TECHNICAL DOCUMENT

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

Protocol version 4.3
Full-scale survey
Codebook

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Contents

Abbreviations

A&E departments	Accident and emergency departments
AM	Antimicrobial/antimicrobial agent
AMR	Antimicrobial resistance
ATC	Anatomical Therapeutic Chemical classification system
AU	Antimicrobial use
BSI	Bloodstream infection
CDC	US Centres for Disease Control and Prevention
CDI	*Clostridium difficile* infection
CFU	Colony-forming units
CVC	Central vascular catheter
DSN	Dedicated surveillance network
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control
EEA	European Economic Area
EFTA	European Free Trade Association
ESAC	European surveillance of antimicrobial consumption
ESBL	Extended-spectrum beta-lactamase
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 Infections Surveillance Network
HALT	Healthcare-Associated Infections in Long-Term Care Facilities (ECDC-sponsored follow-up project to IPSE WP7)
HELICS	Hospitals in Europe Link for Infection Control through Surveillance
ICU	Intensive care unit
IPSE	Improving Patient Safety in Europe
LTCF	Long-term care facilities
LRT	Lower respiratory tract
MS	Member States
NHSN	National Healthcare Safety Network (CDC, Atlanta)
PPS	Point Prevalence Survey, also used to abbreviated the current survey
PVC	Peripheral vascular catheter
SPI	Structure and process indicators
SSI	Surgical site infections
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

In July 2008, the coordination of IPSE (Improving Patient Safety in Europe), the dedicated surveillance network for the surveillance of healthcare-associated infections (HAI) in Europe, was transferred to ECDC. The external ECDC evaluation of IPSE, which was part of the ECDC-IPSE transition plan, recommended that 'European HAI surveillance needed to cover other types of nosocomial infections besides surgical site infections and ICU-acquired infections in order to estimate and monitor the complete HAI disease burden' and 'since the implementation of an expanded continuous incidence surveillance is very resource demanding, hospital-wide prevalence surveys are efficient approaches to address it.'

Consequently, the next ECDC work plan included the elaboration of an agreed EU protocol for a point prevalence survey (PPS) of HAI in acute care hospitals. In 2008, ECDC carried out a review of 17 national or regional point prevalence surveys of HAI (and antimicrobial use) in European countries (see ECDC Annual Epidemiological Report 2008). From this analysis, it was evident that major methodological differences between the protocols made it impossible to compare or pool data at the EU level. This made clear the need for an agreed EU protocol.

A joint expert meeting on case definitions and integrated activities for surveillance of HAI, antimicrobial resistance and antibiotic use, held at ECDC from 20 to 22 January 2009, recommended that PPS for HAI and antibiotic use in hospitals – as performed by the ESAC (European Surveillance of Antimicrobial Consumption) hospital-PPS subproject – should be combined. The majority of participants at the January meeting also advocated the use of IPSE/HELICS case definitions for HAI in surveillance and PPS of HAI, and, if case definitions should be missing or incomplete, to complement them with CDC definitions. A concordance study between IPSE/HELICS and CDC/NHSN definitions was outsourced by ECDC, in order to estimate differences in case classification and provide the scientific background for the use of the HAI case definitions.

Further meetings on the European PPS protocol were held in Stockholm from 8 to 10 June 2009 (annual meeting of the HAI surveillance network), from 9 to 10 September 2009 (experts from all Member States with recent PPS experience) and from 24 to 25 February 2010. At the annual meeting of the HAI surveillance network from 7 to 9 June 2010 in Stockholm, the pilot PPS protocol was finalised and launched for piloting (June 2010 until October 2010). Based on the results of the pilot PPS, the final protocol for the full-scale PPS in Member States was established during a meeting on 6 October 2010 and at a conference jointly organised by the Belgian EU presidency (BAPCOC) and ECDC (PPS workshop from 8 to 10 November 2010). At the PPS workshop it was agreed that all Member States would perform a first national point prevalence survey during one of three possible periods (May–June 2011, September–October 2011, or May–June 2012) and that national PPSs would be conducted at least once every five years after that.

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. It also integrates the main variables of the ESAC hospital PPS protocol, thereby providing support to Council Recommendation 2002/77/EC of 15 November 2001 on the prudent use of antimicrobial agents in human medicine.

Version 4.2 of the protocol represented the final protocol for the full-scale point prevalence survey in 2011–2012.

The current version 4.3 contains some minor corrections, editorial changes and clarifications, all of which are specified in a separate document available on the ECDC HAI-Net Extranet.

Objectives

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

- to estimate the total burden (prevalence) of HAI 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 disseminate results to those who need to know at local, regional, national and EU level how
  - to raise awareness;
  - to train and reinforce 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 hospitals[1] 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 according to national definitions. There is no minimal size of hospitals.

Wards

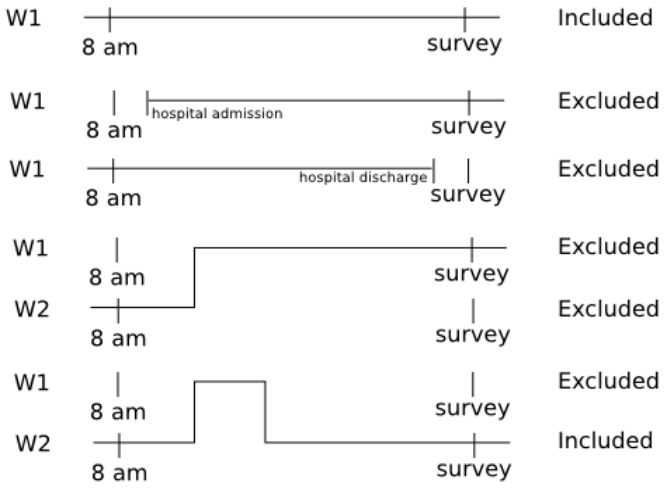
- Include all acute care wards in acute care facilities (e.g. acute psychiatric wards and neonatal ICUs are included).
- Excluded are:
  - long-term care wards in acute care facilities (e.g. nursing homes, spinal injury care);
  - accident and emergency departments (except for wards attached to A&E departments 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*). Include long-term care patients in acute care wards unless more than 20% of the patients in the acute care ward are long-term care patients.
- 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

Notes

- 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 (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 theoretically 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 to estimate an anticipated prevalence of 7% 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 (see below).

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 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 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

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 from the pilot PPS data with the Stata 10 software package (using the survey prefix command 'syv') and was higher than expected compared with earlier results from the national point prevalence surveys ($DEFF_{pPPS}$=5.4 for a mean hospital size of 287, compared with DEFF=2.8 as estimated earlier). Further simulations on subsamples of the pilot PPS database allowed estimating the design effect for different mean hospital sizes (Figure 2).

Figure 2. Variation of the design effect (DEFF) by cluster size (average acute care hospital size), based on subsamples of different average hospital sizes in the pilot PPS database

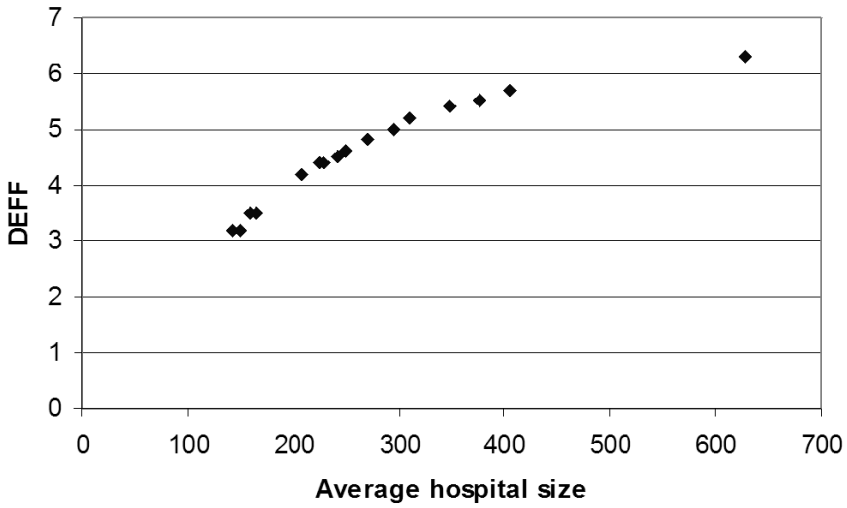


Table 1 below shows the sample size of patients and hospitals for countries that provided the national denominator data during the pilot PPS, using estimated design effects for different average hospital sizes.

