TECHNICAL DOCUMENT

# Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals

Protocol version 5.3

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# Abbreviations

| | |
|---|---|
| A&E | Accidents and emergency |
| AM | Antimicrobial/antimicrobial agent |
| AMR | Antimicrobial resistance |
| ATC | Anatomical Therapeutic Chemical classification system (WHO) |
| AU | Antimicrobial use |
| BSI | Bloodstream infection |
| CDC | Centres for Disease Control and Prevention (Atlanta, USA) |
| CDI | *Clostridium difficile* infections |
| CFU | Colony-forming units |
| CVC | Central vascular catheter |
| DSN | Dedicated surveillance network |
| EARS-Net | European Antimicrobial Resistance Surveillance Network (at ECDC) |
| ECDC | European Centre for Disease Prevention and Control |
| EEA | European Economic Area |
| EFTA | European Free Trade Association |
| ESAC | European Surveillance of Antimicrobial Consumption project |
| ESBL | Extended-spectrum beta-lactamases |
| ESCMID | European Society of Clinical Microbiology and Infectious Diseases |
| ESGARS | ESCMID Study Group on Antimicrobial Resistance Surveillance |
| ESICM | European Society of Intensive Care Medicine |
| FTE | Full-time equivalent |
| HAI | Healthcare-associated infections |
| HAI-Net | Healthcare-Associated Infection surveillance Network (at ECDC) |
| HALT | Healthcare-associated infections in long-term care facilities (ECDC-sponsored follow-up project to IPSE WP7) |
| HCW | Healthcare worker |
| HELICS | Hospitals in Europe Link for Infection Control through Surveillance project |
| ICU | Intensive care unit |
| IPSE | Improving Patient Safety in Europe project |
| LTCF | Long-term care facility |
| LRT | Lower respiratory tract |
| MS | Member States |
| NHSN | National Healthcare Safety Network (at CDC) |
| PPS | Point prevalence survey(also used as an abbreviation of the current survey) |
| PVC | Peripheral vascular catheter |
| SPI | Structure and process indicator |
| SSI | Surgical site infection |
| TESSy | The European Surveillance System (ECDC's web-based data reporting system for the surveillance of communicable diseases) |
| TRICE | Training in Infection Control in Europe (ECDC-sponsored follow-up project to IPSE WP1) |
| WHO | World Health Organization |

# Background and changes to the protocol

In July 2008, the coordination of the EU-funded network IPSE (Improving Patient Safety in Europe) [1] and its component for the surveillance of healthcare-associated infections, HELICS (Hospitals in Europe Link for Infection Control through Surveillance), were transferred to ECDC to form ECDC's healthcare-associated infections surveillance network, HAI-Net. Later, ECDC adopted a plan to conduct EU-wide point prevalence survey (PPS) of healthcare-associated infections (HAIs), based on the recommendations of the external evaluation of the IPSE network and on the conclusions of an expert group that met in January 2009. It was also agreed to include the hospital PPS component of the EU-funded ESAC project (European surveillance of antimicrobial consumption) in the ECDC PPS protocol.

ECDC subsequently developed a protocol for PPSs of HAIs and antimicrobial use in acute care hospitals through seven expert meetings held between 2009 and 2011. More than 100 experts and representatives from all EU Member States, two EEA countries, four EU enlargement countries, international partners (the European Society of Intensive Care Medicine, WHO Regional Office for Europe, the United States Centers for Disease Control and Prevention), the ESAC project and ECDC contributed to the development of the PPS protocol. The first ECDC PPS based on this protocol was conducted in 2011–2012 (version 4.2 and 4.3 of the protocol, see [2]).

The protocol provides a standardised methodology to Member States and hospitals in response to article II.8.c of Council Recommendation 2009/C 151/01 of 9 June 2009 on patient safety, including the prevention and control of healthcare-associated infections [3]. It also integrates the main variables of the ESAC hospital PPS protocol, thereby also providing support to Council Recommendation 2002/77/EC of 15 November 2001 on the prudent use of antimicrobial agents in human medicine.

Version 5.3 is the final protocol for the second EU-wide point prevalence survey 2016–2017. It contains major changes compared to protocol version 4.3 (PPS 2011–2012). Compared to version 5.1 and version 5.2 (distributed to EU/EEA Member States in January and May 2016, respectively), the current version only contains a few corrections, editorial changes and clarifications.

Changes to the protocol were discussed during six ECDC meetings held between 2013 and 2015 (involving 153 participants, see Acknowledgements below). The new protocol further supports Council Recommendation 2009/C 151/01 by including more structure and process indicators for the prevention of HAIs and antimicrobial resistance (AMR) in acute care hospitals, based on a systematic review of such indicators performed upon ECDC's request [4].

Indicators for antimicrobial stewardship are based on a consensus process carried out by a working group of the Transatlantic Taskforce on Antimicrobial Resistance (TATFAR) [5]. The new protocol also takes into account several lessons learned from the first ECDC point prevalence survey in 2011–2012 [6].

The main changes compared to protocol version 4.3 (PPS 2011–2012) can be summarised as follows:

- Inclusion criteria now include chronic care wards in acute care hospitals.
- Inclusion of new structure and process indicators for HAI and AMR prevention at the hospital and ward level.
- Hospital data: Hospital ownership, more details on administrative hospital groups
- Ward data: Simplified ward specialty variable
- Patient data (standard protocol option only):
  - Birth weight for neonates
  - Surgery codes for patients with surgery since admission
- Antimicrobial use data:
  - Date of start of the antimicrobial. Was the antimicrobial changed? If so, what was the reason for changing the antimicrobial? What was the start date for the first antimicrobial given for this infection episode? Information on the changed antimicrobials (plus reasons for the change) will allow for the evaluation of taken measures to improve antimicrobial prescribing, thus adding value to the PPS at the local hospital level. The start date (i.e. the date when the antimicrobial was first administered) serves as proxy indicator of the validity (sensitivity and specificity) of the prevalence of HAIs and will be used to estimate the total annual number of patients receiving antimicrobials in EU hospitals (prevalence to incidence conversion); as indicator of data validity, this variable needs to be interpreted together with the validation studies performed during the national PPS.
  - Dosage per day (number, strength and unit of doses per day): to inform EU/US comparisons and updates of the defined daily dose (DDD) as set by the WHO Collaborating Centre for Drug Statistics Methodology, Norwegian Institute of Public Health (www.whocc.no).

- HAI and AMR data:
  - HAI associated to current ward
  - AMR marker data collected as S/I/R/U rather than 'susceptible/non-susceptible', in addition to 'pandrug resistant' (PDR)
- Codebook:
  - Specialty list: new ward specialty code list (with only main specialties), consultant/patient specialty codes for healthy neonates added
  - Diagnosis (site) code list for antimicrobial use: surgical site infection (SSI) was added as a subcategory of both skin or soft tissue infections (SST) and bone or joint infections (BJ); addition of cystic fibrosis (CF) as a separate entry
  - Antimicrobial ATC codes: updated with new codes added since 2011
  - HAI case definitions:
    - Surgical site infection (SSI): follow-up period of deep incisional and organ/space SSIs after implant surgery: changed from one year to 90 days
    - Pneumonia (PN): note added indicating that one definitive chest X-ray or CT-scan for the current pneumonia episode may be sufficient in patients with underlying cardiac or pulmonary disease if comparison with previous X-rays is possible
    - *Clostridium difficile* infection (GI-CDI): definition is now aligned with the case definition in the CDI surveillance protocol in order to account for other methods for detecting toxin-producing *C. difficile* organisms in stool.
    - SYS-CSEP: no change in the definition, but change of the name from 'clinical sepsis' to 'treated unidentified severe infection' in adults and children, to differentiate this last-resort HAI case definition from the modern concept of sepsis based on organ dysfunction.

# Objectives

The objectives of the ECDC point prevalence survey of healthcare-associated infections (HAIs) and antimicrobial use (AU) in acute care hospitals are as follows:

- to estimate the total burden (prevalence) of HAIs and antimicrobial use in acute care hospitals in the EU
- to describe patients, invasive procedures, infections (sites, microorganisms including markers of antimicrobial resistance) and antimicrobials prescribed (compounds, indications)
  - by type of patients, specialties or healthcare facilities and
  - by EU country, adjusted or stratified
- to describe key structures and processes for the prevention of HAIs and antimicrobial resistance at the hospital and ward level in EU hospitals
- to disseminate results to those who need to know at local, regional, national and EU level:
  - to raise awareness
  - to enhance surveillance structures and skills
  - to identify common EU problems and set up priorities accordingly
  - to evaluate the effect of strategies and guide policies for the future at the local[1]/national/regional level (repeated PPS)
- to provide a standardised tool for hospitals1 to identify targets for quality improvement.

[1] Results at the local (hospital) level should be interpreted carefully and take into account confidence intervals which are influenced by the hospital size (number of patients) and the frequency of the event (relatively wider intervals for rare events). Even if all patients in the hospital are included in the survey, one should consider that the survey day is only a sample of all possible days in that period. The evaluation of the effects of interventions in-between two repeated surveys are more likely to be more meaningful for interventions where important improvement can be expected (e.g. introduction of antimicrobial stop orders, control of an epidemic of specific healthcare-associated infections). If point prevalence surveys are repeated over several years, it will eventually become possible to interpret even weak trends.

# Inclusion/exclusion criteria

## Hospitals

All acute care hospitals are eligible for inclusion. An acute care hospital is defined in accordance with national definitions. There is no minimal size of hospitals.

For administrative hospital groups (hospital 'mergers' or 'trusts'), data should ideally be collected by hospital site.

## Wards

Include all wards in acute care facilities, including, for example, chronic care and long-term care wards, acute psychiatric wards and neonatal ICUs.

Excluded are accident and emergency departments (except for wards attached to A&E departments where patients are monitored for more than 24 hours).

The ward specialty is always recorded so that results can be stratified and standardised.

## Patients

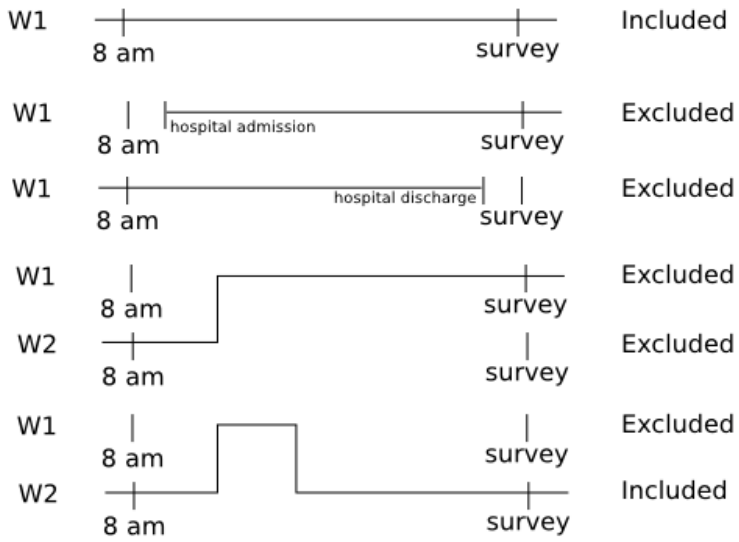
Include all patients admitted to the ward before or at 8 a.m. and not discharged from the ward at the time of the survey; in practice, this means that patients transferred in/out after 8 a.m. from/to another ward should not be included (see Figure 1). Include neonates on maternity and paediatric wards if born before/at 8 a.m. (see also under *neonates*).

Exclude day cases:

- patients undergoing same day treatment or surgery;
- patients seen at outpatient department;
- patients in the emergency room;
- dialysis patients (outpatients).

*Note: Decision to include/exclude patients is based on information available at 8 a.m. on the day of the survey.*

**Figure 1. Examples of included and excluded patients in the point prevalence survey**




*Legend. W1: ward 1, W2: ward 2*

*Note: Include patients who are temporarily off from the ward for diagnostic investigations, procedures; if patient does not return to the ward before the end of the PPS day and information about patient is not available at 8 a.m., please revisit ward.*

*Include patients who are on the patient administration system but at home for a number of hours.*

# Sample design

## Sampling of patients within the hospital

All eligible patients will be included. This will enhance the local usefulness of the results because of the larger sample size by hospital (see objectives).

## Representative sampling of hospitals (for PPS coordinating centres only)

In accordance with objective 1, the results of the PPS should ideally be based on data from hospitals that are representative of all acute care hospitals in the European Union. However, to meet national objectives, results should also be representative for each of the Member States' total hospital population to be meaningful.

Representative samples will be drawn using a systematic sampling design.

### Steps

1. Obtain a list (for example in Microsoft Excel format) of all acute care hospitals in the country, including the number of acute care beds (use the total number of beds if the number of acute care beds is unknown).

2. Rank the list in ascending order of the number of beds.

3. Obtain the number of hospitals to be sampled from ECDC or from the tables and figures below.

4. Divide the total number of hospitals by the number to be sampled = sampling interval k.

5. Choose a random number between 1 and k = i.

6. Select the $i^{th}$ hospital, $i^{th}$ +k hospital, the $i^{th}$+2k hospital etc.

7. Foresee substitution in the case of refusal of the first selected hospital: select the next hospital on the list ($i^{th}$ +1 hospital, $i^{th}$ +k +1 hospital, etc.); if more than one refusal is expected per selected hospital, make a second list of reserve hospitals.

8. Invite the hospitals selected in step 6 to participate; replace them in the case of refusal to participate.

Systematic sampling procedure: Sorting the hospitals according to the number of beds before the selection process ensures that hospitals of different sizes are represented in exactly the same way in the sample as in the national/regional population of hospitals. Additional sorting according to hospital type (for example primary/secondary/tertiary, or any other available national categories that are related to case-mix severity) is recommended, as it ensures representativeness of the different types of hospitals. If the hospital type is available, first sort the hospital list according to hospital type, then according to size, before starting the systematic sampling procedure.

## Design effect and sample size

The sample size is calculated to estimate an anticipated prevalence of 6% with a precision of +/- 1% at the national level. The proposed precision of the results is similar for all Member States. The number of hospitals to be included depends on the expected design effect and on the average hospital size in each country. The total number of hospitals and patients in the country has only a small effect on the recommended sample size.

The selected hospitals can be considered as clusters of patients of the total acute care hospital patient population. Therefore a correction for cluster surveys (design effect) has to be applied when calculating the sample size.

The design effect (DEFF) of a statistic is the ratio of actual variance for a given sample design over the variance if the patients were selected randomly (i.e. from all, or a much larger number of hospitals). The higher the design effect, the more patients have to be included in the sample to estimate the same prevalence with the same precision. The design effect increases with the size of the clusters (average hospital size) and with the magnitude (frequency) of the outcome under study (higher for antimicrobial use than for healthcare-associated infections).

The DEFF for HAI prevalence was calculated on the basis of data from the 2011–2012 ECDC PPS with the Stata 12 software package (using the survey prefix command 'svy'). It was higher than expected compared with earlier national point prevalence surveys and the pilot ECDC PPS: overall $DEFF_{PPS}$=8.0 compared with DEFF=5.4 as estimated earlier. Further simulations on subsamples from the database of the 2011–2012 ECDC PPS made it possible to estimate the design effect for different hospital size categories (Figure 2).

**Figure 2. Increasing design effect (DEFF) as a function of cluster size (average acute care hospital size) in the 2011–2012 PPS database**

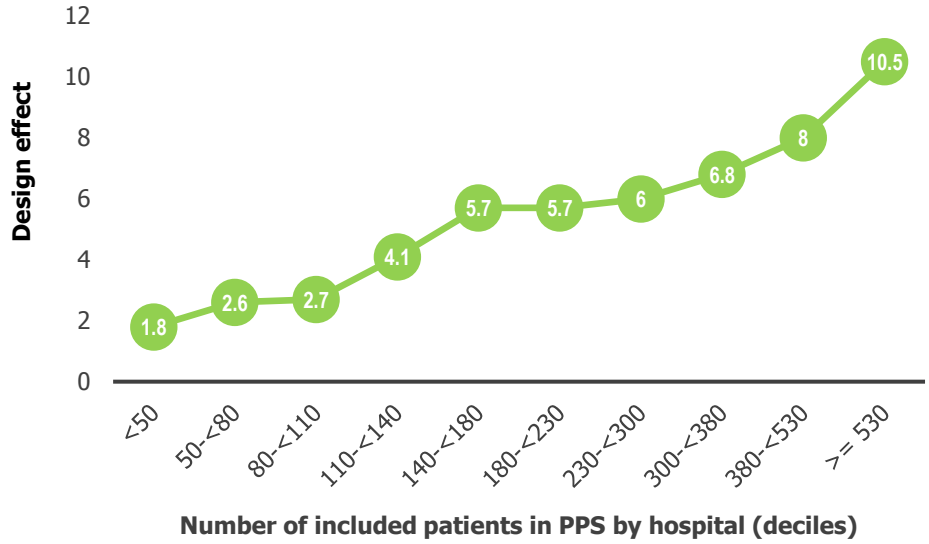



Table 1 below shows the recommended sample size of patients and hospitals by country, using the national denominator data provided during the 2011–2012 PPS and the estimated design effect for an estimated HAI prevalence of 6% +/- 1% for different hospital sizes. If denominator data at the time of the PPS differ from the ones presented in the table, it is recommended that the number of patients and hospitals to be sampled are recalculated. For example, if national statistics report hospital groups (rather than hospital sites), but sampling for the PPS is done by site (rather than by group), national PPS coordinators should adjust the estimated DEFF and the number of hospitals (or hospital sites) to be sampled (Figure 2). This could, for example, result in a lower total number of patients but a higher number of (smaller) hospital entities.

**Table 1. Number of hospitals and patients needed to estimate HAI prevalence of 6% (5–7%), with design effect depending on average acute care hospital size by country**

| Country | Number of acute care hospitals[a] | Number of hospital beds[a] | Average hospital size | Estimated DEFF | Recommended sample size, patients | Number of hospitals to be sampled |
|---|---|---|---|---|---|---|
| Austria | 189 | 53 371 | 282 | 6.0 | 12 493 | 44 |
| Belgium | 194 | 51 798 | 267 | 6.0 | 12 478 | 47 |
| Bulgaria | 241 | 44 164 | 183 | 5.7 | 11 773 | 64 |
| Croatia | 60 | 15 640 | 261 | 6.0 | 11 419 | 44 |
| *Cyprus* | *8* | *2 769** | *346* | *6.8* | *2769* | *8* |
| Czech Republic | 158 | 57 756 | 366 | 6.8 | 14 201 | 39 |
| Denmark | 52 | 13 779 | 265 | 6.0 | 11 234 | 42 |
| *Estonia* | *40* | *4 685* | 117 | *4.1* | *4 685* | 40 |
| *Finland* | *59* | *9 601** | *163* | *5.7* | *9 601* | *59* |
| France | 1558 | 314 598 | 202 | 5.7 | 12 265 | 61 |
| Germany | 1736 | 461 022 | 266 | 6.0 | 12 939 | 49 |
| Greece | 137 | 35 120 | 256 | 6.0 | 12 245 | 48 |
| Hungary | 108 | 69 466 | 643 | 10.5 | 22 062 | 34 |
| *Iceland* | *8* | *1 046* | *131* | *4.1* | *1 046* | *8* |
| Ireland | 60 | 12 398 | 207 | 5.7 | 10 514 | 51 |
| Italy | 1023 | 226 095 | 221 | 5.7 | 12 233 | 55 |
| *Latvia* | *17* | 6 975 | 410 | *8.0* | *6 975* | *17* |
| Lithuania | 92 | 20 867 | 227 | 5.7 | 11 189 | 49 |
| *Luxembourg* | *9* | *2 377* | *264* | *6.0* | *2 377* | *9* |
| *Malta* | *3* | *1 339* | *446* | *8.0* | *1 399* | *3* |
| Netherlands | 96 | 50 095* | 522 | 8.0 | 16 615 | 32 |
| Norway | 60 | 16 282 | 271 | 6.0 | 11 474 | 42 |
| Poland | 795 | 181 077 | 228 | 5.7 | 12 204 | 54 |
| Portugal | 101 | 24 773 | 245 | 6.0 | 11 955 | 49 |
| Romania | 311 | 111 725 | 359 | 6.8 | 14 453 | 40 |
| Slovakia | 112 | 31 217 | 279 | 6.0 | 12 157 | 44 |

| Country | Number of acute care hospitals[a] | Number of hospital beds[a] | Average hospital size | Estimated DEFF | Recommended sample size, patients | Number of hospitals to be sampled |
|---|---|---|---|---|---|---|
| *Slovenia* | *21* | *7 826* | *373* | *6.8* | *7826* | 21 |
| Spain | 550 | 117 504 | 214 | 5.7 | 12 126 | 57 |
| Sweden | 80 | 18 947* | 237 | 6.0 | 11 667 | 49 |
| UK-England | 253 | 158 928* | 628 | 10.5 | 22 444 | 36 |
| *UK-Northern Ireland* | *16* | *4 985* | *312* | *6.8* | *4 985* | *16* |
| UK-Scotland | 52 | 16 537 | 318 | 6.8 | 13 027 | 41 |
| UK-Wales | 89 | 9 952* | 112 | 4.1 | 7 296 | 65 |

*(a) Number of hospitals and hospital beds as reported in the 'national denominator data' in the 2011–2012 PPS. If not available (*), Eurostat data for N of hospital beds (curative) are used. See: http://ec.europa.eu/eurostat/web/health/health-care. Sample size calculations were made using OpenEpi software (www.openepi.com); DEFF=design effect, estimated from the 2011–2012 PPS database for different hospital sizes (deciles, see Figure 2); countries in italics need to include all hospitals.*

## Other sampling methods: reporting of results and data collection periods

Although representative sampling remains strongly recommended for the ECDC point prevalence survey, some countries may have difficulties to draw a representative sample of hospitals or may decide to use a different method for hospital recruitment, e.g. because the data quality is expected to be affected if representative sampling is used. Alternative methods of recruiting hospitals are voluntary participation after invitation of all hospitals, 'convenience' sampling (selection of hospitals by the PPS coordinating centre) or mandatory participation. The hospital sampling/recruitment method(s) used is (are) recorded at the national/regional level and will be included when country data are reported at the European level.

Moreover, some countries may want to include more hospitals than just those included in the sample, e.g. a combination of a representative sample and voluntary participation after invitation of all hospitals. In this case, only data of the representative sample will be used when European results are reported. However, if all data are submitted, ECDC will provide the national coordinators with feedback reports for all participating hospitals by comparing their results to the total national results. A variable at the hospital level indicates whether a hospital belongs to the representative sample or not (this variable should be provided by the national coordinator). This information will then be combined with the sampling method used at the national level to determine the sample for which national results are reported at the European level. If the number of submitted hospitals exceeds the recommended number for that country and information on whether the hospital is part of the representative sample is missing, ECDC will draw a random sample of the required number of hospitals for the reporting at the European level in order to obtain prevalence estimates with a similar precision as for other countries.

In order to increase the number of participating hospitals for the 2016–2017 ECDC PPS, hospitals may be included in any of the four PPS periods: April–June 2016, September–November 2016, April–June 2017, and September–November 2017. Although it is recommended that data collection should be organised during a single period for all hospitals, data collection may also extend over several periods. The same hospital may only be included once over the four periods.

The national sample representativeness is assigned one of four categories (optimal, good, poor and very poor; Table 1) depending on compliance with the recommended sampling methodology.

**Table 2. Criteria for national PPS sample representativeness**

| | |
|---|---|
| Optimal | • Systematic random sample of at least 25 hospitals or at least 75% of the number of hospitals specified in Table 1.<br>• Inclusion of at least 75% of all hospitals or occupied hospital beds in the country and recommended sample size (Table 1) achieved |
| Good | • Selection of at least 25 hospitals or at least 75% of the number of hospitals and/or residents specified in Table 1 using another methodology (e.g. voluntary participation);<br>• Recommended sample size not achieved, but inclusion of ≥75% of all hospitals or occupied hospital beds in the country. |
| Poor | • Between 5 and 25 hospitals included in countries with more than 25 hospitals and recommended sample size not achieved;<br>• Less than 5 hospitals included in countries with more than 5 hospitals but inclusion of 50–75% of all hospitals or occupied hospital beds in the country. |
| Very poor | • Inclusion of less than 5 hospitals and less than 50% of all hospitals and less than 50% of all occupied hospital beds. |

# Data collection

Data collection includes variables at the national, hospital, ward and patient level. In the patient-based (standard) protocol, denominator data are collected for each patient. In the unit-based (light) protocol, aggregated denominator data are collected for each ward. In both protocol options, hospital and ward data (optional indicators) are collected, and numerator data are collected for each patient with an active healthcare-associated infection (related to acute care hospital stay) and/or receiving an antimicrobial drug at the time of the survey. The patient-based and unit-based protocol may not be combined for the same PPS in a single hospital.

## When?

Data should be collected in a single day for each ward/unit. The total time frame for data collection for all wards of a single hospital should not exceed two to three weeks. It is practice in some hospital units to admit additional patients on Mondays for elective procedures; it is therefore recommended to conduct the survey in these units between Tuesday and Friday.

## Who will collect the data?

The composition of the team responsible for data collection may vary from one hospital to another. It is recommended that hospital infection control personnel as well as the team in charge of the patients are involved.

## Training of surveyors

Training material for the personnel collecting the data is made available by ECDC. It is recommended that national/regional PPS coordinators organise at least a one-day information and training session for participating hospitals prior to the point prevalence survey.

## Data processing

Each country is free to organise its own system for data collection and processing. The standard scenario however foresees that data should be collected on forms (see examples provided in this protocol) and subsequently be entered in a computer system by the hospital staff after data verification. Countries may choose to develop and use their own software system to do this. Alternatively, ECDC supports a free software tool for data entering at the hospital level (HelicsWin.Net). If HelicsWin.Net is used, data should be exported by the hospitals and transferred to the national coordination centre. National centres will then submit the national database or individual hospital data to ECDC, using ECDC's TESSy, after which online reports will be made available by ECDC (see also chapter on sample design for reporting of results at the European and hospital level).

# Overview of collected data

Data collected at the hospital level conform to the following two protocol types:

## Light (unit-based) protocol

- Hospital data (**forms H1-H3**): one form per hospital per PPS.
- Ward data (**form W**): one form per ward, including structure and process indicators (optional) and denominator data for all patients present in the ward at 8 a.m. and not discharged at the time of the survey (mandatory).
- Numerator data (**form B**): healthcare-associated infection data (to be collected for all patients with an infection that matches the definition of active healthcare-associated infection) and/or antimicrobial use data (to be collected for all patients receiving an antimicrobial agent), together with basic patient variables for each patient with an HAI and/or receiving an antimicrobial agent.
- National data (e.g. hospital denominator data) are collected by the PPS coordinating centre (**form N**).

## Standard (patient-based) protocol

- Hospital data (**forms H1–H3**): one form per hospital per PPS.
- Ward data (**form W**): one form per ward, including structure and process indicators (optional) and denominator data for all patients present in the ward at 8 a.m. and not discharged at the time of the survey (optional).
- Patient data (**form A**): one form per patient (for all patients present in the ward at 8 a.m. and not discharged at the time of the survey) collecting risk factors for each eligible patient, with or without an HAI or antimicrobial; healthcare-associated infection data (to be collected for all patients with an infection that matches the definition of active healthcare-associated infection) and/or antimicrobial use data (to be collected for all patients receiving an antimicrobial agent) are collected on the same form.
- In addition to the hospital data, national data (e.g. hospital denominator data) are collected by the PPS coordinating centre (**form N**).

# Hospital data

Hospital variables are collected in order to describe results by type and size of healthcare facilities and by the average length of stay in the hospital, a variable which is known to influence prevalence figures because patients with infections are known to stay longer in the hospital than the average hospital population.

The questionnaire also includes structure and process indicators (SPIs) at the hospital level in the context of Council Recommendation 2009/C 151/01 of 9 June 2009 on patient safety, including the prevention and control of healthcare-associated infections. For the selection process of SPIs and the scientific reference [4], see introduction.

