TECHNICAL DOCUMENT

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

Protocol version 5.2

ECDC PPS 2016-2017

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Protocol version 5.2, ECDC PPS 2016-2017

Full-scale survey
and
codebook

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Contents

Abbreviations

A&E	Accidents and emergency
AM	Antimicrobial/antimicrobial agent
AMR	Antimicrobial resistance
ATC	Anatomical therapeutic chemical classification system (WHO)
AU	Antimicrobial use
BSI	Bloodstream infection
CDC	Centres for Disease Control and Prevention, Atlanta
CDI	*Clostridium difficile* infections
CFU	Colony-forming units
CVC	Central vascular catheter
DSN	Dedicated surveillance network
EARS-Net	ECDC-coordinated 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-lactamases
ESCMID	European Society of Clinical Microbiology and Infectious Diseases
ESGARS	ESCMID study group on antimicrobial resistance surveillance
ESICM	European Society of Intensive Care Medicine
FTE	Full-time equivalent
HAI	Healthcare-associated infections
HAI-Net	ECDC-coordinated network for the surveillance of healthcare-associated infections
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 and changes to the protocol

The coordination of the EU-funded network IPSE (Improving Patient Safety in Europe) [1] and its component for the surveillance of healthcare-associated infections (HAIs) HELICS (Hospitals in Europe Link for Infection Control through Surveillance) were transferred to ECDC in July 2008 to form ECDC's HAI surveillance network HAI-Net. At that time, the plan to perform an EU-wide point prevalence survey (PPS) of HAIs was adopted by ECDC, based on the recommendations of the external evaluation of the IPSE network and on the conclusions of an expert group that met in January 2009. It was also agreed to include the hospital PPS component of the EU-funded project European surveillance of antimicrobial consumption (ESAC) as part of the ECDC PPS protocol. ECDC subsequently developed a protocol for PPSs of HAIs and antimicrobial use in acute care hospitals through seven expert meetings held from 2009 to 2011. More than 100 experts and representatives from all EU Member States, two EEA countries, four EU enlargement countries, international partners (the European Society of Intensive Care Medicine, WHO Regional Office for Europe, the United States Centers for Disease Control and Prevention (CDC)), the ESAC project and ECDC contributed to the development of the protocol of the first ECDC PPS performed in 2011-2012 (version 4.2 and 4.3 of the protocol, see [2])

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

The current protocol version 5.2 is the final protocol for the second EU-wide point prevalence survey in 2016–2017, distributed to EU/EEA Member States. It contains major changes compared to protocol version 4.3 (ECDC PPS 2011-2012), which are listed below (and highlighted in the word version of this document). Compared to version 5.1, it only contains editorial changes and a few clarifications. Further editorial changes are still possible. Changes to the protocol were discussed during six ECDC meetings held from 2013 to 2015 (involving 153 participants, see acknowledgements). The new protocol further supports Council Recommendation 2009/C 151/01 by including more structure and process indicators for the prevention of HAIs and antimicrobial resistance (AMR) in acute care hospitals, based on a systematic review of such indicators performed on ECDC's request [4]. Indicators for antimicrobial stewardship are based on a consensus process carried out by a working group of the Transatlantic Taskforce on Antimicrobial Resistance (TATFAR) [5]. The new protocol also takes into account several lessons learned from the first ECDC point prevalence survey in 2011-2012 [6].

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

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

- HAI and AMR data:
    - HAI associated to current ward
    - AMR marker data collected as S/I/R/U rather than as susceptible/non-susceptible, addition of pan-drug resistance (PDR)
- Codebook:
    - Specialty list: new ward specialty code list (with only main specialties), consultant/patient specialty codes for healthy neonates added
    - Diagnosis (site) code list for antimicrobial use: surgical site infection (SSI) was added as a subcategory of both SST and BJ; addition of cystic fibrosis (CF) as a separate entry
    - Antimicrobial ATC codes: updated with new codes added since 2011
    - HAI case definitions:
        - Surgical site infection (SSI): follow-up period of deep superficial and organ/space SSIs after implant surgery changed from one year to 3 months
        - Pneumonia (PN): note added indicating that one definitive chest X-ray or CT-scan for the current pneumonia episode may be sufficient in patients with underlying cardiac or pulmonary disease if comparison with previous X-rays is possible
        - *Clostridium difficile* infection (GI-CDI): definition aligned to the case definition in the CDI surveillance protocol, to account for other methods to detect toxin-producing *C. difficile* organism in stool
        - SYS-CSEP: no change in the definition, but change of the name from 'clinical sepsis' to 'treated unidentified severe infection' in adults and children, to differentiate this 'last resort' HAI case definition from the modern concept of sepsis based on organ dysfunction.

Objectives

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

- to estimate the total burden (prevalence) of HAIs and antimicrobial use in acute care hospitals in the EU;
- to describe patients, invasive procedures, infections (sites, microorganisms including markers of antimicrobial resistance) and antimicrobials prescribed (compounds, indications)
    - by type of patients, specialties or healthcare facilities; and
    - by EU country, adjusted or stratified;
- to describe key structures and processes for the prevention of HAIs and antimicrobial resistance at the hospital and ward level in EU hospitals;
- to disseminate results to those who need to know at local, regional, national and EU level:
    - to raise awareness;
    - to 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.

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

Wards

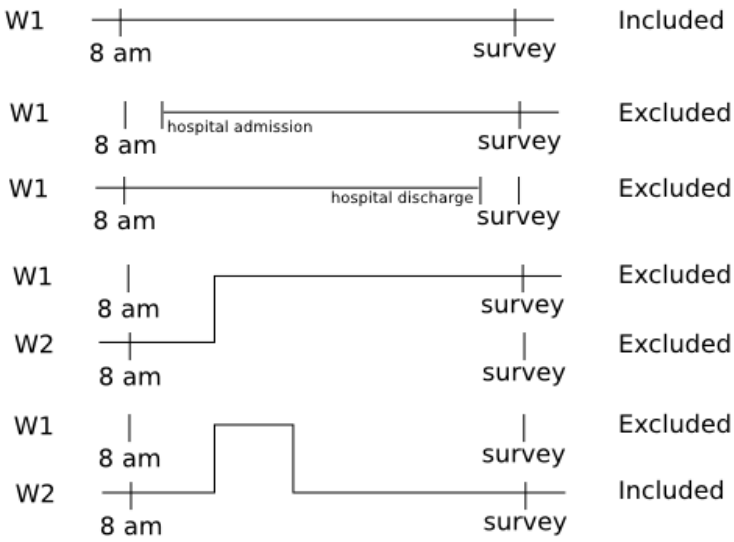
- Include all wards in acute care facilities, including, for example, chronic care and long-term care wards, acute psychiatric wards and neonatal ICUs.
- Excluded are:
  accident & emergency department (except for wards attached to A&E departments where patients are monitored for more than 24 hours).
- The ward specialty is always recorded so that results can be stratified and standardised.

Patients

- Include all patients admitted to the ward before or at 8 a.m. and not discharged from the ward at the time of the survey; in practice, this means that patients transferred in/out after 8 a.m. from/to another ward should not be included (see Figure 1). Include neonates on maternity and paediatric wards if born before/at 8 a.m. (see also under *neonates*).
- Exclude day cases:
  - patients undergoing same day treatment or surgery;
  - patients seen at outpatient department;
  - patients in the emergency room;
  - dialysis patients (outpatients).

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

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



Legend. W1: ward 1, W2: ward 2

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 by hospital (see objectives).

Representative sampling of hospitals (for PPS coordinating centres only)

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

Representative samples will be drawn using a systematic sampling design.