Table 1. Number of hospitals and patients needed to estimate an HAI prevalence of 7% (6–8%), with design effect depending on average acute care hospital size by country*

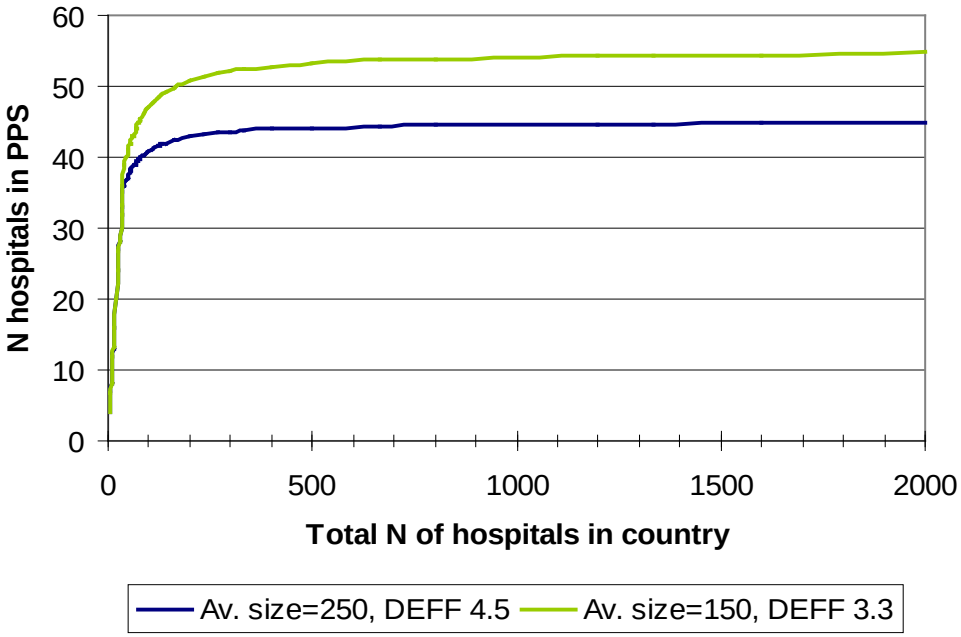
	Number of beds in acute care hospitals	Number of acute care hospitals	Average hospital size	Estimated DEFF	Needed sample size **	Number of hospitals to be included in the PPS
Belgium	28481	201	142	3.2	7357	52
Bulgaria	35980	241	149	3.2	7483	50
Croatia	16161	43	376	5.5	11912	32
Cyprus	*1319*	*8*	*165*	*3.5*	*1319*	*8*
Czech Republic	*7676*	*19*	*404*	*5.7*	*7676*	*19*
Estonia	*6540*	*29*	*226*	*4.4*	*6540*	*29*
France	246633	1560	158	3.5	8665	55
Germany	503000	2080	242	4.5	11198	46
Hungary	43734	87	502	6	14191	28
Lithuania	23553	94	251	4.6	10400	42
Luxembourg	*2282*	*11*	*207*	*4.2*	*2282*	*11*
Malta	*1551*	*5*	*310*	*5.2*	*1551*	*5*
Portugal	24104	89	271	4.8	10876	40
Slovenia	*8000*	*23*	*348*	*5.4*	*8000*	*23*
Slovakia	33648	114	295	5	11640	39
Spain	131582	576	228	4.4	10799	47

** Based on data provided during the pilot PPS in 2010.*

*** Sample size calculations were made using the OpenEpi software* (www.openepi.com) *sample size for proportions; DEFF=design effect, estimated from pilot PPS database for different average hospital sizes using Stata 10; countries in italics need to include all hospitals.*

Figure 3 shows the number of hospitals needed as a function of the number of hospitals in the country for two different average hospital sizes and the corresponding DEFF for the estimation of an expected HAI prevalence of 7% with a precision of +/- 1%. For example, a country with 200 hospitals with an average number of beds of 250 would need to include 43 hospitals (total of 10718 patients) in the PPS. This would allow an estimation at the national/regional level of a 7% HAI prevalence with a precision of +/- 1% (7% [6-8]), and an estimation of an antimicrobial use prevalence of 35% with a precision of +/-4.2% (35% [30.8-39.2]).

Figure 3. Number of hospitals needed to estimate an HAI prevalence of 7% (+/-1%) for average hospital sizes 250 (design effect 4.5) and 150 (design effect 3.3)



Non-representative samples and reporting of results

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 'convenience' sampling (selection of hospitals by the PPS coordinating centre), voluntary participation after invitation of all hospitals, 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 a country submits data from hospitals recruited exclusively through a non-representative method (so none of the hospitals belongs to a representative sample), and the number of hospitals exceeds the calculated needed number for that country, 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.

Data collection

The data collection includes variables at the national, hospital 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 versions, hospital data 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 that the survey in these units is conducted 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 (project outsourced to the Health Protection Agency, London; contract ECD. 1842). This material consists of a one-day course (potentially for larger groups) and a more in-depth five-day course which includes basic epidemiological concepts and data analysis. It is recommended that national/regional PPS coordinators organise at least a one-day information and training session for hospitals participating in a full-scale 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. If more than one hospital participates, data from different hospitals are appended by the national coordination centres. National centres will then submit the national database to ECDC, using ECDC's TESSy system, after which online reports will be available (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 types of protocol:

Standard (patient-based) protocol

- Hospital data (**Form H**): one form per hospital per PPS.
- 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 patient, infected or not; 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.

Light (unit-based) protocol

- Hospital data (**Form H**): one form per hospital per PPS.
- Denominator data (**Form B2**): one form per ward (for all patients present in the ward at 8 a.m. and not discharged at the time of the survey).
- Numerator data (**Form B1**): 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.

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.

Figure 4. Hospital data (Form H)

ECDC prevalence survey of healthcare-associated infections and antimicrobial use

Form H. **Hospital data**

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; please indicate specialisation type: _____

Below: To be filled in/checked by national coordinator

Is the hospital part of a national representative sample of hospitals? ☐ No ☐ Yes ☐ Unknown

	Number	Year data	Inc. wards/ Total (1)
No. of discharges/admissions in year			Inc=Tot
No. of patient days in year			
Alcoholic hand rub consumption liters/year			Inc=Tot
No. of patient rooms in hospital			Inc=Tot
No. of single patient rooms in hospital			
No. of FTE infection control nurses			Inc=Tot
No. of FTE infection control doctors			

(1) Data were collected for included wards (**Inc** = recommended) or for the total hospital (**Tot**); if all wards were included in PPS (Inc Tot), mark "Inc".
FTE = full-time equivalent

Data apply to: ☐ Single hospital or hospital site
☐ Hospital trust or chain

PPS Protocol: ☐ Standard ☐ Light

Comments/observations: _____
_____
_____
_____

Definition of hospital data

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

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

Number of acute care beds. Number of acute care beds in the hospital (according 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.

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 group/trust if data are reported separately by hospital site.

Definition of hospital type

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

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 alcohol 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).

Total number of patient rooms. Total number of rooms in included wards or total for hospital. Data from current 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 single patient rooms. Total number of single-bed rooms in included wards OR total for hospital. Please ensure that both the total number of patient rooms and the number of single patient rooms are collected for the same year and for the same wards (included wards only OR total for hospital)".

Number of FTE infection control nurses. Number of full-time equivalent (FTE) infection control nurses in 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. (see TRICE project report). 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 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. (see TRICE project report). 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.

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: **Inc**, this is the recommended case) or for the entire hospital (code: **Tot**); if all wards are included in the PPS (Inc=Tot), mark 'Inc'; to be specified for each variable.

Hospital site or trust. Data apply to a single hospital (hospital with a single address, or a hospital site belonging to a trust) OR an administrative group of hospitals (including entities referred to as 'trusts', `fusions' or 'chains').

Comments. Free text, comments, maximum 255 characters.

Hospital is part of national representative sample. 'Yes' if the hospital is part of a national representative sample of hospitals (if yes and 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). Field to be filled in (or at least checked) by the national/regional PPS coordinator.

Other hospital variables to be added by PPS coordinating centre before submission to ECDC's TESSy system

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 (Annex 2).

DateUsedForStatistics. Start date of the survey in the hospital; this date allows distinguishing 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 empty, a new record is entered into the database.

NetworkId. Unique identifier for each surveillance network, selected and generated by Member State, e.g. EN, NI, SC, WA for UK 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.

Denominator data

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. They can be collected in two different ways (protocol options): patient-based (standard protocol) or unit-based (light protocol, aggregated data by ward and if available by patient specialty). During the pilot PPS, the patient-based protocol (average time per 100 patients: five working days including data entry) was shown to provide a more precise risk adjustment than the unit-based one (average time per 100 patients: four working days including data entry). The collection of patient-based denominator data including patient risk factors is the recommended method because it allows advanced risk-adjusted analysis of results (standardised infection ratio, standardised antimicrobial use ratio).

Option A. Patient-based denominator data and risk factors (standard protocol)

Patient denominator data 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 5. Patient-based risk factors (Form A): one form per patient, antimicrobial use and HAI data collected on same form

ECDC prevalence survey of healthcare-associated infections and antimicrobial use

Form A. **Patient-based data (standard protocol)**

Patient data (to collect for all patients)

Hospital code

Ward name (abbreviated)/Unit ID

Ward specialty

Survey date: ___ / ___ / _____ (*dd/mm/yyyy*)

Patient counter: _____

Age in years: ____ years; age if < 2 years 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 O Unknown

McCabe score:

O Non-fatal disease O Ultimately fatal disease
O Rapidly fatal disease O Unknown

Central vascular catheter: O No O Yes O Unk

Peripheral vascular catheter: O No O Yes O Unk

Urinary catheter: O No O Yes O Unk

Intubation: O No O Yes O Unk

Patient receives **antimicrobial(s)**(1): O No O Yes O Unk

Patient has **active HAI**(2): O No O Yes O Unk

IF YES

Antimicrobial (generic or brand name)	Route	Indication	Diagnosis (site)	Reason in notes

Route: P: parenteral, O: oral, R: rectal, I: inhalation. **Indication**: CI - LI - HI: treatment intention for community-acquired (CI), long-/intermediate-term care-acquired (LI), or acute hospital-acquired infection (HI); surgical prophylaxis: SP1: single dose, SP2: one day, SP3: > one day; MP: medical prophylaxis; O: other; UI: unknown indication. **Diagnosis:** see site list, only for treatment intention. **Reason in notes:** Y/N.