**Figure 3. Hospital data 1/3 (form H1)**

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form H1. Hospital data 1/3**

Hospital code: ☐

**Survey dates: From** __/__/____ **To:** __/__/____
*dd / mm / yyyy* *dd / mm / yyyy*

Hospital size (total number of beds) ☐
Number of acute care beds ☐
Number of ICU beds ☐

Exclusion of wards for PPS? ☐ No
☐ Yes, please specify which ward types were excluded:

Total number of beds in included wards: ☐
Total number of patients included in PPS: ☐
Hospital type ☐ Primary ☐ Secondary ☐ Tertiary
☐ Specialised, specify : _____
Hospital ownership: ☐ Public ☐ Private, not-for-profit
☐ Private, for profit ☐ Other/unknown

Hospital is part of administrative hospital group (**AHG**):
☐ No ☐ Yes → *if yes:*
Data apply to: ☐ Hospital site only ☐ All hospitals in AHG
AHG code: ☐ AHG type: Prim Sec Tert Spec
N of beds AHG: Total ☐ Acute care beds ☐

| | Number | Year data | Inc./ Total (1) |
|---|---|---|---|
| Number of discharges/admissions in year | | | Inc Tot |
| Number of patient-days in year | | | |
| Alcohol hand rub consumption liters/year | | | Inc Tot |
| N observed hand hygiene opportunities/year | | | Inc Tot |
| Number of blood culture sets/year | | | Inc Tot |
| Number of stool tests for CDI/year | | | Inc Tot |
| Number of FTE infection control nurses | | | Inc Tot |
| Number of FTE infection control doctors | | | |
| Number of FTE antimicrobial stewardship consultants | | | |
| Number of FTE registered nurses | | | Inc Tot |
| Number of FTE nursing assistants | | | |
| Number of FTE registered nurses in ICU | | | |
| Number of FTE nursing assistants in ICU | | | |
| N of airborne infection isolation rooms | | | |

(1) Data were collected for included wards only (**Inc** = recommended) or for the total hospital (**Tot**); if all wards were included in PPS (Inc = Tot), mark "Inc"; N=Number

PPS Protocol: ☐ Standard ☐ Light
Is the hospital part of a national representative sample of hospitals ? ☐ No ☐ Yes ☐ Unknown

## Figure 4. Hospital data 2/3 (form H2)

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form H2. Hospital data 2/3**

Hospital code: ☐

**Survey dates: From** __ / __ /____ **To:** __ / __ / ____
*dd / mm / yyyy* *dd / mm / yyyy*

**Infection prevention and control (IPC) programme:**
Is there an annual IPC plan, approved by the hospital CEO or a senior executive officer? ☐ Yes ☐ No

Is there an annual IPC report, approved by the hospital CEO or a senior executive officer? ☐ Yes ☐ No

**Participation in surveillance networks:**
In the previous year, which surveillance networks did your hospital participate in ? (*tick all that apply*)
☐ SSI ☐ ICU ☐ CDI ☐ Antimicrobial resistance
☐ Antimicrobial consumption ☐ Other, specify _____

**Microbiology/diagnostic services:**
On weekends, can clinicians request routine microbiological tests and get back results?
Clinical tests: ☐ Saturday ☐ Sunday
Screening tests: ☐ Saturday ☐ Sunday

CEO: Chief Executive Officer, Managing Director; SSI: surgical site infections; ICU: intensive care unit (HAIs in ICUs); CDI: *Clostridium difficile* infection

Does your hospital have the following in place for HAI prevention or antimicrobial stewardship? (*Y/N/U*)

| | Guideline | Care bundle | Training | Checklist | Audit | Surveillance | Feedback |
|---|---|---|---|---|---|---|---|
| **ICU** | | | | | | | |
| Pneumonia | | | | | | | |
| Bloodstream infections | | | | | | | |
| Urinary tract infections | | | | | | | |
| Antimicrobial use | | | | | | | |
| Hospital-wide / other wards | | | | | | | |
| Pneumonia | | | | | | | |
| Bloodstream infections | | | | | | | |
| Surgical site infections | | | | | | | |
| Urinary tract infections | | | | | | | |
| Antimicrobial use | | | | | | | |

Fill yes (Y), no (N) or unknown (U) in every cell; Pneumonia, bloodstream infections and urinary tract infections: healthcare-associated and/or device-associated; Care bundle: 3-5 evidence-based practices to improve patient outcome; Training: training or education; Checklist: self-applied; Audit: external process (surveillance, observations).

Comments/observations: _____

## Figure 5. Hospital data 3/3 (form H3, optional): Ward indicator data collected at hospital level

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form H3. Hospital data 3/3**

Hospital code: ☐ **Survey dates: From** __ / __ /____ **To:** __ / __ / ____
*dd / mm / yyyy* *dd / mm / yyyy*

Optional: ward indicators collected at hospital-wide level:

| | Number | Inc./ Total (1) |
|---|---|---|
| Number of beds with AHR dispensers at point of care | | |
| Number of beds assessed for presence of AHR dispensers | | |
| Number of patient rooms in hospital | | |
| Number of single patient rooms in hospital | | |
| Number of single patient rooms with individual toilet and shower in hospital | | |
| Number of beds occupied at 00:01 on the day of PPS | | |
| Number of beds assessed for occupancy at 00:01 on the day of PPS | | |

(1) Data were collected for Included wards only (**Inc** = recommended) or for the total hospital (**Tot**); if all wards were included in PPS (Inc=Tot), mark "Inc"

In your hospital, do healthcare workers (HCWs) carry AHR dispensers (e.g. in their pockets) ? (if yes, please estimate percentage)

O No O >0-25% of HCWs O >25-50% of HCWs O >50-75% of HCWs O >75% of HCWs O Yes, percentage unknown

Is there a formal procedure to review the appropriateness of an antimicrobial within 72 hours from the initial order in the hospital (**post-prescription review**)?

O Yes, in all wards O Yes, in selected wards only O Yes, in ICU only O No

AHR = Alcohol-based hand rub; Variables 'Number of beds assessed for presence of AHR dispensers' and 'Number of beds assessed for occupancy at 00:01 on the day of PPS' are denominator data, typically same number as the total number of beds in the hospital; ICU=intensive care unit.

# Definition of hospital data

**Hospital code.** Hospital identifier/code assigned by national/regional PPS coordinating centre; unique code per surveillance/PPS network; should remain the same for all PPS periods/years.

**Survey dates.** Start and end date for the PPS in the entire hospital; the end date is the date the data were collected in the last ward.

**Hospital size.** Total number of beds in the hospital. Include all beds that may generate (in)patient-days and admissions/discharges. Exclude beds which are exclusively used for day cases (e.g. day-care wards).

**Number of acute care beds.** Number of acute care beds in the hospital (in accordance with to national definition)

**Number of ICU beds.** Number of intensive care unit beds in the hospital. No ICU=0

**Ward exclusion.** Were any wards excluded for the PPS in your hospital? Yes/No.

**Specify excluded wards.** Specify which wards where excluded, if any; free text; please use specialty codes if possible.

**Total number of beds in included wards.** Sum of the number of beds in wards that were included in the PPS.

**Total number of patients included in PPS.** Sum of the number of patients included in the PPS; variable used to double-check the exhaustiveness of reported data, i.e. the sum of a ward's total number of patients in the light protocol option, or the total number of individual patients in the standard protocol option.

**Hospital type.** Hospital type – PRIM: primary, SEC: secondary, TERT: tertiary, SPEC: specialised (definitions see below), missing=UNK; include specialisation if applicable; report the hospital type of the hospital site (single hospital) here; the type of the administrative hospital group/trust (if applicable) is reported in a separate variable (see variable 'Administrative hospital group type' below).

1 Primary

- Often referred to as 'district hospital' or 'first-level referral'.
- Few specialities (mainly internal medicine, obstetrics-gynaecology, paediatrics, general surgery or only general practice).
- Limited laboratory services are available for general, but not for specialised pathological analysis.
- Often corresponds to general hospital without teaching function.

2 Secondary

- Often referred to as 'provincial hospital'.
- Hospital is highly differentiated by function with five to ten clinical specialities, such as haematology, oncology, nephrology, ICU.
- Takes some referrals from other (primary) hospitals.
- Often corresponds to general hospital with teaching function.

3 Tertiary

- Often referred to as 'central', 'regional' or 'tertiary-level' hospital.
- Highly specialised staff and technical equipment (ICU, haematology, transplantation, cardio-thoracic surgery, neurosurgery).
- Clinical services are highly differentiated by function.
- Specialised imaging units.
- Provides regional services and regularly takes referrals from other (primary and secondary) hospitals.
- Often a university hospital or associated to a university.

4 Specialised hospital

- Single clinical specialty, possibly with sub-specialties.
- Highly specialised staff and technical equipment.
- Specify (e.g. paediatric hospital, infectious diseases hospital).

**Hospital specialisation type.** Free text. Include hospital specialty if specialised hospital (e.g. paediatric, infectious diseases, etc.); please use specialty codes if possible

**Hospital ownership.** Hospital ownership as defined by WHO Regional Office for Europe [7], Eurostat [8] and OECD [9]: PUB: Public, PRIVNFP: private, not-for-profit, PRIVFP: private, for profit, OTHUNK: other or unknown

- Public: Hospitals that are owned or controlled by a government unit or a public corporation (where control is defined as the ability to determine the general corporate policy).

- Private, not for profit: Hospitals that are legal or social entities created for the purpose of producing goods and services, whose status does not permit them to be a source of income, profit, or other financial gain for the unit(s) that establish, control or finance them.
- Private, for profit: Hospitals that are legal entities set up for the purpose of producing goods and services and are capable of generating a profit or other financial gain for their owners.
- Other or unknown: Hospital ownership cannot be categorised as one of one of the above, or hospital ownership is unknown.

*Note: If applicable, prioritise 'for profit' over ownership of the building, e.g. if a hospital building is state-owned but the management is private (for profit), select 'private, for-profit'.*

**Hospital is part of administrative hospital group (AHG):** The hospital is part of an administrative group of hospitals (AHG, including entities referred to as 'trusts', 'mergers', 'fusions', 'boards', 'chains', etc.). Yes/No

**Data apply to single hospital site or to AHG/trust.** If the hospital is part of an administrative hospital group (AHG), data apply to a single hospital (hospital with a single address, or a hospital site belonging to a trust) (S) OR to an administrative group of hospitals (T).

**AHG code.** Unique code/identifier for the administrative hospital group; text allowed; please ensure that the AHG code/identifier is identical for all hospital sites belonging to that AHG. Code is selected and generated by the Member State and should remain identical in different surveillance/PPS periods/years; can be identical to the hospital code if the data apply to an AHG.

**Administrative hospital group type.** If the hospital is part of an AHG, what is the hospital type, e.g. PRIM: primary, SEC: secondary, TERT: tertiary, SPEC: specialised (see above for definition of hospital type). Report the highest level of care, e.g. 'tertiary' if a group with three sites contains one specialised, one primary, one secondary and one tertiary hospital. The combined services of the hospital sites belonging to a hospital group may also change the level of care (e.g. combination of the clinical specialties of primary and/or specialised hospitals may result in the AHG matching the definition of a secondary hospital).

**Total number of beds in administrative hospital group.** Total number of beds of the administrative hospital group.

**Number of acute care beds in administrative hospital group.** Total number of acute care beds of the administrative hospital group.

**Hospital indicators:**

**Number of discharges/admissions.** Number of hospital discharges in a given year (data from previous year if available, specify year in second column), use number of admissions if discharges are not available; provide the number for the included wards only (if not available, provide number for entire hospital; specify 'included wards only' OR 'total for hospital' in last column).

**Number of patient-days.** Number of hospital patient-days in a given year (data from previous year if available, specify year in second column). Provide data for the same year and wards (included wards only OR total for hospital) as for the number of discharges/admissions.

**Alcohol hand rub consumption.** Total number of litres of alcoholic hand rub used in a given year (data from previous year if available, specify year in second column); provide the number for the included wards only (if available, otherwise provide number for the entire hospital; specify 'included wards only OR total for hospital' in last column).

**Number of observed hand hygiene opportunities**. Number of observed hand hygiene opportunities performed in the previous year (or the most recent available year). Report the total number of observed opportunities for hand hygiene, not only the compliant observations.

**Number of blood cultures per year.** Number of inpatient blood culture sets received and incubated by the microbiological laboratory for the current hospital over the period of one year. Provide data for the previous year or report the most recent available data (specify year data in a separate variable). If the number of blood culture sets is not available, estimate by dividing the [total number of blood culture bottles processed] by the [total number of bottles per blood culture request]. Count all blood culture sets per patient, not the number of patients for whom ≥1 set was processed. Count the number of blood culture sets actually received and incubated, not the number sent to the laboratory for analysis.

**Number of stool tests for CDI per year.** Number of inpatient stool tests performed for *Clostridium difficile* infections (CDI) per year. Provide data for previous year or the most recent available data (specify year data in a separate variable). Count all stool specimens per patient, not the number of patients for whom ≥1 test was performed. Count the number of stool specimens actually processed by the laboratory (= at least one test for CDI was performed on the sample), not the number sent to the laboratory for analysis.

**Number of FTE infection control nurses.** Number of full-time equivalent (FTE) infection control nurses in the hospital; infection control nurse=nurse with specialised training in infection control/hospital hygiene and usually responsible for infection control/hospital hygiene tasks such as training of hospital employees in infection control, elaboration and implementation of infection control procedures, management (implementation, follow-up, evaluation) of an infection control work plan and projects, audits and evaluation of performance, procedures for disinfection of medical devices etc.. Specify year of data collection (current year if available) and whether the number of FTE infection control nurses is provided for the entire hospital or only for the included wards.

**Number of FTE infection control doctors.** Number of full-time equivalent (FTE) infection control doctors (or pharmacists, hospital epidemiologists, etc.) in the hospital with specialised training in infection control/hospital hygiene and usually responsible for infection control/hospital hygiene tasks such as identification and investigation of outbreaks, analysis and feedback of infection control data, elaboration of an infection control work plan and projects, design and management of surveillance systems, elaboration of infection control procedures etc.. Please ensure that the reported number was collected for the same year and wards (included wards only OR total for hospital) as the number of FTE infection control nurses.

**Number of FTE antimicrobial stewardship consultants.** Number of full-time equivalent antimicrobial stewardship consultants in the hospital. FTE antimicrobial stewardship refers to the dedicated time of a consultant (or pharmacist) employed by the hospital and specifically paid for antimicrobial stewardship tasks (e.g. antimicrobial stewardship activities mentioned as part of his/her job description), *not* the time spent by treating physicians on antimicrobial stewardship activities (e.g. post-prescription review) as part of their daily practice. Deduct FTE from FTE infection control doctor if same person: in case antimicrobial stewardship tasks are an integral part of the job description/daily activities of the infection control doctor (or equivalent), the estimated FTE (proportion of his/her time) spent on antimicrobial stewardship activities should be deduced from the FTE infection control doctors and be reported separately.

**Number of FTE registered nurses.** Number of full-time equivalent registered (graduated, qualified) nurses in the hospital. A 'registered nurse' is a nurse who has graduated from a college's nursing programme or from a school of nursing and has passed a national licensing exam to obtain a nursing license. Also include 'agency nurses', 'bank nurses', 'interim nurses' or other registered nurses who are not permanently employed for that position in the hospital. Students are not included. Provide current situation if possible, or the situation for the earliest available year (specify year) and specify if the number of FTEs is given for the entire hospital or for the included wards only.

**Number of FTE nursing assistants.** Number of full-time equivalent nursing assistants in the hospital. A 'nursing assistant' is also referred to as 'nurses' aide', 'healthcare assistant', 'nursing auxiliary', 'auxiliary nurse', 'patient care assistant' or similar terms. Also include nursing assistants who are not permanently employed for that position in the hospital. Nursing assistants work under the supervision of nurses or physicians to address the most fundamental elements of a patient's care. In general, they feed, dress, bathe and groom patients, but they can also perform more medically oriented but basic duties such as measuring and recording temperature, blood pressure, and other vital signs. Other licensed health professionals such as dieticians, physiotherapists or speech or occupational therapists, logistic personnel, students of any kind or volunteers who provide basic patient care without pay should not be included. Provide current situation if possible, or the situation for the earliest available year (specify year) and specify if the number of FTEs is given for the entire hospital or for the included wards only.

**Number of FTE registered nurses in ICU.** Number of full-time equivalent registered (graduated, qualified) nurses in intensive care unit(s). A 'registered nurse' is a nurse who has graduated from a college's nursing programme or from a school of nursing and has passed a national licensing exam to obtain a nursing license. Also include 'agency nurses', 'bank nurses', 'interim nurses' or other registered nurses who are not permanently employed for that position in the hospital. Students are not included. Provide current situation if possible, or the situation for the earliest available year (specify year) and specify if the number of FTEs is given for the entire hospital or for the included wards only.

**Number of FTE nursing assistants in ICU.** Number of full-time equivalent nursing assistants in in intensive care unit(s). A 'nursing assistant' is also referred to as 'nurses' aide', 'healthcare assistant', 'nursing auxiliary', 'auxiliary nurse', 'patient care assistant' or similar terms. Also include nursing assistants who are not permanently employed for that position in the hospital. Nursing assistants work under the supervision of nurses or physicians to address the most fundamental elements of a patient's care. In general, they feed, dress, bathe and groom patients, but they can also perform more medically oriented but basic duties such as measuring and recording temperature, blood pressure, and other vital signs. Other licensed health professionals such as dieticians, physiotherapists or speech or occupational therapists, logistic personnel, students of any kind or volunteers who provide basic patient care without pay should not be included. Provide current situation if possible, or the situation for the earliest available year (specify year) and specify if the number of FTEs is given for the entire hospital or for the included wards only.

**Number of airborne infection isolation rooms.** Number of airborne infection isolation rooms in the hospital. An airborne infection isolation room is defined as a hospital room provided with negative pressure and an anteroom.

**Annual IPC plan, approved by CEO.** Is there an annual infection prevention and control (IPC) plan *and* if so, was it approved by the hospital Chief Executive Officer (CEO, managing director) or by a senior executive officer? Yes/No.

**Annual IPC report, approved by CEO.** Is there an annual infection prevention and control (IPC) report *and* if so, was it approved by the hospital Chief Executive Officer (CEO, managing director) or by a senior executive officer? Yes/No.

**Participation in surveillance networks.** Indicate (Yes/No) if your hospital participates in a national or regional surveillance network for each of following surveillance modules: surveillance of surgical site infections (SSI), surveillance of HAIs in intensive care (ICU), surveillance of *C. difficile* infections (CDI), surveillance of antimicrobial resistance in accordance with the EARS-Net protocol (surveillance of antimicrobial resistance in invasive isolates of *S. pneumoniae*, *S. aureus*, *Enterococcus* spp., *E. coli*, *K. pneumoniae*, *P. aeruginosa* and/or *A. baumannii*), surveillance of antimicrobial consumption in the hospital (surveillance at 5th ATC level in defined daily dose (DDD) per 1 000 patient-days) and other HAI or AMR surveillance modules (national/regional protocols for which a European/ECDC protocol does not exist). Local surveillance without transmission of data to a national or regional surveillance coordination centre for comparative analysis and feedback is not sufficient.

**Other surveillance networks specification.** Free text. Specify which other surveillance networks the hospital participates in (free text).

**Microbiological laboratory performance during weekends.** At weekends, can clinicians request routine microbiological tests and receive back results within the standard turnaround time? Report yes/no/unknown separately for Saturdays and Sundays for clinical tests and screening tests, respectively.

**Does your hospital have the following in place for HAI prevention or antimicrobial stewardship?**
Indicate for each of the main HAI types and for antimicrobial stewardship which components of a multimodal strategy are available at the hospital-wide level and specifically in intensive care (presence in at least one adult, paediatric or neonatal ICU). Each cell of the table is a Yes/No/Unknown variable (28 variables for ICU + 35 variables hospital-wide/other non-ICU wards): mark Y=Yes, N=No or U=Unknown or 'not assessed' in each cell. A multimodal strategy is defined as an intervention aiming at improving practice and offering education and training at multiple levels (e.g. written information, leaflets, posters, bedside teaching, workshops, focus groups, knowledge tests, competency assessments, surveillance and feedback, audits, checklists). The strategy must be underpinned by written guidelines. Simple information sessions (e.g. for new staff), updating guidelines, or target setting alone (even if communicated to staff but without combining it with education and training) are not multimodal strategies.

Targets for multimodal strategies:

- Pneumonia: prevention of healthcare-associated pneumonia. You should tick the box for pneumonia, even if the components of your multimodal strategy only refer to device-associated pneumonia.
- Bloodstream infections (BSIs): prevention of healthcare-associated BSIs. You should tick the box for bloodstream infections, even if the components of your multimodal strategy only refer to catheter-associated/related BSIs.
- Surgical site infections (SSIs): prevention of SSIs. You should tick the box for surgical site infections, even if the components of your multimodal strategy only refer to specific types of surgery.
  *Note: Prevention of SSIs in the ICU is assumed to be part of the hospital-wide SSI prevention strategy.*
- Urinary tract infections (UTIs): prevention of UTIs. You should tick the box for urinary tract infections, even if the components of your multimodal strategy only refer to catheter-associated/related UTIs.
- Antimicrobial use/stewardship: Antimicrobial stewardship refers to a coordinated programme that implements interventions to ensure appropriate antimicrobial prescribing in order to improve clinical efficacy of antimicrobial treatment, to limit AMR and to prevent *Clostridium difficile* infections. Antimicrobial stewardship contributes to high quality and effective healthcare through decreasing unnecessary antimicrobial-related morbidity and mortality and limiting selective pressure to minimise development of resistance to currently effective antibiotics.

Multimodal strategy components: only report the existence of any of following components when evidence can be presented, e.g. printed copies or electronic documents or tools.

- Guideline: written guideline document available on the ward

- Care bundle: a care bundle is a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices — generally three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes [9]. Should be implemented as part of a formally endorsed hospital programme.
- Training: regular training, courses or other forms of education. Should be organised at least once per year.
- Checklist: checklist is filled in by the healthcare workers (HCWs), as opposed to an audit (see directly below).
- Audit: evaluation of the implementation of prevention practices (process evaluation, observations, etc.) by another person than the one/those who are supposed to implement the practices. An audit is a process during which a practice is measured against a standard such as VAP/CLABSI prevention or antimicrobial stewardship guidelines (e.g. intubation/catheterisation, tube care/catheter care). Includes giving verbal feedback, e.g. between two clinicians. Formal feedback of printed/written results should be reported separately under 'feedback'.
- Surveillance: surveillance of HAI type on a periodical or continuous basis, also including local surveillance (not only as part of a surveillance network)
- Feedback of surveillance and/or audit results to frontline HCWs. Only report 'yes' in the case of (yearly or more frequently) written feedback, e.g. as part of an institutional infection prevention and control report. Verbal feedback as part of an audit is not sufficient.

**H3 form: optional**

The variables on the third hospital form (H3) are normally collected at the ward level. However, countries which do not collect indicators at the ward level may collect these data at the hospital level. Also, if some wards failed to provide a complete set of ward-level indicators, hospital-level data make it possible to obtain a complete picture. Provide data from the current year, or from the most recent available year.

**Number of beds with AHR dispensers at point of care.** Number of beds in the hospital with alcohol hand rub (AHR) dispensers available at the point of care as recommended by the 2009 WHO *Guidelines on Hand Hygiene in Health Care*. AHR dispensers at the entrance of the patient room only are *not* considered as 'available at the point of care'. The 'point of care' is the place where three elements come together: the patient, the HCW, and care or treatment involving contact with the patient or his/her surroundings (within the patient zone). The concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that a hand hygiene product (e.g. alcohol-based hand rub, if available) be easily accessible and as close as possible – within arm's reach of where patient care or treatment is taking place. Point-of-care products should be accessible without having to leave the patient zone. Dispensers available at the point of care that are empty on the PPS day should be included. Provide the number for the included wards only (if available, otherwise provide number for the entire hospital; specify 'included wards only OR total for hospital' in last column).

**Number of beds assessed for the presence of AHR dispensers**. The denominator of the previous variable, i.e. the total number of beds for which the presence of alcohol hand rub dispensers at the point of care was checked. If all wards were assessed, then this number would in principle be the same as the total number of hospital beds.

**Total number of patient rooms.** Total number of rooms in included wards or total for hospital. Provide the number for the included wards only. If not available, provide number for the entire hospital; specify 'included wards only *or* total for hospital' in last column.

**Number of single patient rooms.** Total number of single-bed rooms in included wards *or* total for hospital. Please ensure that the number of single patient rooms was collected for the same year and wards (included wards only OR total for hospital) as the total number of patient rooms. Rooms with more than one bed that are designated for use as single occupancy and isolation rooms (e.g. for infection control purposes) should be included.

**Number of single patient rooms with individual toilet and shower.** Total number of single-bed rooms with individual toilet and shower in included wards *or* total for hospital. Please ensure that the number was collected in the same year and the same wards (included wards only *or* total for hospital) as the total number of patient rooms. Rooms with more than one bed that are designated for use as single occupancy and isolation rooms (e.g. for infection control purposes) should be included. Rooms which have toilet and shower in a communal area should not be counted. An individual toilet alone or a commode (toilet chair) is not sufficient to qualify for this indicator.

**Number of beds occupied at 00:01 on the day of the PPS**. Number of hospital beds occupied at midnight on the day of the PPS. Because the PPS for an entire hospital usually takes several days, this variable does not have to be recorded at the beginning of the PPS data collection period; it should, however, not be recorded on weekends.

**Number of beds assessed for occupancy at 00:01 on the day of PPS**. Number of hospital beds that were checked for occupancy at midnight on the day of the PPS. Denominator of the previous variable. If occupancy was

checked for all beds, this variable normally equals the total number of beds in the hospital. Specify 'included wards only *or* total for hospital' in the last column.

**Percentage of healthcare workers in hospital that carry alcohol hand rub dispensers**. Do healthcare workers in your hospital carry AHR dispensers (e.g. in their pockets)? (If yes, please estimate percentage). No=0%, Q0; 1–25%: Q1; 26–50%: Q2; 51–75%: Q3; >75%: Q4

**Post-prescription review of antimicrobials in hospital.** Is there a formal procedure in the hospital to review the appropriateness of an antimicrobial within 72 hours (three calendar days) from the initial order in the hospital (post-prescription review)? A formal post-prescription review procedure should be documented and adopted by the hospital management and should be performed by a person or team other than the treating physician. The procedure should at least address the prescription of broad-spectrum or reserve antimicrobials. Choose one answer. YESALL = Yes, in all wards; YESSEL = Yes, in selected wards only (usually, but not necessarily, including ICU); YESICU = Yes, in ICU only; N = No; UNK=Unknown.

**General variables and notes:**

**Year data.** Year for which different hospital data apply; to be specified for each variable.

**Included wards only/total for hospital.** Hospital data were collected for wards included in the PPS only (code: **Incl**, this is the recommended case) or for the entire hospital (code: **Tot**); if all wards are included in the PPS (Incl=Tot), mark 'Incl'; to be specified for each variable.

**Comments.** Free text, comments, maximum 255 characters.

*Note: **Full-time equivalent (FTE)** is the proportion of a full time position/job. One FTE = one full time position, but this could also be the sum of 2 half-time (50%) positions of two different persons; 0.10 FTE is 10% of a full time position. FTEs are reported 'on the day of the PPS' or as a 'daily average' for the previous year, depending on the variable. If only person-hours or person-days are available for a year (e.g. for registered nurses), they should be converted to FTEs 'per day', taking into account the local definition of a full-time position in terms of number of hours per day, week or month (and, if applicable, the number of working days per month or per year).*

# Hospital variables to be added by PPS coordinating centre before submission to ECDC's TESSy

**RecordId.** Unique identifier for each hospital-PPS within each network (combination of [NetworkId]+[HospitalId]+[DateStartSurvey]).

**RecordType.** The record type tells TESSy which protocol and level the data relate to. For the PPS, the record type at hospital level (first level) is 'HAIPPS' for the standard protocol, and 'HAIPPSLIGHT' for the light protocol.

**RecordTypeVersion.** There may be more than one version of a record type.

**Subject.** 'Disease' to report. For PPS, 'HAIPPS' for all levels.

**DataSource.** One country can have several data sources. Should correspond to the name of the data source defined in TESSy (e.g. CC-HAI, where 'CC' is a country code); one data source can be used to upload different HAI data (e.g. SSI, ICU and PPS) if the coordinating centre is the same for different surveillance protocols.

**ReportingCountry.** Country reporting the record, codes see codebook.

**DateUsedForStatistics.** Start date of the survey in the hospital; this date allows to distinguish repeated surveys for the same institution. Countries can upload more than one PPS in a single year.

**Status.** Status of reporting NEW/UPDATE or DELETE (deactivate). Default if omitted: NEW/UPDATE. If set to DELETE, the record with the given RecordId will be deleted from the TESSy database (or, rather, invalidated). If set to NEW/UPDATE or left blank, a new record is entered into the database.

**NetworkId.** Unique identifier for each surveillance/PPS network within the country, selected and generated by Member State, e.g. EN, NI, SC, WA for United Kingdom or different CClin networks in France; this field is combined with the hospital identifier to create a unique hospital code since different networks within one country may use the same hospital code. Can be omitted if the hospital identifiers are unique within the reporting country.

**Hospital location.** Region (NUTS 1 code) where the hospital is located; NUTS 1 codes see codebook.

**Hospital is part of national representative sample. '**Yes' if the hospital is part of a national representative sample of hospitals (if the national sampling method provides a representative sample, only these hospitals will be included for the national figures at the EU level; see chapter on sampling). To be provided by the national/regional PPS coordinator.

# Ward data

Ward data can be collected in the standard and light protocol options. Ward-level indicators can optionally be collected at the hospital level, for the entire hospital (form H3), instead of – or in addition to – collecting these variables for each ward. Ward-level denominator data are optional for the standard option but mandatory for the light option. Denominator data are collected for all patients admitted before or present at 8 a.m. in the ward and not discharged from the ward at the time of the survey.

**Figure 6. Ward data (form W)**

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form W. Ward data**

**Hospital code** [_____] **Ward name (abbr.) /Unit Id** [_____] **Survey date**[1]: ___ / ___ / _____
*dd / mm / yyyy*

**Ward specialty**[2] ☐ PED ☐ NEO ☐ ICU ☐ MED ☐ SUR ☐ G/O ☐ GER ☐ PSY ☐ RHB ☐ LTC ☐ OTH ☐ MIX

**Total number of patients in ward**[3] [_____]

Is there a formal procedure to review the appropriateness of an antimicrobial within 72 hours from the initial order in this ward (**post-prescription review**)? O Yes O No

**Number of patients by consultant/patient specialty (LIGHT option only):**

| Consultant/patient Specialty | Number of patients in ward[4] |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |
| | |

| | Number | Year[5] |
|---|---|---|
| Number of patient-days in ward / year | | |
| Alcohol hand rub consumption in ward liters/year[6] | | |
| N of hand hygiene opportunities observed /year | | |
| Number of beds in ward | | |
| N of beds with AHR dispensers at point of care | | |
| Number of HCWs on ward at time of PPS | | |
| Number of HCWs on ward carrying AHR dispensers | | |
| Number of rooms in ward | | |
| Number of single rooms in ward | | |
| N of single rooms with individual toilet and shower | | |
| N of beds occupied at 00:01 on the day of PPS | | |

[1] Patients on the same ward should be included on a single day if possible; [2] Main ward specialty: >=80% of patients belong to this specialty, otherwise choose mixed [3] Optional for standard, mandatory for light protocol option; [3-4] number of patients admitted to the ward before or at 8:00 AM and not discharged from the ward at time of the survey; [5] Year: year of data, previous year or most recent available year; [6] Alcohol hand rub solution in liters delivered to the ward during the same year; N = number; AHR=alcohol hand rub; HCW=healthcare worker.

Comments/observations:
_____

## Definition of ward data

**Survey date.** Date on which the data were collected in the ward. Data from a single ward should be collected on one day; date dd/mm/yyyy.

**Hospital code.** Hospital identifier/code assigned by national/regional PPS coordinating centre; unique code per surveillance/PPS network, should remain the same in different PPS periods/years.