Steps

1. Obtain a list (for example in Microsoft Excel format) of all acute care hospitals in the country, including the number of acute care beds (use the total number of beds if the number of acute care beds is unknown).
2. Rank the list in ascending order of the number of beds.
3. Obtain the number of hospitals to be sampled from ECDC or from the tables and figures below.
4. Divide the total number of hospitals by the number to be sampled = sampling interval k.
5. Choose a random number between 1 and k = i.
6. Select the i^{th} hospital, i^{th} +k hospital, the i^{th}+2k hospital etc.
7. Foresee substitution in 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 and sample size

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

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

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

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

Figure 2. Variation of the design effect (DEFF) by cluster size (average acute care hospital size) in the 2011-2012 PPS database

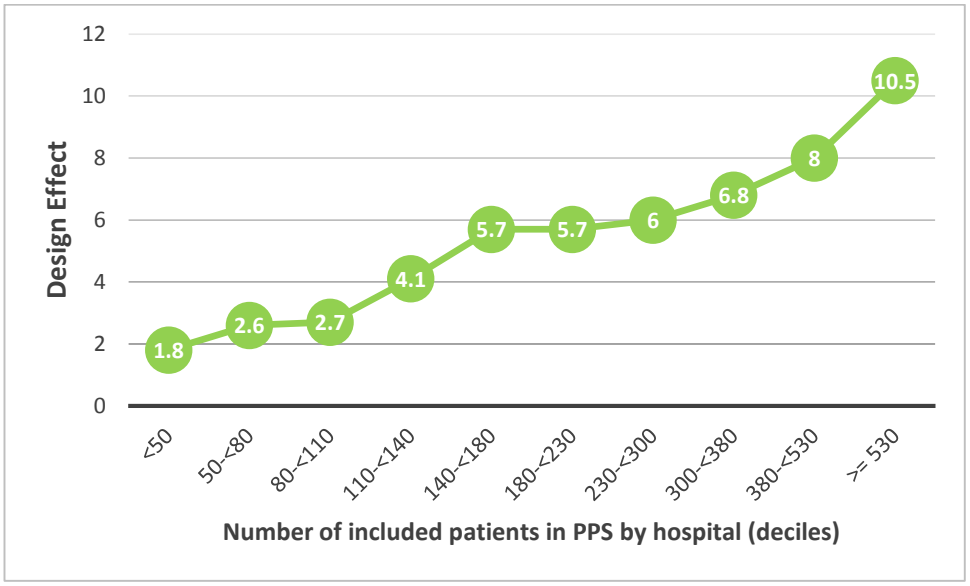


Table 1 below shows the recommended sample size of patients and hospitals by country, using the national denominator data provided during the 2011-2012 PPS and the estimated design effects for an estimated HAI prevalence of 6% +/- 1%, for different hospital size categories. If denominator data at the time of the PPS differ from the ones presented in the table, it is recommended to recalculate the number of patients and hospitals to be sampled. For example, if data are collected by hospital site while the average hospital size in the table reflects the size of hospital groups, a lower design effect should be used (see Figure 2). This would result in a lower total number of patients but a higher number of (smaller) hospital entities.

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

Country	Number of acute care hospitals[a]	Number of hospital beds[a]	Average hospital size	Estimated DEFF	Recommended sample size, patients	Number of hospitals to be sampled
Austria	189	53 371	282	6.0	12 493	44
Belgium	194	51 798	267	6.0	12 478	47
Bulgaria	241	44 164	183	5.7	11 773	64
Croatia	60	15 640	261	6.0	11 419	44
Cyprus	*8*	*2 769**	*346*	*6.8*	*2769*	*8*
Czech Republic	158	57 756	366	6.8	14 201	39
Denmark	52	13 779	265	6.0	11 234	42
Estonia	*40*	*4 685*	117	*4.1*	*4 685*	40
Finland	*59*	*9 601**	*163*	*5.7*	*9 601*	*59*
France	1558	314 598	202	5.7	12 265	61
Germany	1736	461 022	266	6.0	12 939	49
Greece	137	35 120	256	6.0	12 245	48
Hungary	108	69 466	643	10.5	22 062	34
Iceland	*8*	*1 046*	*131*	*4.1*	*1 046*	*8*
Ireland	60	12 398	207	5.7	10 514	51
Italy	1023	226 095	221	5.7	12 233	55
Latvia	*17*	6 975	410	*8.0*	*6 975*	*17*
Lithuania	92	20 867	227	5.7	11 189	49
Luxembourg	*9*	*2 377*	*264*	*6.0*	*2 377*	*9*
Malta	*3*	*1 339*	*446*	*8.0*	*1 399*	*3*
Netherlands	96	50 095*	522	8.0	16 615	32
Norway	60	16 282	271	6.0	11 474	42
Poland	795	181 077	228	5.7	12 204	54
Portugal	101	24 773	245	6.0	11 955	49
Romania	311	111 725	359	6.8	14 453	40
Slovakia	112	31 217	279	6.0	12 157	44
Slovenia	*21*	*7 826*	*373*	*6.8*	*7826*	21
Spain	550	117 504	214	5.7	12 126	57
Sweden	80	18 947*	237	6.0	11 667	49
UK-England	253	158 928*	628	10.5	22 444	36
UK-Northern Ireland	*16*	*4 985*	*312*	*6.8*	*4 985*	*16*
UK-Scotland	52	16 537	318	6.8	13 027	41
UK-Wales	89	9 952*	112	4.1	7 296	65

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

Other sampling methods, reporting of results and data collection periods

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

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

In order to increase the number of participating hospitals for the 2016-2017 ECDC PPS, hospitals may be included in any of the four agreed PPS periods: April-June 2016, September-November 2016, April-June 2017, and September-November 2017. Although it is recommended to organise data collection during a single period for all hospitals, data collection may also be spread over several periods. The same hospital(s) may only be included once over the 4 periods.

The national sample representativeness will be categorised in four levels (optimal, good, poor and very poor; Table 1) depending on compliance with the recommended sampling methodology.

Table 2. Criteria to categorise the national PPS sample representativeness

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

Data collection

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

When?

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

Who will collect the data?

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

Training of surveyors

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

Data processing

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

Overview of collected data

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

Light (unit-based) protocol

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

Standard (patient-based) protocol

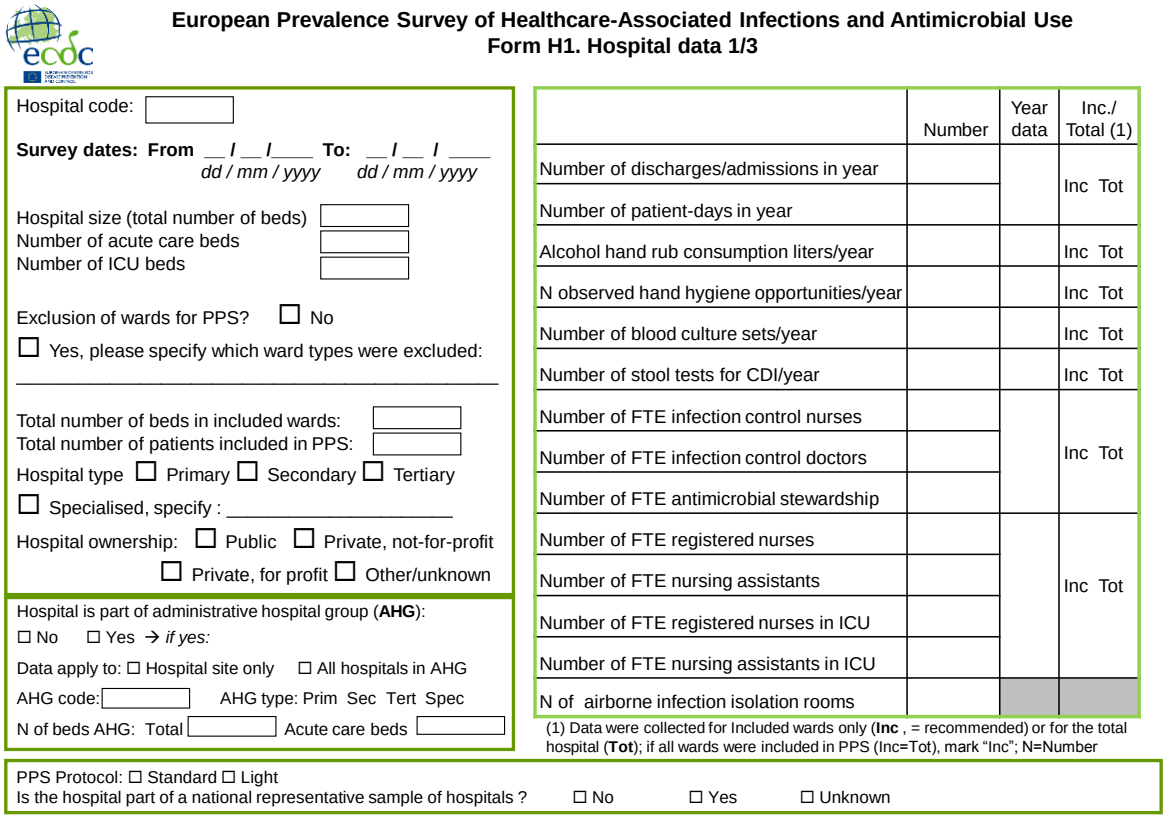
- Hospital data (**forms H1-H3**): one form per hospital per PPS.
- Ward data (**form W**): one form per ward, including structure and process indicators (optional) and denominator data for all patients present in the ward at 8 a.m. and not discharged at the time of the survey (optional).
- Patient data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

Hospital data

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

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

Figure 4. Hospital data 1/3 (form H1)



European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form H1. Hospital data 1/3

Hospital code: ☐

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

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

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

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

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

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

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

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

Figure 5. Hospital data 2/3 (form H2)

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form H2. Hospital data 2/3

Hospital code: ☐

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

Infection prevention and control (IPC) programme:

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

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

Participation in surveillance networks:

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

Microbiology/diagnostic performance:

At weekends, can clinicians request routine microbiological tests and receive back results?
Clinical tests: ☐ Saturday ☐ Sunday
Screening tests: ☐ Saturday ☐ Sunday

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

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

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

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

Comments/observations: _____

Figure 6. Hospital data 3/3 (form H3, optional): Ward indicator data collected at hospital level

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form H2. Hospital data 2/3

Hospital code: ☐

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

Infection prevention and control (IPC) programme:

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

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

Participation in surveillance networks:

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

Microbiology/diagnostic performance:

At weekends, can clinicians request routine microbiological tests and receive back results?
Clinical tests: ☐ Saturday ☐ Sunday
Screening tests: ☐ Saturday ☐ Sunday

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

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

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

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

Comments/observations: _____

Definition of hospital data

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

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

Hospital size. Total number of beds in the hospital

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; variable used to double-check the exhaustiveness of the reported data, i.e. the sum of the ward total number of patients in the light protocol option or the total number of individual patients entered in the standard protocol option.