	HAI 1		HAI 2		HAI 3	
Case definition code						
Relevant device in situ before onset(3)	O Yes O No O Unknown		O Yes O No O Unknown		O Yes O No O Unknown	
Present at admission	O Yes O No		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		O current hospital O other hospital O other origin/unk	
If BSI: source(5)						
	MO code	R(6)	MO code	R(6)	MO code	R(6)
Microorganism 1						
Microorganism 2						
Microorganism 3						

(1) At the time of the survey, except for surgical prophylaxis 24 hours before 8 a.m. on the day of the survey; if yes, fill in antimicrobial use data; (2) [infection with onset ≥ Day 3, OR SSI criteria met (surgery in previous 30 days/1 year), OR discharged from acute care hospital < 48 hours 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 in HAI data.

(3) Relevant device use (intubation for PN, CVC/PVC for BSI, urinary catheter for UTI) within 48 hours before onset of infection (even intermittent use), seven days for UTI. (4) Only for infections not present/active at admission (dd/mm/yyyy). (5) C-CVC, C-PVC, S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH, UO, UNK. (6) AMR marker 0, 1, 2 or 9, see table.

Definition of patient-based denominator data

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. 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 specialty code list.

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).

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.

Age in months. Patients 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 the physician in charge of the patient or main specialty for which the patient was admitted to the hospital; may differ from ward specialty, see specialty code list.

Notes:

- If the consultant specialty differs from the patient specialty, give priority to the patient specialty.
- If the patient is admitted to the intensive care unit, the use of ICU codes is preferred for consultant/patient specialty; e.g. use ICUSUR instead of SURCV for a cardiovascular surgery patient in a mixed ICU.

Surgery since admission. Patient has undergone surgery during current hospitalisation. Surgery is defined as a procedure 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, NHSN surgery (ICD9-CM code of the intervention is listed for the surveillance of surgical site infections in the NHSN system, see codebook); yes, minimal invasive/non-NHSN surgery (examples see codebook); unknown.

McCabe score. Classification of the severity of underlying medical conditions. Disregard the influence of acute healthcare-associated 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
- Alzheimers/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

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, common 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.
- 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. Central line-associated bloodstream infection (CLABSI) event. June 2010. 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 time 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 as GOOBS unless specifically under care of PEDNEO/PEDGEN/ICUNEO.
  - Register ward specialty as MIX if GOOBS/PEDNEO with less than 80% of one patient specialty.
- Obstetrics: in 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.

Option B. Unit-based denominator data (light protocol)

The collection of unit-based (aggregated) denominator data per ward is less labour-intensive than patient-based data collection, but it strongly limits the possibilities for comparing results between hospitals, regions and countries.

Ward denominator data only collect the ward type and the number of patients present on the survey date. The ward type stands for the main specialty of the ward (≥ 80% of the patients require this specialty; if not, report 'mixed ward'). If available, the denominators should be collected separately for each consultant/patient specialty.

Figure 6. Aggregated denominator data by ward, light protocol (Form B1)

ECDC prevalence survey of healthcare-associated infections and antimicrobial use

Form B1. **Ward denominator data (light protocol)**

Survey date[1]: ___ / ___ / _____(dd/mm/yyyy) **Hospital code**

Ward name (abbreviated)/Unit ID **Ward specialty**[2]

Total number of patients in ward[3]

Number of patients by consultant/patient specialty:

Consultant/patient specialty	Number of patients in ward[3]

[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 ward.

[3] Admitted to the ward before or at 8 a.m. and not discharged from the ward at time of the survey.

Definition of aggregated denominator data by ward (light protocol)

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.

Ward name (abbreviated)/unit ID. Unique identifier for each unit (abbreviated ward name) within a hospital; should be used consistently on all forms (link with HAI/AU data) and should remain unchanged in different PPS periods/years.

Ward specialty. Main ward specialty (≥ 80% of patients require this specialty). If less than 80%, report 'mixed ward' (MIX).

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.

Consultant/patient specialty.

Specialty of the physician in charge of the patient or main specialty for which the patient was admitted to the hospital; may differ from ward specialty, see specialty code list.

Notes:

- If the consultant specialty differs from the patient specialty, give priority to the patient specialty.
- If the patient is admitted to the intensive care unit, the use of ICU codes is preferred for consultant/patient specialty; e.g. use ICUSUR instead of SURCV for a cardiovascular surgery patient in a mixed ICU.

Number of patients by consultant/patient specialty. 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.

Antimicrobial use data and HAI data

Only collect information if the patient receives antimicrobials 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 hospital stay (current or another hospital).

The use of antimicrobials will often lead to the detection of an HAI. Some patients may have a healthcare-associated infection 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 healthcare-associated infections (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 2nd level of class J01 antibacterials, J02 antifungals; ATC 4th level A07AA, P01AB, D01BA; ATC 5th level 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 ATC 5th level 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.

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.
- 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 two days after a previous discharge from 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 a year of the operation) and the patient either has symptoms that meet the case definition and/or is on antimicrobial treatment for that infection;
  - 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;
  - an invasive device was placed on Day 1 or Day 2, resulting in an HAI before Day 3.
- Results of tests/examinations that are not 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.
- **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. See: 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 (see code lists, overview and HAI case definitions in codebook, see Annex 2), CVS-VASC. 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]).

Relevant device in situ before onset: yes/no/unknown. To be specified for PN, BSI/NEO-LCBI and UTI only. Yes=Relevant invasive device was in situ (even intermittently) in 48 hours (seven days for UTI) before onset of the infection, i.e. intubation for pneumonia, central/peripheral vascular catheter for bloodstream infections, urinary catheter for UTI; Unk=unknown; this variable allows applying the CDC definition of device-associated infection (see: T.C. Horan 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. Yes=Signs and symptoms of the infection were present at admission to the hospital; if not, provide date of 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 e.g. for infections with an onset after day 2 of the current hospitalisation (= HAI by definition), for which the surveyor does not agree that it is 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.

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; A secondary BSI is reported as a 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.

Resistance phenotype. Specify susceptibility to selected antimicrobial resistance marker depending on microorganism – code 0, 1, 2 or 9, see Table 2.

Table 2. Antimicrobial resistance markers and codes

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

Oxa=Oxacillin. Gly=Glycopeptides (vancomycin, teicoplanin), C3G=Cephalosporins of the third generation (cefotaxime, cetriaxone, ceftazidime), Car=carbapenems (imipenem, meropenem, doripenem – not ertapenem)

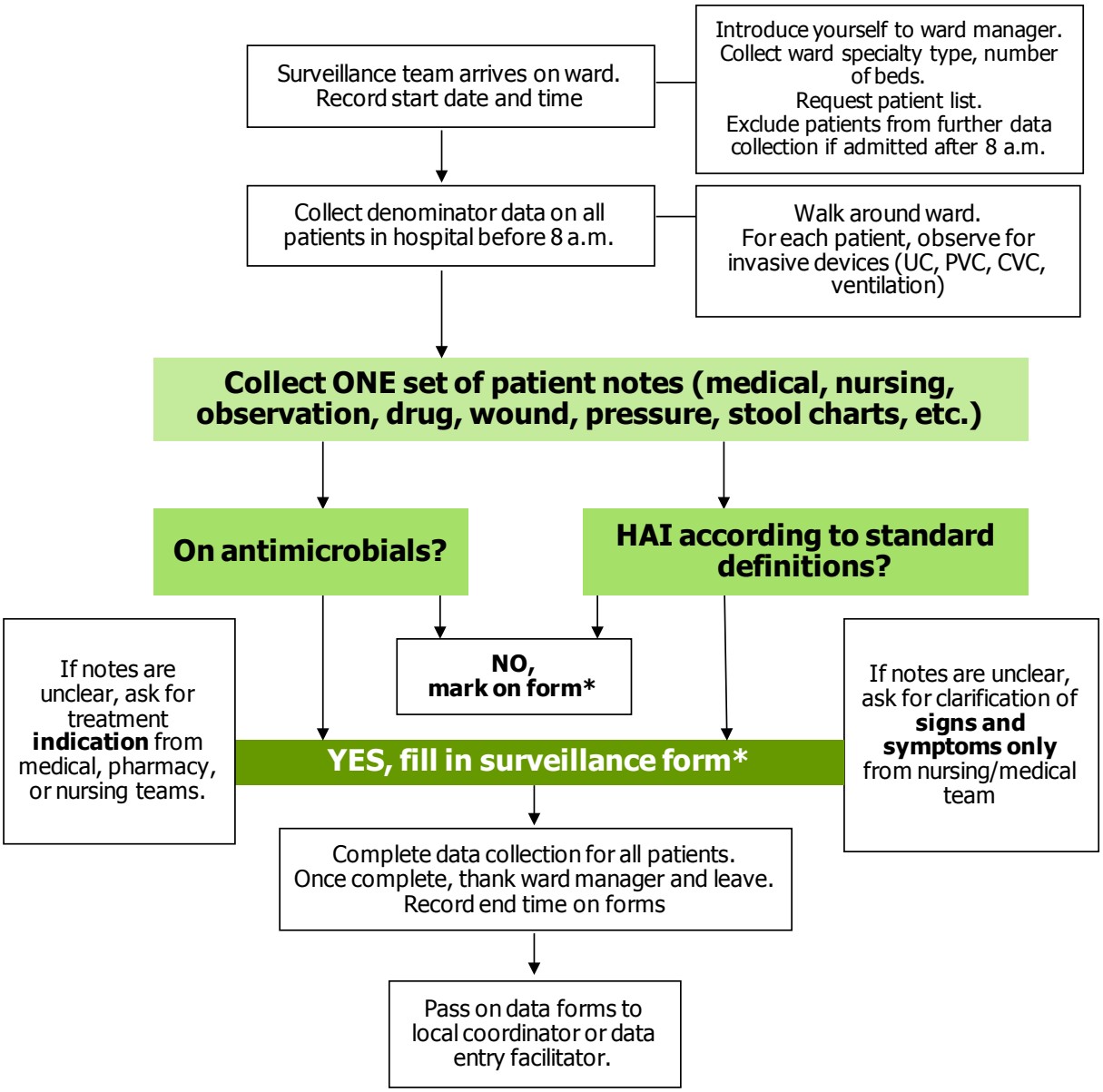
S=susceptibility; R=resistant; intermediate susceptibility (I) must be interpreted as 'non susceptible' and classified as R.