**Ward name (abbreviated)/unit ID.** Unique identifier for each hospital unit (abbreviated ward name); essential for linking between denominator and HAI/AU data; should be used consistently on all forms and should remain the same in different PPS periods/years.

**Ward specialty.** Main ward specialty (≥ 80% of patients requiring this specialty). If fewer than 80%, report 'mixed ward' (MIX). PED=Paediatrics, NEO=Neonatal, ICU=Intensive Care, MED=Medicine, SUR=Surgery, GO=Gynaecology/Obstetrics, GER=Geriatrics, PSY=Psychiatry, RHB=Rehabilitation, LTC=Long-term care, OTH=Other, MIX=Mixed.

As a rule, the ward specialty code is composed of the three first letters of the main consultant/patient specialty, with two exceptions: code ICUNEO (NICU) as ward specialty NEO and ICUPED (PICU) as ward specialty PED. The ward specialty can be combined with patient specialty to refine specialties, e.g. in paediatrics: ward specialty PED + patient specialty: ICUPED = paediatric ICU, PED + SURCARD = paediatric cardiac surgery, PED + MEDONCO = paediatric oncology.

A ward with healthy newborns must either be allocated to GO (GOBAB) when it is located in obstetrics, or to PED (PEDBAB) if it is located in paediatrics.

*Note: How to code paediatric patients: Use the ward code PED for paediatric wards. If the ward specialty code is PED, then patients should be coded as per consultant/patient specialty MEDGEN, MEDSUR, etc. The consultant/patient specialty PEDGEN should normally only be used for paediatric patients on adult wards.*

**Total number of patients in ward.** Total number of patients admitted to the ward before or at 8 a.m. that were not discharged from the ward at the time of the survey. This is mandatory for the light protocol option, but optional for the standard protocol option.

**Number of patients in ward by consultant/patient specialty. Light protocol option only.** Number of patients admitted to the ward before or at 8 a.m. and not discharged from the ward at the time of the survey, recorded separately for each consultant/patient specialty.

**Consultant/patient specialty.** Specialty of physician in charge of the patient, or main specialty for which the patient was admitted to the hospital. See specialty list (six-letter codes). In ward data, this variable needs to be completed in light protocol option only. Also see patient data.

**Post-prescription review of antimicrobials in ward.** Is there a formal procedure to review the appropriateness of an antimicrobial within 72 hours from the initial order in this ward (post-prescription review)? A formal post-prescription review procedure should be documented and adopted by the hospital management and should be performed by a person or team other than the treating physician. The procedure should at least address the prescription of broad-spectrum or reserve antimicrobials. Yes/no

**Number of patient-days in ward.** Number of patient-days in one year for current ward (data from previous year if available, specify year in second column).

**Alcohol hand rub consumption in wards (litres/year)**. Number of litres of alcohol hand rub delivered to the ward in one year. Provide data for the same year as the number of patient-days in the ward.

**Number of hand hygiene opportunities observed in ward/year**. Number of hand hygiene opportunities observed in the current ward in one year. Provide data for previous year or the most recent data available (specify year in second column). Report the total number of observed opportunities for hand hygiene, not only the compliant observations.

**Number of beds in ward**. Total number of beds in ward on the PPS day. Include 'corridor beds' and neonatal beds.

**Number of beds in ward with AHR dispensers at the point of care.** Number of beds in the ward with alcohol hand rub (AHR) dispensers available at the point of care as recommended by the 2009 WHO *Guidelines on Hand Hygiene in Health Care*. AHR dispensers at the entrance of the patient room only are *not* considered as 'available at the point of care'. The 'point of care' is the place where three elements come together: the patient, the HCW, and care or treatment involving contact with the patient or his/her surroundings (within the patient zone). The concept embraces the need to perform hand hygiene at recommended moments exactly where care delivery takes place. This requires that a hand hygiene product (e.g. alcohol-based hand rub, if available) be easily accessible and as close as possible – within arm's reach of where patient care or treatment is taking place. Point-of-care products should be accessible without having to leave the patient zone.

**Number of HCWs on ward at time of PPS**. Number of healthcare workers (HCWs) on ward at the time of PPS. The purpose of this variable is to measure the denominator of those carrying AHR dispensers. Therefore, HCWs should not be included if there is no information on the carriage of alcohol hand rub dispensers.

**Number of HCWs on ward carrying AHR dispensers**. Number of HCWs on ward carrying AHR dispensers (e.g. in their pockets).

**Number of rooms in ward**. Total number of rooms in the ward on the PPS day.

**Number of single rooms in ward**. Total number of single-bed rooms in the ward on the PPS day. Rooms with more than one bed that are designated for use as single occupancy and isolation rooms (e.g. for infection control purposes) should be included.

**Number of single rooms with individual toilet and shower**. Total number of single-bed rooms with individual toilet and shower in the ward. Rooms which have toilet and shower in a communal area should not be counted. An individual toilet alone or a commode (toilet chair) is not sufficient to qualify for this indicator.

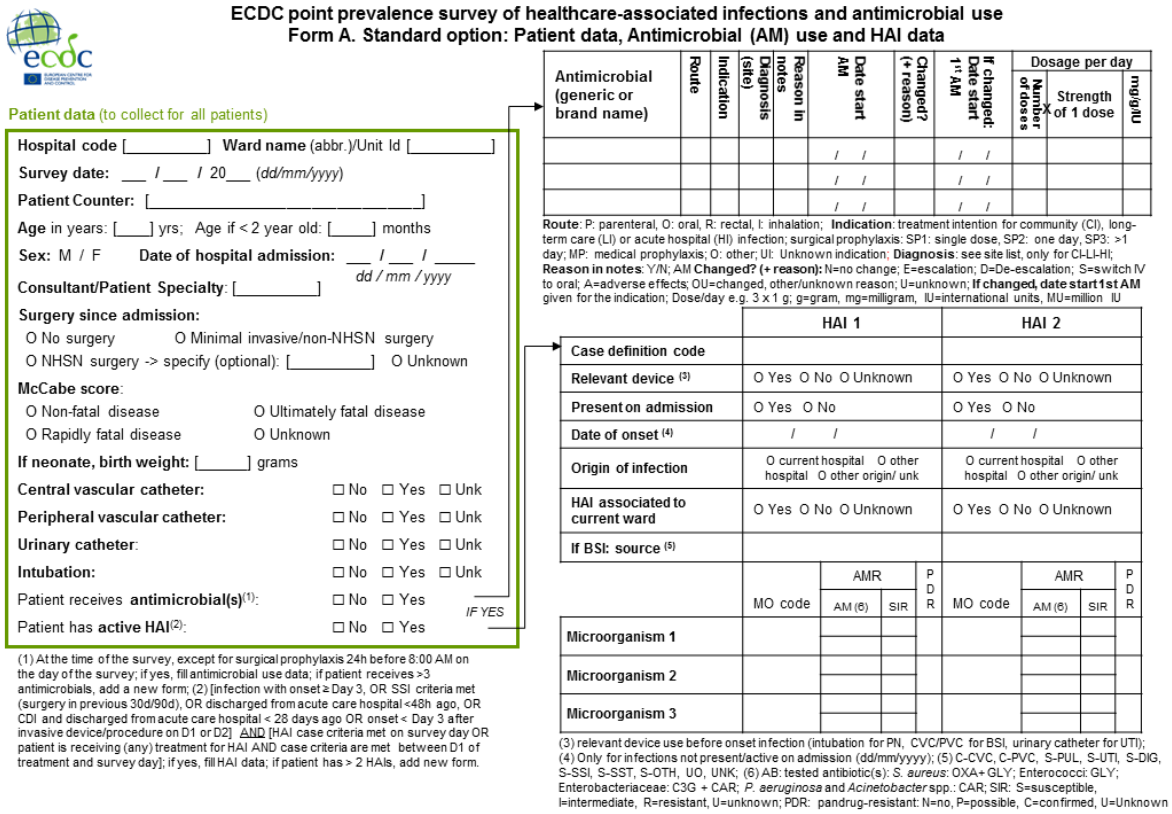
**Number of beds occupied at 00:01 on the day of PPS**. Number of ward beds occupied at midnight on the day of the PPS (can also be measured at midnight after the PPS took place).

**Comments/observations**. Free text field to report, for example, feasibility issues, data quality problems, or specific epidemiological information for the current ward.

# Patient data (standard protocol option)

In the standard (patient-based) protocol option, demographic data and risk factors are collected for each patient present at/admitted to the ward before or at 8 a.m. and not discharged from the ward at the time of the survey (including patients not receiving an antimicrobial and not presenting a healthcare-associated infection).

**Figure 7. Patient-based risk factors (form A): one form per patient, antimicrobial use and HAI data collected on same form**



ECDC point prevalence survey of healthcare-associated infections and antimicrobial use
Form A. Standard option: Patient data, Antimicrobial (AM) use and HAI data

Patient data (to collect for all patients)

Hospital code [_____] Ward name (abbr.)/Unit Id [_____]
Survey date: ___ / ___ / 20___ (dd/mm/yyyy)
Patient Counter: [_____]
Age in years: [____] yrs; Age if < 2 year old: [____] months
Sex: M / F Date of hospital admission: ___ / ___ / ____ dd / mm / yyyy
Consultant/Patient Specialty: [_____]
Surgery since admission:
O No surgery O Minimal invasive/non-NHSN surgery
O NHSN surgery -> specify (optional): [_____] O Unknown
McCabe score:
O Non-fatal disease O Ultimately fatal disease
O Rapidly fatal disease O Unknown
If neonate, birth weight: [_____] grams
Central vascular catheter: ☐ No ☐ Yes ☐ Unk
Peripheral vascular catheter: ☐ No ☐ Yes ☐ Unk
Urinary catheter: ☐ No ☐ Yes ☐ Unk
Intubation: ☐ No ☐ Yes ☐ Unk
Patient receives antimicrobial(s)(1): ☐ No ☐ Yes
Patient has active HAI(2): ☐ No ☐ Yes
IF YES

(1) At the time of the survey, except for surgical prophylaxis 24h before 8:00 AM on the day of the survey; if yes, fill antimicrobial use data; if patient receives >3 antimicrobials, add a new form; (2) [infection with onset ≥ Day 3, OR SSI criteria met (surgery in previous 30d/90d), OR discharged from acute care hospital <48h ago, OR CDI and discharged from acute care hospital < 28 days ago OR onset < Day 3 after invasive device/procedure on D1 or D2] AND [HAI case criteria met on survey day OR patient is receiving (any) treatment for HAI AND case criteria are met between D1 of treatment and survey day]; if yes, fill HAI data; if patient has > 2 HAIs, add new form.

| Antimicrobial (generic or brand name) | Route | Indication | Diagnosis (site) | Reason in notes | Date start AM | Changed? (+ reason) | If changed: Date start 1st AM | Dosage per day: Number of doses | X | Strength of 1 dose | mg/g/IU |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | / / | | / / | | | | |
| | | | | | / / | | / / | | | | |
| | | | | | / / | | / / | | | | |

Route: P: parenteral, O: oral, R: rectal, I: inhalation; Indication: treatment intention for community (CI), long-term care (LI) or acute hospital (HI) infection; surgical prophylaxis: SP1: single dose, SP2: one day, SP3: >1 day; MP: medical prophylaxis; O: other; UI: Unknown indication; Diagnosis: see site list, only for CI-LI-HI; Reason in notes: Y/N; AM Changed? (+ reason): N=no change; E=escalation; D=De-escalation; S=switch IV to oral; A=adverse effects; OU=changed, other/unknown reason; U=unknown; If changed, date start 1st AM given for the indication; Dose/day e.g. 3 x 1 g; g=gram, mg=milligram, IU=international units, MU=million IU

| | HAI 1 | HAI 2 |
|---|---|---|
| Case definition code | | |
| Relevant device (3) | O Yes O No O Unknown | O Yes O No O Unknown |
| Present on admission | O Yes O No | O Yes O No |
| Date of onset (4) | / / | / / |
| Origin of infection | O current hospital O other hospital O other origin/ unk | O current hospital O other hospital O other origin/ unk |
| HAI associated to current ward | O Yes O No O Unknown | O Yes O No O Unknown |
| If BSI: source (5) | | |

| | MO code | AMR: AM (6) | AMR: SIR | PDR | MO code | AMR: AM (6) | AMR: SIR | PDR |
|---|---|---|---|---|---|---|---|---|
| Microorganism 1 | | | | | | | | |
| Microorganism 2 | | | | | | | | |
| Microorganism 3 | | | | | | | | |

(3) relevant device use before onset infection (intubation for PN, CVC/PVC for BSI, urinary catheter for UTI); (4) Only for infections not present/active on admission (dd/mm/yyyy); (5) C-CVC, C-PVC, S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH, UO, UNK; (6) AB: tested antibiotic(s): *S. aureus*: OXA+ GLY; Enterococci: GLY; Enterobacteriaceae: C3G + CAR; *P. aeruginosa* and *Acinetobacter* spp.: CAR; SIR: S=susceptible, I=intermediate, R=resistant, U=unknown; PDR: pandrug-resistant: N=no, P=possible, C=confirmed, U=Unknown

## Definition of patient data

**Hospital code.** Hospital identifier/code assigned by national/regional PPS coordinating centre; unique code per surveillance/PPS network.

**Ward name.** Abbreviated name of hospital ward: essential for linking between denominator and HAI/AU data; should be used consistently on all forms and should remain the same in different PPS periods/years.

**Ward specialty.** Main ward specialty (≥ 80% of patients requiring this specialty). If fewer than 80%, choose mixed ward (MIX). See more details under ward data and specialty code list. This variable can be omitted from the patient data if ward data are provided. If ward data are not provided, it should be added on the patient form.

**Survey date.** Date on which data were collected in this ward. Data from a single ward should be collected on one day (dd/mm/yyyy). This variable can be omitted from the patient data if ward data are provided. If ward data are not provided, it should be added on the patient form.

**Patient counter.** Number: anonymised patient number makes it possible to establish a link between patient data and HAI or antimicrobial use data. Not the actual patient identifier.

**Age in years.** Patient age in years.

**Age in months.** Patient age in months if the patient is less than two years old.

**Sex.** Gender of the patient: M (male), F (female), or UNK (unknown).

**Date of hospital admission.** Date on which the patient was admitted to the hospital for the current hospitalisation (dd/mm/yyyy).

**Consultant/patient specialty.** Specialty of physician in charge of the patient or main specialty for which the patient was admitted to the hospital. If the consultant specialty differs from the patient specialty, give priority to the patient specialty. For paediatric patients on a PED ward, use the subspecialty (MEDGEN, MEDSUR, etc.) (see ward specialty). Please note that long-term care is a ward specialty and should only exceptionally be used as a patient/consultant specialty.

**Surgery since admission.** Patient has undergone surgery during current hospitalisation. Surgery is defined as a procedure performed primarily for therapeutic reasons where an incision is made (not just a needle puncture), with breach of mucosa and/or skin – not necessarily in the operating theatre. Answer categories: No surgery; yes, minimally invasive/non-NHSN surgery (examples see annex); yes, NHSN surgery – optionally specify NHSN surgery code (ICD-9-CM code of the intervention is listed for the surveillance of surgical site infections in the NHSN system, examples see annexes); unknown.

**McCabe score.** Classification of the severity of underlying medical conditions. Disregard the influence of acute infections, e.g. if the patient has an active HAI, estimate the score the patient had before the infection. Answer categories: Non-fatal disease (expected survival at least five years); ultimately fatal disease (expected survival between one and five years); rapidly fatal disease (expected death within one year); unknown.

Although the prognosis of diseases varies in time and between hospitals due to changes in treatment options and their availability, using McCabe scores can still be helpful. Some examples of diseases and their different McCabe score categories are given below. These examples, in particular those of the second (ultimately fatal) category, are not meant to be exhaustive but rather to serve as a guidance tool for the current protocol.

Examples of diseases for different McCabe score categories:

Rapidly fatal: < one year

- End-stage haematological malignancies (unsuitable for transplant, or relapsed), heart failure (EF < 25%) and end-stage liver disease (unsuitable for transplant with recalcitrant ascites, encephalopathy or varices)
- Multiple organ failure on intensive care unit – APACHE II score > 30, SAPS II score > 70
- Pulmonary disease with cor pulmonale

Ultimately fatal: one year to four years

- Chronic leukaemias, myelomas, lymphomas, metastatic carcinoma, end-stage kidney disease (without transplant)
- Motor neuron disease, multiple sclerosis non-responsive to treatment
- Alzheimer's disease/dementia
- Diabetes requiring amputation or post amputation

Non fatal: > five years

- Diabetes
- Carcinoma/haematological malignancy with > 80% five-year survival
- Inflammatory disorders
- Chronic GI, GU conditions
- Obstetrics
- Infections (including HIV, HCV, HBV – unless in above categories)
- All other diseases

**Birth weight:** birth weight in grams, to be provided for neonates (infants less than one month old); the birth weight is the weight of the infant at the time of birth and should not be changed as the infant gains or loses weight.

**Central vascular catheter.** Patient has central vascular catheter in place on survey date; yes/no/unknown.

A central vascular catheter is defined by the CDC as an:

- intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered great vessels for the purpose of reporting central-line BSI and counting central-line days in the NHSN system: Aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, common iliac veins, femoral veins, and in neonates, the umbilical artery/vein.

*Notes: Neither the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line.*

*An introducer is considered an intravascular catheter, and depending on the location of its tip and use, may be a central line.*

*Pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.*

*Source: CDC. Bloodstream infection event. January 2016. Available from: http//www.cdc.gov/nhsn/pdfs/pscmanual/4psc_clabscurrent.pdf*

**Peripheral vascular catheter.** Patient has peripheral vascular (venous or arterial catheter) in place; yes/no/unknown.

**Urinary catheter.** Patient has indwelling urinary catheter in place at the date of the survey; yes/no/unknown.

**Intubation.** Patient is under intubation with or without mechanical ventilation (endotracheal tube or tracheostomy) on survey date; yes/no/unknown.

**Patient receives antimicrobial(s).** Patient receives at least one systemic antimicrobial agent at the date of the survey (given or planned treatment, including intermittent treatments, e.g. alternate day; or medical prophylaxis); for surgical antimicrobial prophylaxis, check whether any surgical prophylaxis was given in the 24 hours prior to 8 a.m. on the day of the survey; yes/no. If yes, collect antimicrobial use data.

**Patient has active HAI.** Patient has an active healthcare-associated infection on survey date; yes/no. If yes, collect HAI data.

*Notes:*
*Patient data have to be collected for each patient admitted to the ward at 8 a.m. on the survey date, infected or not, only excluding day cases (see inclusion criteria).*

*Maternity: both mother and neonate are counted if present at 8 a.m. on the day of the survey.*

*Neonates:*
- *Count all infections after their birth.*
- *Register consultant/patient specialty for healthy neonates as either GOBAB or PEDBAB.*
- *Obstetrics: in the case of natural birth with no interventions/procedures/devices, a maternal infection is only considered as an HAI if the date of onset is on day 3 or later.*

# Antimicrobial use data and HAI data

Only collect information if the patient receives at least one antimicrobial at the time of the survey (except in the 24 hours prior to 8 a.m. on the day of the survey for surgical prophylaxis) or if the patient has an active infection associated to an acute care hospital stay (current or another hospital).

The use of antimicrobials will often lead to the detection of a HAI. Some patients may have a HAI that is not treated by an antimicrobial (e.g. viral infections, urinary tract infections, etc.), which makes it necessary to consult other sources (see HAI case finding algorithm). In other cases, the physicians may treat an infection which does not match the case definition. Therefore the diagnosis list for antimicrobial use differs from the HAI case definition list (see codebook) and the indication list mentions treatment intention of an infection. It is not the objective of this survey to relate the use of an antibiotic to the information on HAIs (such as microorganisms). Both types of data are collected separately.

## Antimicrobial use data

Surgical prophylaxis should be registered if given the day before the survey (i.e. in the 24 hours prior to 8 a.m. on the day of the survey). For all other antimicrobial use (e.g. treatment, medical prophylaxis), any given or planned (including intermittent treatments, e.g. alternate day) administration of antimicrobials should be registered at the time of the survey only. If the antimicrobial agent given for treatment or medical prophylaxis was changed on the day of the survey, only record the last antimicrobial agent at the time of the survey.

*Note: The aim is to determine what the physicians think they are treating. In order to do so, we will look at all patient records and may request additional information from nurses, pharmacists or doctors. The appropriateness of prescriptions will not be discussed. Also, no attempts will be made to change prescriptions. At no time the staff should feel supervised.*

### Definitions of antimicrobial use data

**Antimicrobial generic or brand name.** Allowed are, for example, amoxicillin, but also national brand names; include ATC codes (ATC2: J01 antibacterials, J02 antifungals; ATC4: A07AA, P01AB, D01BA; ATC5: J04AB02). Treatment for tuberculosis is excluded but antituberculosis drugs are included when used for treatment of mycobacteria other than tuberculosis (MOTT) or as reserve treatment for multidrug-resistant bacteria. Brand names or drug names should be converted into ATC5 codes. See codebook for included antimicrobial agents.

**Route.** Route of administration of the antimicrobial agent; **P**=parenteral; **O**=oral; **R**=rectal; **I**=inhalation.

**Indication for antimicrobial use.** Patient receives systemic antimicrobials for:

- Treatment intention: CI: community-acquired infection; LI: infection acquired in long-term care facility (e.g. nursing home) or chronic-care hospital; HI: acute-hospital-acquired infection.
- Surgical prophylaxis: SP1: single dose; SP2: one day; SP3: > 1 day: check if given in the 24 hours prior to 8 a.m. on the day of the survey – if yes, check if given on the day before yesterday or on the day of the survey in order to determine duration.
- MP. Medical prophylaxis.
- O. Other indication (e.g. erythromycin use as a prokinetic agent).
- UI. Unknown indication/reason (verified during PPS).
- UNK. Unknown/missing, information on indication was not verified during PPS.

If the antimicrobial use is intended for treatment of an infection, fill in site of infection (diagnosis). Otherwise code NA (not applicable).

**Diagnosis (site).** Diagnosis group by anatomical site: see diagnosis (site) code list for antimicrobial use. Should only be recorded when the indication is 'intention to treat an infection'; not recorded for prophylaxis or other indications (use code NA=not applicable).

**Reason in notes: yes/no.** Yes if the reason for antimicrobial use was documented in the patient chart/notes.

**Date start antimicrobial.** Day on which the first dose of the current antimicrobial was administered. If the patient received the antimicrobial on admission, record the date of admission.

**Antimicrobial changed? (+ reason).** Was the antimicrobial (or the route of administration) changed for this infection episode, and if so, what was the reason? If the antimicrobial was changed more than once for the current infection episode, report the reason of the last change. Changes should be considered for the entire treatment regimen for one infection episode.

- **N**=no change, antimicrobial was not changed.

- **E**=escalation: antimicrobial was escalated (or another antimicrobial was added) on microbiological and/or clinical grounds, i.e. the isolated microorganism was not susceptible to the previous antimicrobial and/or lack of clinical effect of previous antimicrobial; includes switch from oral to parenteral for the same antimicrobial.
- **D**=De-escalation: antimicrobial was de-escalated on microbiological and/or clinical grounds, i.e. the isolated microorganism was susceptible to more narrow-spectrum or first-line antimicrobials than the previous antimicrobial and/or the clinical situation of the patient allows changing to a more narrow-spectrum or to a first-line antimicrobial. If other antimicrobials given for the same indication were stopped at the time of the survey, report de-escalation for the remaining antimicrobial(s).
- **S**=switch IV to oral; route of administration of same antimicrobial was changed from parenteral to oral. A switch can also occur between antimicrobials belonging to the same antimicrobial class, e.g. IV ampicillin/sulbactam to oral amoxicillin/clavulanate or IV ceftriaxone to oral cefuroxime axetil.
- **A**=adverse effects; antimicrobial was changed because of observed or expected side or adverse effects of the antimicrobial.
- **OU**=change for other or unknown reason: the antimicrobial for that indication was changed for another reason, or the antimicrobial was changed but the reason could not be determined by the surveyor.
- **U**=unknown: no information on whether the antimicrobial was changed or not.

**Date start first antimicrobial (if change)**: If the current antimicrobial replaces a previous one: date on which the first dose of the first antimicrobial given for the same infection episode was administered. Leave blank if there was no change (or if there is no information available). If the antimicrobial was changed more than once for the current indication, report the start date of the first (not the previous) antimicrobial. If the patient received the first antimicrobial on admission, record the date of admission. The main objectives of collecting this variable are 1) estimation of the total annual number of patients receiving antimicrobials in acute care hospitals (prevalence to incidence conversion) and 2) proxy validation of the prevalence of HAIs. Optional.

**Dosage per day**. Number and strength (in milligrams, grams, IU or MU) of doses of the current antimicrobial given per day. Report as, for example, '4 x 1 g per day' (three variables: number of doses, strength of one dose, unit of one dose). When one dose of an antimicrobial is given every other day, report the number of doses as 0.5 (e.g. 0.5 x 1 g/day). The main objectives for collecting this variable are to provide information to 1) enable comparisons of antimicrobial consumption between Europe and the US, and 2) enable updating the defined daily doses (DDD) values as set by the WHO Collaboration Centre for Drug Statistics Methodology (Norwegian Institute of Public Health, www.whocc.no). Report dosage as written in the patient records. Recoding (e.g. to inform DDD updates) will be done in the analysis phase if needed (e.g. for combined products).

# Healthcare-associated infection data

## Key terms and notes

An **active healthcare-associated infection** (associated to acute care hospital stay) present on the day of the survey is defined as follows:

- An infection is active when signs and symptoms of the infection are present on the survey date *or* signs and symptoms were present in the past and the patient is (still) receiving treatment for that infection on the survey date. The presence of symptoms and signs should be verified until the start of the treatment in order to determine whether the treated infection matches one of the case definitions of healthcare-associated infection.

AND

- The onset of symptoms was on Day 3 or later (day of admission = Day 1) of the current admission *or* the patient presents with an infection but has been readmitted less than 48 hours after a previous admission to an acute care hospital; *or*
- The patient has been admitted (or develops symptoms within two days) with an infection that meets the case definition of an active surgical site infection (SSI), i.e. the SSI occurred within 30 days of the operation (or in the case of surgery involving an implant, was a deep or organ/space SSI that developed within 90 days of the operation) and the patient either has symptoms that meet the case definition and/or is on antimicrobial treatment for that infection; *or*
- The patient has been admitted (or develops symptoms within two days) with *C. difficile* infection less than 28 days after a previous discharge from an acute care hospital; *or*
- An invasive device was placed on Day 1 or Day 2, resulting in an HAI before Day 3.

*Note: Results of tests/examinations that are not yet available on the survey date should neither be completed after the survey date nor taken into account when establishing whether the case definition criteria are fulfilled. This will probably cause some actual cases of HAI to be discarded, but this can be seen as compensation for the (potentially long) retrospective period preceding the start of the treatment when no more signs or symptoms are present on the survey date.*

**Device-associated HAI** is an HAI in a patient with a (relevant) device that was used within the 48-hour period before onset of infection (even intermittently). The term 'device-associated' is only used for pneumonia, bloodstream infection and urinary tract infection. The 'relevant devices' are intubation, vascular (central/peripheral) catheter and urinary catheter, respectively. If the interval is longer than 48 hours, there must be compelling evidence that the infection was associated with device use. For catheter-associated UTI, the indwelling urinary catheter must have been in place within seven days before positive laboratory results or signs and symptoms meeting criteria for UTI were evident. See: Horan et al. Definitions of key terms used in the NNIS system. Am J Infect Control 1997; 25:112-6.

A **bloodstream infection** (BSI and secondary BSI) is always registered as a separate HAI with specification of the source in a separate field (peripheral or central catheter, other infection site – S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH; the only exceptions are a CRI3 (catheter-related bloodstream infection with microbiological documentation of the relationship between the vascular catheter and the BSI) and neonatal bloodstream infections: CRI3 and neonatal BSIs should not be reported twice in the point prevalence survey (see case definitions). Microbiologically confirmed catheter-related BSI should be reported as a CRI3. Neonatal bloodstream infections should be reported as NEO-LCBI or NEO-CNSB, together with BSI origin.

## Definitions of healthcare-associated infection data

**Case definition code.** HAI case definition codes: specify subcategory, e.g. PN4, CVS-VASC (see code lists, overview and HAI case definitions in Annex 2). A single-case definition code should only be provided once per patient (no different infection episodes). For pneumonia and urinary tract infections, only fill in one subcategory (priority pneumonia: PN1> PN2> PN3> PN4> PN5; urinary tract infections: UTI-A> UTI-B). For laboratory-confirmed bloodstream infections, provide only one of BSI, CRI3 (priority CRI3> BSI), NEO-LCBI or NEO-CNSB (priority NEO-LCBI> NEO-CNSB [> BSI]). All signs and symptoms since the onset of the infection until the time of the survey should be considered to categorise the HAI.

**Relevant device in situ: yes/no/unknown.** To be specified for PN, BSI, NEO-LCBI, NEO-CNSB and UTI only. Answer 'Yes' if a relevant invasive device was in situ (even intermittently) for any amount of time within a 48-hour time period (seven days for UTIs) before onset of the infection, i.e. intubation for pneumonia, central/peripheral vascular catheter for bloodstream infections, urinary catheter for UTI; Unk=unknown; used to apply CDC definition of device-associated infection (see Horan TC, et al. Definitions of key terms used in the NNIS system. Am J Infect Control 1997; 25:112-6).

**Infection present at admission: yes/no.** Signs and symptoms of the infection were present at admission to the hospital; if not, provide date onset of infection.

**Date of onset.** Date of onset of the infection (dd/mm/yyyy). Not to be recorded if signs/symptoms are present at admission, but mandatory if onset during current hospitalisation. Record the date of first signs or symptoms of the infection; if unknown, record the date treatment was started for this infection or the date the first diagnostic sample was taken. If no treatment or sample, please estimate.