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

1 Primary

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

2 Secondary

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

3 Tertiary

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

4 Specialised hospital

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

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

Hospital ownership. Hospital ownership as defined by WHO/Europe [7], Eurostat [8] and OECD [9]: PUB: Public, PRIVNFP: Private, not-for-profit, PRIVFP: Private, for-profit, OTHUNK: Other or unknown

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

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

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

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

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

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

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

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

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

Hospital indicators:

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

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

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

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

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

Number of stool tests for CDI per year: Number of inpatient stool tests performed for *Clostridium difficile* infections (CDI) per year. Provide data for previous year or the most recently available data (specify year data in a separate variable). Count all stool specimens per patient, not the number of patients for whom >=1 test was

performed. Count the number of stool specimens actually processed by the laboratory (= at least one test for CDI was performed on the sample), not the number sent to the laboratory for analysis.

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

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

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

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

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

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

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

for the earliest available year (specify year) and specify if the number of FTEs is given for the entire hospital or for the included wards only.

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

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

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

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

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

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

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

Targets for multimodal strategies:

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

Multimodal strategy components:

- Guideline: written guideline document available on the ward

- Care bundle: a care bundle is a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices — generally three to five — that, when performed collectively and reliably, have been proven to improve patient outcomes [9].
- Training: regular training, courses or other form of education
- Checklist: self-applied checklist by the healthcare workers
- Audit: evaluation of the implementation of prevention practices (process evaluation, observations, etc.) by another person than the one/those who are supposed to implement the practices.
- Surveillance: surveillance of HAI type on a periodical or continuous basis, also including local surveillance (not only as part of a surveillance network)
- Feedback of surveillance and/or audit results to frontline HCWs

H3 form: optional

The variables on the third hospital form (H3) are normally collected at the ward level. However, countries not collecting indicators at the ward level may collect these data at the hospital-wide level. Also in case not all wards provided the ward-level indicators, the hospital-level data allow to obtain a complete picture for the hospital. Provide data from current year if available, or from the most recently available year.

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

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

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

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

Number of beds occupied at 00:01 on the day of the PPS. Number of hospital beds occupied at midnight on the day of the PPS. Since the PPS usually takes several days for an entire hospital, this variable can be measured on a day in the middle of the PPS data collection period, but not during the weekends.

Number of beds assessed for occupancy at 00:01 on the day of PPS. Number of hospital beds that were checked for occupancy at midnight on the day of the PPS. Denominator of the previous variable. If occupancy was checked for all beds, this variable normally equals the total number of beds in the hospital. Specify 'included wards only OR total for hospital' in last column.

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

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

General variables and notes

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

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

Comments. Free text, comments, maximum 255 characters.

Note: **Full-time equivalent (FTE)** is the proportion of a full time position/job. One FTE = one full time position, but this could also be the sum of 2 half-time (50%) positions of two different persons; 0.10 FTE is 10% of a full time position.

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.

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

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

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

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

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

Ward data

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

Figure 7. Ward data (form W)

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form W. Ward data

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

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

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

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

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

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

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

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

Comments/observations: _____

Definition of ward data

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

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

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

Ward specialty. Main ward specialty (≥ 80% of patients requiring this specialty). If fewer than 80%, report 'mixed ward' (MIX). PED=Paediatrics, NEO=Neonatal, ICU=Intensive Care, MED=Medicine, SUR=Surgery, GO=Gynecology/Obstetrics, GER=Geriatrics, PSY=Psychiatry, RHB=Rehabilitation, LTC=Long-term care, OTH=Other, MIX=Mixed. As a rule, the ward specialty code is composed of the three first letters of the dominant consultant/patient specialty, with two exceptions: code ICUNEO (NICU) as ward specialty NEO and ICUPED (PICU) as ward specialty PED. The ward specialty can be combined with patient specialty to refine specialties, e.g. in paediatrics: ward specialty PED + patient specialty: ICUPED = paediatric ICU, PED + SURCARD = paediatric cardiac surgery, PED + MEDONCO = paediatric oncology. A ward with healthy newborns must either be allocated to GO (GOBAB) when it is located in obstetrics, or to PED (PEDBAB) if it is located in pediatrics.
Note: how to code paediatric patients? Use the ward code PED for paediatric wards. If the ward specialty code is PED, then patients should be coded as per consultant/patient specialty MEDGEN, MEDSUR etc. The consultant/patient specialty PEDGEN should normally only be used for paediatric patients on adult wards.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

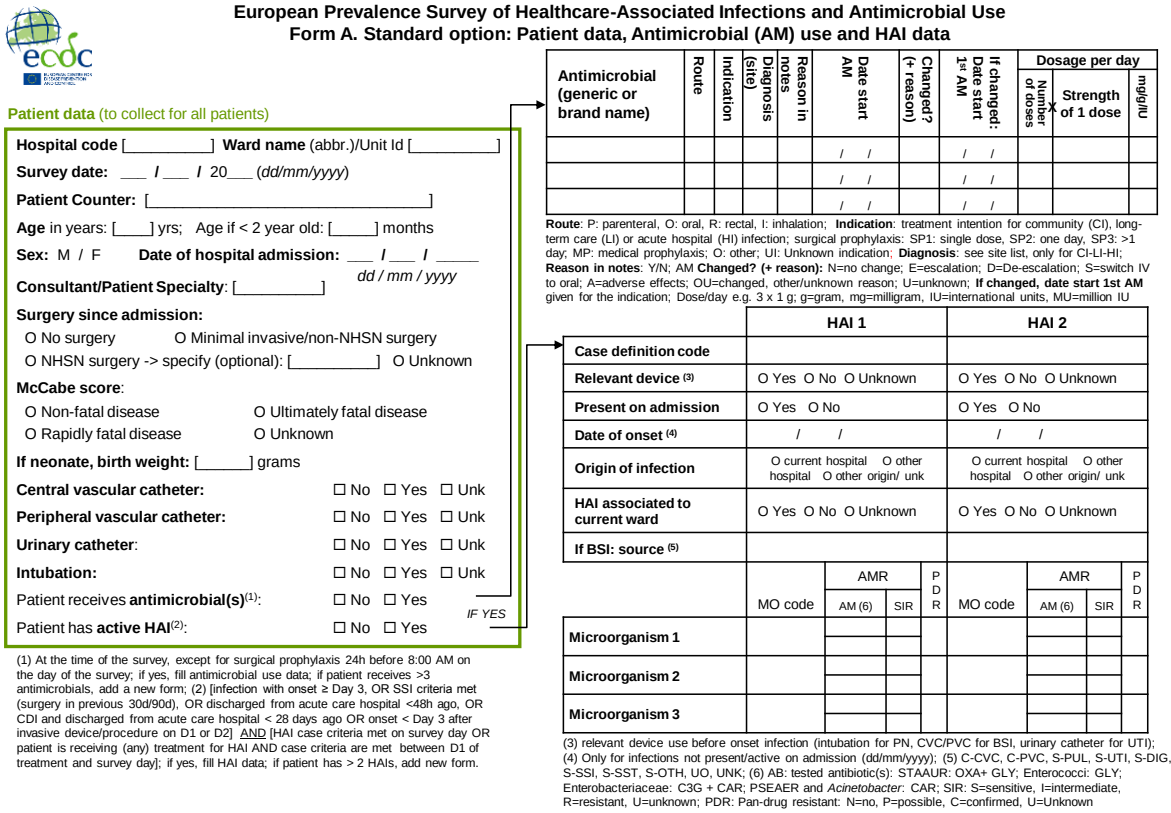
Number of beds occupied at 00:01 on the day of PPS. Number of ward beds occupied at midnight on the day of the PPS (can also be measured at midnight after the PPS took place).