** Antimicrobial resistance markers are not collected for other Enterobacteriaceae (Hafnia* spp., *Salmonella* spp., *Shigella* spp., *Yersinia* spp., *other)*

Note: Report C3G-R Enterobacteriaceae which are resistant to ertapenem but sensitive to meropenem as carbapenem-sensitive (resistance code 1) unless the presence of carbapenemases was phenotypically or genotypically confirmed.

Recommended case-finding algorithm for healthcare-associated infections

Figure 7. 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 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.

Ward name (abbreviated)/unit ID. Abbreviated name of hospital ward: essential for linking between denominator and HAI/AU data; should be used consistently on all forms and should remain unchanged 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.

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

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

Age in months. Patients 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; may differ from ward specialty, see specialty code list.

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 8. Antimicrobial use and HAI data form, light protocol (Form B2)

ECDC prevalence survey of healthcare-associated infections and antimicrobial use

Form B2. **Antimicrobial use and HAI data (light protocol)**

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

Hospital code

Ward name (abbreviated)/Unit ID

Patient counter: _____

Age in years: ____ years; age if < 2 years old: _____ months

Sex: M F

Date of hospital admission: ___ / ___ / _____ *(dd/mm/yyyy)*

Consultant/patient specialty:

Patient receives **antimicrobial(s)**(1): O No O Yes

Patient has **active HAI**(2): O No O Yes

IF YES

(1) At the time of the survey, except for surgical prophylaxis 24 hours before 8 a.m. on the day of the survey; if yes, fill antimicrobial use data; (2) [infection with onset ≥ Day 3, OR SSI criteria met (surgery in previous 30 days/1year), OR discharged from acute care hospital < 48 hours 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 in HAI data.

Antimicrobial (generic or brand name)	Route	Indication	Diagnosis (site)	Reason in notes

Route: P: parenteral, O: oral, R: rectal, I: inhalation. **Indication**: CI - LI - HI: treatment intention for community-acquired (CI), long-/intermediate-termcare-acquired (LI), or acute hospital-acquired infection (HI); surgical prophylaxis: SP1: single dose, SP2: one day, SP3: > 1day; MP: medical prophylaxis; O: other; UI: unknown indication. **Diagnosis**: see site list, only for treatment intention. **Reason in notes**: Y/N.

	HAI 1		HAI 2		HAI 3	
Case definition code						
Relevant device in situ before onset(3)	O Yes O No O Unknown		O Yes O No O Unknown		O Yes O No O Unknown	
Present at admission	O Yes O No		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		O current hospital O other hospital O other origin/unk	
If BSI: source(5)						
	MO code	R(6)	MO code	R(6)	MO code	R(6)
Microorganism 1						
Microorganism 2						
Microorganism 3						

(3) Relevant device use (intubation for PN, CVC/PVC for BSI, urinary catheter for UTI) within 48 hours before onset of infection (even intermittent use), seven days for UTI; (4) Only for infections not present/active at admission (dd/mm/yyyy); (5) C-CVC, C-PVC, S-PUL, S-UTI, S-DIG, S-SSI, S-SST, S-OTH, UO, UNK; (6) AMR marker 0,1,2 or 9; see table.

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 HAI and AB use in acute care hospitals.
- To collect information about the sampling methodology used at the national level.
- The national questionnaires also include national structure and process indicators in line with the Council Recommendation of 9 June 2009 on patient safety, including the prevention and control of healthcare-associated infections (2009/C 151/01).

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 in TESSy (ECDC's surveillance system) or uploaded (one record).

Figure 9. National/regional data (Form N)

ECDC prevalence survey of healthcare-associated infections and antimicrobial use

Form N. **National/regional data**

Country code: _____ Network ID/data source: _____

Start date PPS: __ / __ /____ (dd/mm/yyyy)

National/regional PPS coordination centre/institute:

_____

National/regional PPS coordination programme/unit:

Name: _____

Website: _____

	Number	Year data
Total no. of acute care hospitals (sites)		
No. of hospital trusts or chains		
Total no. of beds in acute care hospitals		
Total no. of acute care beds		
No. of discharges/admissions, all		
No. of discharges/admissions, acute care beds only		
No. of patient days, all		
No. of patient days, acute care beds only		

Method of sampling/recruitment of hospitals (more than one 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 the 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, according to national/regional definition of acute care hospitals.

Number of hospital mergers ('trusts'). Total number of hospital mergers or trusts (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 systematic random 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): 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 participating hospitals), both for the light (unit-based) and standard (patient-based) protocols.

Number of hospitals submitted to ECDC. Number of hospitals for which data are submitted to ECDC, 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

The definition of the PPS data structure and variables for the files to be uploaded to TESSy is defined in internal documents and available on request from ECDC, the TESSy website, or the HAI-Net extranet. The structure is similar to the structure for the surveillance of surgical site infections (HAISSI) and surveillance of ICU-acquired infections (HAIICU) 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. 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

- HAIPPS (1st level) Hospital data, one record per hospital
- HAIPPS$PT (2nd level) Patient data, one record per patient
- HAIPPSPTAM (3rd level) Antimicrobial use data, one record per antimicrobial agent-route indication
- HAIPPSPTINF (3rd level) Healthcare-associated infection data, one record per HAI site
- HAIPPSPTINF$RES (4th level) Microorganism and antimicrobial resistance data for healthcare-associated infections

Light protocol

- HAIPPSLIGHT (1st level) Hospital data, one record per hospital
- HAIPPSLIGHT$DENO (2nd level) Ward denominator data, one record per patient
- HAIPPSLIGHT$DENO$AM (3rd level) Antimicrobial use data, one record per antimicrobial agent-route indication
- HAIPPSLIGHT$DENO$INF (3rd level) Healthcare-associated infection data, one record per HAI site
- HAIPPSLIGHT$DENO$INF$RES (4th level) Microorganism and antimicrobial resistance data for healthcare-associated infections

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

Note on microorganism and resistance data (for PPS coordination only): The TESSy format of the microorganism and resistance data follows the bug-drug structure as in EARS-Net, HAISSI and HAIICU and does not have the same structure as on the PPS data collection forms. The reasons for this difference are 1) consistency with other data in TESSy and 2) to allow for changes in antimicrobial markers in future versions of the PPS protocol.

The PPS antimicrobial marker data can be converted to the 4th level TESSy format as illustrated in the following table.

Table 3. Conversion chart: 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	R
	ENCFAI	9	⇒	ENCFAI	GLY	UNK
Enterobacteriaceae*, e.g. *Klebsiella pneumoniae* (KLEPNE)	KLEPNE	0	⇒	KLEPNE	C3G	S
				KLEPNE	CAR	S
	KLEPNE	1	⇒	KLEPNE	C3G	R
				KLEPNE	CAR	S
	KLEPNE	2	⇒	KLEPNE	C3G	R
				KLEPNE	CAR	R
	KLEPNE	9	⇒	KLEPNE	C3G	UNK
				KLEPNE	CAR	UNK
Pseudomonas aeruginosa (PSEAER)	PSEAER	0	⇒	PSEAER	CAR	S
	PSEAER	1	⇒	PSEAER	CAR	R
	PSEAER	9	⇒	PSEAER	CAR	UNK
Acinetobacter baumannii (ACIBAU)	ACIBAU	0	⇒	ACIBAU	CAR	S
	ACIBAU	1	⇒	ACIBAU	CAR	R
	ACIBAU	9	⇒	ACIBAU	CAR	UNK

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

Acknowledgements

Participating to PPS protocol meetings

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

- PPS working group at the 2009 Annual HAI Surveillance Meeting, 8 to 10 June 2009, ECDC, Stockholm
- PPS expert meeting, 8 and 9 September 2009, ECDC, Stockholm
- PPS expert meeting, 24 and 25 February 2010, ECDC, Stockholm
- Two PPS working groups at the 2010 Annual HAI Surveillance Meeting, 7 to 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 to 10 November 2011
- Teleconference meetings, on sample design, as well as during and after the pilot PPS with the pilot PPS support team
- HAI coordination group meeting, Prague, 3 and 4 March 2010

In total, 108 experts from all 27 Member States (83 experts) participated in the meetings. Also represented in these meetings were four candidate or potential candidate countries, the European Society of Intensive Care Medicine, the WHO Regional Office for Europe (2), CDC Atlanta (2), the ESAC project and several ECDC experts.

The following 61 experts participated in two meetings or more.