**Origin of the infection.** Infection is associated with (1) current hospital; (2) another acute care hospital; (3) other origin or unknown. Infections present at admission may be associated with a previous stay in your hospital or a transfer from another acute care facility. The category 'other origin or unknown' can be used, for example, for infections with an onset after day 2 of the current hospitalisation (= HAI by definition) which the surveyor does not consider to be associated with the current hospital stay. However, the category should not be used for long-term care-facility/nursing-home-associated infections, since only HAI associated with acute care hospital stays are recorded in the ECDC PPS.

**HAI associated to current ward**. An HAI is associated with the current ward if the infection started on day 3 or later after admission to the current ward (where the date of admission to the ward is day 1) *or* if the infection started on day 1 or 2 after placement of an invasive device in the current ward *or* if the patient was readmitted with an HAI present on admission associated to a previous stay in the same ward, within 30 days after operation for surgical site infections (or 90 days for deep and organ/space SSI after implant surgery), less than 28 days after discharge for *C. difficile* infections, less than 48 hours (two calendar days) after discharge for other HAIs.

**If BSI: source.** If lab-confirmed bloodstream infection, specify the origin: catheter-related (central: **C-CVC**, peripheral **C-PVC**), secondary to another infection: pulmonary (**S-PUL**), urinary tract (**S-UTI**), digestive tract (**S-DIG**), surgical site infection (**S-SSI**), skin and soft tissue infection (**S-SST**), other infection (**S-OTH**), or BSI of (confirmed) unknown origin (**UO**); missing data, no information available=UNK; secondary BSI reported as separate HAI, in addition to the primary infection if it matches the case definition.

**Microorganisms.** Collect microbiological results available on the survey date (do not wait for results not available on the survey date). Specify up to three isolated microorganisms using six-letter microorganism codes (e.g. STAAUR=*Staphylococcus aureus*); see codebook.

**Antimicrobial resistance phenotype.** Specify susceptibility to selected antimicrobial resistance (AMR) marker depending on microorganism.

Report S (susceptible), I (intermediate), R (resistant) or UNK (unknown) for the antimicrobial group (preferred) or for tested antimicrobials within the group. Reporting group susceptibility requires that at least one antimicrobial belonging to the group is tested.

If several antibiotics within the group were tested (e.g. carbapenems (CAR)), report the least susceptible result for the group (e.g. meropenem R + imipenem I = CAR R).

If AMR markers are collected in accordance with the PPS I protocol methodology (still allowed but **not recommended**), report S (susceptible), IR (non-susceptible) or U (unknown), except for MRSA, report non-susceptibility to oxacillin (or equivalent) as R (resistant).

*Staphylococcus aureus*: OXA, GLY

- MRSA: Resistant to oxacillin (OXA) or other markers of meticillin-resistant S. aureus (MRSA), such as cefoxitin (FOX), cloxacillin (CLO), dicloxacillin (DIC), flucloxacillin (FLC), methicillin (MET)
- VRSA: Resistant to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)
- VISA: Intermediate to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)

*Enterococcus* spp.: GLY

- VRE: Resistant to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)

Enterobacteriaceae (Selection: *Escherichia coli*, *Klebsiella* spp., *Enterobacter* spp., *Proteus* spp., *Citrobacter* spp., *Serratia* spp., *Morganella* spp.): C3G, CAR

- Third-generation cephalosporins (C3G): cefotaxime (CTX), ceftriaxone (CRO), ceftazidime (CAZ)
- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

*Pseudomonas aeruginosa*: CAR

- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

*Acinetobacter* spp.: CAR

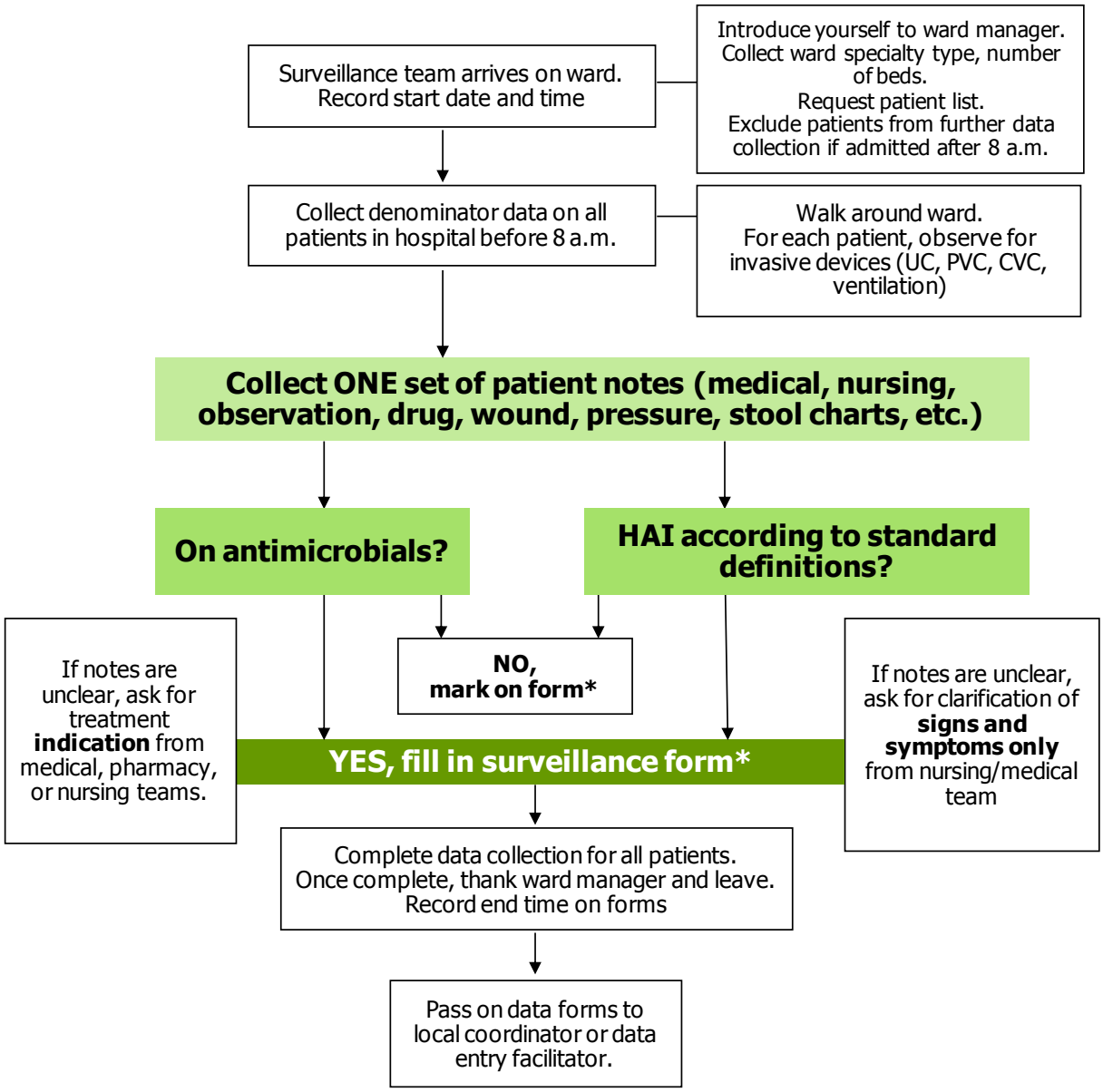
- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

**Pandrug-resistant (PDR).** Microorganism is pandrug-resistant. Not PDR =N (susceptible to at least one antimicrobial), possible PDR = P (I/R to all antimicrobials tested in hospital), confirmed PDR = C (I/R to all antimicrobials confirmed by reference laboratory), UNK=Unknown.

*Source: Magiorakos AP, Srinivasan A, Carey RB, Carmeli Y, Falagas ME, Giske CG, et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect. 2012 Mar;18(3):268-81.*

## Recommended case-finding algorithm for healthcare-associated infections

**Figure 8. Recommended case finding algorithm for healthcare-associated infections**




*UC=urinary catheter; PVC=peripheral vascular catheter; CVC=central vascular catheter*

## Numerator data in the light protocol

Since in the light (unit-based) protocol option denominator data are collected at the aggregated (ward) level, some additional patient and ward variables should be collected for patients receiving antimicrobials and/or patients with an active healthcare-associated infection.

**Hospital code.** Hospital identifier/code assigned by national/regional PPS coordinating centre; unique code per surveillance/PPS network, should remain the same in different PPS periods/years.

**Ward name (abbreviated)/unit ID.** Unique identifier for each hospital unit (abbreviated ward name); essential for linking between denominator and HAI/AU data; should be used consistently in all forms and should remain the same in different PPS periods/years.

**Patient counter.** Number: anonymised patient number allows establishing the link between patient data and HAI or antimicrobial use data. Not the actual patient identifier.

**Age in years.** Patient age in years; number; if missing=UNK.

**Age in months.** Patient age in months if the patient is less than two years old.

**Sex.** Gender of the patient: M (male), F (female), or UNK.

**Date of hospital admission.** Date patient was admitted to the hospital for the current hospitalisation (dd/mm/yyyy).

**Consultant/patient specialty.** Specialty of physician in charge of the patient or main specialty for which the patient was admitted to the hospital. If the consultant specialty differs from the patient specialty, give priority to the patient specialty. For paediatric patients on a PED ward, use the subspecialty (MEDGEN, MEDSUR etc) (see ward specialty). LTC should only exceptionally be used as a patient/consultant specialty.

**Patient receives antimicrobial: yes/no/unknown.** Patient receives non-topical antibacterials or antifungals. Prophylaxis: any patient who received one or more doses in the 24 hours prior to 8 a.m. on the day of the survey.

**Patient has active HAI: yes/no/unknown.** See definition of active infection above.

**Figure 9. Antimicrobial use and HAI data form in the LIGHT option (form B2)**

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form B. Light option: Antimicrobial (AM) use and HAI data**

**Patient data** (patients with HAI and/or antimicrobial only)

Hospital code [_____]
Ward name (abbr.)/Unit Id [_____]
**Patient Counter:** [_____]
**Age** in years: [____] yrs; Age if < 2 years old: [_____] months
**Sex:** M / F
**Date of hospital admission:** ___ / ___ / _____ *(dd/mm/yyyy)*
**Consultant/Patient Specialty**: [_____]
Patient receives **antimicrobial(s)**(1): ☐ No ☐ Yes
Patient has **active HAI**(2): ☐ No ☐ Yes

(1) At the time of the survey, except for surgical prophylaxis 24h before 8:00 AM on the day of the survey; if yes, fill antimicrobial use data; if patient receives >3 antimicrobials, add a new form; (2) [infection with onset ≥ Day 3, OR SSI criteria met (surgery in previous 30d/90d), OR discharged from acute care hospital <48h ago, OR CDI and discharged from acute care hospital < 28 days ago OR onset < Day 3 after invasive device/procedure on D1 or D2] AND [HAI case criteria met on survey day OR patient is receiving (any) treatment for HAI AND case criteria are met between D1 of treatment and survey day]; if yes, fill HAI data; if patient has > 2 HAIs, add new form.

*IF YES*

| Antimicrobial (generic or brand name) | Route | Indication | Diagnosis (site) | Reason in notes | Date start AM | Changed? (+ reason) | If changed: 1st AM Date start | Dosage per day: Number of doses | X | Strength of 1 dose | mg/g/IU |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | / / | | / / | | | | |
| | | | | | / / | | / / | | | | |
| | | | | | / / | | / / | | | | |

**Route**: P: parenteral, O: oral, R: rectal, I: inhalation; **Indication**: treatment intention for community (CI), long-term care (LI) or acute hospital (HI) infection; surgical prophylaxis: SP1: single dose, SP2: one day, SP3: >1 day; MP: medical prophylaxis; O: other; UI: Unknown indication; **Diagnosis**: see site list, only for CI-LI-HI; **Reason in notes**: Y/N; AM **Changed? (+ reason):** N=no change; E=escalation; D=De-escalation; S=switch IV to oral; A=adverse effects; OU=changed, other/unknown reason; U=unknown; **If changed, date start 1st AM** given for the indication; Dose/day e.g. 3 x 1 g; g=gram, mg=milligram, IU=international units, MU=million IU

| | HAI 1 | | | | HAI 2 | | | |
|---|---|---|---|---|---|---|---|---|
| **Case definition code** | | | | | | | | |
| **Relevant device** (3) | O Yes O No O Unknown | | | | O Yes O No O Unknown | | | |
| **Present on admission** | O Yes O No | | | | O Yes O No | | | |
| **Date of onset** (4) | / / | | | | / / | | | |
| **Origin of infection** | O current hospital O other hospital O other origin/ unk | | | | O current hospital O other hospital O other origin/ unk | | | |
| **HAI associated to current ward** | O Yes O No O Unknown | | | | O Yes O No O Unknown | | | |
| **If BSI: source** (5) | | | | | | | | |
| | MO code | AMR: AM (6) | AMR: SIR | PDR | MO code | AMR: AM (6) | AMR: SIR | PDR |
| **Microorganism 1** | | | | | | | | |
| **Microorganism 2** | | | | | | | | |
| **Microorganism 3** | | | | | | | | |

(3) relevant device use before onset infection (intubation for PN, CVC/PVC for BSI, urinary catheter for UTI); (4) Only for infections not present/active on admission (dd/mm/yyyy); (5) C-CVC, C-PVC, S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH, UO, UNK; (6) AB: tested antibiotic(s): *S. aureus*: OXA+ GLY; Enterococci: GLY; Enterobacteriaceae: C3G + CAR; *P. aeruginosa* and *Acinetobacter* spp.: CAR; SIR: S=susceptible, I=intermediate, R=resistant, U=unknown; PDR: pandrug-resistant: N=no, P=possible, C=confirmed, U=Unknown

# National/regional data

(Applies only to PPS coordinating centres.)

## Objectives

- To assess the total number of acute care hospitals in a country and in the EU and to estimate the total number of hospital admissions per year, in order to estimate the total burden of HAIs and antimicrobial use in acute care hospitals.
- To collect information on the sampling methodology used at the national level.

## Notes

- Data at the national level are preferred, but if needed or more appropriate, please provide data from regional (sub-national) levels (e.g. England, Northern Ireland, Scotland and Wales for UK).
- National/regional data are provided by the point prevalence survey coordinating centre before submitting the national/regional hospital data to ECDC. They can be entered manually or be uploaded (one record) to TESSy (ECDC's surveillance system).

**Figure 10. National/regional data (form N)**

**ECDC point prevalence survey of healthcare-associated infections and antimicrobial use**
**Form N. National/regional data**

Country Code: _____ Network ID/Data Source: _____

**Date start PPS : __ / __ /____**

National/regional PPS coordination centre/institute:

_____

National/regional PPS coordination programme/unit:

Name: _____

Website: _____

| | N | Year data |
|---|---|---|
| Total N of acute care hospitals ("sites") | | |
| Number of administrative hospital groups | | |
| Total N of beds in acute care hospitals | | |
| Total N of acute care beds | | |
| Number of discharges/admissions, all | | |
| Number of discharges/admissions, acute care beds only | | |
| Number of patient days, all | | |
| Number of patient days, acute care beds only | | |

**Method of sampling/recruitment of hospitals (more than 1 answer possible)**:

O representative systematic random sample O other representative sample O convenience sample (selection)
O all hospitals invited O voluntary participation O mandatory participation

Total number of hospitals in PPS: Light (unit-based) protocol ____ Standard (patient-based) protocol _____

Number of hospitals submitted to ECDC: Light (unit-based) protocol ____ Standard (patient-based) protocol _____

Comments/observations:

_____

_____

## Definition of national/regional data

**Country code.** The country reporting the record.

**Network ID.** Code of the region or network for which data are provided (e.g. EN, NI, SC, WA for England, Northern Ireland, Scotland and Wales); leave blank if data are provided for the entire country (national level).

**Date start PPS.** First date on which data were collected (by first hospital) or official launch date of the current national/regional point prevalence survey, whichever comes first.

**National/regional PPS coordination centre/institution.** Name of PPS coordinating centre or institution (e.g. national public health institute) in English (if available) or the local language.

**National/regional PPS coordination programme/unit, name.** Name of PPS coordinating programme or unit (e.g. name of national HAI surveillance programme) in English (if available) or local language; leave blank if not relevant.

**National/regional PPS coordination programme/unit, website.** Web address (URL) of programme or unit that coordinated the PPS (if available), regardless of specific PPS pages.

**Total number of acute care hospitals ('sites').** Total number of acute care hospitals (separate sites or geographical entities) in your country/region, in accordance with national/regional definition of acute care hospitals.

**Number of administrative hospital groups/mergers.** Total number of administrative hospital groups (including at least one acute care hospital site) in your country or region; leave blank if not applicable in your country/region; unknown= UNK.

**Total number of beds in acute care hospitals.** Total number of beds (including non-acute beds) in acute care hospitals; unknown=UNK.

**Total number of acute care beds.** Total number of acute care beds (excluding non-acute beds) in acute care hospitals; unknown=UNK.

**Number of discharges/admissions, all.** Total number of hospital discharges from acute care hospitals in your country/region in the previous year (or the nearest year for which data are available); if discharges are not available, report number of admissions to acute care hospitals; unknown=UNK.

**Number of discharges/admissions, acute care beds only.** If available: number of yearly hospital discharges from acute care hospitals for acute care beds only (previous year or the nearest year for which data are available); if discharges are not available, report admissions; unknown=UNK.

**Number of patient-days, all.** Total number of patient-days in acute care hospitals in the previous year (or the nearest year for which data are available); unknown=UNK.

**Number of patient-days, acute care beds only.** If available: number of yearly patient-days in acute care hospitals for acute care beds only (previous year or the nearest year for which data are available); unknown=UNK.

**Year data.** For each of the hospital statistics, report the year for which data apply; leave blank if data is unknown; UNK=data available but year data unknown.

**Method of sampling/recruitment of hospitals.** Method used for sampling (or recruitment) of hospitals for the national PPS; more than one answer is possible:

- REPSRS=representative sample (recommended method): the necessary number of hospitals was selected using systematic random sampling as described in the protocol under 'sample design'.
- REPOTH=other representative sampling method; please describe the method used under 'comments/observations'.
- CONSAM=convenience sample: selection of hospitals by coordinating centre (e.g. based on expectations of high data quality).
- ALLHOSP=all hospitals invited: all acute care hospitals were invited to participate in the national point prevalence survey; can be combined with sample.
- VOLUNT=voluntary participation; hospitals can freely choose whether they respond to the invitation to participate.
- MANDAT=mandatory participation; participation following invitation is mandatory.

**Total number of hospitals in PPS.** Total number of hospitals that participated in the national/regional PPS (if not all data are submitted to ECDC, provide total number of hospitals), both for the light (unit-based) and standard (patient-based) protocols.

**Comments/observations.** Free text; provide any comment you consider relevant or that should be taken into account for the interpretation of the national/region data; for example, provide additional details on the sampling method used.

# Data structure and variable names

Tables with the PPS data structure for the files to be uploaded to TESSy are available in a separate Excel document. The structure is similar to that of other HAI-Net surveillance modules and has four hierarchical levels.

Data can be uploaded in XML format (one single file) or in CSV format (separate files for each level). In CSV files, the RecordId in the superior level links to the ParentId in the underlying level. CSV file names should start with the number indicating the level of the data subset in the database hierarchy. The record type (variable RecordType) provides the level and data subset identity to TESSy. The record types for the PPS data are as follows:

## Standard protocol option record types

- **HAIPPS** (1st level): Hospital data, one record per hospital-survey
- **HAIPPS$WD** (2nd level): Ward data, one record per ward-survey (optional); link ParentId to RecordId in HAIPPS (1st level)
- **HAIPPS$PT** (2nd level): Patient data, one record per patient; link ParentId to RecordId in HAIPPS (1st level)
- **HAIPPS$PT$AM** (3rd level): Antimicrobial use data, one record per antimicrobial agent-route indication; link ParentId to RecordId in HAIPPS$PT (2nd level)
- **HAIPPS$PT$INF** (3rd level): Healthcare-associated infection data, one record per HAI site; link ParentId to RecordId in HAIPPS$PT (2nd level)
- **HAIPPS$PT$INF$RES** (4th level): Microorganism and antimicrobial resistance data for healthcare-associated infections; link ParentId to RecordId in HAIPPS$PT$INF (3rd level)

CSV files to be uploaded to TESSy: 1. HAIPPS.csv, 2. HAIPPSWD.csv (optional), 2. HAIPPSPT.csv, 3. HAIPPSPTAM.csv, 3. HAIPPSPTINF.csv, 4.HAIPPSPTINFRES.csv

## Light protocol option record types

- **HAIPPSLIGHT** (1st level): Hospital data, one record per hospital-survey
- **HAIPPSLIGHT$WD** (2nd level): Ward data, one record per ward-survey (optional); link ParentId to RecordId in HAIPPSLIGHT (1st level)
- **HAIPPSLIGHT$DENO** (2nd level): Ward denominator data, one record per patient; link ParentId to RecordId in HAIPPSLIGHT (1st level)
- **HAIPPSLIGHT$DENO$AM** (3rd level): Antimicrobial use data, one record per antimicrobial agent-route indication; link ParentId to RecordId in HAIPPSLIGHT$DENO (2nd level)
- **HAIPPSLIGHT$DENO$INF** (3rd level): Healthcare-associated infection data, one record per HAI site; link ParentId to RecordId in HAIPPSLIGHT$DENO (2nd level)
- **HAIPPSLIGHT$DENO$INF$RES** (4th level): Microorganism and antimicrobial resistance data for healthcare-associated infections; link ParentId to RecordId in HAIPPSLIGHT$DENO$INF (3rd level)

CSV files to be uploaded to TESSy: 1. HAIPPSLIGHT.csv, 2. HAIPPSLIGHTWD.csv (optional), 2. HAIPPSLIGHTDENO.csv, 3. HAIPPSLIGHTDENOAM.csv, 3. HAIPPSLIGHTDENOINF.csv, 4. HAIPPSLIGHTDENOINFRES.csv

National data: record type HAIPPSDENOM, denominator data and PPS data for the country (or region if the data source is region-specific)

A new ward level with structure and process indicators was added at the second level in both the standard and the light protocol options. Since ward indicator data are optional, this data level is optional; all other elements of the data structure are identical to the first PPS: patient data and ward denominator data are directly linked to the hospital level (not the ward level). It is crucial that the Ward ID code is identical (i.e. spelled exactly the same) at all data levels.

## Note on microorganism and resistance data

The TESSy format of the microorganism and resistance data follows the bug-drug structure as in EARS-Net, HAI-Net SSI and HAI-Net ICU. The reasons for this are 1) consistency with other data in TESSy and 2) to allow for changes in antimicrobial markers in future versions of the protocols.

In the current PPS II protocol, data are directly collected in the bug-drug format. Collection of S/I/R data for each bug-drug combination will allow analysing the data exactly as in the EARS-Net report.

If S/I/R data are not available, the PPS antimicrobial marker data can still be collected in accordance with the PPS I protocol (code system, only indicating non-susceptibility, without detail on intermediate susceptibility or resistance). In this case, they should be converted to the 4th level TESSy format as illustrated in the following table.

**Table 3. Conversion chart: PPS I protocol PPS antimicrobial marker data to the 4th level TESSy format**

| | MO | Code | | ResultIsolate | Antibiotic | SIR |
|---|---|---|---|---|---|---|
| *Staphylococcus aureus* (STAAUR) | STAAUR | 0 | ⇒ | STAAUR | OXA | S |
| | STAAUR | 1 | ⇒ | STAAUR | OXA | R |
| | STAAUR | 9 | ⇒ | STAAUR | OXA | UNK |
| *Enterococcus* spp., e.g. *Enterococcus faecium* (ENCFAI) | ENCFAI | 0 | ⇒ | ENCFAI | GLY | S |
| | ENCFAI | 1 | ⇒ | ENCFAI | GLY | IR |
| | ENCFAI | 9 | ⇒ | ENCFAI | GLY | UNK |
| Enterobacteriaceae*, e.g. *Klebsiella pneumoniae* (KLEPNE) | KLEPNE | 0 | ⇒ | KLEPNE | C3G | S |
| | | | | KLEPNE | CAR | S |
| | KLEPNE | 1 | ⇒ | KLEPNE | C3G | IR |
| | | | | KLEPNE | CAR | S |
| | KLEPNE | 2 | ⇒ | KLEPNE | C3G | IR |
| | | | | KLEPNE | CAR | IR |
| | KLEPNE | 9 | ⇒ | KLEPNE | C3G | UNK |
| | | | | KLEPNE | CAR | UNK |
| *Pseudomonas aeruginosa* (PSEAER) | PSEAER | 0 | ⇒ | PSEAER | CAR | S |
| | PSEAER | 1 | ⇒ | PSEAER | CAR | IR |
| | PSEAER | 9 | ⇒ | PSEAER | CAR | UNK |
| *Acinetobacter baumannii* (ACIBAU) | ACIBAU | 0 | ⇒ | ACIBAU | CAR | S |
| | ACIBAU | 1 | ⇒ | ACIBAU | CAR | IR |
| | ACIBAU | 9 | ⇒ | ACIBAU | CAR | UNK |

** Enterobacteriaceae: only record antimicrobial susceptibility data for following selection:* Escherichia coli, Klebsiella *spp.,* Enterobacter *spp.,* Proteus *spp.,* Citrobacter *spp.,* Serratia *spp.,* Morganella *spp.*

# Acknowledgements

## Participation to PPS protocol meetings

The protocol for the first ECDC point prevalence survey (PPS) of healthcare-associated infections and antimicrobial use in European acute care hospitals (2011–2012) was established during the following meetings:

- PPS working group at the 2009 Annual HAI Surveillance Meeting, 8–10 June 2009, ECDC, Stockholm
- PPS expert meeting, 8–9 September 2009, ECDC, Stockholm
- PPS expert meeting, 24–25 February 2010, ECDC, Stockholm
- Two PPS working groups at the 2010 Annual HAI Surveillance Meeting, 7–9 June 2010, ECDC, Stockholm
- PPS protocol meeting after pilot PPS, 6 October 2010, ECDC, Stockholm
- PPS workshop at the conference 'New strategies to monitor and control infections, antibiotic use and resistance in healthcare facilities in the EU Member States' organised by the Belgian EU Presidency (BAPCOC) and ECDC, 8–10 November 2010
- HAI-Net coordination group meeting, Prague, 3–4 March 2011
- PPS train-the-trainer course for national PPS coordinators/trainers, London, 28–30 March 2011
- Teleconference meetings, on sample design, as well as during and after the pilot PPS with the pilot PPS support team

Changes to the protocol for the second ECDC point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals in 2016–2017 were discussed during following meetings:

- PPS 2011–2012 Evaluation Meeting, 17–18 September 2013, ECDC, Stockholm
- HAI-Net protocol meeting on structure and process indicators, 19–20 February 2014, ECDC, Stockholm
- HAI-Net Coordination Committee meeting, 9 May 2014, Hospital del Mar, Barcelona
- HAI-Net PPS sessions at the third Joint Meeting of the ARHAI Networks, 11–13 February 2015, Courtyard Stockholm Kungsholmen, Stockholm
- HAI-Net Coordination Committee meeting, 14–15 April 2015, ECDC, Stockholm
- Meeting and workshop on the second ECDC point prevalence survey of healthcare-associated infections and antimicrobial use in acute care hospitals, 2016–2017, 20–22 October 2015, ECDC, Stockholm

In total, 111 experts participated in at least one meeting regarding the first ECDC PPS and 153 experts participated in at least one meeting regarding the protocol for the second ECDC PPS. Meeting participants (n=229) are listed by country and institution in the table below together with the number of meetings to which they participated, in total and for the first and second PPS separately (in brackets).

