Patient Safety became part of NHS Improvement, which later merged into NHS England in 2019. Currently, patient safety responsibilities sit within NHS England's Patient Safety Team, under the [NHS Patient Safety Strategy](#)

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ODS Organisation Data Service's [Data Search and Export](#) Service provided by NHS Digital (now part of NHS England) is responsible for publishing all organisation and practitioner codes. These codes form part of the official NHS data standards and are essential for the unambiguous identification of NHS and Independent Sector organisations across health and social care

P. aeruginosa *Pseudomonas aeruginosa*

PII Patient Identifiable Information. 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 1 April 2013 and 1 April 2018. The aim of the PIR was to determine lessons learned from each MRSA bacteraemia report

Sub-ICB locations Sub-Integrated Care Boards are the main commissioners of services funded by the NHS in England, replacing clinical commissioning groups (CCGs) from 1 July 2022

UKHSA UK Health Security Agency

UTI Urinary tract infection

UKHSA Regions Local UKHSA teams responsible for supporting local areas to deliver health and wellbeing strategies and co-ordinating local UKHSA activities

QMLR Quarterly Mandatory Laboratory Returns. The quarterly aggregate totals of various laboratory results which are entered onto the DCS

3. Useful terms

Acute renal failure

Where kidney failure develops suddenly rather than after long term kidney disease.

Assignment

As part of the legacy PIR process, MRSA bacteraemia reports were assigned to acute trust, CCG (now, sub-ICB), or 'third party'. Reports were provisionally assigned based on the apportionment algorithm ([15.7 Appendix 7. Algorithms to determine onset and prior trust exposure status](#)) 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. This process is no longer required as the formal PIR concluded in 31 March 2018 and instead reviews are undertaken at local level.

Sub-ICB location attribution

All MRSA, MSSA, and Gram-negative bacteraemia and CDI reports are attributed to a sub-ICB location. This is regardless of whether the report is hospital-onset. Reports are attributed to a sub-ICB location by a tracing algorithm which matches the patient to a record on the NHS Spine and then attributing to a sub-ICB location based on information (or lack thereof) on the NHS Spine. Further information on sub-ICB location attribution can be found in section [15.6 Appendix 6. Sub-ICB Location Attribution Process](#).

Commissioning Pathway

Refers to how reports are mapped on the system to reflect which organisations were involved in the commissioning of the patient's care. The primary organisations that are part of this pathway are: sub-ICB locations; NHS local offices, DPHs and NHS Commissioning Regions. The Commissioning Pathway for each report is determined by the sub-ICB location to which the report is attributed. Based on the sub-ICB location, each report is mapped to the relevant DPH, NHS England Regional Team, and Commissioning Region. UKHSA Centres and UKHSA Regions are entitled to view reports mapped to sub-ICB locations within their geographic boundaries, although UKHSA organisations are not formally part of the NHS commissioning pathway. UKHSA Centres and Regions can access both Reporting and Commissioning Pathway views for situational awareness.

Commissioning Region

The NHS England Region (East of England, London, Midlands, North East and Yorkshire, North West, South East, South West) within which the sub-ICB location is mapped. Each MRSA, MSSA, Gram-negative bacteraemia, and CDI report is attributed based on the sub-ICB location 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 sub-ICB location attribution process. For any given report of MRSA, MSSA, Gram-negative bacteraemia and CDI the Commissioning Regions and Reporting Region may be the same or may be different; please refer to the example [below](#) under 'Reporting Region'.

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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

Mandatory.Surveillance@ukhsa.gov.uk as per the [Unlock Request User Guide](#). The QMLR dataset is automatically locked down 6 weeks after the end of the reporting quarter.

Locked dataset

A dataset that has been locked either due to sign off (which affects *E. coli*, *Klebsiella* spp., *P. aeruginosa*, MRSA, MSSA or CDI data collection) or lockdown (QMLR data collection only).

They cannot be amended by the user without first contacting

Mandatory.Surveillance@ukhsa.gov.uk as per the [Unlock Request User Guide](#).

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 changed to 'Hospital-onset' and 'non-trust apportioned' has changed to 'Community-onset'.

The process whereby reports from NHS acute trusts of bacteraemia and 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 UKHSA for a given time period. All bacteraemia and CDI cases are subject to this algorithm (see section [15.7 Appendix 7. Algorithms to determine onset and prior trust exposure status](#)).

Outpatient (type of hospital episode)

An attendance at an outpatient clinic in an acute trust. This attendance is not recorded in the HES APC database.

Prior trust exposure

Since 1 April 2018, the HCAI DCS has collected information on prior healthcare exposure to the reporting trust. This enables more detailed classification of onset status for mandatory surveillance reports, comprising healthcare-associated hospital-onset (HOHA), community-onset healthcare-associated (COHA), community-onset of indeterminate association (COIA; CDI only), and community-onset community-associated (COCA) categories.

UKHSA Regions

Four regions covering London; Midlands and East of England; North of England; and South of England which provide local support and guidance to NHS organisations within their region.

Record

A single case entry in the HCAI DCS containing all information relating to a reported case of Gram-negative, MRSA or MSSA bacteraemia, or CDI. A record can be updated as additional information becomes available, for example about risk factors and treatment.

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 the following 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 how reports are mapped on the system to reflect which organisations were 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, 9 UKHSA Centre and 4 UKHSA Region. Reports are mapped to a UKHSA Centre and UKHSA Region based on the reporting trust or IS Provider. Note that UKHSA Centres and UKHSA Regions are able to view Reporting and Commissioning Pathways.

Reporting Region

The UKHSA 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 sub-ICB location in the London Commissioning Region, then the Reporting and Commissioning Regions would be the same. However, if the patient was traced to a sub-ICB location 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 are signed-off it is 'locked' and cannot be amended by users without first contacting UKHSA, as per the [Unlock Request User Guide](#).

Soundex

Encoded 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.

Integrated Care Board (ICB)

NHS organisations responsible for collaborating between local NHS organisations and local government. ICBs replaced Strategic Information Partnerships (STP) on 1 July 2022.

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 the [Unlock Request User Guide](#).

4. Introduction

UKHSA maintains an enhanced reporting system for mandatory surveillance of Gram-positive infections, including methicillin-resistant *Staphylococcus aureus* (MRSA) bacteraemia and methicillin-susceptible *Staphylococcus aureus* (MSSA) bacteraemia; Gram-negative infections, including *Escherichia coli* (*E. coli*), *Klebsiella* species (*Klebsiella* spp.), and *Pseudomonas aeruginosa* (*P. aeruginosa*) bacteraemia; and *Clostridioides difficile* infection (CDI).

A series of letters from the CMO introduced the mandatory requirements for NHS acute trusts to report each case of MRSA bacteraemia (effective from 1 October 2005), MSSA bacteraemia (effective from 1 January 2011), *E. coli* bacteraemia (effective from 1 June 2011) and CDI (effective from 1 April 2007) that fulfil the case definitions (see section [6. Inclusion criteria for reporting to the surveillance 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 UKHSA.⁶⁻⁷

From April 2010 Independent 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 1 January 2011) and *E. coli* bacteraemia (effective from 1 June 2011) surveillance was added later. From October 2010 all ISP required to register with the Care Quality Commission (CQC) 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 UKHSA.

In April 2017, a government initiative expanded mandatory surveillance of Gram-negative bacteraemia to include *Klebsiella* spp. and *P. aeruginosa*, alongside the existing *E. coli* collection. The original aim was to reduce Gram-negative bloodstream infections (GNBSIs) by 50% by 2021. This target was superseded in May 2024 with the launch of the UK Antimicrobial Resistance National Action Plan (AMR NAP) 2024-2029. Under this plan, the target by 2029, is to prevent any increase in GNBSIs in humans compared to the 2019/20 financial year baseline.

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 Independent Sector (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). Since 2018, cases are also further categorised into hospital-onset healthcare-associated (HOHA), community-onset healthcare-associated (COHA), community-onset of indeterminate association (COIA; CDI only), and community-onset community-associated (COCA) categories. See ([15.7 Appendix 7. Algorithms to determine the onset status of cases](#) for more information)
- All cases to be attributed to a sub-ICB location via the tracing process. The HCAI DCS does not currently require patient sub-ICB location 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 daily to identify patient GP details and patient residential postcode, and patients are attributed to a sub-ICB location based on this process. More details about sub-ICB location attribution can be found in [15.6 Appendix 6. Sub-ICB location Attribution Process](#)
- Enhanced data (e.g. data on risk factors and causes) on these HCAs 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 [15.2 Appendix 2: Risk factor and treatment data to be collected](#).

Please note that the quarterly mandatory laboratory return (QMLR) surveillance scheme, which collects quarterly aggregate data, continues to operate independently of this enhanced surveillance scheme. As such, QMLR data must also be completed using the relevant data collection form within the HCAI DCS. Details of the QMLR surveillance scheme are provided in section [6.9 Quarterly Mandatory Laboratory Returns \(QMLR\)](#).

Figure 1: Shows the front page of the HCAI DCS



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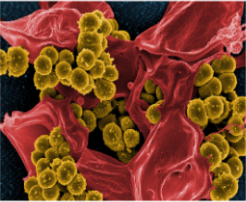
HCAI DCS Mandatory Surveillance

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About the HCAI Data Capture System



Micrograph of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and a dead human neutrophil (Credit: National Institute of Allergy and Infectious Diseases (NIAID))

UKHSA & HCAI

UK Health Security Agency's Data Capture System provides an integrated data reporting and analysis system for the mandatory surveillance of *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella* spp., *Pseudomonas aeruginosa* bacteraemia and *Clostridioides difficile* infections.

Log in

User Name*

Password*

Forgot Password?

Login

Don't have an account?

Register

News & Links

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Links

Guidance

1. Annual Epidemiology Commentary Launch Event recording

>>Please find below the recording for the event held on 16 October 2024:

2. National PPS on HCAI & AMU, England 2023

>>The National Point-Prevalence Survey (PPS) on Healthcare-associated infections, Antimicrobial Use an...

Reports

New Reports

Routine Reports

Independent Sector Annual report FY 2023/24

>> The independent sector annual report for financial year 2023/24 w...