Country	Name	Institution
Austria	Alexander Blacky	Medical University Vienna, Vienna
Belgium	Karl Mertens	Scientific Institute of Public Health (WIV/ISP), Brussels
	Mat Goossens	
	Sofie Vaerenberg	
Bulgaria	Rossitza Vatcheva-Dobrevska	National Centre of Infectious and Parasitic Diseases, Sofia
Croatia	Zrinka Bosnjak	University Hospital Centre, Zagreb
Cyprus	Avgi Hadjiloucas	Ministry of Health
Czech Republic	Miroslava Girod Schreinerova	Ministry of Health, Department of Epidemiology, Prague
	Jan Šturma	National Institute of Public Health (NIPH), Prague
	Vlastimil Jindrák	Homolka Hospital, Prague
Denmark	Christian Stab Jensen	Statens Serum Institute, Copenhagen
	Elsebeth Tvenstrup Jensen	
Estonia	Pille Märtin	West-Tallinn Central Hospital, Tallinn
Finland	Outi Lyytikäinen	National Institute for Health and Welfare, Helsinki
France	Bruno Coignard	National Institute for Public Health Surveillance (InVS), Paris
Germany	Sonja Hansen	Institut für Hygiene und Umweltmedizin, Charité-Universitätsmedizin, Berlin
	Brar Piening	
	Petra Gastmeier	
Greece	Achilleas Gikas	University of Crete, Heraklion
Hungary	Karolina Böröcz	National Centre for Epidemiology, Budapest
	Emese Szilágyi	
Ireland	Fidelma Fitzpatrick	Health Protection Surveillance Centre (HPSC), Dublin
Italy	Maria Luisa Moro	Agenzia Sanitaria e Sociale Regionale dell'Emilia-Romagna, Bologna
	Davide Resi	
Latvia	Uga Dumpis	Stradins University Hospital, Riga
	Elina Dimiņa	
	Jelena Galajeva	Infectiology Center of Latvia, Riga
Lithuania	Rolanda Valinteliene	Institute of Hygiene, Vilnius
	Ramute Budginaite	
Malta	Elizabeth Anne Scicluna	Mater Dei Hospital, Msida MSD

Country	Name	Institution
Netherlands	Birgit Van Benthem	National Institute for Public Health and the Environment (RIVM), Bilthoven
Norway	Janne Møller-Stray	Norwegian Institute of Public Health, Oslo
Poland	Tomasz Ozorowski	Poznan Medical University
	Waleria Hryniewicz	National Medicines Institute, Warsaw
Portugal	Ana Cristina Costa	Directorate General of Health, Lisbon
	Maria Elena Noriega	
Romania	Roxana Serban	National Institute of Public Health, Bucharest
Slovakia	Slavka Litvová	Regional Public Health Authority, Trencin
Slovenia	Jana Kolman	National Institute of Public Health, Ljubljana
	Irena Klavs	
Spain	Josep Vaque Rafart	Hospital Vall d'Hebron, Barcelona
	Angel Asensio Vegas	Clinica Universitaria Puerta de Hierro, Madrid
Sweden	Mats Erntell	Swedish Strategic Programme Against Antibiotic Resistance (STRAMA), Stockholm
UK, England	Susan Hopkins	Health Protection Agency, London
	Jennie Wilson	
UK, Northern Ireland	Gerry McIlvenny	Northern Ireland Healthcare-associated Infection Surveillance Centre, Belfast
UK, Scotland	Jacqueline Reilly	Health Protection Scotland, Glasgow
	Shona Cairns	
ESAC/Belgium	Herman Goossens	University of Antwerp, Antwerp
ESAC/Malta	Peter Zarb	University of Antwerp, Antwerp/Mater Dei Hospital, Msida MSD
ESAC	Arno Muller	University of Antwerp, Antwerp
USA/CDC Atlanta	Shelley Magill	Centers for Disease Control and Prevention, Atlanta
	Scott Fridkin	
WHO-EURO	Ana Paula Coutinho	World Health Organization, Regional Office for Europe, Copenhagen
	Bernardus Ganter	
ECDC	Carl Suetens	European Centre for Disease Prevention and Control, Stockholm
	Jolanta Griškevičienė	
	Klaus Weist	
	Ole Heuer	
	Carlo Gagliotti	
	Luisa Sodano	
	Vladimir Prikazsky	

In addition, 47 experts from 19 Member States, 2 EEA/EFTA countries, four candidate or potential candidate countries, the European Society of Intensive Care Medicine, ESAC, and ECDC participated in one meeting:

Pellumb Pipero (Albania), Rainer Hartl (Austria), Reinhild Strauss (Austria), Béatrice Jans (Belgium), Hilde Jansens (Belgium), Anne-Marie Van Den Abeele (Belgium), Natacha Viseur (Belgium), Arjana Tambic Andrasevic (Croatia), Smilja Kalenic (Croatia), Annika Lemetsar (Estonia), Piret Mitt (Estonia), Viivika Adamson (Estonia), Tommi Kärki (Finland), Pascal Astagneau (France), Michael Behnke (Germany), Martin Mielke (Germany), Flora Kontopidou (Greece), Kritsotakis Evangelos (Greece), Xanthi Dedoukou (Greece), Kurcz Andrea (Hungary), Olafur Gudlaugsson (Iceland), Robert Cunney (Ireland), Fiona Roche (Ireland), Raina Nikiforova (Latvia), Robert Hemmer (Luxembourg), Gordana Mijovic (Montenegro), Hege Line Løwer (Norway), Nina Kristine Sorknes (Norway), Aleksander Deptula (Poland), Camelia Ghita (Romania), Lukas Murajda (Slovakia), Božena Kotnik Kevorkijan (Slovenia), Dag Ström (Sweden), Gunilla Skoog (Sweden), Mayke Koek (Netherlands), Tjally Van der Kooi (Netherlands), Dilek Arman (Turkey), Barry Cookson (UK/PPS Training), Berit Muller-Pebody (UK/PPS Training), Gareth Hughes (UK/PPS Training), Andre Charlett (UK-England), Elizabeth Sheridan (UK-England), Ed Smyth (UK-Northern Ireland), Peter Davey (UK-Scotland), David Nicholas Looker (UK-Wales), Nico Drapier (ESAC), Alain Lepape (ESICM), Tommi Asikainen (ECDC), Marc Struelens (ECDC), Dominique Monnet (ECDC).

Support projects

The following projects were outsourced in support of the 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.

The following persons participated in the pilot PPS at the hospital level and tested V3.3 of the PPS protocol:

Angel Asensio, Serge Alfandari, Anastasia Antoniadou, Andrea Kurcz, Angelo Pan, Anne-Marie Van Den Abeele, Audra Žygelienė, Benedicte Delaere, Christine Laurent, Carlos Palos, Domagoj Drenjancevic, Elizabeth Scicluna, Andrea Kološova, Emmelia Vounou, Achilleas Gikas, Grazia Tura, Robert Hemmer, Hilde Jansens, Henrieta Hudečková, Ioannis Demetriades, Jolanta Falkovska, Josep Vaqué, Katia Verhamme, Maria Kontou, Bozena Kotnik Kevorkijan, Margarita Viciola Garcia, Mari Kanerva, Etelvina Ferreira, Mārīte Kūla, Ghita Camelia, Nadine Mönch, Nieves López Fresneña, Philippe Vanhems, Pille Märtin, Piret Mitt, Rossitza Vatcheva-Dobrevska, Viljaras Reigas, Reinoud Cartuyvels, Bruno Grandbastien, José Sánchez Payá , Shona Cairns, Soraya Cherifi, Sylvie Arias Lopez, Emese Szilagyi, Tatjana Lejko Zupanc, Tomasz Ozorowski, Uga Dumpis, Zrinka Bosnjak, Ladislava Matějíčková, Jana Prattingerova, Liana Signorini.

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 Muller-Pebody, Gareth Hughes, Naomi Boxall) with collaboration of Health Protection Scotland (Jacqueline 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).

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 5th level 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.

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 European PPS protocol uses existing European case definitions ([1-4]) and complements them by case definitions from the Centers for Disease Control and Prevention (CDC), Atlanta, as used by CDC's National Healthcare Safety Network (NHSN, formerly NNIS)[5].

The European case definitions used in the European PPS are:

HELICS/IPSE case definitions

- Surgical site infection[1]
- Pneumonia[2]
- Bloodstream infection[2]
- Central vascular catheter related infection[2]
- Urinary tract infections[2]

Clostridium difficile infection case definitions[3]

Specific neonatal case definitions, as established by the KISS network[4,5]:

- 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[6].

Case definition sources

[1] HELICS surveillance of SSI protocol, version 9.1, September 2004. Available from http:///www.ecdc.europa.eu/IPSE/helicshome.htm

[2] HELICS Surveillance of Nosocomial Infections in Intensive Care Units protocol, version 6.1, September 2004. Available from http://www.ecdc.europa.eu/IPSE/helicshome.htm

[3] Kuijper EJ, Coignard B, Tüll P, the ESCMID Study Group for *Clostridium difficile* (ESGCD), EU Member States and the European Centre for Disease Prevention and Control (ECDC). Emergence of *Clostridium difficile*-associated disease in North America and Europe. Clin Microbiol Infect 2006;12 (Suppl 6):2-18

[4] Neo-KISS. Protokoll. December 2009. Nationales Referenzzentrum für Surveillance von nosokomialen Infektionen. Available from http://www.nrz-hygiene.de/dwnld/NEOKISSProtokoll221209.pdf

[5] Geffers C, Baerwolff S, Schwab F, Gastmeier P. Incidence of healthcare-associated infections in high-risk neonates: results from the German surveillance system for very-low-birthweight infants. J Hosp Infect. 2008 Mar;68(3):214-21.

[6] CDC/NHSN surveillance definition of healthcare-associated infection and criteria for specific types of infections in the acute care setting, AM J Infect Control 2008; 36: 309-32. Available from http://www.cdc.gov/ncidod/dhqp/pdf/nnis/NosInfDefinitions.pdf

Annex 2. Codebook

Specialty code list

Specialty codes are used for following variables: Ward specialty, patient specialty, consultant specialty, specialised hospital (FormH).