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

Patient data (standard protocol option)

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

Figure 8. Patient-based risk factors (form A): one form per patient, antimicrobial use and HAI data collected on same form



European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form A. Standard option: Patient data, Antimicrobial (AM) use and HAI data

Patient data (to collect for all patients)

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

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

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

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

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

	HAI 1 MO code	HAI 1 AMR AM (6)	HAI 1 AMR SIR	HAI 1 PDR	HAI 2 MO code	HAI 2 AMR AM (6)	HAI 2 AMR SIR	HAI 2 PDR
Microorganism 1								
Microorganism 2								
Microorganism 3								

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

Definition of patient data

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

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

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

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

Patient counter. Number: anonymised patient number 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. Patient age in months if the patient is less than two years old.

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

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

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

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

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

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

Examples of diseases for different McCabe score categories:

Rapidly fatal: < one year

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

Pulmonary disease with cor pulmonale

Ultimately fatal: one year to four years

- Chronic leukaemias, myelomas, lymphomas, metastatic carcinoma, end-stage kidney disease (without transplant)
- Motor neuron disease, multiple sclerosis non-responsive to treatment
- 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

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

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

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

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

Notes:

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

- An introducer is considered an intravascular catheter, and depending on the location of its tip and use, may be a central line.
- Pacemaker wires and other non-lumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.

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

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

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

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

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

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

Notes

- Patient data have to be collected for each patient admitted to the ward at 8 a.m. on the survey date, infected or not, only excluding day cases (see inclusion criteria).
- Maternity: both mother and neonate are counted if present at 8 a.m. on the day of the survey.
- Neonates:
  - Count all infections after their birth.
  - Register consultant/patient specialty for healthy neonates as either GOBAB or PEDBAB.
- Obstetrics: in case of natural birth with no interventions/procedures/devices, a maternal infection is only considered as an HAI if the date of onset is on day 3 or later.

Antimicrobial use data and HAI data

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

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

Antimicrobial use data

Surgical prophylaxis should be registered if given the day before the survey (i.e. in the 24 hours prior to 8 a.m. on the day of the survey). For all other antimicrobial use (e.g. treatment, medical prophylaxis), any given or planned (including intermittent treatments, e.g. alternate day) administration of antimicrobials should be registered at the time of the survey only. If the antimicrobial agent given for treatment or medical prophylaxis was changed on the day of the survey, only record the last antimicrobial agent at the time of the survey. Note: The aim is to determine what the physicians think they are treating. In order to do so, we will look at all patient records and may request additional information from nurses, pharmacists or doctors. The appropriateness of prescriptions will not be discussed. Also, no attempts will be made to change prescriptions. At no time the staff should feel supervised.

Definitions of antimicrobial use data

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

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

Indication for antimicrobial use. Patient receives systemic antimicrobials for:

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

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

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

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

Date start antimicrobial. Start date of the current antimicrobial. If the patient received the antimicrobial on admission, record the date of admission.

Antimicrobial changed? (+ reason). Was the antimicrobial (or the route of administration) changed for this indication, and if so, what was the reason? If the antimicrobial was changed more than once for the current indication, report the reason of the last change. The term "indication" in this context should be interpreted as the entire treatment regimen for the infection episode.

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

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

Date start first antimicrobial (if change): Start date of the first antimicrobial prescribed before the current antimicrobial for the same indication if the current antimicrobial replaced a previous one. Leave empty if there was no change (or if there is no information available). If the antimicrobial was changed more than once for the current indication, report the start date of the first (not the previous) antimicrobial. If the patient received the antimicrobial on admission, record the date of admission. The main objectives of collecting this variable are 1) estimation of the burden of antimicrobial use in acute care hospitals (prevalence to incidence conversion) and 2) proxy validation of the prevalence of HAIs. Optional.

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

Healthcare-associated infection data

Key terms and notes

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

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

AND

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

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

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

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

Definitions of healthcare-associated infection data

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

Relevant device in situ: yes/no/unknown. To be specified for PN, BSI, NEO-LCBI, NEO-CNSB and UTI only. Relevant invasive device was in situ (even intermittently) within 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; used to apply 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. Signs and symptoms of the infection were present at admission to the hospital; if not, provide date onset of infection.

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

Origin of the infection. Infection is associated with (1) current hospital; (2) another acute care hospital; (3) other origin or unknown. Infections present at admission may be associated with a previous stay in your hospital or a transfer from another acute care facility. The category 'other origin or unknown' can be used 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.

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

If BSI: source. If lab-confirmed bloodstream infection, specify the origin: catheter-related (central: **C-CVC**, peripheral **C-PVC**), secondary to another infection: pulmonary (**S-PUL**), urinary tract (**S-UTI**), digestive tract (**S-DIG**), surgical site infection (**S-SSI**), skin and soft tissue infection (**S-SST**), other infection (**S-OTH**), or BSI of

(confirmed) unknown origin (**UO**); missing data, no information available=UNK; Secondary BSI reported as separate HAI, in addition to the primary infection if it matches the case definition.

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

Antimicrobial resistance phenotype. Specify susceptibility to selected antimicrobial resistance (AMR) marker depending on microorganism. Report S (susceptible), I (intermediate), R (resistant) or U (unknown) for the antimicrobial group (preferred) or for tested antimicrobials within the group. When group susceptibility is reported and several antibiotics within the group were tested (e.g. carbapenems (CAR)), report the least susceptible result for the group (e.g. meropenem R + imipenem I = CAR R). When AMR markers are collected according to the PPS I protocol methodology (susceptible vs non-susceptible), report S (susceptible), IR (non-susceptible) or U (unknown), except for MRSA, report non-susceptibility to oxacillin (or equivalent) as R (resistant).

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

Enterococcus spp.: GLY
- VRE: Susceptibility to glycopeptides (GLY): vancomycin (VAN) or teicoplanin (TEC)

Enterobacteriaceae (*Escherichia coli, Klebsiella* spp*., Enterobacter* spp*., Proteus* spp*., Citrobacter* spp*., Serratia* spp*., Morganella* spp.): C3G, CAR
- Third-generation cephalosporins (C3G): cefotaxime (CTX), ceftriaxone (CRO), ceftazidime (CAZ)
- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

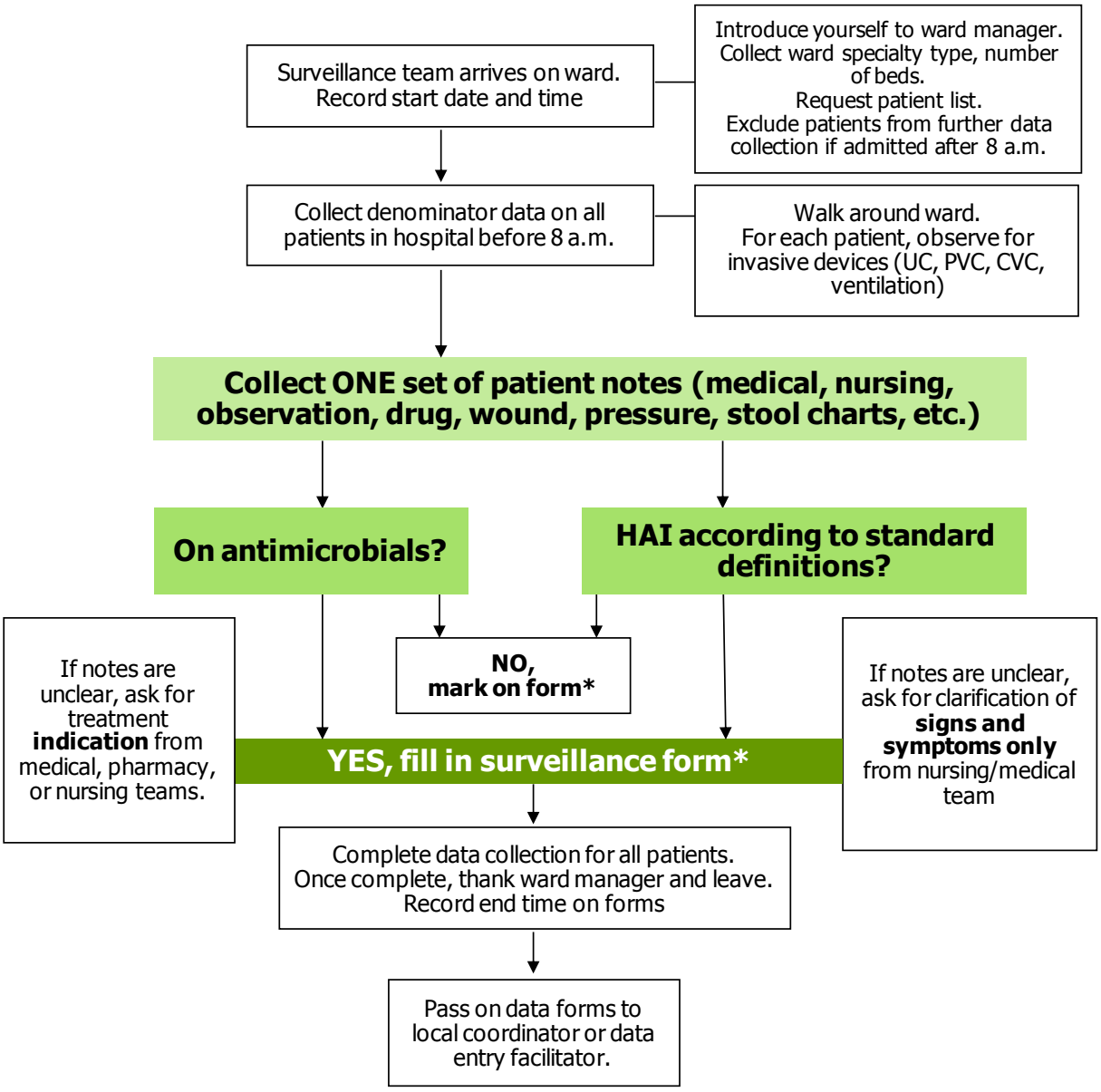
Pseudomonas aeruginosa : CAR
- Carbapenems (CAR): imipenem (IPM), meropenem (MEM), doripenem (DOR)