Quarterly Epidemiological Commentary

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6. Inclusion criteria for reporting to the surveillance system

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

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.

For multiple specimens taken at different trusts whose specimen dates are separated by more than the 14- or 28-day episode window period for bacteraemia or CDI episodes, respectively, these should each be reported by the trusts testing those respective specimens.

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.

For specimens taken in the community, cases should be reported by the trust associated with the testing laboratory, 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 admission date for patients admitted directly from A&E

Patients are increasingly spending extended periods in A&E before admission, which can increase healthcare exposure and, consequently, infection risk. Concerns were raised that the prior trust exposure definitions may classify cases with significant A&E exposure as community-onset (CO), when they might more appropriately be considered hospital-onset healthcare-associated (HOHA). To address this, from 1 April 2024, where a patient is admitted directly following an A&E attendance, the decision-to-admit date should be recorded as the admission date rather than the inpatient admission date. If the decision-to-admit date is not known, the date of admission should be entered.

Example:

Patient arrives in A&E on 1 April. On 2 April there is a decision-to-admit the patient, and the patient is then admitted to the trust as an inpatient on 3 April. A positive specimen is taken on the 4 April. The date of admission should be recorded as 2 April, not 3 April. Previously they were classed as a CO case but now a HOHA as 'day 1' is 2 April and the specimen was taken on day 3 or after (4 April).

6.2 Addition of virtual wards and intermediate care facilities

6.2.1 Virtual wards

Virtual wards (also referred to as “hospital at home”) provide acute, hospital-level care to patients in their own homes, supported by multidisciplinary clinical teams and remote monitoring. The use of virtual wards is increasing across England, making it increasingly important to accurately capture these data within the surveillance. Robust recording is essential both to identify and investigate potential safety concerns and to inform operational, policy, and intervention-related decisions.

From 1 April 2024, ‘virtual ward’ was introduced as a patient category. Where this category is selected, cases are currently assigned a community-onset (CO-) status under the existing algorithm.

6.2.2 Intermediate care facilities

Intermediate care facilities (ICF) provide short-term, non-acute care provided in a dedicated healthcare setting, typically to support recovery, rehabilitation, or prevent hospital admission. Due to increasing use, ICFs were added as a category in the Provenance field from 1 April 2024.

6.3 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* (*S. 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.⁹
- In 2016, *Clostridium difficile* was reclassified as *Clostridioides difficile* (*C. difficile*). Although *Clostridium difficile* remains in widespread use in the scientific literature, we have adopted the new name in line with other organisations (European Centre for Disease Prevention and Control (ECDC) and the Centers for Disease Control and Prevention (CDC)).¹⁰

- In 2017, *Enterobacter aerogenes* was reclassified to *Klebsiella aerogenes* (*K. aerogenes*). The *K. aerogenes* was eligible for surveillance from April 2017 and trusts which identify isolates on or after 1 April 2017 are expected to report them as *K. aerogenes*.¹¹

6.4 MRSA bacteraemia

The following blood cultures positive for *S. aureus*-related complex organisms (*S. aureus*, *S. argenteus* & *S. schweitzeri*) must be reported to UKHSA:

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

Exclusions:

- Cases identified post-mortem are excluded.

6.5 MSSA bacteraemia

The following blood cultures positive for *S. aureus*-related complex bacteria must be reported to UKHSA:

- All cases of bacteraemia caused by *S. aureus*-related complex bacteria which are not resistant to meticillin, oxacillin, ceftazidime, 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* genes negative are an anomaly and should be investigated with possible referral to the national reference laboratory.

6.6 Gram-negative bacteraemia

Blood cultures positive for the following organisms must be reported to UKHSA:

- All laboratory confirmed cases of *E. coli* bacteraemia
- All laboratory confirmed cases of *Klebsiella* spp. (including *Klebsiella aerogenes* formerly in the *Enterobacter* genus, but excluding *K. ornithinolytica*, *Raoultella ornithinolytica* & *K. ornithinolytica*) bacteraemia
- All laboratory confirmed cases of *P. aeruginosa* bacteraemia

Exclusions:

- Cases identified post-mortem are excluded

6.7 *C. difficile* infection

Any of the following defines a CDI in patients aged 2 years and above and must be reported to UKHSA:

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

Notes

In contrast to other collections, CDI post-mortem specimens are included.

When testing for toxin detection is not required, the date of the scan or biopsy investigation should be inputted as the 'Specimen Date' with 'Type of Specimen Date' = "date sample was taken".

*[Current guidelines from DH/ARHAI](#) recommend two tests in sequence for the diagnosis of CDI:

Stage 1: Toxin gene detection by either:

- GDH (glutamate dehydrogenase antigen enzyme immunoassay)
OR
- NAAT (Nucleic Acid Amplification Test)

Stage 2: Specific toxin A and B immunoassay test

In the case of inconsistent results for the two-stage testing, an additional third test should be performed. In this case, NAAT should be performed as a reflex test to distinguish between samples containing toxigenic and non-toxigenic strains.

For additional information, please refer to the Frequently Asked Questions ([15.10 Appendix 10. Frequently Asked Questions](#)).

6.8 Episode categories

The DCS allows for three different episode types:

- **New infection**

An infection is classified as new if either of the following applies:

- The patient has no known prior history of bacteraemia or CDI caused by organism of interest

OR

- The patient had a previous episode of bacteraemia or CDI, but:
 - More than three months (84 days*) have elapsed since resolution, and
 - No positive specimens for the organism have been identified in the intervening period

- **Continuing infection**

A continuing infection is defined as:

- A new positive specimen occurring:
 - more than 14 days* after first positive specimen for bacteraemia, or
 - more than 28 days* after first positive specimen for CDI
- AND occurring within three months (84 days*) of the first positive specimen
- AND with no negative specimens recorded between the first positive specimen and the subsequent positive specimen

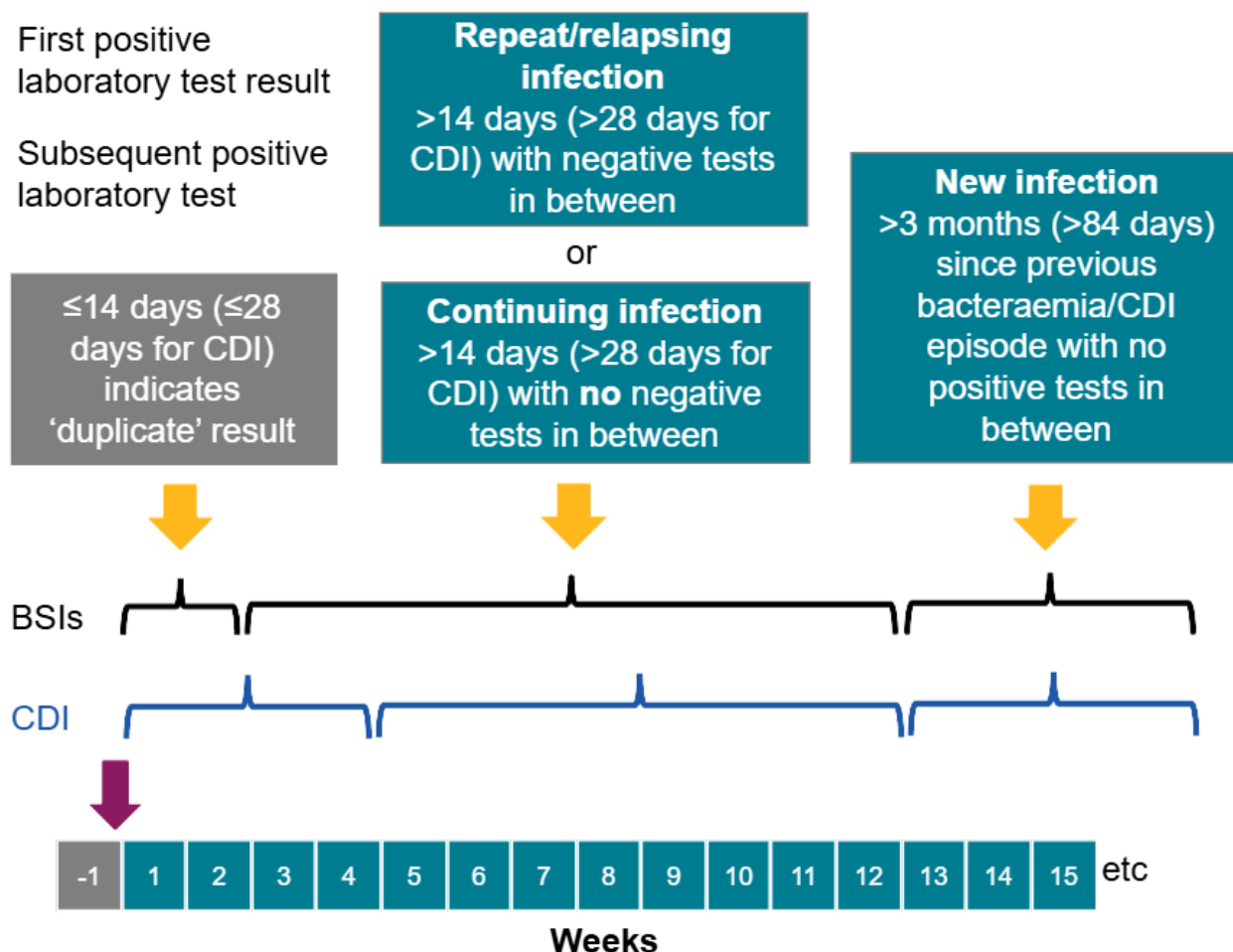
- **Repeat / relapsing infection**

A repeat or relapsing infection is defined as:

- A new positive specimen occurring:
 - more than 14 days* after first positive specimen for bacteraemia, or
 - more than 28 days* after first positive specimen for CDI
- AND occurring within three months (84 days*) of the first positive specimen
- AND with one or more negative tests recorded between the first positive specimen and the most recent positive specimen

*Note that day 1 is the date of the first positive specimen.