Categories	Code	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	Ear, nose, throat or otorhinolaryngology
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	Gastro-enterology
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)	PEDNEO	Neonatology
Paediatrics (PED)	PEDGEN	Paediatrics general, not specialised
Intensive Care Medicine (ICU)	ICUMED	Medical ICU
Intensive Care Medicine (ICU)	ICUSUR	Surgical ICU

Categories	Code	Name
Intensive Care Medicine (ICU)	ICUPED	Paediatric ICU
Intensive Care Medicine (ICU)	ICUNEO	Neonatal 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
Gynaecology/Obstetrics (GO)	GOOBS	Obstetrics/maternity
Gynaecology/Obstetrics (GO)	GOGYN	Gynaecology
Geriatrics (GER)	GER	Geriatrics, care for the elderly
Psychiatrics (PSY)	PSY	Psychiatrics
Rehabilitation (RHB)	RHB	Rehabilitation
OTHER (OTH)	OTH	Others not listed
Mixed (MIX)	MIX	Combination of specialties

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
CVS	Cardiovascular infections: endocarditis, vascular graft
GI	Gastrointestinal infections (e.g. salmonellosis, antibiotic-associated diarrhoea)
IA	Intra-abdominal sepsis, including hepatobiliary
SST	Cellulitis, wound, deep soft tissue not involving bone
BJ	Septic arthritis (including prosthetic joint), osteomyelitis
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)
NA	Not applicable

Antimicrobial ATC codes (2011)

Antimicrobial agent: generic name	ATC 5th level
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
Azanidazole	P01AB04
Azidocillin	J01CE04
Azithromycin	J01FA10
Azlocillin	J01CA09
Aztreonam	J01DF01
Bacampicillin	J01CA06
Bacitracin	J01XX10
Benzathine benzylpenicillin	J01CE08
Benzathine phenoxymethylpenicillin	J01CE10
Benzylpenicillin	J01CE01
Biapenem	J01DH05
Brodimoprim	J01EA02
Carbenicillin	J01CA03
Carindacillin	J01CA05
Caspofungin	J02AX04
Cefacetrile	J01DB10
Cefaclor	J01DC04
Cefadroxil	J01DB05
Cefalexin	J01DB01
Cefaloridine	J01DB02
Cefalotin	J01DB03
Cefamandole	J01DC03
Cefapirin	J01DB08
Cefatrizine	J01DB07
Cefazedone	J01DB06
Cefazolin	J01DB04
Cefcapene	J01DD17
Cefdinir	J01DD15

Antimicrobial agent: generic name	ATC 5th level
Cefditoren	J01DD16
Cefepime	J01DE01
Cefetamet	J01DD10
Cefixime	J01DD08
Cefmenoxime	J01DD05
Cefmetazole	J01DC09
Cefodizime	J01DD09
Cefonicide	J01DC06
Cefoperazone	J01DD12
Cefoperazone, combinations	J01DD62
Ceforanide	J01DC11
Cefotaxime	J01DD01
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
Ceftezole	J01DB12
Ceftibuten	J01DD14
Ceftizoxime	J01DD07
Ceftobiprole medocaril	J01DI01
Ceftriaxone	J01DD04
Ceftriaxone, combinations	J01DD54
Cefuroxime	J01DC02
Cefuroxime, combinations with other antibacterials	J01RA03
Chloramphenicol	J01BA01
Chlortetracycline	J01AA03
Cinoxacin	J01MB06
Ciprofloxacin	J01MA02
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

Antimicrobial agent: generic name	ATC 5th level
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
Combinations of tetracyclines	J01AA20
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
Fleroxacin	J01MA08
Flucloxacillin	J01CF05
Fluconazole	J02AC01
Flucytosine	J02AX01
Flumequine	J01MB07
Flurithromycin	J01FA14
Fosfomycin	J01XX01
Fusidic acid	J01XC01
Garenoxacin	J01MA19
Gatifloxacin	J01MA16
Gemifloxacin	J01MA15
Gentamicin	J01GB03
Grepafloxacin	J01MA11
Griseofulvin	D01BA01
Hachimycin	J02AA02
Hetacillin	J01CA18
Idaprim	J01EA03
Imipenem and enzyme inhibitor	J01DH51
Isepamicin	J01GB11
Isoniazid	J04AC01
Itraconazole	J02AC02
Josamycin	J01FA07
Kanamycin	A07AA08
Kanamycin	J01GB04
Ketoconazole	J02AB02
Latamoxef	J01DD06
Levofloxacin	J01MA12

Antimicrobial agent: generic name	ATC 5th level
Lincomycin	J01FF02
Linezolid	J01XX08
Lomefloxacin	J01MA07
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
Mezlocillin	J01CA10
Micafungin	J02AX05
Miconazole	J02AB01
Midecamycin	J01FA03
Minocycline	J01AA08
Miocamycin	J01FA11
Moxifloxacin	J01MA14
Nalidixic acid	J01MB02
Natamycin	A07AA03
Neomycin (injection, infusion)	J01GB05
Neomycin (oral)	A07AA01
Neomycin, combinations (oral)	A07AA51
Netilmicin	J01GB07
Nifurtoinol	J01XE02
Nimorazole	P01AB06
Nitrofurantoin	J01XE01
Nitroxoline	J01XX07
Norfloxacin	J01MA06
Nystatin	A07AA02
Ofloxacin	J01MA01
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

Antimicrobial agent: generic name	ATC 5th level
Penamecillin	J01CE06
Penicillins, combinations with other antibacterials	J01RA01
Penimepicycline	J01AA10
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
Sparfloxacin	J01MA09
Spectinomycin	J01XX04
Spiramycin	J01FA02
Spiramycin, combinations with other antibacterials	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

Antimicrobial agent: generic name	ATC 5th level
Sulfadimethoxine	J01ED01
Sulfadimidine	J01EB03
Sulfadimidine and trimethoprim	J01EE05
Sulfafurazole	J01EB05
Sulfaisodimidine	J01EB01
Sulfalene	J01ED02
Sulfamazone	J01ED09
Sulfamerazine	J01ED07
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
Teicoplanin	J01XA02
Telavancin	J01XA03
Telithromycin	J01FA15
Temafloxacin	J01MA05
Temocillin	J01CA17
Terbinafine	D01BA02
Tetracycline	J01AA07
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

Antimicrobial agent: generic name	ATC 5th level
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 and 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 (oesophagus, 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	Clinical sepsis 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/1 year).		
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] AND 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 (oesophagus, 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	Clinical sepsis 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 and 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 one year 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 one year 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, and at least one of the following (in patients without underlying cardiac or pulmonary disease one definitive chest x-ray or CT-scan is sufficient):

Symptoms

- fever > 38 °C with no other cause;
- leukopenia (<4000 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. O_2 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)**:

Microbiology

– broncho-alveolar lavage (BAL) with a threshold of > 10^4 CFU*/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* spp., *Aspergillus* spp., 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* spp., *Chlamydia* spp.);
– detection of antigens in urine (*Legionella* spp.).

c) Others:

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

Note: PN 1 and PN 2 criteria were validated without previous antimicrobial therapy.

Comment: The subdivision of the pneumonia definition in five categories allows for the comparison of similar entities of pneumonia within and between networks. It is essential that all networks report PN4 and PN5 (clinical pneumonia without microbiological evidence) 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 much as possible microbiological confirmation (PN1–3) as a routine practice in the ICU.

Intubation-associated pneumonia (IAP)*: 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.

* Information regarding invasive device use is collected in the variable 'relevant device in situ before onset' (see section definition of healthcare-associated infection data), allowing to apply the definition of IAP during data analysis).

* Colony-forming units

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 ≥ 10^2 colonies/ml urine in nonvoided specimens;
  - ≤ 10^5 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, ≥ 10^5 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 ≥ 10^5 microorganisms per ml 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 (including *S. epidermidis*), *Micrococcus* spp., *Propionibacterium acnes*, *Bacillus* spp., *Corynebacterium* spp.

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 in June 2009. BSI-B was also recently excluded from the CDC definition of laboratory-confirmed bloodstream infections.

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 (e.g. meningitis, osteomyelitis, etc.) (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 according to CDC/NHSN definitions (different from CVC-related BSI) is a primary BSI with central vascular 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 ≥ 10^3 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
  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
  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.

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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.

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 titre (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 titre (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-O if it occurs <=1 year of placement; if later or after manipulation/access of the shunt, report as CNS-MEN.
- Report meningoencephalitis as CNS-MEN.
- Report spinal abscess with meningitis as CNS-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.

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 echocardiogram;
  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 echocardiogram, CT scan, MRI, or angiography.

Comment: 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's 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 titre (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 ($AgNO_3$) 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's 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 titre (IgM) or fourfold increase in paired sera (IgG) for pathogen;
  – physician diagnosis of infection and treatment with topical or oral antifungal therapy.

Reporting instruction: Report healthcare-associated primary herpes simplex infections of the oral cavity as EENT-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 titre (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 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.