**Table 4. Participants to ECDC PPS meetings on the first and second PPS protocol, by country and institution, 2009–2015**

| Country | Name (Number of meetings total; PPS1/PPS2) | Institution |
|---|---|---|
| EU/EEA Member States | | |
| Austria | Alexander Blacky (6; 6/0), Elisabeth Presterl (3; 0/3), Michael Hiesmayr (1; 0/1) | Medical University Vienna |
| | Reinhild Strauss (3; 1/2) | Federal Ministry of Health, Vienna |
| | Rainer Hartl (1; 1/0) | Elisabethinen Hospital Linz |
| Belgium | Mat Goossens (3; 3/0), Katrien Latour (3; 0/3), Béatrice Jans (2; 1/1), Karl Mertens (2; 2/0), Sofie Vaerenberg (2; 2/0), Sylvanus Fonguh (1; 0/1), Natacha Viseur (1; 1/0) | Scientific Institute of Public Health, Brussels |
| Bulgaria | Rossitza Vatcheva-Dobrevska (7; 7/0), Elina Dobreva (2; 0/2), Ivan Ivanov (1; 0/1), Nadezhda Vladimirova (1; 0/1) | National Center of Infectious and Parasitic Diseases, Sofia |
| | Hristina Hitkova (1; 1/0) | Medical University Pleven |
| Croatia | Zrinka Bošnjak (7; 4/3), Ana Budimir (3; 0/3), Domagoj Drenjancevic (1; 1/0), Smilja Kalenic (1; 1/0) | University Hospital Centre Zagreb |
| | Arjana Tambic Andrasevic (1; 1/0) | University Hospital for Infectious Diseases, Zagreb |
| Cyprus | Avgi Hadjiloukas (4; 4/0) | Ministry of Health, Nicosia |
| | Niki Paphitou (1; 0/1) | Nicosia General Hospital/ Ministry of Health, Nicosia |
| | Emmelia Vounou (1; 1/0) | Limassol Hospital |

| Country | Name (Number of meetings total; PPS1/PPS2) | Institution |
|---|---|---|
| Czech Republic | Jana Prattingerová (4; 1/3) | Regional Public Health Authority, Liberec; National Institute of Public Health, National reference centre on HAI, Prague |
| | Miroslava Girod Schreinerova (4; 4/0) | Ministry of Health, department of Epidemiology, Prague |
| | Vlastimil Jindrák (3; 1/2) | National Institute of Public Health, National reference centre on HAI, Prague |
| | Jan Sturma (2; 2/0) | National Institute of Public Health, Prague |
| | Hana Tkadlecová (1; 1/0) | Regional Public Heatlh Authority in Zlín |
| | Václav Vaniš (1; 0/1) | Na Homolce Hospital, Prague |
| Denmark | Christian Stab Jensen (6; 4/2), Brian Kristensen (3; 0/3), Elsebeth Tvenstrup Jensen (3; 3/0) | Statens Serum Institute, Copenhagen |
| Estonia | Pille Märtin (7; 4/3) | West-Tallinn Central Hospital |
| | Piret Mitt (3; 1/2), Viivika Adamson (1; 1/0) | Tartu University Hospital |
| | Annika Lemetsar (2; 2/0) | Health Board, Tallinn |
| Finland | Outi Lyytikäinen (11; 6/5), Dinah Arifulla (2; 0/2), Tommi Kärki (2; 2/0) | National Institute for Health and Welfare, Helsinki |
| France | Bruno Coignard (8; 7/1), Sophie Vaux (2; 1/1)<br>Kathleen Chami (1; 0/1), Valérie Ponties (1; 0/1), Jean-Michel Thiolet (1; 1/0) | Institute for Public Health Surveillance, Paris |
| | Anne Savey (3; 0/3), Marine Giard (2; 0/2) | Centre de Coordination de la Lutte contre les Infections Nosocomiales Sud-Est, Lyon |
| | Pascal Astagneau (1; 1/0) | C-Clin Nord, Université ParisVI, Paris |
| Germany | Sonja Hansen (7; 4/3), Brar Piening (5; 3/2), Petra Gastmeier (4; 1/3), Michael Behnke (3; 1/2) | Institute of Hygiene and Environmental Medicine, Charité-Universitätsmedizin, Berlin |
| | Martine Mielke (2; 1/1), Muna Abu Sin (1; 0/1), Jan Walter (1; 0/1) | Robert Koch Institute, Berlin |
| Greece | Achilleas Gikas (4; 3/1), Evangelos Kritsotakis (3; 2/1) | Medical School, University of Crete, Heraklion |
| | Xanthi Dedoukou (3; 1/2), Antonios Maragkos (2; 1/1), Paraskevi Tsounou (1; 0/1), Flora Kontopidou (1; 1/0) | Hellenic Centre for Disease Control and Prevention, Athens |
| Hungary | Karolina Böröcz (5; 4/1), Andrea Kurcz (4; 1/3)<br>Ágnes Hajdu (2; 1/1), Emese Szilágyi (2; 2/0), István Veress (1; 0/1) | National Centre for Epidemiology, Budapest |
| Iceland | Ólafur Guðlaugsson (4; 1/3) | Landspitali University Hospital, Reykjavik |
| Ireland | Karen Burns (3; 1/2), Fidelma Fitzpatrick (2; 2/0), Stephen Murphan (2; 1/1), Fiona Roche (2; 1/1), Robert Cunney (1; 1/0), Sheila Donlon (1; 0/1) | Health Protection Surveillance Centre, Dublin |
| Italy | Maria Luisa Moro (9; 5/4), Enrico Ricchizzi (3; 1/2), Angelo Pan (1; 1/0), Davide Resi (1; 1/0) | Regional Health Agency Emilia-Romagna, Bologna |
| | Antonella Agodi (1; 0/1) | University of Catania |
| | Michela Stillo (1; 0/1) | University of Turin |
| Latvia | Elina Dimina (6; 3/3), Raina Nikiforova (2; 1/1) | Centre for Disease Prevention and Control of Latvia, Riga |
| | Uga Dumpis (5; 5/0), Aija Vilde (1; 0/1) | Stradins University Hospital, Riga |
| | Jelena Galajeva (1; 1/0) | Infectiology Center of Latvia, Riga |
| | Marite Kula (1; 1/0) | Liepaja Regional Hospital |
| Lithuania | Rolanda Valintėlienė (9; 5/4), Greta Vizujė (3; 1/2), Jolanta Ašembergienė (2; 0/2), Ramute Budginaitė (1; 1/0), Ieva Kisielienė (1; 0/1), Ruta Markevicė (1; 1/0) | Institute of Hygiene, Vilnius |
| | Nerija Kupreviciene (1; 0/1) | Ministry of Health, Vilnius |
| Luxem-bourg | Elisabeth Heisbourg (2; 1/1), Martine Debacker (1; 0/1), Eliane Gelhausen (1; 0/1) | Ministry of Health, Luxembourg |
| | Robert Hemmer (1; 1/0) | Centre Hospitalier Luxembourg |
| Malta | Peter Zarb[1,2] (6; 5/1), Elizabeth Scicluna (5; 3/2), Rodianne Abela (1; 0/1), Michael Borg (1; 0/1), Deborah Xuereb (1; 0/1) | Mater Dei Hospital, Msida |
| The Nether-lands | Titia Hopmans (4; 1/3), Mayke Koek (4; 1/3), Birgit Van Benthem (3; 3/0), Sabine De Greeff (1; 0/1), Iralice Jansen (1; 1/0), Emma Smid (1; 0/1), Tjallie Van der Kooi (1; 1/0) | National Institute for Public Health and the Environment, Bilthoven |

| Country | Name (Number of meetings total; PPS1/PPS2) | Institution |
|---|---|---|
| Norway | Nina Kristine Sorknes (5; 2/3), Janne Møller-Stray (4; 4/0), Thale Catherine Berg (2; 0/2)<br>Torunn Alberg (1; 0/1), Horst Bentele (1; 1/0)<br>Jørgen Bjørnholt (1; 0/1), Hanne-Merete Eriksen (1; 0/1), Hege Line Løwer (1; 1/0) | Norwegian Institute of Public Health, Oslo |
| Poland | Aleksander Deptula (6; 2/4) | Nicolaus Copernicus University, Torun |
| | Tomasz Ozorowski (3; 3/0) | Poznan Medical University |
| | Waleria Hryniewicz (2; 1/1) | National Medicines Institute, Warsaw |
| | Ewa Trejnowska (2; 1/1) | Regional Medical Centre, Opole |
| | Jadwiga Wójkowska-Mach (1; 0/1) | Jagiellonian University Medical College, Kraków |
| Portugal | Ana Cristina Costa (4; 4/0), Elaine Pina (3; 1/2)<br>Ana Paula Cruz (1; 0/1), Paulo Nogueira (1; 0/1), Maria Elena Noriega (1; 1/0) | Directorate General of Health, Lisbon |
| | Paulo André Fernandes (2; 0/2) | National Authority of Medicines and Health Products, Lisbon |
| | José Artur Paiva (2; 1/1) | Director PPCIRA; Centro Hospitalar de S.João, Porto |
| Romania | Roxana Serban (6; 3/3), Ionel Iosif (2; 0/2), Aurora Violeta Stanescu (1; 1/0) | National Institute of Public Health, Bucharest |
| | Camelia Ghita (1; 1/0) | Bucharest hospital |
| | Gabriel Adrian Popescu (1; 0/1) | Carol Davila University of Medicine and Pharmacy, Bucharest; National Institute of Infectious Disease 'Dr. Matei Bals', Bucharest |
| Slovak Republic | Slavka Litvova (4; 4/0), Mária Štefkovicová (3; 0/3), Eva Kopšíková (1; 0/1) | Regional Public Health Authority, Trencin |
| | Lukas Murajda (2; 2/0) | Comenius University, Jessenius Faculty of Medicine, Martin |
| | Jana Námešná (2; 0/2) | Regional Public Health Authority, Banska Bystrica |
| Slovenia | Jana Kolman (11; 5/6), Irena Klavs (4; 2/2) | National Institute of Public Health, Ljubljana |
| | Božena Kotnik Kevorkijan (2; 2/0), Rajko Saletinger (1; 0/1) | University Medical Centre Maribor |
| | Tatjana Lejko Zupanc (1; 1/0) | University Medical Centre Ljubljana |
| Spain | Josep Vaque Rafart (7; 4/3), Jose Angel Rodrigo Pendas (1; 1/0) | Vall d'Hebron University Hospital, Barcelona |
| | Angel Asensio Vegas (3; 2/1), Mireia Cantero Caballero (1; 0/1) | University Hospital Puerta de Hierro Majadahonda, Madrid |
| | Mercedes Palomar (3; 0/3) | Spanish Society of Intensive and Critical Care Medicine; University Hospital Arnau de Vilanova, Lleida |
| Sweden | Tomas Söderblom (4; 1/3), Inga Zetterqvist (2; 0/2), Jenny Hellman (1; 0/1), Johan Struwe (1; 1/0) | Public Health Agency of Sweden, Stockholm |
| | Mats Erntell (3; 3/0), Gunilla Skoog (1; 1/0) | Swedish Strategic Programme Against Antibiotic Resistance, Stockholm |
| | Dag Ström (1; 1/0) | Swedish Association of Local Authorities and Regions, Stockholm |
| UK-England | Susan Hopkins (9; 5/4), Jennie Wilson (3; 3/0), Andre Charlett (1; 1/0), Elizabeth Sheridan (1; 1/0) | Public Health England, Colindale |
| UK-Northern Ireland | Gerard McIlvenny (4; 2/2), Lourda Geoghegan (2; 0/2), Ed Smyth (1; 1/0) | Public Health Agency, Nothern Ireland, Belfast |
| UK-Scotland | Jacqui Reilly (11; 5/6), Shona Cairns (4; 4/0) | Health Protection Scotland, Glasgow |
| | Peter Davey[1] (1; 1/0) | University of Dundee |
| UK-Wales | Wendy Harrison (2; 0/2), Dafydd Williams (2; 1/1) | Public Health Wales, Cardiff |
| | David Nicholas Looker (1; 1/0) | Glan Clwyd Hospital, Denbighshire |
| EU enlargement countries | | |
| Albania | Zahide Sulejmani (1; 0/1), Eugena Tomini (1; 0/1) | Institute of Public Health, Tirana |
| | Pellumb Pipero (1; 1/0) | Ministry of Health, Tirana |

| Country | Name (Number of meetings total; PPS1/PPS2) | Institution |
|---|---|---|
| Bosnia and Herze-govina | Maja Ostojic (1; 0/1) | University Clinical Hospital Mostar |
| | Aida Pitic (1; 0/1) | Clinical center University of Sarajevo |
| Kosovo | Agreta Gecaj-Gashi (1; 0/1) | University clinical center of Kosovo, Intensive Care, Pristina |
| | Lul Raka (1; 0/1) | National Institute of Public Health of Kosovo, Pristina |
| The former Yugoslav Republic of Macedonia | Gordana Kuzmanovska (1; 0/1), Kristina Stavridis (1; 0/1) | Institute of Public Health, Skopje |
| | Katja Popovska (1; 0/1) | Institute of microbiology Medical faculty, Skopje |
| Monte-negro | Anton Duravcaj (1; 0/1), Gordana Mijovic (1; 1/0) | Institute for Public Health of Montenegro, Podgorica |
| | Miro Kneževic (1; 0/1) | Clinical Centre of Montenegro, Podgorica |
| | Sanja Simovic (1; 0/1) | National Commission for hospital infections |
| Republic of Serbia | Gorana Cosic (1; 0/1) | Institute for Public Health, Novi Sad |
| | Mitra Drakulovic (1; 0/1) | Institute of Public Health of Serbia "Dr Milan Jovanovic Batut", Belgrade |
| | Natasa Mazic (1; 0/1) | Clinical Center of Serbia, Belgrade |
| Turkey | Dilek Arman (1; 1/0) | Gazi University, Ankara |
| | Fadime Callak Oku (1; 0/1) | General Directorate of Health Services, Department of Health Service Standards |
| EU Neighbourhood Policy countries | | |
| Algeria | Amhis Wahiba (1; 0/1) | Etablissement Public Hospitalier Bologhine, Alger |
| Armenia | Romella Abovyan (1; 0/1) | National Centre for Disease Control and Prevention, Yerevan |
| Egypt | Khaled Hassanein (1; 0/1) | Ministry of Health and Population, Cairo |
| Georgia | Giorgi Chakhunashvili (1; 0/1) | National Centre for Disease Control and Public Health, Tbilisi |
| Israel | Mitchell J. Schwaber (1; 0/1) | National Centre for Infection Control and Antibiotic Resistance, Tel Aviv |
| Lebanon | Rima Moghnieh (2; 0/2) | Makassed General Hospital, Beirut |
| Tunesia | Ihlem Boutiba (1; 0/1) | Faculté de Médecine de Tunis |
| Ukraine | Maxym Pylypenko (1; 0/1), Aidyn Salmanov (1; 0/1) | P.L. Shupyk National Medical Academy of Postgraduate Education, Kiev |
| | Viktoriia Zadorozhna (1; 0/1) | Gromashevsky Institute of Epidemiology and Infectious Diseases, Kiev |
| Individual experts | | |
| France | Arno Muller[1] (9; 6/3) | Individual expert, France; ECDC consultant for ESAC-Net |
| France | Catherine Dumartin (1; 0/1) | Centre de Coordination de la Lutte contre les Infections Nosocomiales Sud-Ouest, Bordeaux |
| UK/PPS Training | Barry Cookson (2; 2/0), Gareth Hughes (2; 2/0)<br>Berit Müller-Peabody (2; 2/0), Naomi Boxall (1; 1/0) | Public Health England, Colindale |
| United Kingdom | Walter Zingg (3; 0/3) | Imperial College London |
| United Kingdom | Mike Sharland[2] (1; 0/1) | St George's Healthcare NHS Trust, London |
| International and European organisations/projects | | |
| European Commission | Nicole Heine (1; 0/1) | European Commission, Luxembourg |
| ESAC | Herman Goossens (5; 5/0), Nico Drapier (1; 1/0) | European Surveillance of Antimicrobial Consumption (ESAC) project; University of Antwerp, Antwerp |

| Country | Name (Number of meetings total; PPS1/PPS2) | Institution |
|---|---|---|
| ESICM | Alain Lepape (4; 1/3) | European Society of Intensive Care Medicine (ESICM), Infection Section; CHU, Lyon |
| EUCIC | Evelina Tacconelli (1; 0/1) | European Society of Clinical Microbiology and Infectious Diseases (ESCMID), European Committee on Infection Control (EUCIC) |
| USA/CDC | Shelley Magill (5; 3/2), Scott Fridkin (2; 2/0) | Centers for Disease Control and Prevention, Atlanta |
| WHO Regional Office for Europe | Ana Paula Coutinho (5; 3/2), Bernardus Ganter (2; 2/0) | World Health Organization, Regional Office for Europe, Copenhagen |
| ECDC | Carl Suetens (14; 8/6), Jolanta Griškevičienė (8; 5/3), Pete Kinross (5; 0/5), Dominique L. Monnet (5; 1/4), Klaus Weist (5; 3/2), Ole Heuer (4; 2/2), Carlo Gagliotti (3; 3/0), Diamantis Plachouras (3; 0/3), Tommi Kärki (1; 0/1), Barbara Albiger (1; 0/1), Tommi Asikainen (1; 1/0), Anna-Pelagia Magiorakos (1; 0/1), Sorin Ostafiev (1; 0/1), Vladimir Prikazsky (1; 1/0), Luisa Sodano (1; 1/0) | European Centre for Disease Prevention and Control, Stockholm |

[1]*Also representing the ESAC project*
[2]*Also representing the ESAC-Net Coordination Committee*

In addition, seven teleconferences for the selection of structure and process indicators were organised with the members of the HAI-Net PPS expert group: Outi Lyytikainen (Finland); Sonja Hansen (Germany); Maria-Louisa Moro (Italy); Peter Zarb (Malta, ESAC-Net Coordination Group); Jana Kolman (Slovenia); Susan Hopkins (UK-England); Jacqui Reilly (UK-Scotland); Walter Zingg (SIGHT project); Arno Muller (ESAC-Net consultant); Pete Kinross (ECDC); Anna-Pelagia Magiorakos (ECDC), Diamantis Plachouras (ECDC), Carl Suetens (ECDC).

National PPS coordination teams during the first ECDC PPS are listed in the ECDC PPS 2011–2012 report [6].

# Support projects

The following projects were outsourced in support of the first point prevalence survey.

1. Contract ECD.2172 following a call for tender entitled 'Support to the pilot point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals'.

The support to the pilot PPS was outsourced to a consortium under coordination of the University of Antwerp, Belgium, in collaboration with the National Institute for Public Health Surveillance (InVS) in Paris, France, and the Scientific Institute of Public Health in Brussels, Belgium. The helpdesk team during the pilot PPS discussed methodological issues during regular teleconferences and was composed of Herman Goossens (Team leader), Arno Muller, Peter Zarb, Bruno Coignard, Boudewijn Catry, Sofie Vaerenberg, Mat Goossens, Susan Hopkins, Klaus Weist, Jolanta Griškevičienė and Carl Suetens (ECDC PPS project manager). During the pilot PPS project, the ESAC web-PPS software for hospitals was adapted to the ECDC protocol.

Participants in the pilot PPS tested V3.3 of the PPS protocol and are listed in Zarb et al [11].

2. Contract ECD.1842 following a call for tender entitled 'Curriculum for course on epidemiology and analysis of point prevalence studies of healthcare-associated infections'.

The development of PPS courses and teaching materials was outsourced to the Health Protection Agency, London (Susan Hopkins (coordinator), Barry Cookson, Berit Müller-Pebody, Gareth Hughes, Naomi Boxall) with collaboration of Health Protection Scotland (Jacqui Reilly, Shona Cairns). Some material developed by the training curriculum team was integrated in the protocol.

3. Contract ECD.2218 following a request for an offer on 'HELICSwin Hospital Software Support' was made with the Belgian Scientific Institute of Public Health to develop a standalone software package for PPS data entry, export and analysis (HELICSwin.Net).

4. Contract ECD.2971 following a call for tender entitled 'Pilot validation study of the ECDC Point Prevalence Survey of healthcare-associated Infections and Antimicrobial Use in European Acute Care Hospitals. OG/23/06/2011-PROC/2011/060'.

The pilot PPS validation study was outsourced to a consortium under coordination of Glasgow Caledonian University, Glasgow, United Kingdom (Jacqui Reilly, Lesley Price, Jon Godwin), in collaboration with Health Protection Scotland, Glasgow, United Kingdom (Jacqui Reilly, Shona Cairns, William Malcolm), Public Health England, London, United Kingdom (Susan Hopkins, Barry Cookson, Gareth Hughes), National Institute for Health

and Welfare, Helsinki, Finland (Outi Lyytikäinen), Institut de Veille Sanitaire, Saint-Maurice, France (Bruno Coignard) and Charité University Medicine Berlin, Germany (Petra Gastmeier, Sonja Hansen).

Participants in the ECDC pilot validation study are listed in Reilly et al [12].

# Annex 1. Additional materials

## Codebook

The codebook is attached to this publication as Annex 2 and contains the following:

- specialty list (ward, Patient/consultant);
- antimicrobial agent generic names and ATC-5 codes;
- diagnosis site list for treatment intention with antimicrobials (adapted from ESAC);
- HAI case definitions;
- algorithm for the diagnosis of catheter-related infections;
- microorganism codes;
- antimicrobial resistance markers codes; and
- surgery categories (NHSN/examples of non-NHSN).

## Forms

A PowerPoint file with all forms is available as a separate download. It is intended for high quality printing and/or the translation of forms.

## TESSy variable definitions and validation rules

An Excel file containing the definition of variables for data upload to ECDC's TESSy system is available as a separate download from TESSy or on ECDC's HAI-Net extranet. It can also be requested by email from ARHAI@ecdc.europa.eu.

## Note on case definitions of healthcare-associated infections

As recommended by the joint expert group in January 2009 and confirmed during the PPS expert meetings in 2009 and 2010, the ECDC PPS protocol uses existing European case definitions [13-17] and complements them by case definitions from the Centers for Disease Control and Prevention (CDC), as used by CDC's National Healthcare Safety Network (NHSN, formerly NNIS)[18]. The concordance between US/CDC and EU/HELICS case definitions was assessed by Hansen et al [19].

The European case definitions used in the ECDC PPS are:

HELICS/IPSE case definitions

- Surgical site infection
- Pneumonia
- Bloodstream infection
- Central vascular catheter related infection
- Urinary tract infections

*Clostridium difficile* infection

Specific neonatal definitions, as established by the KISS network:

- Clinically suspected bloodstream infections (clinical sepsis)
- Laboratory-confirmed bloodstream infection
- Laboratory-confirmed bloodstream infection with coagulase-negative staphylococci
- Pneumonia in neonates
- Necrotising enterocolitis

*Note: The CDC HAI case definitions in neonates were replaced by case definitions used in the Neo-KISS system. These definitions were not established at the EU level, but they were preferred by the EU-PPS expert group.*

*All other case definitions are CDC/NHSN case definitions.*

# Annex 2. Codebook

## Specialty code list

Specialty codes are used for following variables: Ward specialty, patient/consultant specialty, specialised hospital (form H). Ward specialty codes are shown in the first column (in parentheses).

| Categories (ward specialty) | Patient/consultant specialty code | Patient/consultant specialty name |
|---|---|---|
| Surgical specialties (SUR) | SURGEN | General surgery |
| Surgical specialties (SUR) | SURDIG | Digestive tract surgery |
| Surgical specialties (SUR) | SURORTR | Orthopaedics and surgical traumatology |
| Surgical specialties (SUR) | SURORTO | Orthopaedics |
| Surgical specialties (SUR) | SURTR | Traumatology |
| Surgical specialties (SUR) | SURCV | Cardio surgery and vascular surgery |
| Surgical specialties (SUR) | SURCARD | Cardio surgery |
| Surgical specialties (SUR) | SURVASC | Vascular surgery |
| Surgical specialties (SUR) | SURTHO | Thoracic surgery |
| Surgical specialties (SUR) | SURNEU | Neurosurgery |
| Surgical specialties (SUR) | SURPED | Paediatric general surgery |
| Surgical specialties (SUR) | SURTRANS | Transplantation surgery |
| Surgical specialties (SUR) | SURONCO | Surgery for cancer |
| Surgical specialties (SUR) | SURENT | ENT |
| Surgical specialties (SUR) | SUROPH | Ophthalmology |
| Surgical specialties (SUR) | SURMAXFAC | Maxillo-facial surgery |
| Surgical specialties (SUR) | SURSTODEN | Stomatology/Dentistry |
| Surgical specialties (SUR) | SURBURN | Burns care |
| Surgical specialties (SUR) | SURURO | Urology |
| Surgical specialties (SUR) | SURPLAS | Plastic and reconstructive surgery |
| Surgical specialties (SUR) | SUROTH | Other surgery |
| Medical specialties (MED) | MEDGEN | General medicine |
| Medical specialties (MED) | MEDGAST | Gastroenterology |
| Medical specialties (MED) | MEDHEP | Hepatology |
| Medical specialties (MED) | MEDENDO | Endocrinology |
| Medical specialties (MED) | MEDONCO | Oncology |
| Medical specialties (MED) | MEDHEMA | Haematology |
| Medical specialties (MED) | MEDBMT | Bone marrow transplantation (BMT) |
| Medical specialties (MED) | MEDHEMBMT | Haematology/BMT |
| Medical specialties (MED) | MEDCARD | Cardiology |
| Medical specialties (MED) | MEDDERM | Dermatology |
| Medical specialties (MED) | MEDNEPH | Nephrology |
| Medical specialties (MED) | MEDNEU | Neurology |
| Medical specialties (MED) | MEDPNEU | Pneumology |
| Medical specialties (MED) | MEDRHEU | Rheumatology |
| Medical specialties (MED) | MEDID | Infectious diseases |
| Medical specialties (MED) | MEDTR | Medical traumatology |
| Medical specialties (MED) | MEDOTH | Other medical |
| Paediatrics (PED) | PEDGEN | Paediatrics general, not specialised |
| Neonatology (NEO) | PEDNEO | Neonatology (excl. healthy neonates) |
| Neonatology (NEO) | PEDBAB | Healthy neonates (paediatrics) |
| Neonatology (NEO) | ICUNEO | Neonatal ICU |
| Paediatrics (PED) | ICUPED | Paediatric ICU |
| Intensive care medicine (ICU) | ICUMED | Medical ICU |
| Intensive care medicine (ICU) | ICUSUR | Surgical ICU |
| Intensive care medicine (ICU) | ICUMIX | Mixed (polyvalent) ICU, general intensive or critical care |
| Intensive care medicine (ICU) | ICUSPEC | Specialised ICU |
| Intensive care medicine (ICU) | ICUOTH | Other ICU |

| Categories (ward specialty) | Patient/consultant specialty code | Patient/consultant specialty name |
|---|---|---|
| Gynaecology/Obstetrics (GO) | GOOBS | Obstetrics /maternity |
| Gynaecology/Obstetrics (GO) | GOGYN | Gynaecology |
| Gynaecology/Obstetrics (GO) | GOBAB | Healthy neonates (maternity) |
| Geriatrics (GER) | GER | Geriatrics, care for the elderly |
| Psychiatry (PSY) | PSY | Psychiatry |
| Rehabilitation (RHB) | RHB | Rehabilitation |
| Long-term care (LTC) | LTC* | Long-term care |
| OTHER (OTH) | OTH | Others not listed |
| Mixed (MIX) | MIX* | Combination of specialties |

** LTC and MIX are in principle ward specialties and should only exceptionally be used as a patient/consultant specialty (e.g. for LTC, use MEDGEN, GER, RHB instead; for MIX, use the specialty of the main disease of the patient only).*

# Diagnosis (site) code list for antimicrobial use

| Diagnosis | Examples |
|---|---|
| CNS | Infections of the central nervous system |
| EYE | Endophthalmitis |
| ENT | Infections of ear, nose, throat, larynx and mouth |
| BRON | Acute bronchitis or exacerbations of chronic bronchitis |
| PNEU | Pneumonia |
| CF | Cystic fibrosis |
| CVS | Cardiovascular infections: endocarditis, vascular graft |
| GI | Gastrointestinal infections (e.g. salmonellosis, antibiotic-associated diarrhoea) |
| IA | Intra-abdominal sepsis, including hepatobiliary |
| SST-SSI | Surgical site infection involving skin or soft tissue but not bone |
| SST-O | Cellulitis, wound, deep soft tissue not involving bone, not related to surgery |
| BJ-SSI | Septic arthritis, osteomyelitis of surgical site |
| BJ-O | Septic arthritis, osteomyelitis, not related to surgery |
| CYS | Symptomatic lower urinary tract infection (e.g. cystitis) |
| PYE | Symptomatic upper urinary tract infection (e.g. pyelonephritis) |
| ASB | Asymptomatic bacteriuria |
| OBGY | Obstetric or gynaecological infections, STD in women |
| GUM | Prostatitis, epididymo-orchitis, STD in men |
| BAC | Laboratory-confirmed bacteraemia |
| CSEP | Clinical sepsis (suspected bloodstream infection without lab confirmation/results are not available, no blood cultures collected or negative blood culture), excluding febrile neutropenia |
| FN | Febrile neutropenia or other form of manifestation of infection in immunocompromised host (e.g. HIV, chemotherapy, etc.) with no clear anatomical site |
| SIRS | Systemic inflammatory response with no clear anatomical site |
| UND | Completely undefined; site with no systemic inflammation |
| NA | Not applicable; for antimicrobial use other than treatment |

# Indications for antimicrobial use

| **Treatment** | |
|---|---|
| CI | Treatment of community-acquired infection (CI) |
| LI | Treatment of long-term care-acquired infection (LI) |
| HI | Treatment of hospital-acquired infection (HI) |
| **Prophylaxis** | |
| MP | Medical prophylaxis |
| SP1 | Surgical prophylaxis: single dose |
| SP2 | Surgical prophylaxis: one day |
| SP3 | Surgical prophylaxis: > 1 day |
| **Other** | |
| O | Other reason (e.g. prokinetic erythromicin) |
| UI | Unknown indication (verified during PPS) |

# Antimicrobial ATC codes (2016)

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Amikacin | J01GB06 |
| Amoxicillin | J01CA04 |
| Amoxicillin and enzyme inhibitor | J01CR02 |
| Amphotericin B (oral) | A07AA07 |
| Amphotericin B (parenteral) | J02AA01 |
| Ampicillin | J01CA01 |
| Ampicillin and enzyme inhibitor | J01CR01 |
| Ampicillin, combinations | J01CA51 |
| Anidulafungin | J02AX06 |
| Arbekacin | J01GB12 |
| Aspoxicillin | J01CA19 |
| Azanidazole | P01AB04 |
| Azidocillin | J01CE04 |
| Azithromycin | J01FA10 |
| Azithromycin, fluconazole and secnidazole | J01RA07 |
| Azlocillin | J01CA09 |
| Aztreonam | J01DF01 |
| Bacampicillin | J01CA06 |
| Bacitracin | J01XX10 |
| Bekanamycin | J01GB13 |
| Benzathine benzylpenicillin | J01CE08 |
| Benzathine phenoxymethylpenicillin | J01CE10 |
| Benzylpenicillin | J01CE01 |
| Biapenem | J01DH05 |
| Brodimoprim | J01EA02 |
| Carbenicillin | J01CA03 |
| Carindacillin | J01CA05 |
| Carumonam | J01DF02 |
| Caspofungin | J02AX04 |
| Cefacetrile | J01DB10 |
| Cefaclor | J01DC04 |
| Cefadroxil | J01DB05 |
| Cefalexin | J01DB01 |
| Cefaloridine | J01DB02 |
| Cefalotin | J01DB03 |
| Cefamandole | J01DC03 |
| Cefapirin | J01DB08 |
| Cefatrizine | J01DB07 |
| Cefazedone | J01DB06 |
| Cefazolin | J01DB04 |
| Cefbuperazone | J01DC13 |
| Cefcapene | J01DD17 |
| Cefdinir | J01DD15 |
| Cefditoren | J01DD16 |
| Cefepime | J01DE01 |
| Cefepime and amikacin | J01RA06 |
| Cefetamet | J01DD10 |
| Cefixime | J01DD08 |
| Cefmenoxime | J01DD05 |
| Cefmetazole | J01DC09 |