Figure 2. Schematic diagram for episode categorisation for bacteraemia and CDI



6.9 Quarterly Mandatory Laboratory Returns (QMLR)

On a quarterly basis NHS acute trusts are mandated to report eight aggregated laboratory testing variables to the HCAI DCS (Table 2). Data for each 3-month period (quarter) must be submitted within 6 weeks of the end of the data collection period (up to and including the 15th day of lockdown months) (Table 3). After this point, the dataset is automatically locked, and it is not possible to enter further data. Organisations must contact Mandatory.Surveillance@ukhsa.gov.uk, as per the [Unlock Request User Guide](#) if data needs to be entered after lockdown. The QMLR reporting scheme is distinct from the enhanced surveillance system described in the [section 6 above](#) but is also entered on the HCAI DCS.

Table 2: Definitions of data items for Quarterly Mandatory Laboratory Returns

Laboratory finding	Definition
Total number of blood culture sets examined	- Count the blood culture sets, not the number of bottles that make up each set. Count the sets irrespective of their result (positive, negative or inconsistent) - Include: - repeat blood samples - sets using samples drawn from a single venepuncture or existing line - Do not deduplicate by patient - i.e. 3 sets from the same patient, tested on the same day, counts as 3 in the total - Exclude samples: - received by the lab but not tested in culture (for whatever reason) - post-mortem
Total number of positive blood culture sets	- Same definition as 'Total number of blood culture sets examined' EXCEPT only count sets with positive results: - E.g. the blood culture set has any bottles positive for bacterial growth or contaminants - This total will always be less than or equal to the 'Total number of blood culture sets examined'
Total number of <i>S. aureus</i> -related complex positive blood culture episodes	Firstly, if any of the bottles of a blood sample drawn from a patient is positive for <i>S. aureus</i> related complex (<i>S. aureus</i>, <i>S. argenteus</i> & <i>S. schweitzeri</i>), including repeat samples, then that blood culture set should be counted once

	- Secondly, the count of sets should be deduplicated by patient episode, where the episode window is 14 days, with day 1 being the date of the first sample - If a patient has multiple episodes within the same reporting period, all episodes need to be reported - Exclude post-mortem samples - This total will always be less than or equal to the 'Total number of blood culture sets examined'
Total number of stool specimens examined	- Include: - all stools, not just the ones that fit the Bristol Stool Chart as we wish to count stools from patients displaying signs broader than just diarrhoea - this metric implicitly includes the 'Total number of stool specimens examined for diagnosis of <i>C. difficile</i> infection' 'all stools' means any stool sample examined for a pathogen processed in the lab, for example but not exclusively: - bacterial - viral - parasites - post-mortem samples - repeat samples - Exclude: - stool samples that were received by the lab but not examined - biochemistry samples - Do not deduplicate by patient - i.e. 3 stools from the same patient, tested on the same day, counts as 3 in total

Total number of stool specimens examined for diagnosis of <i>C. difficile</i> infection	• Same definition as 'Total number of stool specimens examined' EXCEPT: ○ Only include <i>C. difficile</i> toxin tests performed irrespective of result (positive, negative or inconsistent). Two-stage testing (or three-stage if two-stage is inconsistent) on a single sample should be counted as a single test • Do not deduplicate by patient
Total number of <i>C. difficile</i> toxin positive results in people aged ≥ 65 years	• Total number of <i>C. difficile</i> toxin-positive stool samples in patients aged 65 years and over at the time of specimen collection: ○ Do not include duplicates i.e. when the same patient has more than one positive result from samples taken within the 28-day episode window, with day 1 being the date of the first sample ○ Is positive according to testing guidance
Total number of <i>C. difficile</i> toxin positive results in people aged 2-64 years	• Total number of <i>C. difficile</i> toxin-positive stool samples in patients aged 2 to 64 years at the time of specimen collection: ○ Do not include duplicates i.e. when the same patient has more than one positive result from samples taken within the 28-day episode window, with day 1 being the date of the first sample ○ Is positive according to testing guidance
Total number of rectal swabs and faecal specimens taken for CPE screening	• This field collects denominator data for the surveillance of Carbapenemase-producing Enterobacterales (CPE). Collecting this data will allow UKHSA 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. • Include: ○ post-mortem stool samples ○ repeat samples • Do not deduplicate by patient ○ i.e. 3 stools from the same patient should counts as 3 in total
Total number of GRE positive blood culture episodes (optional)	• 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 <i>Enterococcus</i> genus do not constitute separate episodes

Table 3: Data collection periods and system lockdown dates for QMLR data

Data collection period	System lockdown
October – December	00:10 on 16 February
January – March	00:10 on 16 May
April – June	00:10 on 16 August
July – September	00:10 on 16 November

If a value for a quarter is missing and after investigation you find there is no way to obtain it then please do not input "0" nor provide a guestimate. Instead, please contact us so that we can add you to a list of trusts with known missing values, we will then not contact you in future to chase these missing quarters of data.

6.10 Method of reporting data on the HCAI DCS

The HCAI DCS is a web portal designed by UKHSA to facilitate the collection of the enhanced data set. The HCAI DCS can be accessed at the following URL:

<https://hcaidcs.ukhsa.gov.uk/WebPages/GeneralHomePage.aspx>

For complete guidance on the HCAI DCS please refer to the [User Manuals](#). 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](#). Register for access to the HCAI DCS [using this webform](#). 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 below:

Table 4: User roles and permissions on the HCAI DCS

Role	Permissions
System Administrator	Full access to the system. Able to authorise requests for local administrator accounts. National team responsible for mandatory surveillance only
Local Administrator	Able to authorise local accounts. Unable to perform data entry or export line listing reports
Sign Off Authority	Able to sign off monthly data collections. Unable to perform data entry.
Data Entry	Creates new cases on system. Can edit saved cases. Only role that can view 'Find duplicates' report
Read Only (PII)	Read access only, PII visible
Read Only (No PII)	Read access only, PII not visible
Renal Data Entry	Able to edit data on cases shared with renal unit
Renal Read Only (No PII)	Able to view data on cases shared with renal unit. PII not visible
Renal Read Only (PII)	Able to view data, including PII on cases shared with renal unit

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PIR Data Entry User	Can edit PIR tabs on existing cases. Unable to view PIR case summary
PIR Assignment	Able to perform assignment of PIR case. Unable to enter or edit PIR data. Can view PIR case summary
PIR Arbitrator	Able to perform arbitration of PIR case. Unable to enter or edit PIR data. Can view PIR case summary
PIR View Only	Can view PIR case summary. Unable to enter or edit PIR data
Sub-ICB Data Entry Role	Can edit the Risk Factors tab only on existing Gram-negative cases

Directors of Public Health (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. Sub-ICBs, Local Authorities, DPH, NHS England Regional Teams, Field Services, UKHSA Region and UKHSA 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' or 'Risk Factors and Treatment' tab, depending on the organism (see Figure 3). Fields and tabs vary between organism collections; e.g. Gram-negative bacteraemia and CDI have different fields available in their Risk Factors tabs.

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 for a record to be saved. Fields that are mandatory for sign-off must be completed for the CEO/sign-off authority to complete the sign-off.

Optional fields, along with their child (triggered) fields, will remain editable for up to one year after sign-off and do not require CEO approval to edit within this time. This does not include mandatory or sign-off fields within the Episode details, Prior Trust Exposure (PTE), or Species tabs, which remain restricted.

Further details about data items can be found in [15.1 Appendix 1: Episode details to be collected](#), [15.2 Appendix 2: Risk factor and treatment data to be collected](#) and the [Case Capture User Guide](#).

Figure 3: HCAI DCS showing tabs for MRSA data collection

The screenshot displays the HCAI DCS Mandatory Surveillance - Test Site interface. At the top, there is a navigation bar with links for Home, About Us, and Contact Us. Below this, a section titled 'New Infection Episode' contains a dropdown menu for 'Data Collection' set to 'MRSA', an 'ID' field, a 'Created Date' field, and a 'Print' button. A row of tabs is visible, including 'Episode Details', 'Species', 'Prior Trust Exposure', 'Source of Bacteraemia & Associated Infections', 'Risk Factors & Treatment', and 'Healthcare Interactions (1)'. Below these tabs, there are two more tabs: 'Data Enrichment' and 'Additional Comments'. A warning box with an exclamation mark icon states: 'Mandatory fields are marked with red asterisk (*)' and 'Mandatory for Sign Off fields are marked with red hash (#)'. Below the warning box, there is a section titled 'Organisation Details *#', indicating it is a mandatory field for sign-off.

A data dictionary report is available, allowing users to download all fields and associated explanations on the DCS by data collection (see Figure 4). When you are logged into the DCS,

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navigate to the report by clicking ‘Reports’ on the left hand-side banner, then ‘Data Dictionary Report’.

Figure 4. Data dictionary report on the HCAI DCS

Data Dictionary Report

Data Collection

MRSA

Question Group

Organisation Details, Specimen Detail

Mandatory Type

Mandatory, Mandatory for Sign-Off, Other

Category

Episode Details, Species, Prior Trust

Question Type

Agreed Contaminant, Date, Dropdown

View Report

1

of 2496

75%

UK Health
Security
Agency

DATA DICTIONARY

Data Collection

MRSA

Question Group

--All--

Mandatory Type

--All--

Category

--All--

Question Type

--All--

DATA COLLECTION	TAB NAME	QUESTION GROUP DESCRIPTION	QUESTION DESCRIPTION	QUESTION TYPE	QUESTION OPTION CODE	OPTION DESCRIPTION	QUESTION IS MANDATORY	QUESTION IS MANDATORY FOR SIGN-OFF	QUESTION IS MANDATORY FOR SIGN-OFF
MRSA	Episode Details	Specimen Details	Laboratory where specimen processed	Dropdown	697G0	ACCULABS DIAGNOSTICS UK LTD	No	No	Laboratory specimen processed
MRSA	Episode Details	Specimen Details	Laboratory where specimen processed	Dropdown	69010	ADDENBROOKE'S HOSPITAL LABORATORY	No	No	Laboratory specimen processed
MRSA	Episode Details	Specimen Details	Laboratory where specimen processed	Dropdown	699V0	ADVANCED DIAGNOSTICS LABORATORY	No	No	Laboratory specimen processed
MRSA	Episode Details	Specimen Details	Laboratory where specimen processed	Dropdown	697C0	AIREDALE NHS FOUNDATION TRUST LABORATORY	No	No	Laboratory specimen processed
MRSA	Episode Details	Specimen Details	Laboratory where specimen processed	Dropdown	69480	ALDER HEY CHILDREN'S NHS FOUNDATION TRUST LABORATORY	No	No	Laboratory specimen processed

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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 [15.5 Appendix 5: Renal data items](#). Instructions on sharing and entering renal data can be found in the [Case Capture Renal User Guide](#).