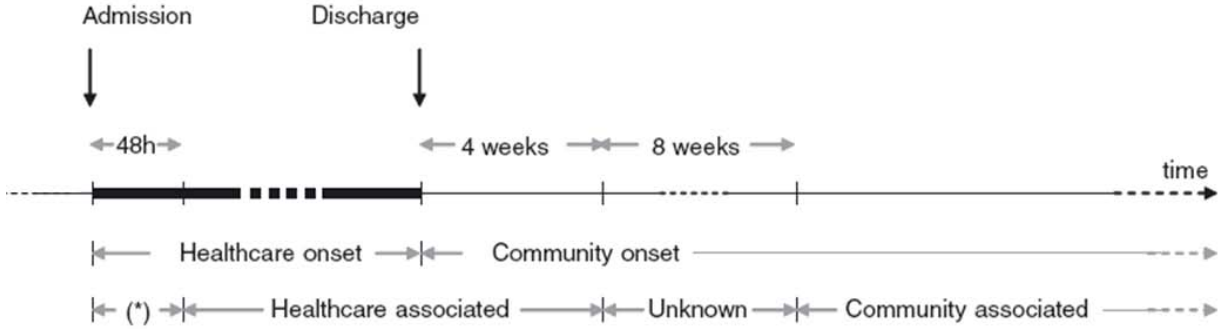
GI: GASTROINTESTINAL SYSTEM INFECTION

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;
- 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 titre (IgM) or fourfold increase in paired sera (IgG) for pathogen.

GI-GIT: gastrointestinal tract (oesophagus, 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's 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 result from exposure to hepatotoxins (alcoholic or acetaminophen-induced hepatitis, etc).
- Do not report hepatitis or jaundice that result 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's 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 occurring within 30 days after surgery as SSI-O.

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 REPR-EMET.
- Report vaginal cuff infections as REPR-VCUF (if occurring after 30 days post-surgery, otherwise report as SSI-O).

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 titre (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 titre (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 oedema 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 oedema 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.
-

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.

Comment: Breast abscesses occur most frequently after childbirth. Those that occur within seven days after childbirth should be considered healthcare associated.

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; only the primary site of these infections should be reported.
- Do not report fever of unknown origin (FUO) as DI.
- Report viral exanthems or rash illness as DI.

SYS-CSEP: clinical sepsis in adults and children

- Patient has at least one of the following criteria:
  - clinical signs or symptoms with no other recognised cause;
  - fever (38 °C);
  - hypotension (systolic pressure < 90 mm);
  - or oliguria (20 cm^3(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 in neonates

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).

Notes:

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).

Notes:

- 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 ECDC 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.

Notes:

- 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 ECDC 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

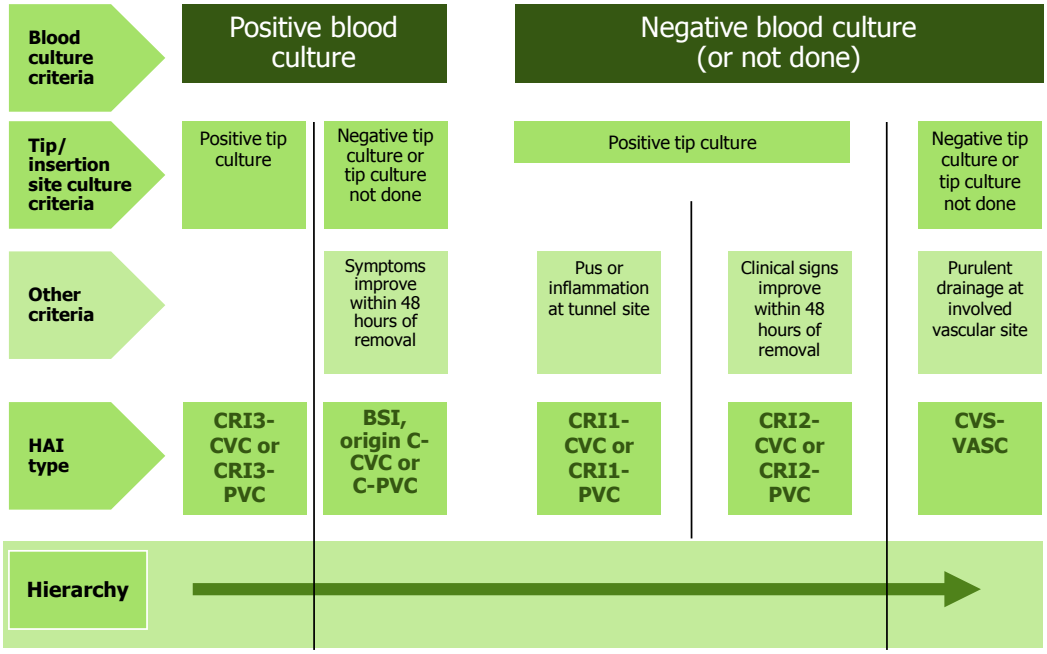
- respiratory compromise;
  and
  – new infiltrate, consolidation or pleural effusion on chest x-ray;
  and
  – and at least four of: temperature > 38 °C or < 36.5 °C or temperature instability, tachycardia or bradycardia, tachypnoea or apnoea, dyspnoea, increased respiratory secretions, new onset of 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 ECDC PPS.

Microorganism code list (PPS selection), by category

Family	Microorganism	Code
Gram-positive 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 pneumoniae	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-negative cocci	*Moraxella catharralis*	MORCAT
	Moraxella spp., other	MOROTH
	Moraxella spp., not specified	MORNSP
	Neisseria meningitidis	NEIMEN
	Neisseria spp., other	NEIOTH
	Neisseria spp., not specified	NEINSP
	Gram-negative cocci, not specified	GNCNSP
	Other Gram-negative cocci	GNCOTH
Gram-positive 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

Family	Microorganism	Code
	Enterobacter spp., not specified	ENBNSP
	Escherichia coli	ESCCOL
	Klebsiella pneumoniae	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-negative 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 influenzae	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

Family	Microorganism	Code
	Pasteurella spp.	PASSPP.
	Gram-negative bacilli, not specified	GNBNSP
	Other Gram-negative bacilli, non enterobacteriaceae	GNBOTH
Anaerobic bacilli	*Bacteroides fragilis*	BATFRA
	Bacteroides 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

Family	Microorganism	Code
	Varicella-zoster virus	VIRVZV
	Virus, not specified	VIRNSP
	Other virus	VIROTH
Microorganism not identified		_NONID
Examination not done		_NOEXA
Sterile examination		_STERI
Result not (yet) available or missing		_NA

Notes:

For bacteria, the first three letters designate the genus, the last three letters the species.

Use the species code 'OTH' (other) if the full species name is known but the code is not included in the ECDC-PPS microorganisms code list, e.g. *Staphylococcus saprophyticus* should be coded as 'STAOTH'.

Use the species code 'NSP' (not specified) when only the genus is known, but not the species (e.g. code *Acinetobacter* spp. without further identification is 'ACINSP'). For unspecified coagulase-negative staphylocci, use the code 'STACNS'. For *Staphylococcus* spp. without any further details, use the code 'STANSP'.

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

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

Oxa=Oxacillin, Gly=Glycopeptides (vancomycin, teicoplanin), C3G=Cephalosporins of the third generation (cefotaxime, cetriaxone, ceftazidime), Car=carbapenems (imipenem, meropenem, doripenem – not ertapenem).

S=sensitive; R=resistant; intermediate susceptibility (I) must be interpreted as 'non susceptible' and classified as R.

** Antimicrobial resistance markers are not collected for other Enterobacteriaceae (*Hafnia spp., Salmonella spp., Shigella spp., Yersinia spp., *other)*

Microorganism code list, alphabetically

Microorganism code	Label
_NOEXA	EXAMINATION NOT DONE
_NA	RESULTS NOT AVAILABLE
_NONID	MICROORGANISM NOT IDENTIFIED
_STERI	STERILE EXAMINATION
ACHSPP.	ACHROMOBACTER SPECIES
ACIBAU	ACINETOBACTER BAUMANNII
ACICAL	ACINETOBACTER CALCOACETICUS
ACIHAE	ACINETOBACTER HAEMOLYTICUS
ACILWO	ACINETOBACTER LWOFFI
ACINSP	ACINETOBACTER SP., NOT SPECIFIED
ACIOTH	ACINETOBACTER SP., OTHER
ACTSPP.	ACTINOMYCES SPECIES
AEMSPP.	AEROMONAS SPECIES
AGRSPP.	AGROBACTERIUM SPECIES
ALCSPP.	ALCALIGENES SPECIES
ANANSP	ANAEROBES, NOT SPECIFIED
ANAOTH	OTHER ANAEROBES
ASPFUM	ASPERGILLUS FUMIGATUS
ASPNIG	ASPERGILLUS NIGER
ASPNSP	ASPERGILLUS SP., NOT SPECIFIED
ASPOTH	ASPERGILLUS SP., OTHER
BACSPP.	BACILLUS SPECIES
BATFRA	BACTEROIDES FRAGILIS
BATNSP	BACTEROIDES SPECIES, NOT SPECIFIED
BATOTH	BACTEROIDES SP., OTHER
BCTNSP	OTHER BACTERIA, NOT SPECIFIED
BCTOTH	OTHER BACTERIA
BURCEP	BURKHOLDERIA CEPACIA
CAMSPP.	CAMPYLOBACTER SPECIES
CANALB	CANDIDA ALBICANS
CANGLA	CANDIDA GLABRATA
CANKRU	CANDIDA KRUSEI
CANNSP	CANDIDA SP., NOT SPECIFIED
CANOTH	CANDIDA SP., OTHER
CANPAR	CANDIDA PARAPSILOSIS
CANTRO	CANDIDA TROPICALIS
CHLSPP.	CHLAMYDIA SPECIES
CITDIV	CITROBACTER KOSERI (EX. DIVERSUS)
CITFRE	CITROBACTER FREUNDII
CITNSP	CITROBACTER SP., NOT SPECIFIED
CITOTH	CITROBACTER SP., OTHER
CLODIF	CLOSTRIDIUM DIFFICILE
CLOOTH	CLOSTRIDIUM OTHER
CORSPP.	CORYNEBACTERIUM SPECIES
ENBAER	ENTEROBACTER AEROGENES
ENBAGG	ENTEROBACTER AGGLOMERANS
ENBCLO	ENTEROBACTER CLOACAE
ENBGER	ENTEROBACTER GERGOVIAE
ENBNSP	ENTEROBACTER SP., NOT SPECIFIED
ENBOTH	ENTEROBACTER SP., OTHER
ENBSAK	ENTEROBACTER SAKAZAKII
ENCFAE	ENTEROCOCCUS FAECALIS
ENCFAI	ENTEROCOCCUS FAECIUM
ENCNSP	ENTEROCOCCUS SP., NOT SPECIFIED

