



Public Health  
England

Protecting and improving the nation's health

# HCAI Data Capture System

## User manual

Overview of Location of Onset Algorithm

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# Algorithms for apportioning cases

## Introduction

Historically, cases were only apportioned based on the location of onset of infection. The algorithm used for this was referred to as the “Apportioning” algorithm. The apportioning algorithm was applied to all data collections although, for *Clostridioides difficile* infections (CDI) the number of days to onset was taken as 4 days (where day 1 was date of admission), while for the bacteraemias was 3 days. Using the apportioning algorithm, all cases of MRSA, MSSA, *E.coli*, *P.aeruginosa* and *Klebseilla* spp. bacteraemia, and CDI were determined to be either hospital-onset or community-onset cases (see Figures 1 and 2).

Since 1 April 2017, the prior trust exposure questions and algorithm were introduced for CDI and bactermias. Prior trust exposure was made mandatory for CDI in Apr 2017, and for all other collections from Apr 2019. Categorisation of cases using the “Prior Trust Exposure” algorithm can be seen in Figs 2 & 3. To differentiate both algorithms, the “Apportioning” algorithm is now referred to as the “onset of location” algorithm.

It is not possible for PHE to change the apportionment category of a case for either algorithm. The apportionment is done automatically using the data as entered by the reporting acute trust. A case may only change from one apportionment category to another if the relevant case details are incorrect and are corrected by the reporting acute trust. Please also note that both algorithms are applied to data entered by NHS acute trusts

In addition to the location of onset algorithms, all cases are also attributed to a CCG. Thus all cases, no matter the apportionment category, will be attributed to a CCG.

## Apportionment algorithms

### 1. Location of onset algorithm

Cases are either categorised as hospital-onset or community-onset based on the following case definitions.

#### Hospital-onset:

Any NHS patient specimens taken on the third day (fourth day for CDI<sup>1</sup>) of admission onwards (i.e.  $\geq$  day 3 when day of admission is day 1) at an acute trust (including cases with

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<sup>1</sup> MRSA bacteraemias underwent the apportioning algorithm until 31 March 2013. From 1 April 2013 all MRSA bacteraemia cases were subject to the Post Infection Review. Based upon these individual investigations an MRSA case would then be assigned to an acute Trust or CCG. As apportioning is based solely on other data items collected the process can be carried out on current data to allow the time series to be

unspecified specimen location) for Inpatients, Day-patients, Emergency Assessment, or an unspecified patient category.

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

### Community-onset:

Any case reported by an NHS acute trust not determined to be Hospital-onset. This will typically include the following groups:

- MRSA, MSSA, *E. coli*<sup>2</sup>, *Klebsiella* spp. and *P. aeruginosa* bacteraemia and CDI<sup>3</sup> cases with a specimen date from the same acute trust as the day of admission or one day after admission (i.e. days 1 or 2, where day 1 equals day of admission).
- Any specimens from patients attending an acute trust who are not Inpatients, Day patients or under Emergency Assessment.
- Any specimens from patients attending an identifiable healthcare location except an acute trust. This will typically include GP, nursing home, non-acute NHS provider, Independent Sector Provider, residential home, penal establishment, unknown or other locations.

## 2. Prior trust exposure algorithm

From April 2017, the HCAI DCS was updated so that information on a patient's history of prior admission to the same reporting trust could be captured for each case. This allowed for the classification of bacteraemia and CDI cases based on prior trust exposure. This was done to better align the CDI surveillance with that of the European Centre for Disease Prevention and Control (ECDC) and the Center for Disease Control and Prevention (CDC) in the USA.

As a result, all CDI cases reported on or after 1 April 2017 are categorised as; Hospital-Onset Healthcare Associated, Community-Onset Healthcare Associated, Community-Onset Indeterminant Association, Community-Onset Community Associated, Missing data or Unknown based on the following case definitions;

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continued. In April 2018, the PIR process ended and thus MRSA bacteraemias were no longer assigned to organisations. This meant MRSA bacteraemias reverted back to apportioning algorithm.

<sup>2</sup> From April 2017, the facility for apportioning *E. coli*, *Klebsiella* spp and *P. aeruginosa* bacteraemias using the 3 day algorithm, already in use for MSSA bacteraemia was turned on in the HCAI DCS. *E. coli* bacteraemia cases entered earlier were retrospectively apportioned and then counts and rates of apportioned *E. coli* bacteraemia are available via the DCS reports.