9. Data upload wizard

The Data Upload Wizard (DUW) is an optional functionality on the DCS, that allows multiple records to be batch uploaded directly onto the HCAI DCS via a correctly formatted file for each data collection. To understand how to use the DUW and correctly format the file for upload, please refer to our [DUW user guide](#).

This function helps to speed up the entry of data onto the HCAI DCS, but does not influence the data collecting process, the responsibility of compiling and formatting the data onto the batch upload file is still on the reporting organisation.

10. 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 11:59PM on the 15th of the following month. That month of data must then be signed-off by 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 11:59PM on the 15th of every month. For example, data concerning specimens collected in October must be entered and signed-off by 11:59PM on the 15th of November. The records belonging to a trust for a certain month will remain unlocked until they are signed off. More details can be found in the [Sign-Off user guide](#).

QMLR data for each quarter must be submitted within 6 weeks of the end of the data collection period (up to and including 15). 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](#).

We no longer have a specific process for submitting a nil return (i.e. a data period with no cases). To submit a nil return, simply sign-off the data period with no cases entered for that period.

11. CEO sign-off and unlock requests

11.1 CEO sign-off

The mandatory surveillance data for healthcare associated infections (HCAI) 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 have been verified and are 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 and Social Care (DHSC).

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 (see Figure 5).

When we detect that a trust has not signed-off data for three months in a row, and we have not received a response from the trust CEO or sign-off authority, then the UKHSA mandatory surveillance team may escalate this to DHSC.

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Figure 5: Sign-off history in the Summary dashboard of the DCS

Home

Summary

ICU Summary

Benchmarking

ICU Benchmarking

Data Quality

1

of 2

Data Collection Completeness (Shared Cases) - Current Period

Data Collection	Sharing Unit	Total Shared Cases	Mandatory	Optional
C. difficile	Renal Unit			
E. coli	Renal Unit			
Klebsiella spp	Renal Unit			
MRSA	Renal Unit			
MSSA	Renal Unit			
Pseudomonas aeruginosa	Renal Unit			

Sign-Off History

Date	Sign-Off	Data Collection	Org Code	Organisation Name	Total Reported Cases	Earliest Sign-Off Date	Sign-Off Deadline	Date Signed-Off	Sign-Off Status
01/11/2021 - 30/11/2021	Sign Off	C. difficile			2	01/12/2021	15/12/2021		
01/11/2021 - 30/11/2021	Sign Off	E. coli			9	01/12/2021	15/12/2021		
01/11/2021 - 30/11/2021	Sign Off	Klebsiella spp			5	01/12/2021	15/12/2021		
01/11/2021 - 30/11/2021	Sign Off	MRSA			0	01/12/2021	15/12/2021		
01/11/2021 - 30/11/2021	Sign Off	MSSA			6	01/12/2021	15/12/2021		
01/11/2021 - 30/11/2021	Sign Off	Pseudomonas aeruginosa			0	01/12/2021	15/12/2021		
01/10/2021 - 31/10/2021		C. difficile			4	01/11/2021	15/11/2021	22/11/2021	
01/09/2021 - 30/09/2021		C. difficile			3	01/10/2021	15/10/2021	26/10/2021	
01/10/2021 - 31/10/2021		E. coli			11	01/11/2021	15/11/2021	22/11/2021	
01/09/2021 - 30/09/2021		E. coli			16	01/10/2021	15/10/2021	26/10/2021	
01/10/2021 - 31/10/2021		Klebsiella spp			5	01/11/2021	15/11/2021	22/11/2021	
01/09/2021 - 30/09/2021		Klebsiella spp			6	01/10/2021	15/10/2021	26/10/2021	
01/10/2021 - 31/10/2021		MRSA			0	01/11/2021	15/11/2021	22/11/2021	
01/09/2021 - 30/09/2021		MRSA			0	01/10/2021	15/10/2021	26/10/2021	

11.2 Identification of duplicate records

Prior to sign-off, records should be checked 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.

11.3 Sign-off process

To sign-off on a data period, it is necessary to ensure all records within that period are appropriately completed. This means that every record for a data collection that you wish to sign-off on must have all its mandatory fields filled out. In the DCS, mandatory fields are denoted with a red asterisk (*) to indicate their requirement for saving, or a red hash (#) symbol to indicate their requirement for sign-off.

Once all the records for the data collection(s) to be signed-off have had all 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 becomes locked, meaning that further additions or removals of cases within that month are restricted. To make any changes to a locked month, such as adding, editing or removing cases, it is necessary to request an unlock.

11.4 Unlock requests

Unlock requests allow:

- the modification of a record, such as to add or amend data in the fields of an existing record, or
- the reporting of additional cases or deletion of incorrectly reported cases

Unlock requests should be sent to Mandatory.Surveillance@ukhsa.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 unlocking 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](#).

12. Denominator data

12.1 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 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 from 2010/11 onwards. This dataset is an open access return published by NHS England every 3 months and provides a measure of clinical activity in each trust. If any KH03 data is missing, the same quarter in the previous year is used, e.g. substituting data from 2024 calendar quarter 2 for 2025 calendar quarter 2.

If any quarter of KH03 data for an individual trust is missing, we will use proxy data for that quarter. The proxy will be the same quarter in the previous year. For example, if quarter 1 of financial year 2025/26 is missing, quarter 1 from financial year 2024/25 will be used.

Note that for definitive counts and rates always refer to the official statistics on [UKHSA gov.uk pages](https://www.ukhsa.gov.uk/pages) rather than DCS reports as the latter may not be using the latest denominators. In addition, if you wish to use DCS rates for organisations other than your own please contact us at Mandatory.Surveillance@ukhsa.gov.uk to confirm the rates are accurate and appropriate.

KH03 data are downloaded from the [NHS England website](https://www.nhs.uk), as it is for the Official Statistics reports; however, data are then scaled up to the total number of occupied overnight beds for a given financial year. This is calculated as the total occupied overnight beds for the financial year divided by the number of days in the financial year and then multiplied by the number of days in the time period in question. This is then uploaded to the HCAI DCS on a quarterly basis for the system to use when calculating rates. For example, to calculate the number of occupied overnight beds for January 2014 you would follow equations (1) and (2) in Figure 6.

Figure 6: Algorithm for calculating the number of occupied overnight beds in January 2014

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

$$\begin{aligned} \text{Number of occupied overnight beds for January 2014} = & \\ & \frac{34327781}{365} \times 31 \text{ days} = 2915510 \quad (2) \end{aligned}$$

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.

12.2 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 [15.11 Appendix 11. Independent Sector denominator data calculations](#).

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

12.3 Geographic population denominators

Various organisations (sub-ICBs, ICBs, 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.

13. Analysis of data

13.1 Organisation-specific data

There are several reports/dashboards available on the HCAI DCS that can be used to look at the data reported to the mandatory surveillance programme. This can be summarised as aggregated data reports/dashboards, and the line listing report.

13.1.1 Aggregated data reports/dashboards

The selected organisation's data generated in the aggregated report is determined by the default data pathway assigned to the organisation type, as defined in Table 1 of the [Roles and Permissions user guide](#). Who has access to these reports/dashboards is outlined in Table 2 of the user guide.

Examples and guides of key reports/dashboards are outlined below. Reports/dashboards that focus on data quality, or DCS functionality are not included.

13.1.1.1 Counts or Rates of Infection Episodes report

This report presents the aggregate counts/rates of any of the data collections for a specified time period. A number of parameters are available for you to change so that you can view the data for a number of different combinations, including different time periods, frequencies and organisations. For further information please refer to the [Counts or Rates of Infection Episodes Report user guide](#).

13.1.1.2 Quarterly Mandatory Laboratory Return (QMLR) report

This report presents the number of QMLR test records broken down by Reporting Organisation, Frequency and Field Listing matching the parameters selected by the user. For further information please refer to the [QMLR Report user guide](#).

13.1.1.3 Summary dashboard

The Summary Dashboard has up to five elements, access to which is determined by user permissions. These five elements are the Summary graph, Trends graph, Data Collection Completeness table, Data Collection Completeness (Shared cases) table, and the Sign-off History table. For further information please refer to the [Summary Dashboard user guide](#).

13.1.1.4 Benchmarking dashboard

The benchmarking dashboard allows users to compare a specific organisation (for example an NHS acute Trust) against a selection of other user-specified Trusts. This report can display both counts and rates for the selected time period. This dashboard only displays data that has been signed off. For more information please refer to the [Benchmarking Dashboard user guide](#).

13.1.2 Line listing report

The Line Listing report provides case level information on each case reported to the HCAI DCS as well as aggregate level QMLR data returns. The data view provided by this report may differ to the aggregated report/dashboard views depending on the organisation type that is accessible to you, for specifics on data views for the line listing report please refer to the [Roles and Permissions user guide](#). This report is commonly used to extract data from the DCS. As the report is formatted as each row being a case, and each column being a DCS field.

For further information on the line listing report, please refer to the [Line listing report user guide](#).

13.2 Publications and reports

Different reports can be obtained from the HCAI DCS on demand, depending on the user's role. Please note UKHSA publish data tables on a regular basis (Table 5). These outputs are classed as 'accredited Official Statistics' and as such constitute the final monthly, quarterly or annual position. These reports should be used as a benchmark against which individual numbers can be compared.