Microorganism code	Label
ENCOTH	ENTEROCOCCUS SP., OTHER
ESCCOL	ESCHERICHIA COLI
ETBNSP	ENTEROBACTERIACEAE, NOT SPECIFIED
ETBOTH	OTHER ENTEROBACTERIACEAE
FILOTH	FILAMENTS OTHER
FLASPP.	FLAVOBACTERIUM SPECIES
FUNNSP	FUNGI, NOT SPECIFIED
FUNOTH	FUNGI OTHER
GARSPP.	GARDNERELLA SPECIES
GNBNSP	GRAM NEGATIVE BACILLI NON ENTEROBACTERIACEAE, NOT SPEC.
GNBOTH	OTHER GRAM BACILLI, NON ENTEROBACTERIACIAEA
GNCNSP	GRAM NEGATIVE COCCI, NOT SPECIFIED
GNCOTH	GRAM NEGATIVE COCCI, OTHER
GPBNSP	GRAM POSITIVE BACILLI, NOT SPECIFIED
GPBOTH	OTHER GRAM POSITIVE BACILLI
GPCNSP	GRAM POSITIVE COCCI, NOT SPECIFIED
GPCOTH	OTHER GRAM POSITIVE COCCI
HAEINF	HAEMOPHILUS INFLUENZAE
HAENSP	HAEMOPHILUS SP., NOT SPECIFIED
HAEOTH	HAEMOPHILUS SP., OTHER
HAEPAI	HAEMOPHILUS PARAINFLUENZAE
HAFSPP.	HAFNIA SPECIES
HELPYL	HELICOBACTER PYLORI
KLENSP	KLEBSIELLA SP., NOT SPECIFIED
KLEOTH	KLEBSIELLA SP., OTHER
KLEOXY	KLEBSIELLA OXYTOCA
KLEPNE	KLEBSIELLA PNEUMONIAE
LACSPP.	LACTOBACILLUS SPECIES
LEGSPP.	LEGIONELLA SPECIES
LISMON	LISTERIA MONOCYTOGENES
MOGSPP.	MORGANELLA SPECIES
MORCAT	MORAXELLA CATHARRALIS
MORNSP	MORAXELLA SP., NOT SPECIFIED
MOROTH	MORAXELLA SP., OTHER
MYCATY	MYCOBACTERIUM, ATYPICAL
MYCTUB	MYCOBACTERIUM TUBERCULOSIS COMPLEX
MYPSPP.	MYCOPLASMA SPECIES
NEIMEN	NEISSERIA MENINGITIDIS
NEINSP	NEISSERIA SP., NOT SPECIFIED
NEIOTH	NEISSERIA SP., OTHER
NOCSPP.	NOCARDIA SPECIES
PAROTH	OTHER PARASITES
PASSPP.	PASTEURELLA SPECIES
PRESPP.	PREVOTELLA SPECIES
PROSPP.	PROPIONIBACTERIUM SPECIES
PRTMIR	PROTEUS MIRABILIS
PRTNSP	PROTEUS SP., NOT SPECIFIED
PRTOTH	PROTEUS SP., OTHER
PRTVUL	PROTEUS VULGARIS
PRVSPP.	PROVIDENCIA SPECIES
PSEAER	PSEUDOMONAS AERUGINOSA
PSENSP	PSEUDOMONADACEAE FAMILY, NOT SPECIFIED
PSEOTH	PSEUDOMONADACEAE FAMILY, OTHER
SALENT	SALMONELLA ENTERITIDIS
SALNSP	SALMONELLA SP., NOT SPECIFIED

Microorganism code	Label
SALOTH	SALMONELLA SP., OTHER
SALTYM	SALMONELLA TYPHIMURIUM
SALTYP	SALMONELLA TYPHI OR PARATYPHI
SERLIQ	SERRATIA LIQUEFACIENS
SERMAR	SERRATIA MARCESCENS
SERNSP	SERRATIA SP., NOT SPECIFIED
SEROTH	SERRATIA SP., OTHER
SHISPP.	SHIGELLA SPECIES
STAAUR	STAPHYLOCOCCUS AUREUS
STACNS	COAGULASE-NEGATIVE STAFYLOCOCCI, NOT SPECIFIED
STAEPI	STAPHYLOCOCCUS EPIDERMIDIS
STAHAE	STAPHYLOCOCCUS HAEMOLYTICUS
STANSP	STAPHYLOCOCCUS SP., NOT SPECIFIED
STAOTH	OTHER COAGULASE-NEGATIVE STAFYLOCOCCI (CNS)
STEMAL	STENOTROPHOMONAS MALTOPHILIA
STRAGA	STREPTOCOCCUS AGALACTIAE (B)
STRHCG	OTHER HAEMOL. STREPTOCOCCAE (C, G)
STRNSP	STREPTOCOCCUS SP., NOT SPECIFIED
STROTH	STREPTOCOCCUS SP., OTHER
STRPNE	STREPTOCOCCUS PNEUMONIAE
STRPYO	STREPTOCOCCUS PYOGENES (A)
VIRADV	ADENOVIRUS
VIRCMV	CYTOMEGALOVIRUS (CMV)
VIRENT	ENTEROVIRUS (POLIO, COXSACKIE, ECHO)
VIRHAV	HEPATITIS A VIRUS
VIRHBV	HEPATITIS B VIRUS
VIRHCV	HEPATITIS C VIRUS
VIRHIV	HUMAN IMMUNODEFICIENCY VIRUS (HIV)
VIRHSV	HERPES SIMPLEX VIRUS
VIRINF	INFLUENZA VIRUS
VIRNOR	NOROVIRUS
VIRNSP	VIRUS, NOT SPECIFIED
VIROTH	OTHER VIRUS
VIRPIV	PARAINFLUENZAVIRUS
VIRRHI	RHINOVIRUS
VIRROT	ROTAVIRUS
VIRRSV	RESPIRATORY SYNCYTIAL VIRUS (RSV)
VIRSAR	SARS-CORONAVIRUS
VIRVZV	VARICELLA-ZOSTER VIRUS
YEAOTH	OTHER YEASTS
YERSPP.	YERSINIA SPECIES

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.

Operative procedure	Description	ICD-9-CM codes
Abdominal aortic aneurysm repair	Resection of abdominal aorta with anastomosis or replacement	38.34, 38.44, 38.64
Limb amputation	Total or partial amputation or disarticulation of the upper or lower limbs, including digits	84.00-84.19, 84.91
Appendix surgery	Operation of appendix (not incidental to another procedure)	47.01, 47.09, 47.2, 47.91, 47.92, 47.99
Shunt for dialysis	Arteriovenostomy for renal dialysis	39.27, 39.42
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, 51.91-51.95, 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
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, 85.9385.96
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, 35.3135.35, 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*
Carotid endarterectomy	Endarterectomy on vessels of head and neck (includes carotid artery and jugular vein)	38.12
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
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
Gallbladder surgery	Cholecystectomy and cholecystotomy	51.03, 51.04, 51.13, 51.21-51.24
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
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
Caesarean section	Obstetrical delivery by Caesarean section	74.0, 74.1, 74.2, 74.4, 74.91, 74.99
Spinal fusion	Immobilisation of spinal column	81.00-81.08
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

Operative procedure	Description	ICD-9-CM codes
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
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
Hip prosthesis	Arthroplasty of hip	00.70-00.73, 00.85-00.87, 81.51 - 81.53
Heart transplant	Transplantation of heart	37.51-37.55
Abdominal hysterectomy	Removal of uterus through an abdominal incision	68.31, 68.39, 68.41, 68.49, 68.61, 68.69
Knee prosthesis	Arthroplasty of knee	00.80-00.84, 81.54, 81.55
Kidney transplant	Transplantation of kidney	55.61, 55.69
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
Liver transplant	Transplantation of liver	50.51, 50.59
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
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
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
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
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
Peripheral vascular bypass surgery	Bypass operations on peripheral arteries	39.29
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
Refusion of spine	Refusion of spine	81.30-81.39
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
Spleen surgery	Resection or manipulation of spleen	41.2, 41.33, 41.41-41.43, 41.5, 41.93, 41.95, 41.99
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
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
Vaginal hysterectomy	Removal of the uterus through vaginal or perineal incision	68.51, 68.59, 68.71, 68.79

Operative procedure	Description	ICD-9-CM codes
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^
Abdominal surgery	Abdominal operations not involving the gastrointestinal tract or biliary system	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, 54.7154.75, 54.92, 54.93

** If the incision is not entirely closed at procedure's end (i.e. if wires or tubes extrude through the incision) then the procedure does not meet the criteria of an NHSN operative procedure.*

+ If this procedure is performed percutaneously, it is not considered an NHSN operative procedure and should not be included in LAM denominator data.

^ Include only if this procedure involves ventricular shunt.

Examples of non-NHSN surgery

- Obstetrical procedures: peri-delivery/labour (one or more) ICD9CM 75.3 and 75.9.
- Dental extraction: ICD9CM 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