<sup>3</sup> From April 2017, the prior trust exposure tab was introduced and apportioning algorithm switched on. Prior to this hospital-onset was determined as day 4 onwards (with day 1 as day of admission), for the prior trust exposure hospital-onset follows the 3 day rule (where day 1 is day of admission) already in use for the bacteraemias.

### Hospital-Onset Healthcare Associated (HOHA<sup>4</sup>):

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

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

### Community-Onset Healthcare Associated (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 acute trust within 28 days prior to the current specimen date (where date of discharge is day 1).

### Community-Onset Indeterminant Association (COIA<sup>5</sup>):

Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient was discharged from the acute trust reporting organisation between 28 and 84 days prior to the current specimen date (where date of discharge is day 1).

### Community-Onset Community Associated (COCA):

Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the patient has not been discharged from the reporting organisation within the past 84 days for CDI and 28 days for bacteraemias, to the current specimen date (where date of discharge is day 1).

### 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.

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<sup>4</sup> Please note that this is similar to the "Hospital Onset" category of the "Location of onset" category except that the days to onset is 3 days as opposed to 4 days in the former.

<sup>5</sup> COIA cases are not currently applicable to bacteraemia cases.

## Unknown:

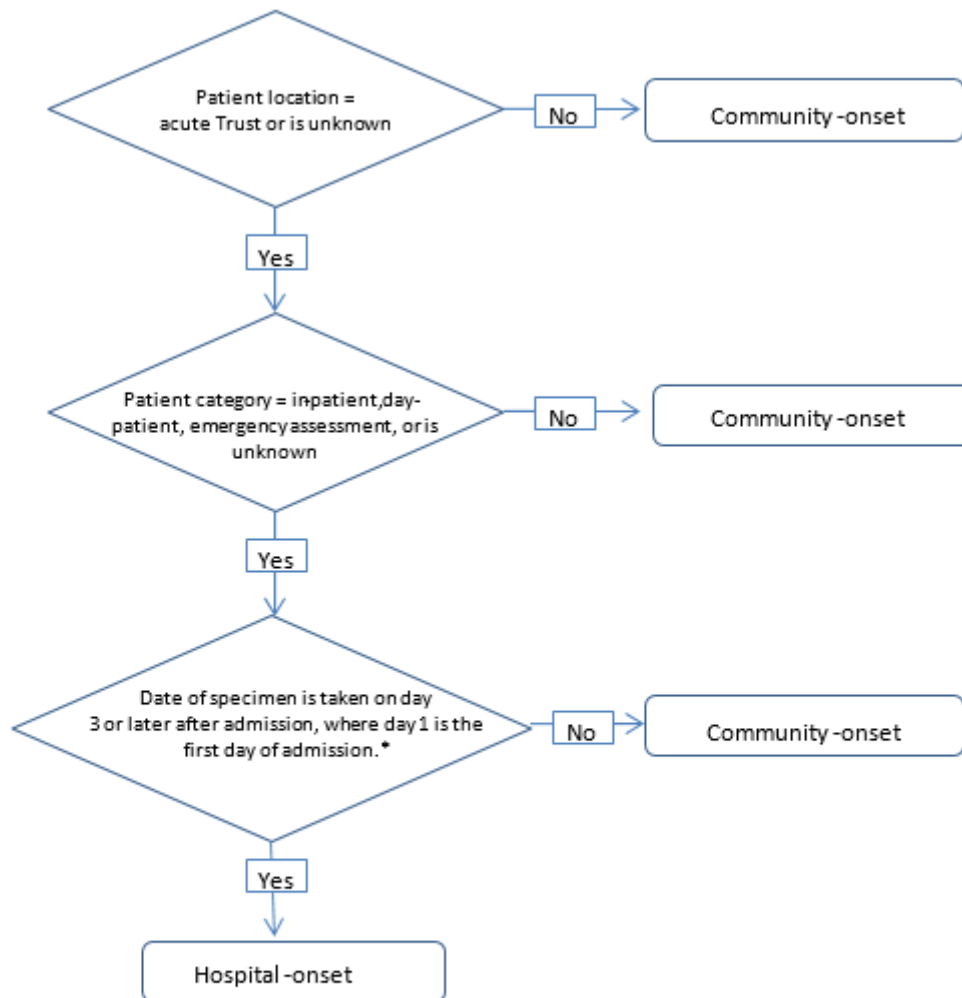
Any case reported by an NHS acute trust not determined to be Hospital-Onset Healthcare Associated but where the information on the patient prior discharge was reported as 'Don't know'.