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

Pandrug resistance (PDR). Microorganism is pandrug-resistant. No PDR =N (susceptible to at least one antimicrobial), Possible PDR = P (I/R to all antimicrobials tested in hospital), Confirmed PDR = C (I/R to all antimicrobials confirmed by reference laboratory), U=Unknown. Source Clin Microbiol Infect. 2012 Mar;18(3):268-81.

Recommended case-finding algorithm for healthcare-associated infections

Figure 9. Recommended case finding algorithm for healthcare-associated infections



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

Numerator data in the light protocol

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

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

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

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

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

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

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

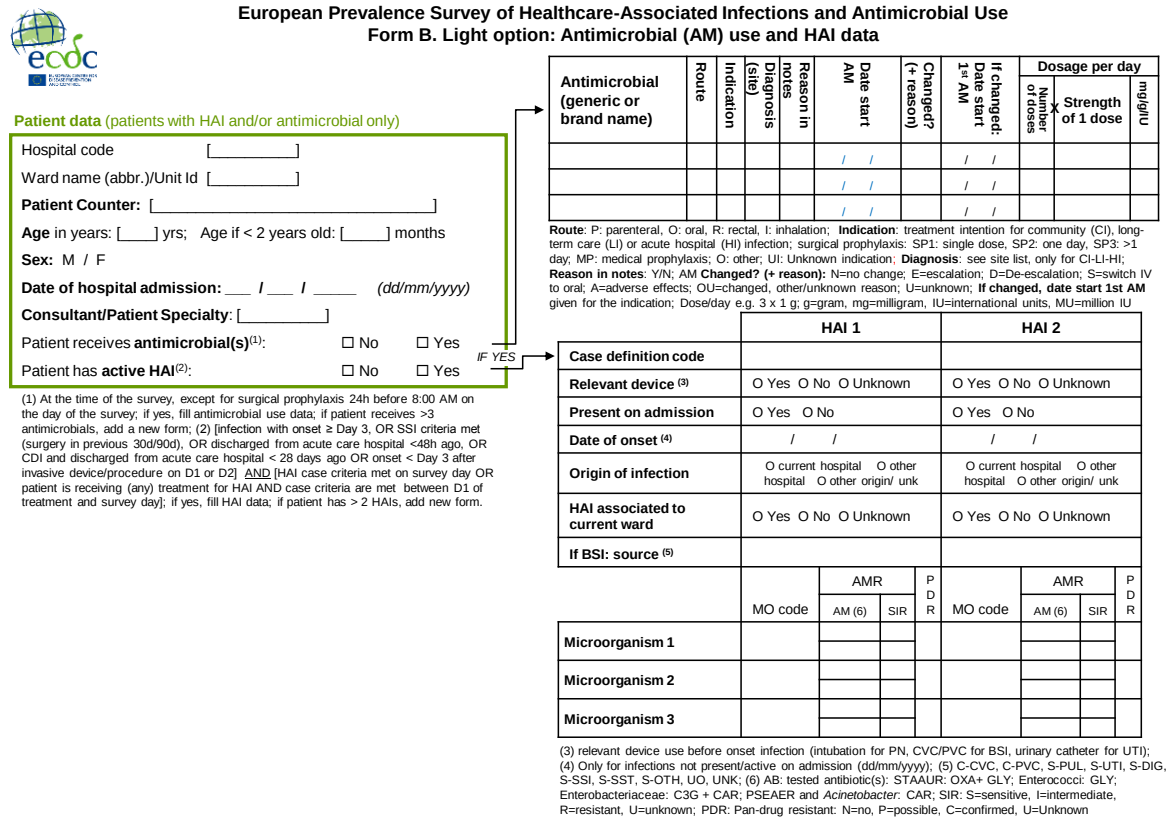
Date of hospital admission. Date patient was admitted to the hospital for the current hospitalisation (dd/mm/yyyy).

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

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

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

Figure 10. Antimicrobial use and HAI data form in the LIGHT protocol option (form B2)



European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form B. Light option: Antimicrobial (AM) use and HAI data

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

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

IF YES

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

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

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

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

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

National/regional data

(Applies only to PPS coordinating centres.)

Objectives

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

Notes

- Data at the national level are preferred, but if needed or more appropriate, please provide data from regional (sub-national) levels (e.g. England, Northern Ireland, Scotland and Wales for UK).

National/regional data are provided by the point prevalence survey coordinating centre before submitting the national/regional hospital data to ECDC. They can be entered manually or be uploaded (one record) in TESSy (ECDC's surveillance system).

Figure 11. National/regional data (form N)

European Prevalence Survey of Healthcare-Associated Infections and Antimicrobial Use
Form N. National/regional data

Country Code: _____ Network ID/Data Source: _____

Date start PPS : __ / __ /____

National/regional PPS coordination centre/institute:

_____

National/regional PPS coordination programme/unit:

Name: _____

Website: _____

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

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

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

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

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

Comments/observations: _____

_____

Definition of national/regional data

Country code. The country reporting the record.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MANDAT=mandatory participation; participation following invitation is mandatory.

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

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

Data structure and variable names

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

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

Standard protocol option record types

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

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

Light protocol option record types

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

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

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

A new ward level with structure and process indicators was added at the second level in both standard and light protocol options. However, since ward indicator data are optional, this data level is optional as well and the remainder of the data structure is kept the same as in the first PPS, with direct link of patient resp. ward denominator data to the hospital level (not to the ward level). Therefore, it is crucial that the Ward ID code is identical (spelled in exactly the same way) in all data levels.