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Cefminox | J01DC12 |
| Cefodizime | J01DD09 |
| Cefonicide | J01DC06 |
| Cefoperazone | J01DD12 |
| Cefoperazone, combinations | J01DD62 |
| Ceforanide | J01DC11 |
| Cefotaxime | J01DD01 |
| Cefotaxime, combinations | J01DD51 |
| Cefotetan | J01DC05 |
| Cefotiam | J01DC07 |
| Cefoxitin | J01DC01 |
| Cefozopran | J01DE03 |
| Cefpiramide | J01DD11 |
| Cefpirome | J01DE02 |
| Cefpodoxime | J01DD13 |
| Cefprozil | J01DC10 |
| Cefradine | J01DB09 |
| Cefroxadine | J01DB11 |
| Cefsulodin | J01DD03 |
| Ceftaroline fosamil | J01DI02 |
| Ceftazidime | J01DD02 |
| Ceftazidime, combinations | J01DD52 |
| Ceftezole | J01DB12 |
| Ceftibuten | J01DD14 |
| Ceftizoxime | J01DD07 |
| Ceftobiprole medocaril | J01DI01 |
| Ceftolozane and enzyme inhibitor | J01DI54 |
| Ceftriaxone | J01DD04 |
| Ceftriaxone, combinations | J01DD54 |
| Cefuroxime | J01DC02 |
| Cefuroxime and metronidazole | J01RA03 |
| Chloramphenicol | J01BA01 |
| Chlortetracycline | J01AA03 |
| Cinoxacin | J01MB06 |
| Ciprofloxacin | J01MA02 |
| Ciprofloxacin and metronidazole | J01RA10 |
| Ciprofloxacin and ornidazole | J01RA12 |
| Ciprofloxacin and tinidazole | J01RA11 |
| Clarithromycin | J01FA09 |
| Clindamycin | J01FF01 |
| Clofoctol | J01XX03 |
| Clometocillin | J01CE07 |
| Clomocycline | J01AA11 |
| Cloxacillin | J01CF02 |
| Colistin (injection, infusion) | J01XB01 |
| Colistin (oral) | A07AA10 |
| Combinations of beta-lactamase sensitive penicillins | J01CE30 |
| Combinations of intermediate-acting sulphonamides | J01EC20 |
| Combinations of long-acting sulphonamides | J01ED20 |
| Combinations of penicillins | J01CR50 |
| Combinations of penicillins with extended spectrum | J01CA20 |
| Combinations of short-acting sulphonamides | J01EB20 |

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Combinations of tetracyclines | J01AA20 |
| Cycloserine | J04AB01 |
| Dalbavancin | J01XA04 |
| Daptomycin | J01XX09 |
| Demeclocycline | J01AA01 |
| Dibekacin | J01GB09 |
| Dicloxacillin | J01CF01 |
| Dirithromycin | J01FA13 |
| Doripenem | J01DH04 |
| Doxycycline | J01AA02 |
| Enoxacin | J01MA04 |
| Epicillin | J01CA07 |
| Ertapenem | J01DH03 |
| Erythromycin | J01FA01 |
| Ethambutol | J04AK02 |
| Ethionamide | J04AD03 |
| Faropenem | J01DI03 |
| Fidaxomicin | A07AA12 |
| Fleroxacin | J01MA08 |
| Flomoxef | J01DC14 |
| Flucloxacillin | J01CF05 |
| Fluconazole | J02AC01 |
| Flucytosine | J02AX01 |
| Flumequine | J01MB07 |
| Flurithromycin | J01FA14 |
| Fosfomycin | J01XX01 |
| Furazidin | J01XE03 |
| Fusidic acid | J01XC01 |
| Garenoxacin | J01MA19 |
| Gatifloxacin | J01MA16 |
| Gemifloxacin | J01MA15 |
| Gentamicin | J01GB03 |
| Grepafloxacin | J01MA11 |
| Griseofulvin | D01BA01 |
| Hachimycin | J02AA02 |
| Hetacillin | J01CA18 |
| Iclaprim | J01EA03 |
| Imipenem and enzyme inhibitor | J01DH51 |
| Isavuconazole | J02AC05 |
| Isepamicin | J01GB11 |
| Isoniazid | J04AC01 |
| Itraconazole | J02AC02 |
| Josamycin | J01FA07 |
| Kanamycin | A07AA08 |
| Kanamycin | J01GB04 |
| Ketoconazole | J02AB02 |
| Latamoxef | J01DD06 |
| Levofloxacin | J01MA12 |
| Levofloxacin, combinations with other antibacterials | J01RA05 |
| Lincomycin | J01FF02 |
| Linezolid | J01XX08 |
| Lomefloxacin | J01MA07 |

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Loracarbef | J01DC08 |
| Lymecycline | J01AA04 |
| Mandelic acid | J01XX06 |
| Mecillinam | J01CA11 |
| Meropenem | J01DH02 |
| Metacycline | J01AA05 |
| Metampicillin | J01CA14 |
| Methenamine | J01XX05 |
| Meticillin | J01CF03 |
| Metronidazole (oral, rectal) | P01AB01 |
| Metronidazole (parenteral) | J01XD01 |
| Metronidazole, combinations | P01AB51 |
| Mezlocillin | J01CA10 |
| Micafungin | J02AX05 |
| Miconazole | J02AB01 |
| Midecamycin | J01FA03 |
| Minocycline | J01AA08 |
| Miocamycin | J01FA11 |
| Moxifloxacin | J01MA14 |
| Nafcillin | J01CF06 |
| Nalidixic acid | J01MB02 |
| Natamycin | A07AA03 |
| Nemonoxacin | J01MB08 |
| Neomycin (injection, infusion) | J01GB05 |
| Neomycin (oral) | A07AA01 |
| Neomycin, combinations (oral) | A07AA51 |
| Netilmicin | J01GB07 |
| Nifurtoinol | J01XE02 |
| Nimorazole | P01AB06 |
| Nitrofurantoin | J01XE01 |
| Nitrofurantoin, combinations | J01XE51 |
| Nitroxoline | J01XX07 |
| Norfloxacin | J01MA06 |
| Norfloxacin and tinidazole | J01RA13 |
| Nystatin | A07AA02 |
| Ofloxacin | J01MA01 |
| Ofloxacin and ornidazole | J01RA09 |
| Oleandomycin | J01FA05 |
| Oritavancin | J01XA05 |
| Ornidazole (oral) | P01AB03 |
| Ornidazole (parenteral) | J01XD03 |
| Oxacillin | J01CF04 |
| Oxolinic acid | J01MB05 |
| Oxytetracycline | J01AA06 |
| Oxytetracycline, combinations | J01AA56 |
| Panipenem and betamipron | J01DH55 |
| Paromomycin | A07AA06 |
| Pazufloxacin | J01MA18 |
| Pefloxacin | J01MA03 |
| Penamecillin | J01CE06 |
| Penicillins, combinations with other antibacterials | J01RA01 |
| Penimepicycline | J01AA10 |

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Pheneticillin | J01CE05 |
| Phenoxymethylpenicillin | J01CE02 |
| Pipemidic acid | J01MB04 |
| Piperacillin | J01CA12 |
| Piperacillin and enzyme inhibitor | J01CR05 |
| Piromidic acid | J01MB03 |
| Pivampicillin | J01CA02 |
| Pivmecillinam | J01CA08 |
| Polymyxin B | A07AA05 |
| Polymyxin B | J01XB02 |
| Posaconazole | J02AC04 |
| Pristinamycin | J01FG01 |
| Procaine benzylpenicillin | J01CE09 |
| Propenidazole | P01AB05 |
| Propicillin | J01CE03 |
| Prulifloxacin | J01MA17 |
| Pyrazinamide | J04AK01 |
| Quinupristin/dalfopristin | J01FG02 |
| Ribostamycin | J01GB10 |
| Rifabutin | J04AB04 |
| Rifampicin | J04AB02 |
| Rifaximin | A07AA11 |
| Rokitamycin | J01FA12 |
| Rolitetracycline | J01AA09 |
| Rosoxacin | J01MB01 |
| Roxithromycin | J01FA06 |
| Rufloxacin | J01MA10 |
| Secnidazole | P01AB07 |
| Sisomicin | J01GB08 |
| Sitafloxacin | J01MA21 |
| Solithromycin | J01FA16 |
| Sparfloxacin | J01MA09 |
| Spectinomycin | J01XX04 |
| Spiramycin | J01FA02 |
| Spiramycin and metronidazole | J01RA04 |
| Streptoduocin | J01GA02 |
| Streptomycin (oral) | A07AA04 |
| Streptomycin (parenteral) | J01GA01 |
| Streptomycin, combinations | A07AA54 |
| Sulbactam | J01CG01 |
| Sulbenicillin | J01CA16 |
| Sulfadiazine | J01EC02 |
| Sulfadiazine and tetroxoprim | J01EE06 |
| Sulfadiazine and trimethoprim | J01EE02 |
| Sulfadimethoxine | J01ED01 |
| Sulfadimidine | J01EB03 |
| Sulfadimidine and trimethoprim | J01EE05 |
| Sulfafurazole | J01EB05 |
| Sulfaisodimidine | J01EB01 |
| Sulfalene | J01ED02 |
| Sulfamazone | J01ED09 |
| Sulfamerazine | J01ED07 |

| Antimicrobial agent: generic name | ATC5 |
|---|---|
| Sulfamerazine and trimethoprim | J01EE07 |
| Sulfamethizole | J01EB02 |
| Sulfamethoxazole | J01EC01 |
| Sulfamethoxazole and trimethoprim | J01EE01 |
| Sulfamethoxypyridazine | J01ED05 |
| Sulfametomidine | J01ED03 |
| Sulfametoxydiazine | J01ED04 |
| Sulfametrole and trimethoprim | J01EE03 |
| Sulfamoxole | J01EC03 |
| Sulfamoxole and trimethoprim | J01EE04 |
| Sulfanilamide | J01EB06 |
| Sulfaperin | J01ED06 |
| Sulfaphenazole | J01ED08 |
| Sulfapyridine | J01EB04 |
| Sulfathiazole | J01EB07 |
| Sulfathiourea | J01EB08 |
| Sulfonamides, combinations with other antibacterials (excl. trimethoprim) | J01RA02 |
| Sultamicillin | J01CR04 |
| Talampicillin | J01CA15 |
| Tazobactam | J01CG02 |
| Tedizolid | J01XX11 |
| Teicoplanin | J01XA02 |
| Telavancin | J01XA03 |
| Telithromycin | J01FA15 |
| Temafloxacin | J01MA05 |
| Temocillin | J01CA17 |
| Terbinafine | D01BA02 |
| Tetracycline | J01AA07 |
| Tetracycline and oleandomycin | J01RA08 |
| Thiamphenicol | J01BA02 |
| Thiamphenicol, combinations | J01BA52 |
| Ticarcillin | J01CA13 |
| Ticarcillin and enzyme inhibitor | J01CR03 |
| Tigecycline | J01AA12 |
| Tinidazole (oral, rectal) | P01AB02 |
| Tinidazole (parenteral) | J01XD02 |
| Tobramycin | J01GB01 |
| Trimethoprim | J01EA01 |
| Troleandomycin | J01FA08 |
| Trovafloxacin | J01MA13 |
| Vancomycin (oral) | A07AA09 |
| Vancomycin (parenteral) | J01XA01 |
| Voriconazole | J02AC03 |
| Xibornol | J01XX02 |

# Healthcare-associated infections: code lists

## HAI code list, table

| HAI code | HAI label |
|---|---|
| SSI-S | Surgical site infection, superficial incisional |
| SSI-D | Surgical site infection, deep incisional |
| SSI-O | Surgical site infection, organ/space |
| PN1 | Pneumonia, clinical + positive quantitative culture from minimally contaminated lower respiratory tract specimen |
| PN2 | Pneumonia, clinical + positive quantitative culture from possibly contaminated lower respiratory tract specimen |
| PN3 | Pneumonia, clinical + microbiological diagnosis by alternative microbiology methods |
| PN4 | Pneumonia, clinical + positive sputum culture or non-quantitative culture from lower respiratory tract specimen |
| PN5 | Pneumonia: clinical signs of pneumonia without positive microbiology |
| UTI-A | symptomatic urinary tract infection, microbiologically confirmed |
| UTI-B | symptomatic urinary tract infection, not microbiologically confirmed |
| BSI | Bloodstream infection (laboratory-confirmed), other than CRI3 |
| CRI1-CVC | Local CVC-related infection (no positive blood culture) |
| CRI2-CVC | General CVC-related infection (no positive blood culture) |
| CRI3-CVC | Microbiologically confirmed CVC-related bloodstream infection |
| CRI1-PVC | Local PVC-related infection (no positive blood culture) |
| CRI2-PVC | General PVC-related infection (no positive blood culture) |
| CRI3-PVC | Microbiologically confirmed PVC-related bloodstream infection |
| BJ-BONE | Osteomyelitis |
| BJ-JNT | Joint or bursa |
| BJ-DISC | Disc-space infection |
| CNS-IC | Intracranial infection |
| CNS-MEN | Meningitis or ventriculitis |
| CNS-SA | Spinal abscess without meningitis |
| CVS-VASC | Arterial or venous infection |
| CVS-ENDO | Endocarditis |
| CVS-CARD | Myocarditis or pericarditis |
| CVS-MED | Mediastinitis |
| EENT-CONJ | Conjunctivitis |
| EENT-EYE | Eye, other than conjunctivitis |
| EENT-EAR | Ear mastoid |
| EENT-ORAL | Oral cavity (mouth, tongue, or gums) |
| EENT-SINU | Sinusitis |
| EENT-UR | Upper respiratory tract, pharyngitis, laryngitis, epiglottitis |
| LRI-BRON | Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia |
| LRI-LUNG | Other infections of the lower respiratory tract |
| GI-CDI | *Clostridium difficile* infection |
| GI-GE | Gastroenteritis (excluding CDI) |
| GI-GIT | Gastrointestinal tract (esophagus, stomach, small and large bowel, and rectum), excluding GE, CDI |
| GI-HEP | Hepatitis |
| GI-IAB | Intra-abdominal infection, not specified elsewhere |
| REPR-EMET | Endometritis |
| REPR-EPIS | Episiotomy |
| REPR-VCUF | Vaginal cuff |
| REPR-OREP | Other infections of the male or female reproductive tract |
| SST-SKIN | Skin infection |
| SST-ST | Soft tissue (necrotizing fascitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis) |
| SST-DECU | Decubitus ulcer, including both superficial and deep infections |
| SST-BURN | Burn |
| SST-BRST | Breast abscess or mastitis |
| SYS-DI | Disseminated infection |
| SYS-CSEP | Treated unidentified severe infection in adults and children |
| NEO-CSEP | Clinical sepsis in neonates |
| NEO-LCBI | Laboratory-confirmed bloodstream infection in neonates, non-CNS |
| NEO-CNSB | Laboratory-confirmed bloodstream infection with coagulase-negative staphylococci in neonates |
| NEO-PNEU | Pneumonia in neonates |
| NEO-NEC | Necrotising enterocolitis |

## Definition of active HAI

| Onset of HAI[1] | | Case definition |
|---|---|---|
| Day 3 onwards | AND | Meets the case definition on the day of survey. |
| OR | | |
| Day 1 (day of admission) or Day 2: SSI criteria met at any time after admission (including previous surgery 30 days/90 days). | | |
| OR | | OR |
| Day 1 or Day 2 AND patient discharged from acute care hospital in preceding 48 hours. | | |
| OR | | |
| Day 1 or Day 2 AND patient discharged from acute care hospital in preceding 28 days if CDI[2] present. | | Patient is receiving treatment[3]<br>AND<br>HAI has previously met the case definition between Day 1 of treatment and survey day. |
| OR | | |
| Day 1 or Day 2 AND patient has relevant device inserted on this admission prior to onset. | | |

[1] *Date of onset of HAI: date of first signs or symptoms of the infection; if unknown, record the date when treatment was started for this infection or the date the first diagnostic sample was taken. If no treatment or sample, please estimate. Not to be recorded if signs/symptoms are present at admission.*

[2] *CDI:* Clostridium difficile *infection*

[3] *Any kind of treatment, not necessarily antimicrobial.*

## HAI case definition codes, overview

| | | |
|---|---|---|
| **SSI** | | **Surgical site infection** |
| | SSI-S | Superficial incisional |
| | SSI-D | Deep incisional |
| | SSI-O | Organ/space |
| **PN** | | **Pneumonia** |
| | PN1 | Positive quantitative culture from minimally contaminated lower respiratory tract specimen |
| | PN2 | Positive quantitative culture from possibly contaminated lower respiratory tract specimen |
| | PN3 | Microbiological diagnosis by alternative microbiology methods |
| | PN4 | Positive sputum culture or non-quantitative culture from lower respiratory tract specimen |
| | PN5 | Clinical signs of pneumonia without positive microbiology |
| **UTI** | | **Urinary tract infection*** |
| | UTI-A | Microbiologically confirmed symptomatic UTI |
| | UTI-B | Not microbiologically confirmed symptomatic UTI |
| | ** Asymptomatic bacteriuria are not within the scope of the PPS* | |
| **BSI** | | **Bloodstream infection (laboratory-confirmed)** |
| | Source of BSI: | |
| | C-CVC | Central vascular catheter (note: report as CRI3 if microbiological criteria are met) |
| | C-PVC | Peripheral vascular catheter |
| | S-PUL | Secondary to pulmonary infection |
| | S-UTI | Secondary to urinary tract infection |
| | S-DIG | Secondary to digestive tract infection |
| | S-SSI | Secondary to surgical site infection |
| | S-SST | Secondary to skin and soft tissue infection |
| | S-OTH | Secondary to another infection |
| | UO | BSI of (confirmed) unknown origin |
| | UNK | No information/truly unknown |
| **CRI-CVC** | | **Central vascular catheter-related infection** |
| | CRI1-CVC | Local CVC-related infection (no positive blood culture) |
| | CRI2-CVC | General CVC-related infection (no positive blood culture) |
| | CRI3-CVC | Microbiologically confirmed CVC-related BSI |
| **CRI-PVC** | | **Peripheral vascular catheter-related infection** |
| | CRI1-PVC | Local PVC-related infection (no positive blood culture) |
| | CRI2-PVC | General CRI (no positive blood culture) |
| | CRI3-PVC | Microbiologically confirmed PVC-related BSI |
| **CVS** | | **Cardiovascular system infection** |
| | VASC | Arterial or venous infection |
| | ENDO | Endocarditis |
| | CARD | Myocarditis or pericarditis |
| | MED | Mediastinitis |
| **CNS** | | **Central nervous system infection** |
| | IC | Intracranial infection |
| | MEN | Meningitis or ventriculitis |
| | SA | Spinal abscess without meningitis |
| **EENT** | | **Eye, ear, nose or mouth infection** |
| | CONJ | Conjunctivitis |
| | EYE | Eye, other than conjunctivitis |
| | EAR | Ear mastoid |
| | ORAL | Oral cavity (mouth, tongue, or gums) |
| | SINU | Sinusitis |
| | UR | Upper respiratory tract, pharyngitis, laryngitis, epiglottitis |
| **GI** | | **Gastrointestinal system infections** |
| | CDI | *Clostridium difficile* infection |
| | GE | Gastroenteritis (excluding CDI) |
| | GIT | Gastrointestinal tract (esophagus, stomach, small and large bowel, and rectum), excluding GE, CDI |
| | HEP | Hepatitis |
| | IAB | Intra-abdominal, not specified elsewhere |
| **LRI** | | **Lower respiratory tract infection, other than pneumonia** |
| | BRON | Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia |
| | LUNG | Other infections of the lower respiratory tract |

| | | |
|---|---|---|
| **REPR** | | **Reproductive tract infections** |
| | EMET | Endometritis |
| | EPIS | Episiotomy |
| | VCUF | Vaginal cuff |
| | OREP | Other infections of the male or female reproductive tract |
| **SST** | | **Skin and soft tissue infections** |
| | SKIN | Skin |
| | ST | Soft tissue (necrotising fascitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis) |
| | DECU | Decubitus ulcer, including both superficial and deep infections |
| | BURN | Burn |
| | BRST | Breast abscess or mastitis |
| **BJ** | | **Bone and joint infection** |
| | BONE | Osteomyelitis |
| | JNT | Joint or bursa |
| | DISC | Disc space infection |
| **SYS** | | **Systemic infections** |
| | DI | Disseminated infection |
| | CSEP | Treated unidentified severe infection in adults and children |
| **NEO** | | **CASE DEFINITIONS FOR NEONATES** |
| | CSEP | Clinical sepsis in neonates |
| | LCBI | Laboratory-confirmed bloodstream infection in neonates, non-coagulase-negative staphylococci |
| | CNSB | Laboratory-confirmed bloodstream infection with coagulase-negative staphylococci in neonates |
| | PNEU | Pneumonia in neonates |
| | NEC | Necrotising enterocolitis |

## BSI origin (BSI source) code list

| | |
|---|---|
| Related to catheter | |
| C-CVC | Central vascular catheter, clinical relationship (e.g. symptoms improve within 48 hours after catheter removal) |
| C-PVC | Peripheral vascular catheter, clinical relationship (e.g. symptoms improve within 48 hours after catheter removal) |
| * | CRI3-CVC, central vascular catheter, microbiologically confirmed |
| * | CRI3-PVC, peripheral vascular catheter, microbiologically confirmed |
| Secondary to another site | |
| S-PUL | Pulmonary infection |
| S-UTI | Urinary tract infection |
| S-SSI | Surgical site infection |
| S-DIG | Digestive tract infection |
| S-SST | Skin soft tissue |
| S-OTH | Other infection (e.g. meningitis, osteomyelitis, etc.) |
| BSI of unknown origin | |
| UO | None of the above; BSI confirmed to be of unknown origin |

** Note: Do not report CRI3 as BSI with BSI origin C-CVC or C-PVC, but use CRI3-CVC or CRI3-PVC; see CRI definitions.*

# Case definitions of healthcare-associated infections

## SSI: SURGICAL SITE INFECTION

### *Superficial incisional (SSI-S)*

Infection occurs within 30 days after the operation and infection involves only skin and subcutaneous tissue of the incision and at least one of the following:

- Purulent drainage with or without laboratory confirmation, from the superficial incision.
- Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision.
- At least one of the following signs or symptoms of infection: pain or tenderness, localised swelling, redness, or heat, and superficial incision is deliberately opened by surgeon, unless incision is culture-negative.
- Diagnosis of superficial incisional SSI made by a surgeon or attending physician.

### *Deep incisional (SSI-D)*

Infection occurs within 30 days after the operation if no implant is left in place, or within 90 days if implant is in place and the infection appears to be related to the operation and infection involves deep soft tissue (e.g. fascia, muscle) of the incision and at least one of the following:

- Purulent drainage from the deep incision but not from the organ/space component of the surgical site.
- A deep incision spontaneously dehisces or is deliberately opened by a surgeon when the patient has at least one of the following signs or symptoms: fever (> 38 °C), localised pain or tenderness, unless incision is culture-negative.
- An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination.
- Diagnosis of deep incisional SSI made by a surgeon or attending physician.

### *Organ/space (SSI-O)*

Infection occurs within 30 days after the operation if no implant is left in place, or within 90 days if implant is in place and the infection appears to be related to the operation and infection involves any part of the anatomy (e.g. organs and spaces) other than the incision which was opened or manipulated during an operation, and at least one of the following:

- purulent drainage from a drain that is placed through a stab wound into the organ/space;
- organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space;
- an abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination;
- diagnosis of organ/space SSI made by a surgeon or attending physician.

# PN: PNEUMONIA

Rx

Two or more serial chest X-rays or CT-scans with a suggestive image of pneumonia for patients with underlying cardiac or pulmonary disease (in patients without underlying cardiac or pulmonary disease one definitive chest X-ray or CT-scan is sufficient),

and at least one of the following:

Symptoms

- fever > 38 °C with no other cause;
- leukopenia (<4 000 WBC/mm$^3$) or leucocytosis (≥ 12 000 WBC/mm$^3$);

and at least one of the following (or at least two if clinical pneumonia only = PN 4 and PN 5):

- new onset of purulent sputum, or change in character of sputum (colour, odour, quantity, consistency);
- cough or dyspnea or tachypnea;
- suggestive auscultation (rales or bronchial breath sounds), ronchi, wheezing;
- worsening gas exchange (e.g. O2 desaturation or increased oxygen requirements or increased ventilation demand);

and according to the used diagnostic method:

Microbiology

a) Bacteriologic diagnostic test performed by:

- Positive quantitative culture from minimally contaminated LRT (lower respiratory tract) specimen **(PN 1)**:
  - broncho-alveolar lavage (BAL) with a threshold of > $10^4$ CFU[2]/ml or ≥ 5 % of BAL obtained cells contain intracellular bacteria on direct microscopic exam (classified on the diagnostic category BAL);
  - protected brush (PB Wimberley) with a threshold of > $10^3$ CFU/ml;
  - distal protected aspirate (DPA) with a threshold of > $10^3$ CFU/ml.
- Positive quantitative culture from possibly contaminated LRT specimen (PN 2):
  - Quantitative culture of LRT specimen (e.g. endotracheal aspirate) with a threshold of $10^6$ CFU/ml

b) Alternative microbiology methods **(PN 3)**:

- positive blood culture not related to another source of infection;
- Positive growth in culture of pleural fluid;
- pleural or pulmonary abscess with positive needle aspiration;
- histologic pulmonary exam shows evidence of pneumonia;
- positive exams for pneumonia with virus or particular germs (*Legionella*, *Aspergillus*, mycobacteria, mycoplasma, *Pneumocystis carinii*):
  - positive detection of viral antigen or antibody from respiratory secretions (e.g. EIA, FAMA, shell vial assay, PCR);
  - positive direct exam or positive culture from bronchial secretions or tissue;
  - seroconversion (e.g. influenza viruses, *Legionella*, *Chlamydia*);
  - detection of antigens in urine (*Legionella*).

c) Others:

- positive sputum culture or non-quantitative LRT specimen culture **(PN 4)**;
- no positive microbiology **(PN 5)**.

*Notes:*
*One definitive chest X-ray or CT-scan for the current pneumonia episode may be sufficient in patients with underlying cardiac or pulmonary disease if comparison with previous X-rays is possible.*
*PN 1 and PN 2 criteria were validated without previous antimicrobial therapy. However, this does not exclude the diagnosis of PN 1 or PN 2 in the case of previous antimicrobial use.*

Comment: The subdivision of the pneumonia definition in five categories allows for the comparison of similar entities of pneumonia within and between countries. It is essential that all hospitals report PN4 and PN5 (clinical pneumonia without microbiological evidence) if appropriate in order to achieve overall comparability, even if a microbiological exam was performed and yielded negative results. It is also advised, both for clinical and surveillance purposes, that networks promote as microbiological confirmation (PN1–3) as a routine practice, at least in the ICU.

[2] Colony-forming units

Intubation-associated pneumonia (IAP): a pneumonia is defined as intubation-associated (IAP) if an invasive respiratory device was present (even intermittently) in the 48 hours preceding the onset of infection.

# UTI: URINARY TRACT INFECTION

## *UTI-A: microbiologically confirmed symptomatic UTI*

- Patient has at least one of the following signs of symptoms with no other recognised cause: fever (> 38°C), urgency, frequency, dysuria, or suprapubic tenderness

and

- patient has a positive urine culture, that is, ≥ $10^5$ microorganisms per ml of urine with no more than two species of microorganisms.

## *UTI-B: not microbiologically confirmed symptomatic UTI*

- Patient has at least two of the following with no other recognised cause: fever (> 38°C), urgency, frequency, dysuria, or suprapubic tenderness,

and

- at least one of the following:
  - positive dipstick for leukocyte esterase and/or nitrate;
  - pyuria urine specimen with ≥ 10 WBC/ml or ≥ 3 WBC/high-power field of unspun urine;
  - organisms seen on Gram stain of unspun urine;
  - at least two urine cultures with repeated isolation of the same uropathogen (Gram-negative bacteria or S. saprophyticus) with ≥ 102 colonies/ml urine in nonvoided specimens;
  - ≤ 105 colonies/ml of a single uropathogen (Gram-negative bacteria or S. saprophyticus) in a patient being treated with effective antimicrobial agent for a urinary infection;
  - physician diagnosis of a urinary tract infection;
  - physician institutes appropriate therapy for a urinary infection.

## *UTI-C: asymptomatic bacteriuria: EXCLUDED FOR PPS, not to be reported**

- Patient has no fever (> 38°C), urgency, frequency, dysuria, or suprapubic tenderness

and

either of the following criteria:

- Patient has had an indwelling urinary catheter within seven days before urine is cultured,

and

- patient has a urine culture, that is, ≥ 105 microorganisms per ml of urine with no more than two species of microorganisms;
- patient has not had an indwelling urinary catheter within seven days before the first positive culture;

and

- patient has had at least two positive urine cultures ≥ 105 microorganisms per mm3 of urine with repeated isolation of the same microorganism and no more than two species of microorganisms.

** Note: Bloodstream infections secondary to asymptomatic bacteriuria are reported as BSI with source (origin) S-UTI*

# BSI: BLOODSTREAM INFECTION

## *BSI: Laboratory-confirmed bloodstream infection*

- One positive blood culture for a recognised pathogen

or

- patient has at least one of the following signs or symptoms: fever (> 38°C), chills, or hypotension

and

- two positive blood cultures for a common skin contaminant (from two separate blood samples, usually within 48 hours).

Skin contaminants = coagulase-negative staphylococci, *Micrococcus* sp., *Propionibacterium acnes*, *Bacillus* sp., *Corynebacterium* sp.