## Types of admissions to be included for prior trust exposure

- **inpatients** – a patient admitted to an acute trust for care and is expected to stay overnight
- **day patients** – 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
- **regular day attender** - 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** - a patient admitted electively for the night, as part of a planned series of regular admissions for an on-going regime of broadly similar treatment and who is discharged in the morning. If the intention is not fulfilled and one of these admissions should involve a stay of at least 24 hours, such an admission should be classified as an ordinary admission. The series of regular admissions ends when the patient no longer requires frequent admissions
- **emergency assessment** – a patient admitted to an Emergency Assessment Unit (EAU)

# Appendix

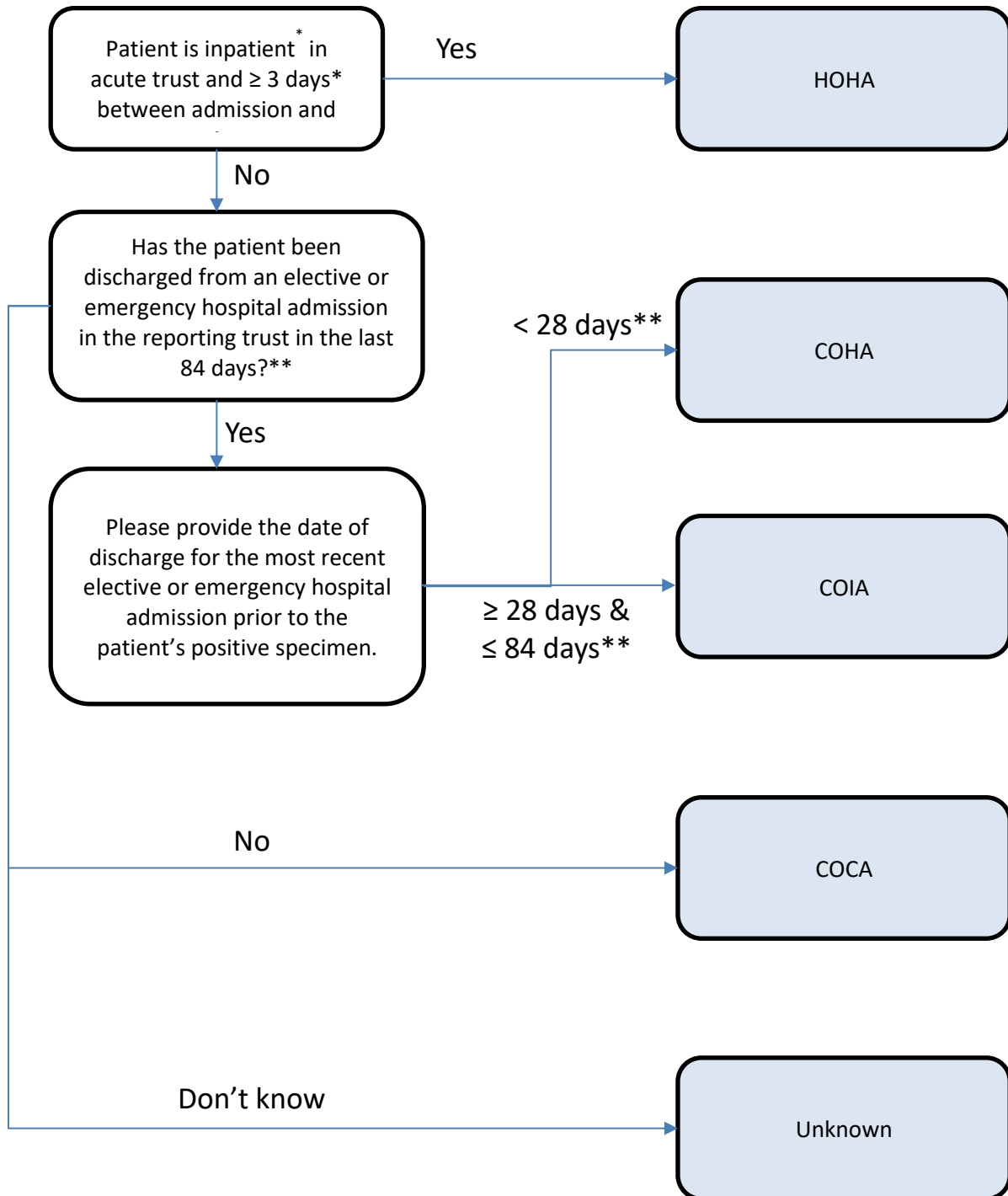
Figure 1. Summary of the process to determine the location of onset status for bacteraemia cases entered onto the HCAI DCS