Table 5: List of the mandatory surveillance team's publications and reports

Report name and hyperlink	Summary	Publication Frequency	Official statistics ?
Clostridioides difficile infection: monthly data by prior trust exposure and NHS organisation	Counts of prior healthcare exposure to <i>C. difficile</i> infections by NHS organisations in patients aged 2 years and over.	Monthly	Accredited official statistics
Escherichia coli (E. coli) bacteraemia: monthly data by onset of infection and NHS organisation	Counts of <i>E. coli</i> bacteraemia split by location of onset of infection and by NHS organisations.	Monthly	Accredited official statistics

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<i>Pseudomonas aeruginosa</i> (<i>P. aeruginosa</i>) bacteraemia: monthly data by onset of infection and NHS organisation	Counts of <i>P. aeruginosa</i> bacteraemia split by location of onset of infection and by NHS organisation.	Monthly	Accredited official statistics
<i>Klebsiella</i> species (<i>Klebsiella</i> spp.) bacteraemia: monthly data by onset of infection and NHS organisation	Counts of <i>Klebsiella</i> species bacteraemia split by location of onset of infection and by NHS acute trust.	Monthly	Accredited official statistics
Meticillin-resistant <i>Staphylococcus aureus</i> bacteraemia (MRSA): monthly data by onset of infection and NHS organisation	Counts of meticillin-resistant <i>Staphylococcus aureus</i> bacteraemia split by onset of infection and by NHS organisation.	Monthly	Accredited official statistics
Meticillin-susceptible <i>Staphylococcus aureus</i> bacteraemia (MSSA): monthly data by onset of infection and NHS organisation	Counts of meticillin-susceptible <i>Staphylococcus aureus</i> bacteraemia split by onset of infection and by NHS organisation.	Monthly	Accredited official statistics
MRSA, MSSA and Gram-negative bacteraemia and <i>C. difficile</i> infection: quarterly epidemiological commentary	National trends in meticillin-resistant <i>Staphylococcus aureus</i> , meticillin-susceptible <i>Staphylococcus aureus</i> and Gram-negative bacteraemia and <i>C. difficile</i> infection along with epidemiological commentary.	Quarterly	Accredited official statistics
MRSA, MSSA and Gram-negative bacteraemia and <i>Clostridioides difficile</i> infection: annual data for independent sector healthcare organisations	Counts and rates of meticillin-resistant <i>Staphylococcus aureus</i> , meticillin susceptible <i>Staphylococcus aureus</i> , <i>E. coli</i> , <i>P. aeruginosa</i> , and <i>Klebsiella</i> species bacteraemia and <i>C. difficile</i> .	Annually	Management information (as of 2025 – previously

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	<i>difficile</i> infection reported by independent sector organisations, with commentary		official statistics)
MRSA, MSSA and Gram-negative bacteraemia and <i>C. difficile</i> infection: annual epidemiological commentary	Trends in meticillin-resistant <i>Staphylococcus aureus</i> , meticillin susceptible <i>Staphylococcus aureus</i> , <i>E. coli</i> , <i>P. aeruginosa</i> and <i>Klebsiella</i> species bacteraemia and <i>C. difficile</i> infection by financial year.	Annually	Accredited official statistics
Fingertips Healthcare-associated infection domain and Fingertips portal	AMR local indicators are publicly available data intended to raise awareness of antibiotic prescribing, AMR, HCAI, IPC and AMS; and to facilitate the development of local action plans.	Monthly FT: first Tuesday of each month Quarterly FT (QMLR): first Tuesday of January, April, July, October Annual FT: after the publication of the AEC	N/A
HCAI dashboard	Monthly data visualisations for trends over the latest 13-month period which can be filtered by location.	Monthly: first Wednesday of each month	N/A
<i>Clostridioides difficile</i> ribotype 955 infections in England	Epidemiology of <i>C. difficile</i> RT955 infection in England between 2021 and 2025, with particular reference to an outbreak centred on the NHS Midlands region.	One off	N/A
Increase in <i>Clostridioides difficile</i> infections (CDI): current epidemiology, data and investigations – Technical report	Technical report investigating the increase in CDI cases from financial year (FY) 2020 to 2021 and FY 2023 to 2024	One off	N/A

13.3 Independent Sector report outputs

The following IS data are produced by UKHSA every year:

- Counts and rates of MRSA, MSSA and Gram-negative bacteraemia and CDI by IS organisation

14. 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 UKHSA and NHS organisations please email: mandatory-surveillance@ukhsa.gov.uk
- For questions regarding the use of the DCS, please email support.hcaidcs@ukhsa.gov.uk
- For queries from the Independent Sector please email: independentsector@ukhsa.gov.uk
- Telephone: 020 8327 7000 – ask to be put through to the AMR and HCAI Division.
- Please note that automatic emails generated by the HCAI DCS come from the hcai.dcs@ukhsa.gov.uk email address. Emails to this address are not monitored and will not be replied to.

15. Appendices

15.1 Appendix 1. Episode details to be collected

Table A1 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 ([15.2 Appendix 2: Risk factor and treatment data to be collected](#)).

Table A1: Properties of data items included in core data set

Field	Completion	Rationale for inclusion
Organisation Details		
Reporting organisation	Automatic	Identifies the organisation (trust or ISS) reporting the case. If the original reporting organisation needs to be changed in the future this can be done using the Case Transfer option – please contact us to arrange this.
Attributed Organisation	Automatic	Sub-ICB responsible for commissioning the patient's care.
Specimen Details		
Specimen Date	Mandatory	When the specimen was taken or received in the laboratory. Useful when assessing timing of detection. Date specimen taken (collected) is preferred over date received in laboratory. In the rare scenario that a CDI case is diagnosed without a stool sample but with CT or pathology results, the date of the scan or biopsy investigation should be inputted with Type of Specimen Date = "date sample was taken"
Type of Specimen Date	Mandatory	Whether the specimen date marks when sample was taken from the patient or received in the laboratory.

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Specimen No	Optional	A unique specimen identifier.
Laboratory where specimen processed	Optional	Laboratory providing diagnostics on specimen. A useful identifier.
Patient Details		
NHS Number	Mandatory	Unique identifier for each individual patient. Allows tracing and attribution to a sub-ICB. Enables linkage to HES to obtain ethnic group for health equity analysis. Helps when deduplicating records for the same individual.
Forename	Mandatory	Useful Patient Identifiable Information. Allows tracing. Enables linkage to HES to obtain ethnic group for health equity analysis. Helps when deduplicating records for the same individual.
Surname	Mandatory	Useful Patient Identifiable Information. Allows tracing. Enables linkage to HES to obtain ethnic group for health equity analysis. Used to create soundex. Helps when deduplicating records for the same individual.
Date of Birth	Mandatory	Useful Patient Identifiable Information. Allows tracing. Enables linkage to HES to obtain ethnic group for health equity analysis. Allows age calculation and associated age-related analyses. Where date of birth is not available the date 01/01/1900 should be entered. Can be used to deduplicate records for the same individual.
Sex	Mandatory	Important for epidemiologic analysis. Allows tracing. Enables linkage to HES to obtain ethnic group for health equity analysis.
Hospital Number	Optional	Unique local hospital identifier specific for patient and particular admission. Useful in

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		deduplicating records for the same individual when other information is missing.
Episode Category	Optional	Information on whether a particular record is a new infectious episode; a continuing infection; or a repeat infection/relapse. Useful for epidemiological categorisation.
Admission Details		
Patient Location	Mandatory	Where the patient was when the specimen was taken. Used in the algorithm to determine the onset status for bacteraemia and CDI. Used historically in the PIR MRSA algorithm for establishing the leading organisation.
Trust/Provider	Mandatory, if triggered	Organisation providing care at time of specimen collection. Only triggered if patient location is NHS acute trust; Non-Acute NHS Provider; Independent Sector Provider; or Mental Health Provider.
Hospital Site	Mandatory, if triggered	Allows stratification of cases by site. Triggered if Patient Location is any of NHS acute trust; Non-acute NHS Provider; Independent Sector Provider; or Mental Health Provider.
Patient Category	Mandatory, if triggered	Admission status of patient at time of specimen. Used in the onset status algorithm. See Table A11 below for information on patient categories and whether they are considered part of 'prior trust exposure'. Only triggered if patient location is NHS acute trust, Non-acute NHS Provider, Independent Sector Provider or Mental Health Provider.

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Other Patient Category	Mandatory, if triggered	Allows completion of detail in other patient categories. Triggered only when Patient Category is Other. Free text field.
Do you know the admission date?	Mandatory if triggered	Trigger question for Date admitted. Triggered only when Patient Category is 'Day Patient', 'Inpatient', 'Emergency Assessment', 'Virtual ward', 'Other', or 'Unknown'.
Date admitted (decision-to-admit date where via A&E)	Mandatory, if triggered	Allows calculation of time between admission and onset. Where a patient is admitted directly following an A&E attendance, the decision-to-admit date should be recorded as the admission date rather than the inpatient admission date. If the decision-to-admit date is not known, the date closest to this should be used, either the A&E arrival date or the hospital admission date, as appropriate.
Admission Method	Mandatory, if triggered	Allows stratification of rates by method of admission. Only triggered where Patient Category is inpatient, day patient, emergency assessment or other.
Provenance	Optional	Where the patient was prior to arriving at the healthcare facility. Useful for data analysis involving patient history. "Intermediate care facility" was added as an option since April 2
Trust/Provider admitted from	Optional	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.
Non-UK Country	Optional	Allows epidemiological analysis of risk of infection by originating country. Only triggered when provenance is Non-UK resident.

Treatment details		
Admitted any time during episode	Optional	Provides information on if the patient was admitted at any point during the episode. Useful for data analysis.
On dialysis	Mandatory	Provides information on whether the patient was on dialysis. Allows record to be shared with renal units. Acute RF = where kidney failure develops suddenly rather than after long term kidney disease Established RF = 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.
Main Specialty	Mandatory, if triggered	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.
Treatment Specialty	Mandatory, if triggered	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.
Augmented Care	Mandatory, if triggered	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.

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Additional comments – <i>NB this is a separate tab in Case Capture</i>		
Comments	Optional	Free text field for comments regarding case, please refrain from putting patient identifiable information in this field.

15.2 Appendix 2: Risk factor and treatment data to be collected

Tables A2 to A4 below provide detailed information about the risk factor and treatment data to be collected for CDI, gram-negative BSIs, and MRSA and MSSA, respectively, 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 ([15.1 Appendix 1. Episode details to be collected](#)).

The CDI risk factor fields in Table A2 were comprehensively reviewed by the UKHSA and NHSE in 2025/26. This was to ensure they remain relevant and aligned with current clinical practice, surveillance needs and infection prevention priorities. The revised questions, below, were launched on the DCS on 17 September 2026.