*Note: This definition corresponds to the former HELICS BSI-A definition; BSI-B (single blood culture for skin contaminants in patients with central vascular catheter and adapted treatment) was deleted following recommendations at an ECDC expert meeting in January 2009 and subsequent confirmation at the annual meeting.*

Sources of bloodstream infection:

- Catheter related: the same microorganism was cultured from the catheter or symptoms improve within 48 hours after removal of the catheter (C-PVC: peripheral catheter, C-CVC: central vascular catheter). Important: Report C-CVC or C-PVC BSI as CRI3-CVC or CRI3-PVC respectively if microbiologically confirmed; see CRI3 definition.
- Secondary to another infection: the same microorganism was isolated from another infection site, or strong clinical evidence exists that bloodstream infection was secondary to another infection site, invasive diagnostic procedure or foreign body:
  - pulmonary (S-PUL);
  - urinary tract infection (S-UTI);
  - digestive tract infection (S-DIG);
  - surgical site infection (S-SSI);
  - skin and soft tissue (S-SST);
  - other (S-OTH).
- Unkown origin (UO): none of the above, bloodstream infection of unknown origin (verified during survey and no source found)
- Unknown (UNK): no information available about the source of the bloodstream infection or information missing

*Note:*

*Primary bloodstream infections include catheter-related BSI and BSI of unknown origin.*

*A CVC-associated bloodstream infection in accordance with CDC/NHSN definitions (as opposed to CVC-related BSI) is a primary BSI with central venous catheter use (even intermittent) in the 48 hours preceding the onset of the infection: therefore the presence of 'the relevant device' (central/peripheral vascular catheter) in the 48 hours before onset of infection is collected even in the absence of microbiological confirmation. (See also AJIC, 1997;25:112-6).*

# CRI: CATHETER-RELATED INFECTION

## *CRI1-CVC: local CVC-related infection (no positive blood culture)*

- Quantitative CVC culture ≥ $10^3$ CFU/ml (1) or semi-quantitative CVC culture > 15 CFU (2)
  and
- pus/inflammation at the insertion site or tunnel.

## *CRI1-PVC: local PVC-related infection (no positive blood culture)*

- Quantitative PVC culture ≥ $10^3$ CFU/ml or semi-quantitative PVC culture > 15 CFU
  and
- pus/inflammation at the insertion site or tunnel.

## *CRI2-CVC: General CVC-related infection (no positive blood culture)*

- Quantitative CVC culture ≥ 103 CFU/ml or semi-quantitative CVC culture > 15 CFU
  and
- clinical signs improve within 48 hours after catheter removal.

## *CRI2-PVC: General PVC-related infection (no positive blood culture)*

- Quantitative PVC culture ≥ $10^3$ CFU/ml or semi-quantitative PVC culture > 15 CFU
  and
- clinical signs improve within 48 hours after catheter removal.

## *CRI3-CVC: microbiologically confirmed CVC-related bloodstream infection*

- BSI occurring 48 hours before or after catheter removal (if any)
  and
- positive culture with the same microorganism of either:
  - quantitative CVC culture ≥ $10^3$ CFU/ml or semi-quantitative CVC culture > 15 CFU;
  - quantitative blood culture ratio CVC blood sample/peripheral blood sample > 5 (3);
  - differential delay of positivity of blood cultures (4): CVC blood sample culture positive two hours or more before peripheral blood culture (blood samples drawn at the same time);
  - positive culture with the same microorganism from pus from insertion site.

## *CRI3-PVC: microbiologically confirmed PVC-related bloodstream infection*

- BSI occurring 48 hours before or after catheter removal (if any)

and

- positive culture with the same microorganism of either:
  - quantitative PVC culture ≥ $10^3$ CFU/ml or semi-quantitative PVC culture > 15 CFU;
  - positive culture with the same microorganism from pus from insertion site.

*Notes:*

- *CVC=central vascular catheter; PVC=peripheral vascular catheter.*
- *Central vascular catheter colonisation should not be reported.*
- *A CRI3 (-CVC or -PVC) is also a bloodstream infection with source C-CVC or C-PVC respectively; however when a CRI3 is reported, the BSI should not be reported in the point prevalence survey; microbiologically confirmed catheter-related BSI should be reported as CRI3.*

## *References*

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(4) Quilici N, Audibert G, Conroy MC, Bollaert PE, Guillemin F, Welfringer P et al. Differential quantitative blood cultures in the diagnosis of catheter-related sepsis in intensive care units. Clin Infect Dis 1997; 25(5):1066-1070.

(5) Raad I, Hanna HA, Alakech B, Chatzinikolaou I, Johnson MM, Tarrand J. Differential time to positivity: a useful method for diagnosing catheter-related bloodstream infections. Ann Intern Med. 2004 Jan 6;140(1):18-25.

# BJ: BONE AND JOINT INFECTION

## *BJ-BONE: osteomyelitis*

Osteomyelitis must meet at least one of the following criteria:

- patient has organisms cultured from bone;
- patient has evidence of osteomyelitis on direct examination of the bone during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), localised swelling, tenderness, heat, or drainage at suspected site of bone infection;
  and
  at least one of the following:
  - organisms cultured from blood;
  - positive blood antigen test (e.g. *H. influenzae, S. pneumoniae*);
  - radiographic evidence of infection, e.g. abnormal findings on X-ray, CT scan, MRI, radiolabel scan (gallium, technetium, etc.).

Reporting instructions: Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as surgical site infection-organ/space (SSI-O).

## *BJ-JNT: joint or bursa*

Joint or bursa infections must meet at least one of the following criteria:

- patient has organisms cultured from joint fluid or synovial biopsy;
- patient has evidence of joint or bursa infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause: joint pain, swelling, tenderness, heat, evidence of effusion or limitation of motion;
  and
  at least one of the following:
  - organisms and white blood cells seen on Gram's stain of joint fluid;
  - positive antigen test on blood, urine, or joint fluid;
  - cellular profile and chemistries of joint fluid compatible with infection and not explained by an underlying rheumatologic disorder;
  - radiographic evidence of infection, e.g. abnormal findings on X-ray, CT scan, MRI, radiolabel scan (gallium, technetium, etc.).

## *BJ-DISC: disc space infection*

Vertebral disc space infection must meet at least one of the following criteria:

- patient has organisms cultured from vertebral disc space tissue obtained during a surgical operation or needle aspiration;
- patient has evidence of vertebral disc space infection seen during a surgical operation or histopathologic examination;
- patient has fever (> 38 °C) with no other recognised cause or pain at the involved vertebral disc space
  and
  radiographic evidence of infection, e.g. abnormal findings on X-ray, CT scan, MRI, radiolabel scan (gallium, technetium, etc.);
- patient has fever (> 38 °C) with no other recognised cause and pain at the involved vertebral disc space
  and
  positive antigen test on blood or urine (e.g. *H. influenzae, S. pneumoniae*, *N. meningitidis*, or Group B Streptococcus).

# CNS: CENTRAL NERVOUS SYSTEM INFECTION

## *CNS-IC: intracranial infection (brain abscess, subdural or epidural infection, encephalitis)*

Intracranial infection must meet at least one of the following criteria:

- patient has organisms cultured from brain tissue or dura;
- patient has an abscess or evidence of intracranial infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause: headache, dizziness, fever (> 38 °C), localising neurologic signs, changing level of consciousness, or confusion,
  and
  at least one of the following:
  - organisms seen on microscopic examination of brain or abscess tissue obtained by needle aspiration or by biopsy during a surgical operation or autopsy;
  - positive antigen test on blood or urine;
  - radiographic evidence of infection, e.g. abnormal findings on ultrasound, CT scan, MRI, radionuclide brain scan, or arteriogram;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen
  and,
  if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

Reporting instruction: If meningitis and a brain abscess are present together, report the infection as IC.

## *CNS-MEN: meningitis or ventriculitis*

Meningitis or ventriculitis must meet at least one of the following criteria:

- patient has organisms cultured from cerebrospinal fluid (CSF);
- patient has at least one of the following signs or symptoms with no other recognised cause: fever (> 38 °C), headache, stiff neck, meningeal signs, cranial nerve signs, or irritability,
  and
  at least one of the following:
  - increased white cells, elevated protein, and/or decreased glucose in CSF;
  - organisms seen on Gram's stain of CSF;
  - organisms cultured from blood;
  - positive antigen test of CSF, blood, or urine;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen
  and,
  if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

Reporting instructions:

- Report CSF shunt infection as SSI if it occurs ≤90 days of placement; if >90 days or after manipulation/access of the shunt, report as CNS-MEN if the infection meets the general case definition of HAI
- Report meningoencephalitis as MEN.
- Report spinal abscess with meningitis as MEN.

## *CNS-SA: spinal abscess without meningitis*

An abscess of the spinal epidural or subdural space, without involvement of the cerebrospinal fluid or adjacent bone structures, must meet at least one of the following criteria:

- patient has organisms cultured from abscess in the spinal epidural or subdural space;
- patient has an abscess in the spinal epidural or subdural space seen during a surgical operation or at autopsy or evidence of an abscess seen during a histopathologic examination;
- patient has at least one of the following signs or symptoms with no other recognised cause: fever (> 38 °C), back pain, focal tenderness, radiculitis, paraparesis, or paraplegia,
  and
  at least one of the following:
  - organisms cultured from blood;
  - radiographic evidence of a spinal abscess, e.g. abnormal findings on myelography, ultrasound, CT scan, MRI, or other scans (gallium, technetium, etc.);
  and,
  if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

Reporting instruction: Report spinal abscess with meningitis as meningitis.

# CVS: CARDIOVASCULAR SYSTEM INFECTION

## *CVS-VASC: arterial or venous infection*

Arterial or venous infection must meet at least one of the following criteria:

- patient has organisms cultured from arteries or veins removed during a surgical operation and blood culture not done or no organisms cultured from blood;
- patient has evidence of arterial or venous infection seen during a surgical operation or histopathologic examination;
- patient has at least one of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), pain, erythema, or heat at involved vascular site,
  and
  more than 15 colonies cultured from intravascular cannula tip using semiquantitative culture method,
  and
  blood culture not done or no organisms cultured from blood.
- patient has purulent drainage at involved vascular site,
  and
  blood culture not done or no organisms cultured from blood.

Reporting instructions: Report infections of an arteriovenous graft, shunt, or fistula, or intravascular cannulation site without organisms cultured from blood as CVS-VASC; report CVS-VASC matching the third criterion as CRI1 or CRI2, as appropriate.

## *CVS-ENDO: endocarditis*

Endocarditis of a natural or prosthetic heart valve must meet at least one of the following criteria:

- patient has organisms cultured from valve or vegetation;
- patient has two or more of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), new or changing murmur, embolic phenomena, skin manifestations (i.e. petechiae, splinter haemorrhages, painful subcutaneous nodules), congestive heart failure, or cardiac conduction abnormality, and at least one of the following:
  - organisms cultured from two or more blood cultures;
  - organisms seen on Gram's stain of valve when culture is negative or not done;
  - valvular vegetation seen during a surgical operation or autopsy;
  - positive antigen test on blood or urine (e.g. H. influenzae, S. pneumoniae, N. meningitidis, or Group B Streptococcus);
  - evidence of new vegetation seen on echocardiogramme;

  and,
  if diagnosis is made antemortem, physician institutes appropriate antimicrobial therapy.

## *CVS-CARD: myocarditis or pericarditis*

Myocarditis or pericarditis must meet at least one of the following criteria:

- patient has organisms cultured from pericardial tissue or fluid obtained by needle aspiration or during a surgical operation;
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), chest pain, paradoxical pulse, or increased heart size;
  and
  at least one of the following:
  - abnormal ECG/EKG consistent with myocarditis or pericarditis;
  - positive antigen test on blood (e.g. *H. influenzae*, *S. pneumoniae*);
  - evidence of myocarditis or pericarditis on histologic examination of heart tissue;
  - fourfold rise in type-specific antibody with or without isolation of virus from pharynx or feces;
  - pericardial effusion identified by echocardiogramme, CT scan, MRI, or angiography.

*Note: Most cases of postcardiac surgery or postmyocardial infarction pericarditis are not infectious.*

## *CVS-MED: mediastinitis*

Mediastinitis must meet at least one of the following criteria:

- patient has organisms cultured from mediastinal tissue or fluid obtained during a surgical operation or needle aspiration;
- patient has evidence of mediastinitis seen during a surgical operation or histopathologic examination;
- patient has at least one of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), chest pain, or sternal instability;
  and
  at least one of the following:

- purulent discharge from mediastinal area;
- organisms cultured from blood or discharge from mediastinal area;
- mediastinal widening on X-ray.

Reporting instruction: Report mediastinitis following cardiac surgery that is accompanied by osteomyelitis as SSI-O.

# EENT: EYE, EAR, NOSE, THROAT, OR MOUTH INFECTION

## *EENT-CONJ: conjunctivitis*

Conjunctivitis must meet at least one of the following criteria:

- patient has pathogens cultured from purulent exudate obtained from the conjunctiva or contiguous tissues, such as eyelid, cornea, meibomian glands, or lacrimal glands;
- patient has pain or redness of conjunctiva or around eye;
  and
  at least one of the following:
  - WBCs and organisms seen on Gram stain of exudates;
  - purulent exudates;
  - positive antigen test (e.g. ELISA or IF for *Chlamydia trachomatis*, herpes simplex virus, adenovirus) on exudate or conjunctival scraping;
  - multinucleated giant cells seen on microscopic examination of conjunctival exudate or scrapings
  - positive viral culture;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen.

Reporting instructions

- Report other infections of the eye as EYE.
- Do not report chemical conjunctivitis caused by silver nitrate (AgNO3) as a health care–associated infection.
- Do not report conjunctivitis that occurs as a part of a more widely disseminated viral illness (such as measles, chickenpox, or a URI).

## *EENT-EYE: eye, other than conjunctivitis*

An infection of the eye, other than conjunctivitis, must meet at least one of the following criteria:

- patient has organisms cultured from anterior or posterior chamber or vitreous fluid.
- patient has at least two of the following signs or symptoms with no other recognised cause: eye pain, visual disturbance, or hypopyon and at least one of the following:
  - physician diagnosis of an eye infection
  - positive antigen test on blood (e.g. H. influenzae, S. pneumoniae)
  - organisms cultured from blood.

## *EENT-EAR: ear mastoid*

Ear and mastoid infections must meet at least one of the following criteria:

Otitis externa must meet at least one of the following criteria:

- patient has pathogens cultured from purulent drainage from ear canal;
- patient has at least one of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), pain, redness, or drainage from ear canal
  and organisms seen on Gram's stain of purulent drainage.

Otitis media must meet at least one of the following criteria:

- patient has organisms cultured from fluid from middle ear obtained by tympanocentesis or at surgical operation;
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), pain in the eardrum, inflammation, retraction or decreased mobility of eardrum, or fluid behind eardrum.

Otitis interna must meet at least one of the following criteria:

- patient has organisms cultured from fluid from inner ear obtained at surgical operation;
- patient has a physician diagnosis of inner ear infection.

Mastoiditis must meet at least one of the following criteria:

- patient has organisms cultured from purulent drainage from mastoid;
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), pain, tenderness, erythema, headache, or facial paralysis;
  and
  at least one of the following:
  - a. organisms seen on Gram stain of purulent material from mastoid;
  - b. positive antigen test on blood.

### *EENT-ORAL: oral cavity (mouth, tongue, or gums)*

Oral cavity infections must meet at least one of the following criteria:

- patient has organisms cultured from purulent material from tissues of oral cavity;
- patient has an abscess or other evidence of oral cavity infection seen on direct examination, during a surgical operation, or during a histopathologic examination;
- patient has at least one of the following signs or symptoms with no other recognised cause: abscess, ulceration, or raised white patches on inflamed mucosa, or plaques on oral mucosa;
  and
  at least one of the following:
  - organisms seen on Gram's stain;
  - positive KOH (potassium hydroxide) stain;
  - multinucleated giant cells seen on microscopic examination of mucosal scrapings;
  - positive antigen test on oral secretions;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen;
  - physician diagnosis of infection and treatment with topical or oral antifungal therapy.

Reporting instructions: Report healthcare-associated primary herpes simplex infections of the oral cavity as ORAL; recurrent herpes infections are not healthcare-associated.

### *EENT-SINU: sinusitis*

Sinusitis must meet at least one of the following criteria:

- patient has organisms cultured from purulent material obtained from sinus cavity;
- patient has at least one of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), pain or tenderness over the involved sinus, headache, purulent exudate, or nasal obstruction;
  and
  at least one of the following:
  - positive transillumination;
  - positive radiographic examination (including CT scan).

### *EENT-UR: upper respiratory tract, pharyngitis, laryngitis, epiglottitis*

Upper respiratory tract infections must meet at least one of the following criteria:

- Patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), erythema of pharynx, sore throat, cough, hoarseness, or purulent exudate in throat;
  and
  at least one of the following:
  - organisms cultured from the specific site;
  - organisms cultured from blood;
  - positive antigen test on blood or respiratory secretions;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen;
  - physician diagnosis of an upper respiratory infection.
- Patient has an abscess seen on direct examination, during a surgical operation, or during a histopathologic examination.

# LRI: LOWER RESPIRATORY TRACT INFECTION, OTHER THAN PNEUMONIA

## *LRI-BRON: bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia*

Tracheobronchial infections must meet at least one of the following criteria:

- Patient has no clinical or radiographic evidence of pneumonia
  and
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), cough, new or increased sputum production, rhonchi, wheezing and at least one of the following:
  - positive culture obtained by deep tracheal aspirate or bronchoscopy;
  - positive antigen test on respiratory secretions.

Reporting instruction: Do not report chronic bronchitis in a patient with chronic lung disease as an infection unless there is evidence of an acute secondary infection, manifested by change in organism.

## *LRI-LUNG: other infections of the lower respiratory tract*

Other infections of the lower respiratory tract must meet at least one of the following criteria:

- patient has organisms seen on smear or cultured from lung tissue or fluid, including pleural fluid;
- patient has a lung abscess or empyema seen during a surgical operation or histopathologic examination;
- patient has an abscess cavity seen on radiographic examination of lung.

Reporting instructions: Report lung abscess or empyema without pneumonia as LUNG.

# GI: GASTROINTESTINAL SYSTEM INFECTION

## *GI-CDI:* Clostridium difficile *infection*

A *Clostridium difficile* infection (previously also referred to as *Clostridium difficile* associated diarrhoea, or CDAD) must meet at least one of the following criteria:

- diarrhoeal stools or toxic megacolon, and a positive laboratory assay for *C. difficile* toxin A and/or B in stools or a toxin-producing *C. difficile* organism detected in stool via culture or other means, e.g. a positive PCR result;
- pseudomembranous colitis revealed by lower gastro-intestinal endoscopy;
- colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea) on a specimen obtained during endoscopy, colectomy or autopsy.

*Note: If clinical signs of* Clostridium difficile *infection appear in 28 days after hospital discharge period, GI-CDI must be defined as healthcare-associated infection.*


*(*) May be community- or healthcare-associated, depending on case's history. If healthcare-associated, may have been acquired in the same facility or imported.*

## *GI-GE: gastroenteritis (excluding CDI)*

Gastroenteritis must meet at least one of the following criteria:

- Patient has an acute onset of diarrhoea (liquid stools for more than 12 hours) with or without vomiting or fever (> 38 °C) and no likely non-infectious cause (e.g. diagnostic tests, therapeutic regimen other than antimicrobial agents, acute exacerbation of a chronic condition, or psychological stress).
- Patient has at least two of the following signs or symptoms with no other recognised cause: nausea, vomiting, abdominal pain, fever (> 38 °C), or headache;
  and
  at least one of the following:
  - an enteric pathogen is cultured from stool or rectal swab;
  - an enteric pathogen is detected by routine or electron microscopy;
  - an enteric pathogen is detected by antigen or antibody assay on blood or feces;
  - evidence of an enteric pathogen is detected by cytopathic changes in tissue culture (toxin assay);
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen.

## *GI-GIT: gastrointestinal tract (esophagus, stomach, small and large bowel, and rectum) excluding gastroenteritis and appendicitis*

Gastrointestinal tract infections, excluding gastroenteritis and appendicitis, must meet at least one of the following criteria:

- patient has an abscess or other evidence of infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause and compatible with infection of the organ or tissue involved: fever (> 38 °C), nausea, vomiting, abdominal pain, or tenderness;
  and
  at least one of the following:
  - organisms cultured from drainage or tissue obtained during a surgical operation or endoscopy or from a surgically placed drain;
  - organisms seen on Gram stain or KOH stain or multinucleated giant cells seen on microscopic examination of drainage or tissue obtained during a surgical operation or endoscopy or from a surgically placed drain;
  - organisms cultured from blood;
  - evidence of pathologic findings on radiographic examination;

- evidence of pathologic findings on endoscopic examination (e.g. *Candida* esophagitis or proctitis).

### GI-HEP: hepatitis

Hepatitis must meet the following criterion:

- Patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), anorexia, nausea, vomiting, abdominal pain, jaundice, or history of transfusion within the previous three months;
  and
  at least one of the following:
  - positive antigen or antibody test for hepatitis A, hepatitis B, hepatitis C, or delta hepatitis;
  - abnormal liver function tests (e.g. elevated ALT/AST, bilirubin);
  - cytomegalovirus (CMV) detected in urine or oropharyngeal secretions.

Reporting instructions

- Do not report hepatitis or jaundice of non-infectious origin (alpha-1 antitrypsin deficiency, etc).
- Do not report hepatitis or jaundice that results from exposure to hepatotoxins (alcoholic or acetaminophen-induced hepatitis, etc).
- Do not report hepatitis or jaundice that results from biliary obstruction (cholecystitis).

### GI-IAB: intra-abdominal, not specified elsewhere including gallbladder, bile ducts, liver (excluding viral hepatitis), spleen, pancreas, peritoneum, subphrenic or subdiaphragmatic space, or other intra-abdominal tissue or area not specified elsewhere

Intra-abdominal infections must meet at least one of the following criteria:

- patient has organisms cultured from purulent material from intra-abdominal space obtained during a surgical operation or needle aspiration;
- patient has abscess or other evidence of intra-abdominal infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause:
  fever (> 38 °C), nausea, vomiting, abdominal pain, or jaundice;
  and
  at least one of the following:
  - organisms cultured from drainage from surgically placed drain (e.g. closed suction drainage system, open drain, T-tube drain);
  - organisms seen on Gram stain of drainage or tissue obtained during surgical operation or needle aspiration;
  - organisms cultured from blood and radiographic evidence of infection, e.g. abnormal findings on ultrasound, CT scan, MRI, or radiolabel scans (gallium, technetium, etc.) or on abdominal X-ray.

Reporting instruction: Do not report pancreatitis (an inflammatory syndrome characterised by abdominal pain, nausea, and vomiting associated with high serum levels of pancreatic enzymes) unless it is determined to be infectious in origin.

# REPR: REPRODUCTIVE TRACT INFECTION

## *REPR-EMET: endometritis*

Endometritis must meet at least one of the following criteria:

- patient has organisms cultured from fluid or tissue from endometrium obtained during surgical operation, by needle aspiration, or by brush biopsy;
- patient has at least two of the following signs or symptoms with no other recognised cause: fever (> 38 °C), abdominal pain, uterine tenderness, or purulent drainage from uterus.

Reporting instruction: Report postpartum endometritis as a health care-associated infection unless the amniotic fluid is infected at the time of admission or the patient was admitted 48 hours after rupture of the membrane.

## *REPR-EPIS: episiotomy*

Episiotomy infections must meet at least one of the following criteria:

- postvaginal delivery patient has purulent drainage from the episiotomy;
- postvaginal delivery patient has an episiotomy abscess.

## *REPR-VCUF: vaginal cuff*

Vaginal cuff infections must meet at least one of the following criteria:

- posthysterectomy patient has purulent drainage from the vaginal cuff;
- posthysterectomy patient has an abscess at the vaginal cuff;
- posthysterectomy patient has pathogens cultured from fluid or tissue obtained from the vaginal cuff.

Reporting instruction: Report vaginal cuff infections as SSI-O if other SSI criteria are met (within 30 days following hysterectomy).

## *REPR-OREP: other infections of the male or female reproductive tract (epididymis, testes, prostate, vagina, ovaries, uterus, or other deep pelvic tissues, excluding endometritis or vaginal cuff infections)*

Other infections of the male or female reproductive tract must meet at least one of the following criteria:

- patient has organisms cultured from tissue or fluid from affected site;
- patient has an abscess or other evidence of infection of affected site seen during a surgical operation or histopathologic examination;
- patient has two of the following signs or symptoms with no other recognised cause: fever (> 38 °C), nausea, vomiting, pain, tenderness, or dysuria;
  and
  at least one of the following:
  - organisms cultured from blood;
  - physician diagnosis.

Reporting instructions

- Report endometritis as EMET.
- Report vaginal cuff infections as VCUF.

# SST: SKIN AND SOFT TISSUE INFECTION

## *SST-SKIN: skin infection*

Skin infections must meet at least one of the following criteria:

- patient has purulent drainage, pustules, vesicles, or boils;
- patient has at least two of the following signs or symptoms with no other recognised cause: pain or tenderness, localised swelling, redness, or heat;
  and
  at least one of the following:
  - organisms cultured from aspirate or drainage from affected site; if organisms are normal skin flora (i.e. diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], viridans group streptococci, *Aerococcus* spp, *Micrococcus* spp), they must be a pure culture;
  - organisms cultured from blood;
  - positive antigen test performed on infected tissue or blood (e.g. herpes simplex, varicella zoster, *H. influenzae*, *N. meningitidis*);
  - multinucleated giant cells seen on microscopic examination of affected tissue;
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen.

Reporting instructions

- Report infected decubitus ulcers as DECU.
- Report infected burns as BURN.
- Report breast abscesses or mastitis as BRST.

## *SST-ST: soft tissue (necrotizing fascitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis)*

Soft tissue infections must meet at least one of the following criteria:

- patient has organisms cultured from tissue or drainage from affected site;
- patient has purulent drainage at affected site;
- patient has an abscess or other evidence of infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms at the affected site with no other recognised cause: localised pain or tenderness, redness, swelling, or heat;
  and
  at least one of the following:
  - organisms cultured from blood;
  - positive antigen test performed on blood or urine (e.g. *H. influenzae*, *S. pneumoniae*, *N. meningitidis*, Group B *Streptococcus*, *Candida* spp);
  - diagnostic single antibody titer (IgM) or fourfold increase in paired sera (IgG) for pathogen.

Reporting instructions

- Report infected decubitus ulcers as DECU.
- Report infection of deep pelvic tissues as OREP.

## *SST-DECU: decubitus ulcer, including both superficial and deep infections*

Decubitus ulcer infections must meet the following criterion:

- patient has at least two of the following signs or symptoms with no other recognised cause: redness, tenderness, or swelling of decubitus wound edges
  and
  at least one of the following:
  - organisms cultured from properly collected fluid or tissue (see comments below);
  - organisms cultured from blood.

Comments

- Purulent drainage alone is not sufficient evidence of an infection.
- Organisms cultured from the surface of a decubitus ulcer are not sufficient evidence that the ulcer is infected. A properly collected specimen from a decubitus ulcer involves needle aspiration of fluid or biopsy of tissue from the ulcer margin.

## *SST-BURN: burn*

Burn infections must meet at least one of the following criteria:

- patient has a change in burn wound appearance or character, such as rapid eschar separation, or dark brown, black, or violaceous discoloration of the eschar, or edema at wound margin and histologic examination of burn biopsy shows invasion of organisms into adjacent viable tissue;
- patient has a change in burn wound appearance or character, such as rapid eschar separation, or dark brown, black, or violaceous discoloration of the eschar, or edema at wound margin;
  and
  at least one of the following:
  - organisms cultured from blood in the absence of other identifiable infection;
  - isolation of herpes simplex virus, histologic identification of inclusions by light or electron microscopy, or visualisation of viral particles by electron microscopy in biopsies or lesion scrapings.
- patient with a burn has at least two of the following signs or symptoms with no other recognised cause: fever (> 38 °C) or hypothermia (< 36 °C), hypotension, oliguria (< 20 cc/hr), hyperglycemia at previously tolerated level of dietary carbohydrate, or mental confusion;
  and
  at least one of the following:
  - histologic examination of burn biopsy shows invasion of organisms into adjacent viable tissue
  - organisms cultured from blood;
  - isolation of herpes simplex virus, histologic identification of inclusions by light or electron microscopy, or visualisation of viral particles by electron microscopy in biopsies or lesion scrapings.

Comments

- Purulence alone at the burn wound site is not adequate for the diagnosis of burn infection; such purulence may reflect incomplete wound care.
- Fever alone in a burn patient is not adequate for the diagnosis of a burn infection because fever may be the result of tissue trauma or the patient may have an infection at another site.
- Surgeons in regional burn centres who take care of burn patients exclusively may require Criterion 1 for diagnosis of burn infection.
- Hospitals with regional burn centres may further divide burn infections into the following: burn wound site, burn graft site, burn donor site, burn donor site-cadaver; NHSN, however, will code all of these as BURN.

### *SST-BRST: breast abscess or mastitis*

A breast abscess or mastitis must meet at least one of the following criteria:

- patient has a positive culture of affected breast tissue or fluid obtained by incision and drainage or needle aspiration;
- patient has a breast abscess or other evidence of infection seen during a surgical operation or histopathologic examination;
- patient has fever (> 38 °C) and local inflammation of the breast and physician diagnosis of breast abscess.

# SYS: SYSTEMIC INFECTION

## *SYS-DI: disseminated infection*

Disseminated infection is infection involving multiple organs or systems, without an apparent single site of infection, usually of viral origin, and with signs or symptoms with no other recognised cause and compatible with infectious involvement of multiple organs or systems.

Reporting instructions

- Use this code for viral infections involving multiple organ systems (e.g. measles, mumps, rubella, varicella, erythema infectiosum). These infections often can be identified by clinical criteria alone. Do not use this code for healthcare-associated infections with multiple metastatic sites, such as with bacterial endocarditis.
- Do not report fever of unknown origin (FUO) as DI.
- Report viral exanthems or rash illness as DI.

## *SYS-CSEP: treated unidentified severe infection (formerly: clinical sepsis in adults and children)*

- Patient has at least one of the following:
  - clinical signs or symptoms with no other recognised cause;
  - fever (38 °C);
  - hypotension (systolic pressure < 90 mm);
  - or oliguria (20 cm3(ml)/hr);

  and
  - blood culture not done or no organisms or antigen detected in blood;

  and
  - no apparent infection at another site;

  and
  - physician institutes treatment for sepsis.

Reporting instructions:

- Do not use this code unless absolutely needed (last-resort definition).
- For CSEP in neonates, use NEO-CSEP case definition (see below).