Note on microorganism and resistance data

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

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

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

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

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

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

Acknowledgements

Participation to PPS protocol meetings

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

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

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

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

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

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

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

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

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

Country	Name (Number of meetings total; PPS1/PPS2)	Institution
Bosnia and Herzegovina	Aida Pitic (1;0/1)	Clinical center University of Sarajevo
Kosovo	Agreta Gecaj-Gashi (1;0/1)	University clinical center of Kosovo, Intensive Care, Pristina
	Lul Raka (1;0/1)	National Institute of Public Health of Kosovo, Pristina
The former Yugoslav Republic of Macedonia	Gordana Kuzmanovska (1;0/1), Kristina Stavridis (1;0/1)	Institute of Public Health, Skopje
	Katja Popovska (1;0/1)	Institute of microbiology Medical faculty, Skopje
Montenegro	Anton Duravcaj (1;0/1), Gordana Mijovic (1;1/0)	Institute for Public Health of Montenegro, Podgorica
	Miro Kneževic (1;0/1)	Clinical Centre of Montenegro, Podgorica
	Sanja Simovic (1;0/1)	National Commission for hospital infections
Republic of Serbia	Gorana Cosic (1;0/1)	Institute for Public Health, Novi Sad
	Mitra Drakulovic (1;0/1)	Institute of Public Health of Serbia "Dr Milan Jovanovic Batut", Belgrade
	Natasa Mazic (1;0/1)	Clinical Center of Serbia, Belgrade
Turkey	Dilek Arman (1;1/0)	Gazi University, Ankara
	Fadime Callak Oku (1;0/1)	General Directorate of Health Services, Department of Health Service Standards
EU Neighbourhood Policy countries		
Algeria	Amhis Wahiba (1;0/1)	Etablissement Public Hospitalier Bologhine, Alger
Armenia	Romella Abovyan (1;0/1)	National Centre for Disease Control and Prevention, Yerevan
Egypt	Khaled Hassanein (1;0/1)	Ministry of Health and Population, Cairo
Georgia	Giorgi Chakhunashvili (1;0/1)	National Centre for Disease Control and Public Health, Tbilisi
Israel	Mitchell J. Schwaber (1;0/1)	National Centre for Infection Control and Antibiotic Resistance, Tel Aviv
Lebanon	Rima Moghnieh (2;0/2)	Makassed General Hospital, Beirut
Tunesia	Ihlem Boutiba (1;0/1)	Faculté de Médecine de Tunis
Ukraine	Maxym Pylypenko (1;0/1), Aidyn Salmanov (1;0/1)	P.L. Shupyk National Medical Academy of Postgraduate Education, Kiev
	Viktoriia Zadorozhna (1;0/1)	Gromashevsky Institute of Epidemiology and Infectious Diseases, Kiev
Individual experts		
France	Arno Muller[1] (9;6/3)	Individual expert, France; ECDC consultant for ESAC-Net
France	Catherine Dumartin (1;0/1)	Centre de Coordination de la Lutte contre les Infections Nosocomiales Sud-Ouest, Bordeaux
UK/PPS Training	Barry Cookson (2;2/0), Gareth Hughes (2;2/0) Berit Muller-Peabody (2;2/0), Naomi Boxall (1;1/0)	Public Health England, Colindale
United Kingdom	Walter Zingg (3;0/3)	Imperial College London
United Kingdom	Mike Sharland[2] (1;0/1)	St George's Healthcare NHS Trust, London
International organisations		
EC	Nicole Heine (1;0/1)	European Commission, Luxembourg
ESAC	Herman Goossens (5;5/0), Nico Drapier (1;1/0)	European Surveillance of Antimicrobial Consumption (ESAC) project; University of Antwerp, Antwerp
ESICM	Alain Lepape (4;1/3)	European Society of Intensive Care Medicine (ESICM), Infection Section; CHU, Lyon
EUCIC	Evelina Tacconelli (1;0/1)	European Society of Clinical Microbiology and Infectious Diseases (ESCMID), European Committee on Infection Control (EUCIC)
USA/CDC	Shelley Magill (5;3/2), Scott Fridkin (2;2/0)	Centers for Disease Control and Prevention, Atlanta
WHO-EURO	Ana Paula Coutinho (5;3/2), Bernardus Ganter (2;2/0)	World Health Organization, Regional Office for Europe, Copenhagen

Country	Name (Number of meetings total; PPS1/PPS2)	Institution
ECDC	Carl Suetens (14;8/6), Jolanta Griškeviciene (8;5/3), Pete Kinross (5;0/5), Dominique L. Monnet (5;1/4), Klaus Weist (5;3/2), Ole Heuer (4;2/2), Carlo Gagliotti (3;3/0), Diamantis Plachouras (3;0/3), Tommi Kärki (1;0/1), Barbara Albiger (1;0/1), Tommi Asikainen (1;1/0), Anna-Pelagia Magiorakos (1;0/1), Sorin Ostafiev (1;0/1), Vladimir Prikazsky (1;1/0), Luisa Sodano (1;1/0)	European Centre for Disease Prevention and Control, Stockholm

[1]also representing the ESAC project; [2]also representing the ESAC-Net Coordination Committee;

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

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

Support projects

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

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

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

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

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

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

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

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

The pilot PPS validation study was outsourced to a consortium under coordination of Glasgow Caledonian University, Glasgow, United Kingdom (Jacqui Reilly, Lesley Price, Jon Godwin), in collaboration with Health Protection Scotland, Glasgow, United Kingdom (Jacqui Reilly, Shona Cairns, William Malcolm), Public Health England, London, United Kingdom (Susan Hopkins, Barry Cookson, Gareth Hughes), National Institute for Health and Welfare, Helsinki, Finland (Outi Lyytikaïnen), Institut de Veille Sanitaire, Saint-Maurice, France (Bruno Coignard) and Charité University Medicine Berlin, Germany (Petra Gastmeier, Sonja Hansen).

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

Annex 1. Additional materials

Codebook

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

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

Forms

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

TESSy variable definitions and validation rules

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

Note on case definitions of healthcare-associated infections

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

The European case definitions used in the ECDC PPS are:

HELICS/IPSE case definitions

- Surgical site infection
- Pneumonia
- Bloodstream infection
- Central vascular catheter related infection

Urinary tract infections

Clostridium difficile infection

Specific neonatal definitions, as established by the KISS network:

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

Necrotising enterocolitis

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

All other case definitions are CDC/NHSN case definitions.

Annex 2. Codebook

Specialty code list

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

Categories (Ward Specialty)	Patient/consultant Specialty Code	Patient/consultant Specialty Name
Surgical specialties (SUR)	SURGEN	General surgery
Surgical specialties (SUR)	SURDIG	Digestive tract surgery
Surgical specialties (SUR)	SURORTR	Orthopaedics and surgical traumatology
Surgical specialties (SUR)	SURORTO	Orthopaedics
Surgical specialties (SUR)	SURTR	Traumatology
Surgical specialties (SUR)	SURCV	Cardio surgery and vascular surgery
Surgical specialties (SUR)	SURCARD	Cardio surgery
Surgical specialties (SUR)	SURVASC	Vascular surgery
Surgical specialties (SUR)	SURTHO	Thoracic surgery
Surgical specialties (SUR)	SURNEU	Neurosurgery
Surgical specialties (SUR)	SURPED	Paediatric general surgery
Surgical specialties (SUR)	SURTRANS	Transplantation surgery
Surgical specialties (SUR)	SURONCO	Surgery for cancer
Surgical specialties (SUR)	SURENT	ENT
Surgical specialties (SUR)	SUROPH	Ophthalmology
Surgical specialties (SUR)	SURMAXFAC	Maxillo-facial surgery
Surgical specialties (SUR)	SURSTODEN	Stomatology/Dentistry
Surgical specialties (SUR)	SURBURN	Burns care
Surgical specialties (SUR)	SURURO	Urology
Surgical specialties (SUR)	SURPLAS	Plastic and reconstructive surgery
Surgical specialties (SUR)	SUROTH	Other surgery
Medical specialties (MED)	MEDGEN	General medicine
Medical specialties (MED)	MEDGAST	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)	PEDGEN	Paediatrics general, not specialised
Neonatology (NEO)	PEDNEO	Neonatology (excl. healthy neonates)
Neonatology (NEO)	PEDBAB	Healthy neonates (paediatrics)
Neonatology (NEO)	ICUNEO	Neonatal ICU
Paediatrics (PED)	ICUPED	Paediatric ICU

Intensive Care Medicine (ICU)	ICUMED	Medical ICU
Intensive Care Medicine (ICU)	ICUSUR	Surgical ICU
Intensive Care Medicine (ICU)	ICUMIX	Mixed (polyvalent) ICU, general intensive or critical care
Intensive Care Medicine (ICU)	ICUSPEC	Specialised ICU
Intensive Care Medicine (ICU)	ICUOTH	Other ICU
Gynaecology/Obstetrics (GO)	GOOBS	Obstetrics /maternity
Gynaecology/Obstetrics (GO)	GOGYN	Gynaecology
Gynaecology/Obstetrics (GO)	GOBAB	Healthy neonates (maternity)
Geriatrics (GER)	GER	Geriatrics, care for the elderly
Psychiatrics (PSY)	PSY	Psychiatrics
Rehabilitation (RHB)	RHB	Rehabilitation
Long-term care (LTC)	LTC*	Long-term care
OTHER (OTH)	OTH	Others not listed
Mixed (MIX)	MIX	Combination of specialties

**LTC is in principle a ward specialty and should only exceptionally be used as a patient/consultant specialty (e.g. use MEDGEN, GER, RHB instead).*

Diagnosis (site) code list for antimicrobial use

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

Indications for antimicrobial use

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

Antimicrobial ATC codes (2016)

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

Antimicrobial agent: generic name	ATC5
Cefepime and amikacin	J01RA06
Cefetamet	J01DD10
Cefixime	J01DD08
Cefmenoxime	J01DD05
Cefmetazole	J01DC09
Cefminox	J01DC12
Cefodizime	J01DD09
Cefonicide	J01DC06
Cefoperazone	J01DD12
Cefoperazone, combinations	J01DD62
Ceforanide	J01DC11
Cefotaxime	J01DD01
Cefotaxime, combinations	J01DD51
Cefotetan	J01DC05
Cefotiam	J01DC07
Cefoxitin	J01DC01
Cefozopran	J01DE03
Cefpiramide	J01DD11
Cefpirome	J01DE02
Cefpodoxime	J01DD13
Cefprozil	J01DC10
Cefradine	J01DB09
Cefroxadine	J01DB11
Cefsulodin	J01DD03
Ceftaroline fosamil	J01DI02
Ceftazidime	J01DD02
Ceftazidime, combinations	J01DD52
Ceftezole	J01DB12
Ceftibuten	J01DD14
Ceftizoxime	J01DD07
Ceftobiprole medocaril	J01DI01
Ceftolozane and enzyme inhibitor	J01DI54
Ceftriaxone	J01DD04
Ceftriaxone, combinations	J01DD54
Cefuroxime	J01DC02
Cefuroxime and metronidazole	J01RA03
Chloramphenicol	J01BA01
Chlortetracycline	J01AA03
Cinoxacin	J01MB06
Ciprofloxacin	J01MA02
Ciprofloxacin and metronidazole	J01RA10
Ciprofloxacin and ornidazole	J01RA12
Ciprofloxacin and tinidazole	J01RA11
Clarithromycin	J01FA09
Clindamycin	J01FF01
Clofoctol	J01XX03