Table A2: Risk factor and treatment fields for CDI

Field	Completion	Rationale for inclusion
Select the number of different antibiotics that the patient was prescribed (all settings) in the 28 days prior to, and including, the date of positive specimen	Mandatory	Antibiotic therapy is an important risk factor for CDI. Time period extended from 7 days to 28 days prior to specimen date
Antibiotic, setting, date started and date ended	By April 2027: Antibiotic, setting, date started: mandatory, if triggered; date ended: optional Initially: all optional	Allows analysis of which antimicrobials result in increased risk of <i>C. difficile</i> infection. Provides greater granularity on the number and type of antibiotics, the settings (primary care, secondary care, dentistry, other or unknown) and timing of antibiotic course
Was the patient prescribed (all settings) a Proton Pump Inhibitor (PPI) in the 28 days prior to, and including, the	By April 2027: Mandatory Initially: optional	Allows analysis of trends behind infection risk factors and association with PPIs

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date of the positive specimen?		
Was the patient prescribed systemic anti-cancer therapy (SACT) at any point during the 12 months prior to, and including, the date of the positive specimen?	By April 2027: Mandatory Initially: optional	Allows analysis of trends behind infection risk factors and association with SACTs
When did the SACT end (use most recent SACT)?	By April 2027: Mandatory, if triggered Initially: optional	Allows analysis of trends behind infection risk factors and association with SACTs
Select the number of treatments that were provided for this episode of CDI	By April 2027: Mandatory Initially: optional	Allows assessment of the trends in CDI treatments
Date started, date ended, status, treatment and route of administration	By April 2027: Date started, status, treatment, route: mandatory, if triggered; date ended: optional Initially: all optional	Allows assessment of the trends in CDI treatments, including status (ongoing, completed or unknown) and route. Date ended can be left blank if the treatment status is ongoing or has an unknown end date
Was there evidence of potential cross-transmission of <i>C. difficile</i> in the patient's setting (e.g. ward, care home)?	By April 2027: Mandatory Initially: optional	Allows epidemiologic analysis of trends behind infection risk factors
Did the cases have the same <i>C. difficile</i> PCR ribotype?	By April 2027: Mandatory, if triggered Initially: optional	Allows linkage with <i>Clostridioides difficile</i> ribotyping network (CDRN) data

Did the patient have severe or life-threatening infection?	By April 2027: Mandatory Initially: optional	Allows epidemiological analysis of infection severity and outcomes
How long after diarrhoea onset was a stool sample sent for <i>C. difficile</i> testing?	By April 2027: Mandatory Initially: optional	Allows analysis of time between onset of diarrhoea, admission, and date sample taken
If the patient was in hospital, were they placed in appropriate patient placement (e.g. isolation / cohort ward / cohort bay) within 4 hours of their confirmed CDI diagnosis?	By April 2027: Mandatory Initially: optional	Allows analysis of Infection Prevention and Control measures used

Table A3: Risk factor and treatment fields for Gram-negative collections (*E. coli*, *Klebsiella* spp., *P. aeruginosa*)

Field	Completion	Rationale for inclusion
Primary focus of bacteraemia	Mandatory	Provides information about organ system in which bacteraemia arose
Urinary catheter (including intermittent or temporary) in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Urinary catheter (including intermittent or temporary) inserted, removed or manipulated in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors

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Vascular device (PPM or ICD) or CVC inserted, removed or manipulated in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Intubated (ET or PT) or extubated in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Surgery (30 days or 12 months prosthetic material) prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Surgical methods used	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Hepatobiliary procedure (ERCP or MRCP or similar) in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
UTI treatment in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Open wounds or ulcer (excluding diabetic foot infection) in last 28 days prior to specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Diabetic foot ulcer or infection in last 28 days prior	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Absolute neutrophil count less than 500 (0.5) cells per microlitre at time of specimen date	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors

Has the patient been on anti-cancer chemotherapy in 28 days prior to specimen date?	Optional	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
Prostate biopsy in 28 days prior	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Number of antibiotic courses prescribed in 28 days prior*	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Antibiotics: Date started, date stopped, indication, name*	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors

* Up to 5 sets of antibiotics can be entered against each case.

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 the next section.

15.2.1 Definitions of risk factors for Gram-negative collections (*E. coli*, *Klebsiella* spp., *P. aeruginosa*)

Absolute neutrophil count < 500 (0.5) cells/ μ l

Patient has an absolute neutrophil count of less than 500 cells/ μ l at time of 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.

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.

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Hepatobiliary procedure in 28 days prior

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

Intubated or extubated in 28 days prior to onset

Whether endotracheal or PT intubation was inserted or removed in last 28 days.

Neutropenia

Absolute neutrophil count < 500 cells/ μ l.

Number of antibiotic courses prescribed in 28 days prior

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

Open wounds or ulcers

Patient has an unhealed wound or ulcer in 28 days prior to onset of bacteraemia

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

Urinary catheter in 28 days prior

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

Urinary catheter manipulated, inserted or removed in last 28 days

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

Urinary tract infection (UTI) treatment in 28 days prior

Patient has received medical care in 28 days prior to onset of bacteraemia with intention of treating a UTI.

Vascular device

Any device inserted into peripheral or central vascular sites, up to 28 days prior to infection, with the intention of being left in situ for > 1 hour. Excludes intravenous injections or venepuncture for blood samples.

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.

Table A4: Risk factor and treatment fields for MRSA and MSSA

Field	Completion	Rationale for inclusion
Were there any pre-disposing risk factors for the bacteraemia	Optional	Allows epidemiologic analysis of trends behind infection risk factors
Peripheral IV device	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Central IV device	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Surgical wound	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Assisted ventilation (Current)	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Assisted ventilation (Past 7 days)	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Urinary catheter	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Liver disease	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Prosthesis	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Person who injects drugs	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Immunosuppressed	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Diabetic	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors
Other	Mandatory, if triggered	Allows epidemiologic analysis of trends behind infection risk factors

Prior <i>S. aureus</i> -related complex history	Optional	Allows assessment of risk posed by prior history of <i>S. aureus</i> -related complex infection
When (this field relates to prior <i>S. aureus</i> -related complex history)	Mandatory, if triggered	Allows classification of prior <i>S. aureus</i> -related complex infection
Has the patient been on anti-cancer chemotherapy in 28 days prior to specimen date?	Optional	Allows epidemiologic analysis of trends behind infection risk factors
Treatment of bacteraemia	Optional	Allows assessment of trends in <i>S. aureus</i> -related complex bacteraemia treatments. Includes an 'Other' option, which will trigger a free-text field.
If Other treatment	Mandatory, if triggered	Provides opportunity to identify other risk factors for bacteraemia

15.2.2 Definitions of risk factors for MRSA or MSSA

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 positive airway pressure (CPAP) and hypo CPAP are not considered ventilators unless delivered via tracheostomy or endotracheal intubation (e.g., ET-CPAP).

Diabetic

Patient has ever had a diagnosis of type I or type II diabetes.

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.

Person who injects drugs (PWID)

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.

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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.

Surgical wound

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

Urinary catheter

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

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.

15.3 Appendix 3: Source of bacteraemia & associated infections

Data items on the Source of Bacteraemia and Associated Infections tab are limited to MRSA and MSSA only (Table A5).

Table A5: Data items for the Source of bacteraemia & Associated Infections tab

Field	Mandatory?	Rationale for inclusion
Source of bacteraemia		
Do you know the source of bacteraemia	No	If 'Yes' triggers appearance of field 'Source of bacteraemia'
Source of bacteraemia	Mandatory, if triggered	Provides options for recording source of bacteraemia. Allows epidemiological analyses of sources of bacteraemia. Triggers "Other source of bacteraemia" Mandatory free text field if "Other" selected.
Certainty	Mandatory, if triggered	Clinical judgement on degree of certainty. Only triggered by certain responses to 'Source of bacteraemia' question
Associated Clinical Infections		
Associated clinical infection	No	Provides information on infection site, when patient has co-infection with the same organism
Certainty	Mandatory, if triggered	Clinical judgement on degree of certainty
Inpatient details		
For inpatients, what specialty was the infection thought to have been acquired in (Augmented Care)?	No	Allows specification of an augmented care unit in which the infection is believed to have been acquired

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		Only for records where patient was inpatient at time of specimen
Date from	No	Date admitted to ward. Allows cross-checking with date of sample
Date to	No	Date discharged or transferred from ward. Allows cross-checking with date of sample

15.4 Appendix 4: Healthcare Interactions

All data collections have a tab to complete for prior trust exposure information (Table A6). This asks whether a patient had been discharged from the reporting trust within a certain time frame 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.

Same Day Emergency Care (SDEC) or Acute Surgical Assessment Unit (ASAU) episodes coded as an admission (inpatient, day patient, regular attender or emergency assessment admission) should be included as prior trust exposure events. However, emergency department (ED) attendances (not admissions) are recorded on Emergency Care Data Set (ECDS) and so should be excluded as a prior trust exposure regardless of duration, unless it immediately precedes a hospital admission and there is a known decision-to-admit date (see [section 6.1 above](#)).

Table A6: Details of prior trust exposure data items

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

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 (Table A7). 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 A7: Details of prior healthcare interaction data items for MSSA and MRSA.

Field	Mandatory?	Comment
When	Yes	Allows specification of when prior healthcare interaction occurred
Type of interaction	Yes	Type of patient care provided (i.e. inpatient, outpatient, A&E only, Emergency assessment, Regular attender, Primary care, Day patient or Other)
Where	Yes	Specification of type of organisation providing care
Date from	Yes	First day of prior healthcare interaction
Date to	Yes	Last day of prior healthcare interaction
Reason for interaction	Yes	Choice of medical specialty of prior healthcare interaction
Admission method	Yes	Admission method for prior healthcare interaction

15.5 Appendix 5: Renal data items

Table A8: Definitions of renal data items

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

15.6 Appendix 6. Sub-ICB Location Attribution Process

All cases of MRSA, MSSA, gram-negative bacteraemia and CDI are attributed to a sub-ICB location. Cases are attributed to a sub-ICB location by tracing patient identifiers (NHS number and date of birth, or date of birth, forename, surname and sex) 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, which is a legacy term now termed 'onset status', referring to community- and hospital-onset.