\*Additionally include records where admission date is missing and the specimen location is acute Trust or unknown and the patient category is in-patient, day-patient, emergency assessment or is null



Figure 2. Flow diagram of the process to determine the prior trust exposure status for *C. difficile* infection cases entered onto the DCS

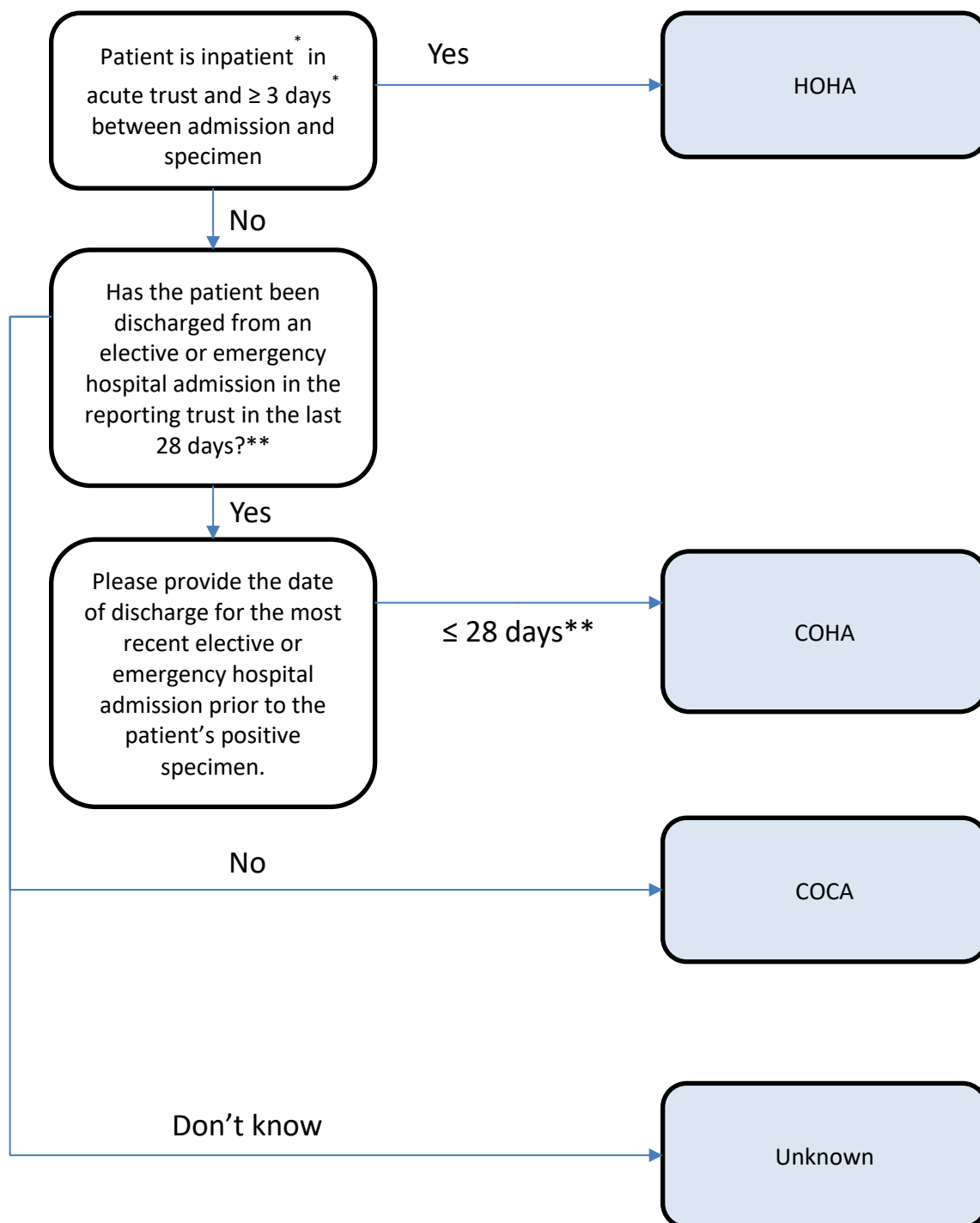


*\*Referring to days between current hospital admission and specimen date. With day 1 as day of admission. Not applicable to community/non acute trusts*

*\*\* With date of discharge being counted as Day 1*

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

Figure 3. Flow diagram of the process to determine the prior trust exposure status for bacteraemia infection cases entered onto the DCS



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

*\*\* \*With date of discharge being counted as Day 1*

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