Antimicrobial agent: generic name	ATC5
Clometocillin	J01CE07
Clomocycline	J01AA11
Cloxacillin	J01CF02
Colistin (injection, infusion)	J01XB01
Colistin (oral)	A07AA10
Combinations of beta-lactamase sensitive penicillins	J01CE30
Combinations of intermediate-acting sulphonamides	J01EC20
Combinations of long-acting sulphonamides	J01ED20
Combinations of penicillins	J01CR50
Combinations of penicillins with extended spectrum	J01CA20
Combinations of short-acting sulphonamides	J01EB20
Combinations of tetracyclines	J01AA20
Cycloserine	J04AB01
Dalbavancin	J01XA04
Daptomycin	J01XX09
Demeclocycline	J01AA01
Dibekacin	J01GB09
Dicloxacillin	J01CF01
Dirithromycin	J01FA13
Doripenem	J01DH04
Doxycycline	J01AA02
Enoxacin	J01MA04
Epicillin	J01CA07
Ertapenem	J01DH03
Erythromycin	J01FA01
Ethambutol	J04AK02
Ethionamide	J04AD03
Faropenem	J01DI03
Fidaxomicin	A07AA12
Fleroxacin	J01MA08
Flomoxef	J01DC14
Flucloxacillin	J01CF05
Fluconazole	J02AC01
Flucytosine	J02AX01
Flumequine	J01MB07
Flurithromycin	J01FA14
Fosfomycin	J01XX01
Fusidic acid	J01XC01
Garenoxacin	J01MA19
Gatifloxacin	J01MA16
Gemifloxacin	J01MA15
Gentamicin	J01GB03
Grepafloxacin	J01MA11
Griseofulvin	D01BA01
Hachimycin	J02AA02
Hetacillin	J01CA18

Antimicrobial agent: generic name	ATC5
Idaprim	J01EA03
Imipenem and enzyme inhibitor	J01DH51
Isavuconazole	J02AC05
Isepamicin	J01GB11
Isoniazid	J04AC01
Itraconazole	J02AC02
Josamycin	J01FA07
Kanamycin	A07AA08
Kanamycin	J01GB04
Ketoconazole	J02AB02
Latamoxef	J01DD06
Levofloxacin	J01MA12
Levofloxacin, combinations with other antibacterials	J01RA05
Lincomycin	J01FF02
Linezolid	J01XX08
Lomefloxacin	J01MA07
Loracarbef	J01DC08
Lymecycline	J01AA04
Mandelic acid	J01XX06
Mecillinam	J01CA11
Meropenem	J01DH02
Metacycline	J01AA05
Metampicillin	J01CA14
Methenamine	J01XX05
Meticillin	J01CF03
Metronidazole (oral, rectal)	P01AB01
Metronidazole (parenteral)	J01XD01
Metronidazole, combinations	P01AB51
Mezlocillin	J01CA10
Micafungin	J02AX05
Miconazole	J02AB01
Midecamycin	J01FA03
Minocycline	J01AA08
Miocamycin	J01FA11
Moxifloxacin	J01MA14
Nafcillin	J01CF06
Nalidixic acid	J01MB02
Natamycin	A07AA03
Nemonoxacin	J01MB08
Neomycin (injection, infusion)	J01GB05
Neomycin (oral)	A07AA01
Neomycin, combinations (oral)	A07AA51
Netilmicin	J01GB07
Nifurtoinol	J01XE02
Nimorazole	P01AB06
Nitrofurantoin	J01XE01

Antimicrobial agent: generic name	ATC5
Nitrofurantoin, combinations	J01XE51
Nitroxoline	J01XX07
Norfloxacin	J01MA06
Norfloxacin and tinidazole	J01RA13
Nystatin	A07AA02
Ofloxacin	J01MA01
Ofloxacin and ornidazole	J01RA09
Oleandomycin	J01FA05
Oritavancin	J01XA05
Ornidazole (oral)	P01AB03
Ornidazole (parenteral)	J01XD03
Oxacillin	J01CF04
Oxolinic acid	J01MB05
Oxytetracycline	J01AA06
Oxytetracycline, combinations	J01AA56
Panipenem and betamipron	J01DH55
Paromomycin	A07AA06
Pazufloxacin	J01MA18
Pefloxacin	J01MA03
Penamecillin	J01CE06
Penicillins, combinations with other antibacterials	J01RA01
Penimepicycline	J01AA10
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

Antimicrobial agent: generic name	ATC5
Rosoxacin	J01MB01
Roxithromycin	J01FA06
Rufloxacin	J01MA10
Secnidazole	P01AB07
Sisomicin	J01GB08
Sitafloxacin	J01MA21
Sparfloxacin	J01MA09
Spectinomycin	J01XX04
Spiramycin	J01FA02
Spiramycin and metronidazole	J01RA04
Streptoduocin	J01GA02
Streptomycin (oral)	A07AA04
Streptomycin (parenteral)	J01GA01
Streptomycin, combinations	A07AA54
Sulbactam	J01CG01
Sulbenicillin	J01CA16
Sulfadiazine	J01EC02
Sulfadiazine and tetroxoprim	J01EE06
Sulfadiazine and trimethoprim	J01EE02
Sulfadimethoxine	J01ED01
Sulfadimidine	J01EB03
Sulfadimidine and trimethoprim	J01EE05
Sulfafurazole	J01EB05
Sulfaisodimidine	J01EB01
Sulfalene	J01ED02
Sulfamazone	J01ED09
Sulfamerazine	J01ED07
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

Antimicrobial agent: generic name	ATC5
Tazobactam	J01CG02
Tedizolid	J01XX11
Teicoplanin	J01XA02
Telavancin	J01XA03
Telithromycin	J01FA15
Temafloxacin	J01MA05
Temocillin	J01CA17
Terbinafine	D01BA02
Tetracycline	J01AA07
Tetracycline and oleandomycin	J01RA08
Thiamphenicol	J01BA02
Thiamphenicol, combinations	J01BA52
Ticarcillin	J01CA13
Ticarcillin and enzyme inhibitor	J01CR03
Tigecycline	J01AA12
Tinidazole (oral, rectal)	P01AB02
Tinidazole (parenteral)	J01XD02
Tobramycin	J01GB01
Trimethoprim	J01EA01
Troleandomycin	J01FA08
Trovafloxacin	J01MA13
Vancomycin (oral)	A07AA09
Vancomycin (parenteral)	J01XA01
Voriconazole	J02AC03
Xibornol	J01XX02

Healthcare-associated infections: code lists

HAI code list, table

HAI code	HAI label
SSI-S	Surgical site infection, superficial incisional
SSI-D	Surgical site infection, deep incisional
SSI-O	Surgical site infection, organ/space
PN1	Pneumonia, clinical + positive quantitative culture from minimally contaminated lower respiratory tract specimen
PN2	Pneumonia, clinical + positive quantitative culture from possibly contaminated lower respiratory tract specimen
PN3	Pneumonia, clinical + microbiological diagnosis by alternative microbiology methods
PN4	Pneumonia, clinical + positive sputum culture or non-quantitative culture from lower respiratory tract specimen
PN5	Pneumonia: clinical signs of pneumonia without positive microbiology
UTI-A	symptomatic urinary tract infection, microbiologically confirmed
UTI-B	symptomatic urinary tract infection, not microbiologically confirmed
BSI	Bloodstream infection (laboratory-confirmed), other than CRI3
CRI1-CVC	Local CVC-related infection (no positive blood culture)
CRI2-CVC	General CVC-related infection (no positive blood culture)
CRI3-CVC	Microbiologically confirmed CVC-related bloodstream infection