15.6.1 Overview of sub-ICB location attribution

All records are attributed to a 'Responsible' sub-ICB location based on the patient's registered GP practice which are provided through the DBS. A responsible sub-ICB location is the sub-ICB location 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' sub-ICB location will be the one covering the catchment area of the patient's registered residential address. The responsible sub-ICB location is identifiable by querying the NHS Spine database, which contains GP practice codes and patient postcodes for all the patients registered in the NHS. [NHS Digital's Organisation Data Service](#) (ODS) provides mappings for organisational relationships between GP practice and sub-ICB locations.

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' sub-ICB location. The 'lead' sub-ICB location is the main commissioning organisation for the acute trust which reported the case. It is possible a single sub-ICB location is 'lead' to one or more acute trusts, but a trust can only have one lead sub-ICB location.

15.6.2 Sub-ICB location attribution algorithm

Attribution to a sub-ICB 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, forename, sex 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 sub-ICB location 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 sub-ICB location 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 sub-ICB location based on the patient's residential postcode;
3. If any of the above (in 1 and 2) are not available or valid, then then patient is attributed to a sub-ICB location 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 sub-ICB locations. Similarly, any foreign patients who have no NHS number are attributed to lead sub-ICB locations.

Please see Figure A1 [below](#) for a detailed schematic regarding the attribution of cases to sub-ICB locations.

15.6.3 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 sub-ICB location.

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.

15.6.4 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.

15.6.5 'C codes'

Once patients have been traced, details of the trace (including sub-ICB location type, sub-ICB location 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 A9 for C Code definitions).

If a case has NOT been attributed based on the patient's GP, i.e. sub-ICB location type is not "GP sub-ICB location", then the trust may want to verify that the patient's NHS number and other identifiers such as date of birth, forename, surname and sex 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 A9: Definitions of 'C-Code' field in DCS

Sub-ICB attribution	C code	Description
Trust sub-ICB	0	Cases with an invalid NHS number and patient details*
Trust sub-ICB	1	Cases with valid NHS number or patient details, but patient not listed on Spine
GP sub-ICB	20	Cases with valid details (forename, surname, DOB and sex) and traced to GP practice in England
GP sub-ICB	30	Cases with a valid NHS Number and date of birth are successfully traced via DBS to an English GP
Residential sub-ICB	122	Cases which are traced via patient postcode (only when GP code is not available)
Residential sub-ICB	123	Cases which are traced through Step 2 of DBS tracing (i.e. forename, surname, DOB, sex), via patient postcode (only when GP code is not available, and postcode is in England)
Trust sub-ICB	124	Cases with valid NHS number and date of birth are traced to a GP or postcode outside England

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Trust sub-ICB	125	Cases with invalid NHS number however traced through Step 2 of DBS tracing (i.e. first name, surname, DOB, sex) are traced to a GP or postcode outside of England
Trust sub-ICB	126	Cases which have been successfully traced against Spine, but patient details (i.e. residential postcode or registered GP code) are not available
Trust sub-ICB	127	Cases which have been successfully traced against Spine, but patient details (i.e. residential postcode or registered GP code) are not available
Trust sub-ICB	321	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
Residential sub-ICB	322	Cases without valid NHS number, but successfully traced through second stage and GP practice closed or is not in England
Trust sub-ICB	331	Cases traced successfully, but GP practice closed and patient postcode not available or not in England
Residential sub-ICB	332	Cases successfully traced but GP practice closed, and patient postcode is available and in England

* Note: Patients with C code 0 or 1 may potentially be traced if either NHS number and/or date of birth, forename, surname and sex are added/corrected and re-traced.



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15.6.7 Contacts/information

Any queries regarding case allocation should in the first instance be directed to mandatory-surveillance@ukhsa.gov.uk

15.7 Appendix 7. Algorithms to determine onset and prior trust exposure status

Please note that the algorithm applied to CDI is now aligned with the algorithm used for bacteraemia in terms of the number of days between specimen collection and admission used to determine the onset status of the cases (see table A10). Please note the onset status of cases is different to the prior trust exposure algorithm, which is covered in [section 15.7.2](#).

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

It is not possible for UKHSA 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 sub-ICB location (see [15.6 Appendix 6. Sub-ICB Location Attribution Process](#)). All cases regardless of whether they are hospital-onset or community-onset cases are attributed to a sub-ICB location.

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.

15.7.1 Onset status algorithm

Table A10: Definitions for onset status for bacteraemia and CDI

Onset status	Definition
Hospital-onset	- NHS patient specimens taken from day 3 of admission onwards, where day 1 is the day of admission, with Patient Location of 'NHS Acute Trust' or 'Unknown' - Applies to patients with a Patient Category of 'Inpatient', 'Day patient', 'Emergency Assessment', or 'Unknown'. - Includes records with an unknown admission date, where the Patient Location is 'NHS Acute Trust' or 'Unknown' - Applies to patients with a Patient Category of 'Inpatient', 'Day patient', 'Emergency Assessment', or 'Unknown'.
Community-onset	Any NHS patient specimen not meeting the criteria for hospital-onset, including:

	○ Acute trust specimens taken on day 1 or day 2 of admission (where day 1 is the day of admission). ○ Specimens from patients attending an acute trust who are not Inpatients, Day patients, or under Emergency Assessment. ○ Specimens from patients attending any identifiable non-acute healthcare location, including GP practices, nursing homes, sub-ICB-location hospitals, non-acute NHS providers, Independent Sector Providers, Mental Health Providers, residential homes, penal establishments, or locations recorded as unknown or other.
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A summary of how bacteraemia and CDI cases are determined to be hospital or community onset is illustrated in Figure 7.

15.7.2 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 (ECDC) and the Centers for Disease Control and Prevention (CDC) in the USA.

A new tab, the prior trust 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. Prior exposures are limited to the reporting trust because many trusts cannot routinely access information relating to previous admissions in other organisations. See table A11 below for the prior trust exposure categories and their definitions.

Table A11: Definitions for prior trust exposure categories for bacteraemia and CDI

Prior trust exposure category	Definition
Hospital-Onset Healthcare-Associated (HOHA)	• NHS patient specimens taken from day 3 of admission onwards, where day 1 is the day of admission, with Patient Location of 'NHS Acute Trust' or 'Unknown' • Applies to patients with a Patient Category of 'Inpatient', 'Day patient', 'Emergency Assessment', or 'Unknown'.

	- Includes records with an unknown admission date, where the Patient Location is 'NHS Acute Trust' or 'Unknown' - Applies to patients with a Patient Category of 'Inpatient', 'Day patient', 'Emergency Assessment', or 'Unknown'.
Community-Onset Healthcare-Associated (COHA)	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 (for bacteraemia and CDI), where date of discharge is day 0).
Community-Onset Indeterminate Association (COIA) <i>CDI only</i>	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 between 28 and 84 days prior to the current specimen date (where date of discharge is day 0).
Community-Onset Community-Associated (COCA)	Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated and where the patient has not been discharged from the reporting organisation within the past 28 days (or 84 days for CDI), to the current specimen date (where date of discharge is day 0).

A summary of how prior trust exposure category for bacteraemia and CDI cases is illustrated in [Figure A2 below](#). See table A12 for a description of each of the patient categories and whether they are considered as a prior trust exposure.

15.7.2.1 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 April 2019, it is no longer possible to leave these questions blank.

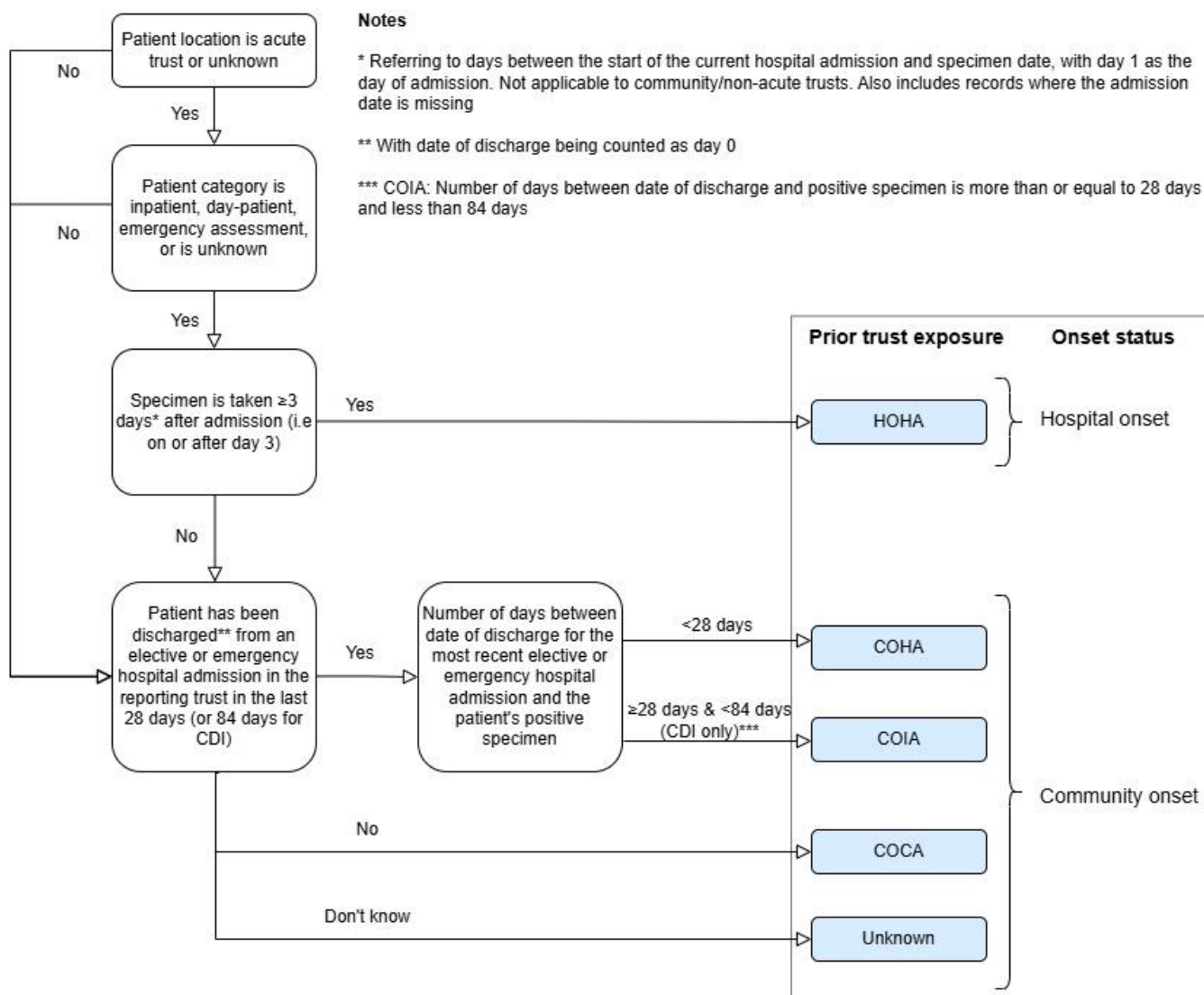
Unknown:

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'.