# NEO: SPECIFIC NEONATAL CASE DEFINITIONS

## NEO-CSEP: clinical sepsis

All of the three following criteria:

- supervising physician started appropriate antimicrobial therapy for sepsis for at least five days;
- no detection of pathogens in blood culture or not tested;
- no obvious infection at another site;
  and
  two of the following criteria (without other apparent cause):
  - fever (> 38 °C) or temperature instability (frequent post-set of the incubator) or hypothermia (< 36.5 °C);
  - tachycardia (> 200/min) or new /increased bradycardia (< 80/min);
  - capillary refilling time (CRT) > 2s;
  - new or increased apnoea(s) (> 20s);
  - unexplained metabolic acidosis;
  - new-onset hyperglycemia (> 140mg/dl);
  - another sign of sepsis (skin colour (only if the CRT is not used), laboratory signs (CRP, interleukin), increased oxygen requirement (intubation), unstable general condition of the patient, apathy).

*Note: A one-time detection of coagulase-negative staphylococci (CNS) in blood cultures should not exclude the diagnosis of clinical sepsis. A clinical sepsis can also be diagnosed with a single positive blood culture with CNS, which is considered as a blood culture contamination, while other criteria of CNS bloodstream infection are not met and criteria of clinical sepsis have been met.*

## NEO-LCBI: laboratory-confirmed BSI

- At least two of: temperature > 38 °C or < 36.5 °C or temperature instability, tachycardia or bradycardia, apnoea, extended capillary refilling time (CRT), metabolic acidosis, hyperglycaemia, other sign of BSI such as apathy;

and

- a recognised pathogen other than coagulase-negative staphylococci (CNS) cultured from blood or cerebrospinal fluid (CSF; this is included because meningitis in this age group is usually haematogenous, so positive CSF can be regarded as evidence of BSI even if blood cultures are negative or were not taken).

*Note: In order to be consistent with BSI reporting in adults (including secondary BSI), the criterion 'the organism is not related to an infection at another site' was removed from the Neo-KISS definition for the purposes of the EU PPS.*
*Report the origin of the neonatal BSI in the field BSI origin.*
*If both the case definitions for NEO-LCBI and NEO-CNSB are matched, report NEO-LCBI.*

## NEO-CNSB: laboratory-confirmed BSI with coagulase-negative staphylococci (CNS)

- At least two of: temperature > 38 °C or < 36.5 °C or temperature instability, tachycardia or bradycardia, apnoea, extended recapillarisation time, metabolic acidosis, hyperglycaemia, other sign of BSI such as apathy;

and

- CNS is cultured from blood or catheter tip;

and

- patient has one of: C-reactive protein > 2.0 mg/dL, immature/total neutrophil ratio (I/T ratio) > 0.2, leukocytes < 5/nL, platelets <100/nL.

*Note: In order to be consistent with BSI reporting in adults (including secondary BSI), the criterion 'the organism is not related to an infection at another site' was removed from the Neo-KISS definition for the purposes of the EU PPS.*
*Report the origin of the neonatal BSI in the field BSI origin.*
*If both the case definitions for NEO-LCBI and NEO-CNSB are matched, report NEO-LCBI.*

### *NEO-PNEU: pneumonia*

- respiratory compromise;

and

- new infiltrate, consolidation or pleural effusion on chest X-ray;

and

- and at least four of: temperature > 38 °C or < 36.5 °C or temperature instability, tachycardia or bradycardia, tachypnoea or apnoea, dyspnoea, increased respiratory secretions, new onset of purulent sputum, isolation of a pathogen from respiratory secretions, C-reactive protein > 2.0 mg/dL, I/T ratio > 0.2.

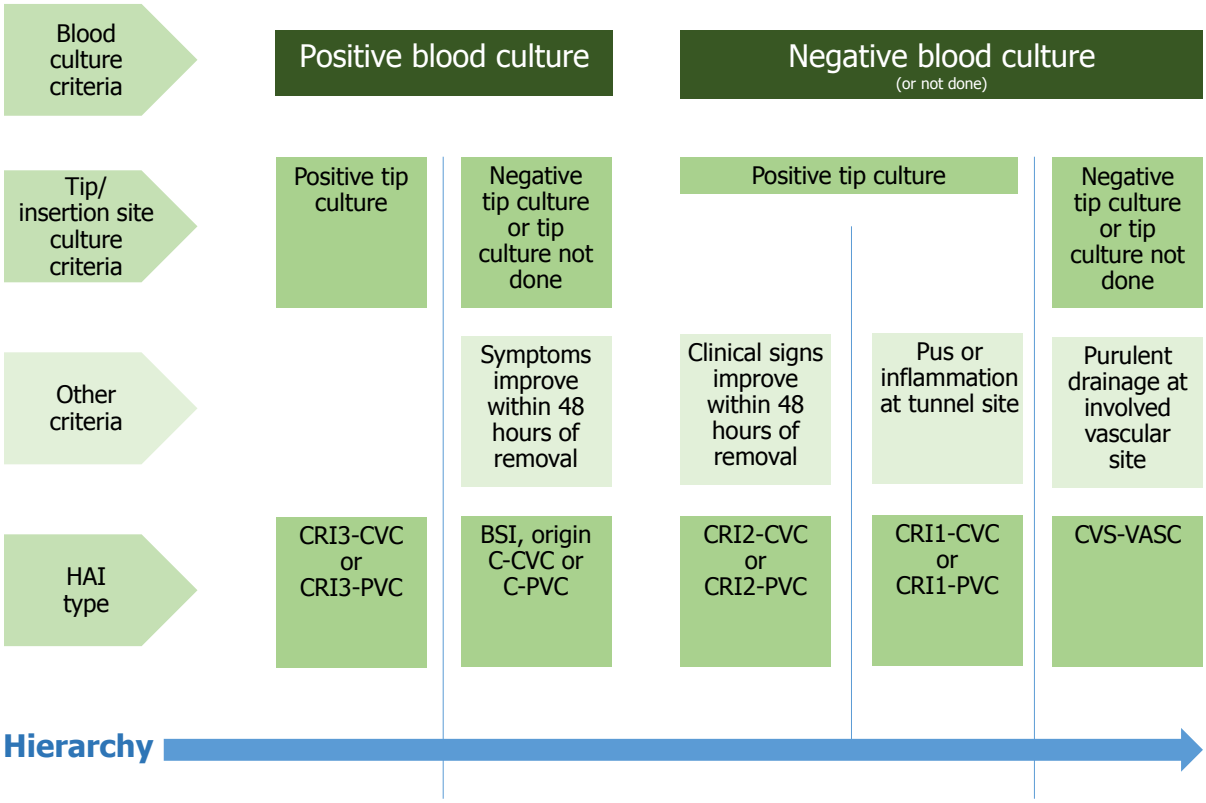
### *NEO-NEC: necrotising enterocolitis*

- Histopathological evidence of necrotising enterocolitis;

or

- at least one characteristic radiographic abnormality (pneumoperitoneum, pneumatosis intestinalis, unchanging 'rigid' loops of small bowel)
  plus at least two of the following without other explanation:
  vomiting, abdominal distention, prefeeding residuals, persistent microscopic or gross blood in stools.

## Algorithm for diagnosis of catheter-related infections




*Note: Arterial line is central or peripheral, depending on where it ends.*

# Microorganism code list

The microorganism code list is adapted from the original WHOCARE coding system. The current list (150 codes) is a selection of microorganisms based on their frequency of occurrence in healthcare-associated infections in different infection types and/or on their public health importance. Networks/countries preferring to use the complete WHOCARE list (currently 990 codes) may obtain the database from ECDC. The minimal list (32 codes, currently used by some countries for HAI surveillance) should not be used for the EU PPS.

## Microorganism code list (PPS selection), by category

| Family | Microorganism | Code |
|---|---|---|
| Gram + cocci | *Staphylococcus aureus* | STAAUR |
| | *Staphylococcus epidermidis* | STAEPI |
| | *Staphylococcus haemolyticus* | STAHAE |
| | Coagulase-negative staphylococci, not specified | STACNS |
| | Other coagulase-negative staphylococci (CNS) | STAOTH |
| | *Staphylococcus* spp., not specified | STANSP |
| | *Streptococcus pneumonia* | STRPNE |
| | *Streptococcus agalactiae* (B) | STRAGA |
| | *Streptococcus pyogenes* (A) | STRPYO |
| | Other haemolytic streptococci (C, G) | STRHCG |
| | *Streptococcus* spp., other | STROTH |
| | *Streptococcus* spp., not specified | STRNSP |
| | *Enterococcus faecalis* | ENCFAE |
| | *Enterococcus faecium* | ENCFAI |
| | *Enterococcus* spp., other | ENCOTH |
| | *Enterococcus* spp., not specified | ENCNSP |
| | Gram-positive cocci, not specified | GPCNSP |
| | Other Gram-positive cocci | GPCOTH |
| Gram – cocci | *Moraxella catharralis* | MORCAT |
| | *Moraxella* spp., other | MOROTH |
| | *Moraxella* spp., not specified | MORNSP |
| | *Neisseria meningitides* | NEIMEN |
| | *Neisseria* spp., other | NEIOTH |
| | *Neisseria* spp., not specified | NEINSP |
| | Gram-negative cocci, not specified | GNCNSP |
| | Other gram-negative cocci | GNCOTH |
| Gram + bacilli | *Corynebacterium* spp. | CORSPP |
| | *Bacillus* spp. | BACSPP |
| | *Lactobacillus* spp. | LACSPP |
| | *Listeria monocytogenes* | LISMON |
| | Gram-positive bacilli, not specified | GPBNSP |
| | Other gram-positive bacilli | GPBOTH |
| Enterobacteriaceae | *Citrobacter freundii* | CITFRE |
| | *Citrobacter koseri* (e.g. *diversus*) | CITDIV |
| | *Citrobacter* spp., other | CITOTH |
| | *Citrobacter* spp., not specified | CITNSP |
| | *Enterobacter cloacae* | ENBCLO |
| | *Enterobacter aerogenes* | ENBAER |
| | *Enterobacter agglomerans* | ENBAGG |
| | *Enterobacter sakazakii* | ENBSAK |
| | *Enterobacter gergoviae* | ENBGER |
| | *Enterobacter* spp., other | ENBOTH |
| | *Enterobacter* spp., not specified | ENBNSP |
| | *Escherichia coli* | ESCCOL |

| Family | Microorganism | Code |
|---|---|---|
| | *Klebsiella pneumonia* | KLEPNE |
| | *Klebsiella oxytoca* | KLEOXY |
| | *Klebsiella* spp., other | KLEOTH |
| | *Klebsiella* spp., not specified | KLENSP |
| | *Proteus mirabilis* | PRTMIR |
| | *Proteus vulgaris* | PRTVUL |
| | *Proteus* spp., other | PRTOTH |
| | *Proteus* spp., not specified | PRTNSP |
| | *Serratia marcescens* | SERMAR |
| | *Serratia liquefaciens* | SERLIQ |
| | *Serratia* spp., other | SEROTH |
| | *Serratia* spp., not specified | SERNSP |
| | *Hafnia* spp. | HAFSPP |
| | *Morganella* spp. | MOGSPP |
| | *Providencia* spp. | PRVSPP |
| | *Salmonella Enteritidis* | SALENT |
| | *Salmonella Typhi* or *Paratyphi* | SALTYP |
| | *Salmonella Typhimurium* | SALTYM |
| | *Salmonella* spp., not specified | SALNSP |
| | *Salmonella* spp., other | SALOTH |
| | *Shigella* spp. | SHISPP |
| | *Yersinia* spp. | YERSPP |
| | Other enterobacteriaceae | ETBOTH |
| | Enterobacteriaceae, not specified | ETBNSP |
| Gram – bacilli | *Acinetobacter baumannii* | ACIBAU |
| | *Acinetobacter calcoaceticus* | ACICAL |
| | *Acinetobacter haemolyticus* | ACIHAE |
| | *Acinetobacter lwoffii* | ACILWO |
| | *Acinetobacter* spp., other | ACIOTH |
| | *Acinetobacter* spp., not specified | ACINSP |
| | *Pseudomonas aeruginosa* | PSEAER |
| | *Stenotrophomonas maltophilia* | STEMAL |
| | *Burkholderia cepacia* | BURCEP |
| | *Pseudomonadaceae family,* other | PSEOTH |
| | *Pseudomonadaceae family,* not specified | PSENSP |
| | *Haemophilus influenza* | HAEINF |
| | *Haemophilus parainfluenzae* | HAEPAI |
| | *Haemophilus* spp., other | HAEOTH |
| | *Haemophilus* spp., not specified | HAENSP |
| | *Legionella* spp. | LEGSPP |
| | *Achromobacter* spp. | ACHSPP |
| | *Aeromonas* spp. | AEMSPP |
| | *Agrobacterium* spp. | AGRSPP |
| | *Alcaligenes* spp. | ALCSPP |
| | *Campylobacter* spp. | CAMSPP |
| | *Flavobacterium* spp. | FLASPP |
| | *Gardnerella* spp. | GARSPP |
| | *Helicobacter pylori* | HELPYL |
| | *Pasteurella* spp. | PASSPP |
| | Gram-negative bacilli, not specified | GNBNSP |
| | Other Gram-negative bacilli, non enterobacteriaceae | GNBOTH |
| Anaerobic bacilli | *Bacteroïdes fragilis* | BATFRA |

| Family | Microorganism | Code |
|---|---|---|
| | *Bacteroïdes* other | BATOTH |
| | *Clostridium difficile* | CLODIF |
| | *Clostridium* other | CLOOTH |
| | *Propionibacterium* spp. | PROSPP |
| | *Prevotella* spp. | PRESPP |
| | Anaerobes, not specified | ANANSP |
| | Other anaerobes | ANAOTH |
| Other bacteria | Mycobacterium, atypical | MYCATY |
| | *Mycobacterium tuberculosis* complex | MYCTUB |
| | *Chlamydia* spp. | CHLSPP |
| | *Mycoplasma* spp. | MYPSPP |
| | *Actinomyces* spp. | ACTSPP |
| | *Nocardia* spp. | NOCSPP |
| | Other bacteria | BCTOTH |
| Fungi | *Candida albicans* | CANALB |
| | *Candida glabrata* | CANGLA |
| | *Candida krusei* | CANKRU |
| | *Candida parapsilosis* | CANPAR |
| | *Candida tropicalis* | CANTRO |
| | *Candida* spp., other | CANOTH |
| | *Candida* spp., not specified | CANNSP |
| | *Aspergillus fumigatus* | ASPFUM |
| | *Aspergillus niger* | ASPNIG |
| | *Aspergillus* spp., other | ASPOTH |
| | *Aspergillus* spp., not specified | ASPNSP |
| | Other yeasts | YEAOTH |
| | Fungi other | FUNOTH |
| | Filaments other | FILOTH |
| | Other parasites | PAROTH |
| Viruses | Adenovirus | VIRADV |
| | Cytomegalovirus (CMV) | VIRCMV |
| | Enterovirus (polio, coxsackie, echo) | VIRENT |
| | Hepatitis A virus | VIRHAV |
| | Hepatitis B virus | VIRHBV |
| | Hepatitis C virus | VIRHCV |
| | Herpes simplex virus | VIRHSV |
| | Human immunodeficiency virus (HIV) | VIRHIV |
| | Influenza A virus | VIRINA |
| | Influenza B virus | VIRINB |
| | Influenza C virus | VIRINC |
| | Norovirus | VIRNOR |
| | Parainfluenzavirus | VIRPIV |
| | Respiratory syncytial virus (RSV) | VIRRSV |
| | Rhinovirus | VIRRHI |
| | Rotavirus | VIRROT |
| | SARS virus | VIRSAR |
| | Varicella-zoster virus | VIRVZV |
| | Virus, not specified | VIRNSP |
| | Other virus | VIROTH |
| Microorganism not identified | | _NONID |
| Examination not done | | _NOEXA |
| Sterile examination | | _STERI |

| Family | Microorganism | Code |
|---|---|---|
| Result not (yet) available or missing | | _NA |

*Note:*

*Negative microorganism codes: _NONID: evidence exists that a microbiological examination has been done, but the microorganism cannot be correctly classified; _NOEXA: no diagnostic sample taken, no microbiological examination done; _STERI: a microbiological examination has been done, but the result was negative (e.g. negative culture); _NA: the results of the microbiological examination are not yet available or cannot be retrieved.*

*If available, microbiological results should be reported for the active HAI on the survey date, covering the entire infection episode. Results which are not available on the survey date should not be waited for.*

# Antimicrobial resistance markers and codes

The method for collecting AMR marker data was modified to allow comparative analysis between ECDC ARHAI networks EARS-Net and HAI-Net.

**New method to collect AMR markers**

For each antimicrobial marker, indicate whether microorganism is susceptible (S), intermediate (I), resistant (R) or susceptibility unknown (UNK):

*Staphylococcus aureus*

- MRSA: Resistant to oxacillin (OXA) or other markers of methicillin-resistant *S. aureus* (MRSA), such as cefoxitin (FOX), cloxacillin (CLO), dicloxacillin (DIC), flucloxacillin (FLC), meticillin (MET)
- VRSA: Resistant to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)
- VISA: Intermediate to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)

*Enterococcus* spp.

- VRE: Resistant to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)

Enterobacteriaceae *(*Selection: *Escherichia coli, Klebsiella* spp.*, Enterobacter* spp.*, Proteus* spp.*, Citrobacter* spp.*, Serratia* spp., *Morganella* spp.*)*

- Third-generation cephalosporins (C3G): cefotaxime (CTX), ceftriaxone (CRO), ceftazidime (CAZ)
- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

*Pseudomonas aeruginosa*

- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

*Acinetobacter* spp.

- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

**Old (PPS I) method to collect AMR markers (still allowed, but not recommended)**

| Microorganisms | Codes | | | |
|---|---|---|---|---|
| | 0 | 1 | 2 | 9 |
| *Staphylococcus aureus* | Oxa- S MSSA | Oxa R MRSA | | Unknown |
| *Enterococcus* spp. | Gly-S | Gly-IR VRE | | Unknown |
| Enterobacteriaceae: Selection: *Escherichia coli, Klebsiella* spp.*, Enterobacter* spp.*, Proteus* spp.*, Citrobacter* spp.*, Serratia* spp., *Morganella* spp. | C3G-S, Car-S | C3G-IR, Car-S | C3G-IR, Car-IR | Unknown |
| *Pseudomonas* spp., *Acinetobacter* spp. | Car-S | Car-IR | | Unknown |

*Oxa=Oxacillin, Gly=glycopeptides (vancomycin, teicoplanin), C3G= third-generation cephalosporins (cefotaxim, cetriaxone, ceftazidim), Car=carbapenems (imipenem, meropenem, doripenem)*

If AMR markers are collected in accordance with the PPS I protocol methodology, report S (susceptible), IR (non-susceptible) or U (unknown), except for MRSA, report non-susceptibility to oxacillin (or equivalent) as R (resistant).

# Surgery categories

## NHSN surgery codes

Reference: NHSN operative procedure category mappings to ICD-9-CM codes, October 2010. Available from: www.cdc.gov/nhsn/PDFs/pscManual/9pscSSIcurrent.pdf.

| NHSN code | Operative procedure | Description | ICD-9-CM Codes |
|---|---|---|---|
| NHSN-AAA | Abdominal aortic aneurysm repair | Resection of abdominal aorta with anastomosis or replacement | 38.34, 38.44, 38.64 |
| NHSN-AMP | Limb amputation | Total or partial amputation or disarticulation of the upper or lower limbs, including digits | 84.00-84.19, 84.91 |
| NHSN-APPY | Appendix surgery | Operation of appendix (not incidental to another procedure) | 47.01, 47.09, 47.2, 47.91, 47.92, 47.99 |
| NHSN-AVSD | Shunt for dialysis | Arteriovenostomy for renal dialysis | 39.27, 39.42 |
| NHSN-BILI | Bile duct, liver or pancreatic surgery | Excision of bile ducts or operative procedures on the biliary tract, liver or pancreas (does not include operations only on gallbladder) | 50.0, 50.12, 50.14, 50.21-50.23, 50.25, 50.26, 50.29, 50.3, 50.4, 50.61, 50.69, 51.31-51.37, 51.39, 51.41-51.43, 51.49, 51.51, 51.59, 51.61-51.63, 51.69, 51.71, 51.72, 51.79, 51.81-51.83, 51.89, 51.9151.95, 51.99, 52.09, 52.12, 52.22, 52.3, 52.4, 52.51-52.53, 52.5952.6, 52.7, 52.92, 52.95, 52.96, 52.99 |
| NHSN-BRST | Breast surgery | Excision of lesion or tissue of breast including radical, modified, or quadrant resection, lumpectomy, incisional biopsy, or mammoplasty. | 85.12, 85.20-85.23, 85.31-85.36, 85.41-85.48, 85.50, 85.53, 85.54, 85.6, 85.70-85.76, 85.79, 85.93, 85.96 |
| NHSN-CARD | Cardiac surgery | Procedures on the valves or septum of heart; does not include coronary artery bypass graft, surgery on vessels, heart transplantation, or pacemaker implantation | 35.00 - 35.04, 35.10-35.14, 35.20-35.28, 35.31-35.35, 35.39, 35.42, 35.50, 35.51, 35.53, 35.54, 35.60-35.63, 35.7035.73, 35.81-35.84, 35.91-35.95, 35.98-35.99, 37.10, 37.11, 37.24, 37.31-37.33, 37.35, 37.36, 37.41, 37.49, 37.60 |
| NHSN-CEA | Carotid endarterectomy | Endarterectomy on vessels of head and neck (includes carotid artery and jugular vein) | 38.12 |
| NHSN-CBGB | Coronary artery bypass graft with both chest and donor site incisions | Chest procedure to perform direct revascularisation of the heart; includes obtaining suitable vein from donor site for grafting. | 36.10-36.14, 36.19 |
| NHSN-CBGC | Coronary artery bypass graft with chest incision only | Chest procedure to perform direct vascularisation of the heart using, for example the internal mammary (thoracic) artery | 36.15-36.17, 36.2 |
| NHSN-CHOL | Gallbladder surgery | Cholecystectomy and cholecystotomy | 51.03, 51.04, 51.13, 51.21-51.24 |
| NHSN-COLO | Colon surgery | Incision, resection, or anastomosis of the large intestine; includes large-tosmall and small-to-large bowel anastomosis; does not include rectal operations | 17.31-17.36, 17.39, 45.03, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 46.03, 46.04, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94 |
| NHSN-CRAN | Craniotomy | Incision through the skull to excise, repair, or explore the brain; does not include taps or punctures | 01.12, 01.14, 01.21-01.25, 01.28, 01.31, 01.32, 01.39, 01.41, 01.42, 01.51-01.53, 01.59, 02.11-02.14, 02.91-02.93, 07.51-07.54, 07.59, 07.61-07.65, 07.68, 07.69, 07.71, 07.72, 07.79, 38.01, 38.11, 38.31, 38.41, 38.51, 38.61, 38.81, 39.28 |
| NHSN-CSEC | Cesarean section | Obstetrical delivery by Cesarean section | 74.0, 74.1, 74.2, 74.4, 74.91, 74.99 |
| NHSN-FUSN | Spinal fusion | Immobilisation of spinal column | 81.00-81.08 |

| NHSN code | Operative procedure | Description | ICD-9-CM Codes |
|---|---|---|---|
| NHSN-FX | Open reduction of fracture | Open reduction of fracture or dislocation of long bones that requires internal or external fixation; does not include placement of joint prosthesis | 79.21, 79.22, 79.25, 79.26, 79.31, 79.32, 79.35, 79.36, 79.51, 79.52, 79.55, 79.56 |
| NHSN-GAST | Gastric surgery | Incision or excision of stomach; includes subtotal or total gastrectomy; does not include vagotomy and fundoplication | 43.0, 43.42, 43.49, 43.5, 43.6, 43.7, 43.81, 43.89, 43.91, 43.99, 44.15, 44.21, 44.29, 44.31, 44.38 - 44.42, 44.49, 44.5, 44.61-44.65, 44.68-44.69, 44.95-44.98 |
| NHSN-HER | Herniorrhaphy | Repair of inguinal, femoral, umbilical, or anterior abdominal wall hernia; does not include repair of diaphragmatic or hiatal hernia or hernias at other body sites. | 17.11-17.13, 17.21-17.24, 53.00 - 53.05, 53.10-53.17, 53.21, 53.29, 53.31, 53.39, 53.41-53.43, 53.49, 53.51, 53.59, 53.61-53.63, 53.69 |
| NHSN-HPRO | Hip prosthesis | Arthroplasty of hip | 00.70-00.73, 00.85-00.87, 81.51 - 81.53 |
| NHSN-HTP | Heart transplant | Transplantation of heart | 37.51-37.55 |
| NHSN-HYST | Abdominal hysterectomy | Removal of uterus through an abdominal incision | 68.31, 68.39, 68.41, 68.49, 68.61, 68.69 |
| NHSN-KPRO | Knee prosthesis | Arthroplasty of knee | 00.80-00.84, 81.54, 81.55 |
| NHSN-KTP | Kidney transplant | Transplantation of kidney | 55.61, 55.69 |
| NHSN-LAM | Laminectomy | Exploration or decompression of spinal cord through excision or incision into vertebral structures | 03.01, 03.02, 03.09, 80.50, 80.51, 80.53, 80.54, 80.59, 84.60-84.69, 84.80-84.85 |
| NHSN-LTP | Liver transplant | Transplantation of liver | 50.51, 50.59 |
| NHSN-NECK | Neck surgery | Major excision or incision of the larynx and radical neck dissection; does not include thyroid and parathyroid operations. | 30.1, 30.21, 30.22, 30.29, 30.3, 30.4, 31.45, 40.40-40.42 |
| NHSN-NEPH | Kidney surgery | Resection or manipulation of the kidney with or without removal of related structures | 55.01-55.02, 55.11, 55.12, 55.24, 55.31, 55.32, 55.34, 55.35, 55.39, 55.4, 55.51, 55.52, 55.54, 55.91 |
| NHSN-OVRY | Ovarian surgery | Operations on ovary and related structures | 65.01, 65.09, 65.12, 65.13, 65.2165.25, 65.29, 65.31, 65.39, 65.41, 65.49, 65.51-65.54, 65.61-65.64, 65.71-65.76, 65.79, 65.81, 65.89, 65.92-65.95, 65.99 |
| NHSN-PACE | Pacemaker surgery | Insertion, manipulation or replacement of pacemaker | 00.50-00.54, 17.51, 17.52, 37.7037.77, 37.79-37.83, 37.85-37.87, 37.89, 37.94-37.99 |
| NHSN-PRST | Prostate surgery | Suprapubic, retropubic, radical, or perineal excision of the prostate; does not include transurethral resection of the prostate. | 60.12, 60.3, 60.4, 60.5, 60.61, 60.62, 60.69 |
| NHSN-PVBY | Peripheral vascular bypass surgery | Bypass operations on peripheral arteries | 39.29 |
| NHSN-REC | Rectal surgery | Operations on rectum | 48.25, 48.35, 48.40, 48.42, 48.43, 48.49-48.52, 48.59, 48.61-48.65, 48.69, 48.74 |
| NHSN-RFUSN | Refusion of spine | Refusion of spine | 81.30-81.39 |
| NHSN-SB | Small bowel surgery | Incision or resection of the small intestine; does not include small-to-large bowel anastomosis. | 45.01, 45.02, 45.15, 45.31-45.34, 45.51, 45.61-45.63, 45.91, 46.01, 46.02, 46.20-46.24, 46.31, 46.39, 46.41, 46.51, 46.71-46.74, 46.93 |
| NHSN-SPLE | Spleen surgery | Resection or manipulation of spleen | 41.2, 41.33, 41.41-41.43, 41.5, 41.93, 41.95, 41.99 |

| NHSN code | Operative procedure | Description | ICD-9-CM Codes |
|---|---|---|---|
| NHSN-THOR | Thoracic surgery | Noncardiac, nonvascular thoracic surgery; includes pneumonectomy and diaphragmatic or hiatal hernia repair. | 32.09, 32.1, 32.20, 32.21-32.23, 32.25, 32.26, 32.29, 32.30, 32.39, 32.41, 32.49, 32.50, 32.59, 32.6, 32.9, 33.0, 33.1, 33.20, 33.25, 33.28, 33.31-33.34, 33.39, 33.41 - 33.43, 33.48, 33.49, 33.98, 33.99, 34.01-34.03, 34.06, 34.1, 34.20, 34.26, 34.3, 34.4, 34.51, 34.52, 34.59, 34.6, 34.81-34.84, 34.89, 34.93, 34.99, 53.80-53.84 |
| NHSN-THYR | Thyroid and/or parathyroid surgery | Resection or manipulation of thyroid and/or parathyroid | 06.02, 06.09, 06.12, 06.2, 06.31, 06.39, 06.4, 06.50-06.52, 06.6, 06.7, 06.81, 06.89, 06.91-06.95, 06.98, 06.99 |
| NHSN-VHYS | Vaginal hysterectomy | Vaginal hysterectomy; includes that by laparoscope | 68.51, 68.59, 68.71, 68.79 |
| NHSN-VSHN | Ventricular shunt | Ventricular shunt operations, including revision and removal of shunt | 02.2, 02.31-02.35, 02.39, 02.42, 02.43, 54.95 |
| NHSN-XLAP | Exploratory laparotomy | Procedures involving an incision through abdominal wall to gain access into the abdominal cavity; diagnostic procedure on abdominal region | 53.71-53.72, 53.75, 54.0, 54.11, 54.12, 54.19, 54.3, 54.4, 54.51, 54.59, 54.61, 54.63, 54.64, 54.71-54.75, 54.92, 54.93 |

*Report NHSN-codes even if the incision is not entirely closed at procedure's end (i.e. if wires or tubes extrude through the incision).*

## Examples of non-NHSN surgery

- Obstetrical procedures: peri-delivery/labour (one or more) ICD-9-CM 75.3 and 75.9.
- Dental extraction: ICD-9-CM code 23.1 Surgical removal.
- Transurethral resection of prostate
- Incision and drainage of abscess with secondary closure
- Any diabetic forefoot amputation with healing by secondary intention
- Any other operation where healing is by secondary intention
- Tonsillectomy
- Application of external fixator/Olizarov
- Extraventricular drain
- Hysteroscopic removal of fibroids: Evacuation of retained products of conception

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