Table A12: Patient categories and whether they contribute to prior trust exposure

Patient category	Description	Considered exposure for 'prior trust exposure' categorisation?
Inpatient	A patient admitted to hospital with the intent to stay overnight at the time the specimen was taken	Yes
Outpatient	A patient who is not admitted and was receiving outpatient care at the time the specimen was taken.	No
A&E only	a patient who was receiving care in an Accident and Emergency (A&E) department when the specimen was taken irrespective of whether they were subsequently admitted.	No
Emergency Assessment	A patient admitted to an Emergency Assessment Unit (EAU).	Yes
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.	No
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.	Yes
Virtual ward	This represents acute, hospital-level care delivered in a patient's home under the responsibility of an NHS provider.	No
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")	Yes

Figure A2: Summary of process to determine the onset status and prior trust exposure for bacteraemia and CDI



Please note that all prior healthcare exposure questions must still be completed even if a case fits the criteria for a HOHA. Community/non-acute trust specimens should also complete the prior healthcare exposure questions, for which 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.

15.8 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.¹

The information below is retained for the purposes of historical context and interpreting previously published results.

15.8.1 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 nor the sub-ICB location are best placed to ensure improvements are made.

15.8.2 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 sub-ICB locations 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;

¹ Further details on the updated PIR process are available at https://improvement.nhs.uk/documents/2512/MRSA_post_infection_review_2018_changes.pdf

- 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 sub-ICB location 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.

15.8.3 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 sub-ICB location) or Third Party if there were no learning outcomes identified for either the reporting acute trust or attributed sub-ICB location.

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 was 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 sub-ICB location 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, sub-ICB location or Third party).

If an organisation failed to respond within the set time period at either 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 sub-ICB location 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.

15.9 Appendix 9. Organisation mappings in the DCS

Organisation hierarchies are mapped according to the hierarchies provided by the NHS Digital's [ODS](#). Cases are mapped upwards to higher level health geographies (NHS local office, NHS Region, UKHSA Centre and region) in one of three ways: by the reporting pathway, commissioning pathway or resident pathway.

15.9.1 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 UKHSA centres.

15.9.2 Commissioning pathway

Sub-ICB locations are mapped to a local authority based on the postcode of the sub-ICB location HQ. The postcode of the sub-ICB location 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 sub-ICB location to local office and to NHS region.

15.9.3 Resident pathway

The patient's postcode is used to map to local authority and then UKHSA centres and UKHSA Region

15.9.4 Director of Public Health mappings

Directors of Public Health are embedded within local authorities. sub-ICB locations are mapped to Directors of Public Health in the same way as sub-ICB locations are mapped to local authorities.

15.9.5 Trust site mappings

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

15.9.6 Maintenance of organisation mappings

Comma-separated values of organisation relationships are maintained by NHS Digital. New versions of the files are [released quarterly here](#).

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 UKHSA's GIS team.

15.10 Appendix 10. Frequently Asked Questions

15.10.1 Bacteraemia reporting: Frequently Asked Questions

See below for section [15.10.2 CDI reporting: Frequently Asked Questions](#).

Q. Do continuing infections inherit the prior trust exposure category of the first episode?

A. If a patient has a first episode of a Gram-negative, MRSA or MSSA bacteraemia and is admitted to hospital as a COCA, then when subsequent continuing episodes (>14 days after first specimen) are recorded while still admitted, these subsequent episodes will be classed HOHA and will not inherit the prior trust exposure category of the first episode.

Q. How long is an episode?

A. The episode length for Gram-negative, MRSA and MSSA bacteraemia is 14 days. Day 1 is the date of specimen collection, irrespective of the time of day the specimen was collected. Specimens collected on day 15 or afterwards are categorised as subsequent episodes. Even if additional positive specimens are collected from day 1 to day 14 inclusive, it will not change the classification of day 15 or later specimens as being in subsequent episodes.

Q. Do all positive blood samples need to be reported, even if the patient wasn't treated?

A. Yes, all positive blood samples that meet the case definitions 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 venepuncture 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 bacteraemia cases that conform to the case definitions 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 bacteraemia cases that conform to the case definitions 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 bacteraemia cases that conform to the case definitions 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. 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. 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. If a single specimen cultures more than one *S. aureus* Related Complex species, or both MRSA and MSSA, how should I report them?

A. All species cultured, and separate MRSA and MSSA isolates, from the same specimen should be reported separately. In this situation, a single patient episode would result in multiple reports (or cases) in the HCAI DCS.

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 HCAI DCS. In this situation, a single patient episode would result in multiple reports (or cases) in the HCAI DCS.

Q. Is *Enterobacter aerogenes* subject to mandatory reporting?

*A. In 2017, *E. aerogenes* was reclassified to *Klebsiella aerogenes*. Trusts which identify isolates from 1 April 2017 onward are expected to report them as *K. aerogenes* ¹¹.*

15.10.2 *C. difficile* Infection reporting: Frequently Asked Questions

Q. Do continuing infections inherit the prior trust exposure category of the first episode?

A. If a patient has a first episode of CDI and is admitted to hospital as a COCA, then when subsequent continuing episodes (>28 days after first specimen) are recorded while still admitted, these subsequent episodes will be classed HOHA and will not inherit the prior trust exposure category of the first episode.

Q. How long is an episode?

A. An episode of CDI is 28 days. Day 1 is the date of specimen collection, irrespective of the time of day the specimen was collected. Specimens collected on day 29 or afterwards are categorised as subsequent episodes. Even if additional positive specimens are collected from day 1 to day 28 inclusive, it will not change the classification of day 29 or later specimens as being in subsequent episodes.

Q. Do I need to report positive specimens from deceased patients?

A. Yes, unlike other organisms, positive specimens from deceased patients should be reported. Unlike bacteraemia, 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*. Ideally, the stool sample should take on the shape of the container and be at least ¼ filled (to indicate the patient has diarrhoea) before sending to the laboratory. 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 over and, as a minimum, all diarrhoeal samples from those aged 65 years and over in the community where clinically indicated, should be collected. Ideally, samples from community patients less than 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 do not need to 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. What is the definition of diarrhoea?

A. The current primary care UKHSA advice on the definition of diarrhoea is [the passage of 3 or more loose or liquid stools per day \(or more frequent passage than is normal for the individual\)](#). "Stools of a loose or liquid consistency are typically classed as 5 to 7 on the Bristol Stool Form Scale, taking the form of the container".

Q. 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 UKHSA guidance covers the minimum criteria on 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. No, cell-cytotoxicity neutralisation assay (cell culture) is not advised in [updated UKHSA guidelines on C. difficile infection diagnostic tests](#) due to antitoxin availability, the required expertise and long waiting time for a result.

Q. Are samples taken for research or assessing a 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.

15.11 Appendix 11. Independent Sector denominator data calculations

The denominator used for Independent Sector Providers in the DCS, 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 as 1 bed day, a one-night stay in the year will count as 2 bed days.

15.11.1 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:

$$\begin{aligned} &\text{Those in a bed at midnight at the end of the day 1 April 2014} + \\ &\quad (\text{all consecutive days up to}) \dots + \\ &\text{those in a bed at midnight at the end of the day 31 March 2015} \end{aligned}$$

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:

$$\begin{aligned} &\text{Discharge date or 1 April 2015, whichever is earlier} \\ &\quad \text{MINUS} \\ &\quad \text{Admission date or 1 April 2014, whichever is later} \end{aligned}$$

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.

15.11.2 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.

$$\begin{aligned} & \text{number of patients discharged on 1 April 2014} + \\ & \quad (\text{all consecutive days up to}) \dots + \\ & \text{number of patients discharged on 31 March 2015} \end{aligned}$$

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

15.11.3 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:

$$\begin{aligned} & \text{Minimum of (discharge date or 1 April 2015) - maximum of (admission date or 1 April 2014)} \\ & = 1 \text{ April 2015} - \text{maximum (1 March 2015 or 1 April 2014)} \\ & = 1 \text{ April 2015} - 1 \text{ March 2015} \\ & = 31 \text{ Days} \end{aligned}$$

15.12 Appendix 12. List of useful hyperlinks

15.12.1 Updated domain name for the DCS

<https://hcaidcs.ukhsa.gov.uk>

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

[B 10 - Investigation of faecal specimens for *Clostridioides difficile*](#)

15.12.3 MRSA bacteraemia by PIR status - archived data

<https://webarchive.nationalarchives.gov.uk/20190509024224/https://www.gov.uk/government/statistics/mrsa-bacteraemia-monthly-data-by-post-infection-review-assignment>

15.12.4 DCS User Guides

<https://hcaidcs.ukhsa.gov.uk/WebPages/InternalContentPage.aspx?gjvD2ZhVtrnMIb222Qn7yv+1xgGCdd9b>

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homotypic synonyms, with consequences for the name *Klebsiella mobilis* Bascomb et al. 1971 (Approved Lists 1980). *Int J Syst Evol Microbiol* 2017;67(2):502-04. doi: 10.1099/ijsem.0.001572 [published Online First: 2016/12/03]

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