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

Definition of active HAI

Onset of HAI[1]		Case definition
Day 3 onwards	AND	Meets the case definition on the day of survey.
OR		
Day 1 (day of admission) or Day 2: SSI criteria met at any time after admission (including previous surgery 30 days/90 days).		
OR		OR
Day 1 or Day 2 AND patient discharged from acute care hospital in preceding 48 hours.		
OR		
Day 1 or Day 2 AND patient discharged from acute care hospital in preceding 28 days if CDI[2] present.		Patient is receiving treatment[3] 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 (esophagus, stomach, small and large bowel, and rectum), excluding GE, CDI
	HEP	Hepatitis
	IAB	Intra-abdominal, not specified elsewhere
LRI		**Lower respiratory tract infection, other than pneumonia**
	BRON	Bronchitis, tracheobronchitis, bronchiolitis, tracheitis, without evidence of pneumonia
	LUNG	Other infections of the lower respiratory tract
REPR		**Reproductive tract infections**
	EMET	Endometritis
	EPIS	Episiotomy
	VCUF	Vaginal cuff
	OREP	Other infections of the male or female reproductive tract
SST		**Skin and soft tissue infections**
	SKIN	Skin
	ST	Soft tissue (necrotising fascitis, infectious gangrene, necrotizing cellulitis, infectious myositis, lymphadenitis, or lymphangitis)
	DECU	Decubitus ulcer, including both superficial and deep infections
	BURN	Burn
	BRST	Breast abscess or mastitis
BJ		**Bone and joint infection**
	BONE	Osteomyelitis
	JNT	Joint or bursa
	DISC	Disc space infection
SYS		**Systemic infections**
	DI	Disseminated infection
	CSEP	Treated unidentified severe infection in adults and children
NEO		**CASE DEFINITIONS FOR NEONATES**
	CSEP	Clinical sepsis in neonates
	LCBI	Laboratory-confirmed bloodstream infection in neonates, non-coagulase-negative staphylococci
	CNSB	Laboratory-confirmed bloodstream infection with coagulase-negative staphylococci in neonates
	PNEU	Pneumonia in neonates
	NEC	Necrotising enterocolitis

BSI origin (BSI source) code list

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

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

Case definitions of healthcare-associated infections

SSI: SURGICAL SITE INFECTION

Superficial incisional (SSI-S)

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

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

Deep incisional (SSI-D)

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

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

Organ/space (SSI-O)

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

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

PN: PNEUMONIA

Rx

Two or more serial chest x-rays or CT-scans with a suggestive image of pneumonia for patients with underlying cardiac or pulmonary disease, 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)**:
  - 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*, *Aspergillus*, mycobacteria, mycoplasma, *Pneumocystis carinii*):
  - positive detection of viral antigen or antibody from respiratory secretions (e.g. EIA, FAMA, shell vial assay, PCR);
  - positive direct exam or positive culture from bronchial secretions or tissue;
  - seroconversion (e.g. influenza viruses, *Legionella*, *Chlamydia*);
  - detection of antigens in urine (*Legionella*).

c) Others:

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

Notes:

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

Comment: The subdivision of the pneumonia definition in five categories allows for the comparison of similar entities of pneumonia within and between countries. It is essential that all hospitals report PN4 and PN5 (clinical pneumonia without microbiological evidence) when appropriate in order to achieve overall comparability, even if a microbiological exam was performed and yielded negative results. It is also advised, both for clinical and

* Colony-forming units

surveillance purposes, that networks promote as microbiological confirmation (PN1–3) as a routine practice, at least in the ICU.

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

UTI: URINARY TRACT INFECTION

UTI-A: microbiologically confirmed symptomatic UTI

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

and

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

UTI-B: not microbiologically confirmed symptomatic UTI

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

and

at least one of the following:

- positive dipstick for leukocyte esterase and/or nitrate;
- pyuria urine specimen with ≥ 10 WBC/ml or ≥ 3 WBC/high-power field of unspun urine;
- organisms seen on Gram stain of unspun urine;
- at least two urine cultures with repeated isolation of the same uropathogen (gram-negative bacteria or *S. saprophyticus*) with ≥ 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 mm^3 of urine with repeated isolation of the same microorganism and no more than two species of microorganisms.

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

BSI: BLOODSTREAM INFECTION

BSI: Laboratory-confirmed bloodstream infection

One positive blood culture for a recognised pathogen

or

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

and

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

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

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

Sources of bloodstream infection:

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

Note:

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

CRI: CATHETER-RELATED INFECTION

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

Quantitative CVC culture ≥ 10^3 CFU/ml (1) or semi-quantitative CVC culture > 15 CFU (2)
and

- pus/inflammation at the insertion site or tunnel.

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

Quantitative PVC culture ≥ 10^3 CFU/ml or semi-quantitative PVC culture > 15 CFU
and

- pus/inflammation at the insertion site or tunnel.

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

Quantitative CVC culture ≥ 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.

References

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

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

BJ: BONE AND JOINT INFECTION

BJ-BONE: osteomyelitis

Osteomyelitis must meet at least one of the following criteria:

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

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

BJ-JNT: joint or bursa

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

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

BJ-DISC: disc space infection

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

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

CNS: CENTRAL NERVOUS SYSTEM INFECTION

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

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

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

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

CNS-MEN: meningitis or ventriculitis

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

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

Reporting instructions:

- Report CSF shunt infection as SSI if it occurs <=90 days of placement; if later or after manipulation/access of the shunt, report as CNS-MEN.
- Report meningoencephalitis as MEN.
- Report spinal abscess with meningitis as MEN.

CNS-SA: spinal abscess without meningitis

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

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

Reporting instruction: Report spinal abscess with meningitis as meningitis.

CVS: CARDIOVASCULAR SYSTEM INFECTION

CVS-VASC: arterial or venous infection

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

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

patient has purulent drainage at involved vascular site,
and
blood culture not done or no organisms cultured from blood.

Reporting instructions: Report infections of an arteriovenous graft, shunt, or fistula, or intravascular cannulation site without organisms cultured from blood as CVS-VASC.

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 titer (IgM) or fourfold increase in paired sera (IgG) for pathogen.

Reporting instructions

- Report other infections of the eye as EYE.
- Do not report chemical conjunctivitis caused by silver nitrate ($AgNO_3$) 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 titer (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 ORAL; recurrent herpes infections are not healthcare-associated.

EENT-SINU: sinusitis

Sinusitis must meet at least one of the following criteria:

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

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

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

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

LRI: LOWER RESPIRATORY TRACT INFECTION, OTHER THAN PNEUMONIA

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

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

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

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

LRI-LUNG: other infections of the lower respiratory tract

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

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

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

GI: GASTROINTESTINAL SYSTEM INFECTION

GI-CDI: Clostridium difficile *infection*

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

- diarrhoeal stools or toxic megacolon, and a positive laboratory assay for *C. difficile* toxin A and/or B in stools or a toxin-producing *C. difficile* organism detected in stool via culture or other means e.g. a positive PCR result;
- pseudomembranous colitis revealed by lower gastro-intestinal endoscopy;

colonic histopathology characteristic of *C. difficile* infection (with or without diarrhoea) on a specimen obtained during endoscopy, colectomy or autopsy.

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

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

GI-GE: gastroenteritis (excluding CDI)

Gastroenteritis must meet at least one of the following criteria:

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

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

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

- patient has an abscess or other evidence of infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause and compatible with infection of the organ or tissue involved: fever (> 38 °C), nausea, vomiting, abdominal pain, or tenderness;
  and
  at least one of the following:
  - organisms cultured from drainage or tissue obtained during a surgical operation or endoscopy or from a surgically placed drain;
  - organisms seen on Gram'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 results from exposure to hepatotoxins (alcoholic or acetaminophen-induced hepatitis, etc).

Do not report hepatitis or jaundice that results from biliary obstruction (cholecystitis).

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

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

- patient has organisms cultured from purulent material from intra-abdominal space obtained during a surgical operation or needle aspiration;
- patient has abscess or other evidence of intra-abdominal infection seen during a surgical operation or histopathologic examination;
- patient has at least two of the following signs or symptoms with no other recognised cause: fever (> 38 °C), nausea, vomiting, abdominal pain, or jaundice;
  and
  at least one of the following:
  - organisms cultured from drainage from surgically placed drain (e.g. closed suction drainage system, open drain, T-tube drain);
  - organisms seen on Gram'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 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 EMET.
- Report vaginal cuff infections as VCUF.

SST: SKIN AND SOFT TISSUE INFECTION

SST-SKIN: skin infection

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

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

Reporting instructions

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

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

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

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

Reporting instructions

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

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

Decubitus ulcer infections must meet the following criterion:

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

Comments

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

SST-BURN: burn

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

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

Comments

- Purulence alone at the burn wound site is not adequate for the diagnosis of burn infection; such purulence may reflect incomplete wound care.
- Fever alone in a burn patient is not adequate for the diagnosis of a burn infection because fever may be the result of tissue trauma or the patient may have an infection at another site.
- Surgeons in regional burn centres who take care of burn patients exclusively may require Criterion 1 for diagnosis of burn infection.

Hospitals with regional burn centres may further divide burn infections into the following: burn wound site, burn graft site, burn donor site, burn donor site-cadaver; NHSN, however, will code all of these as BURN.

SST-BRST: breast abscess or mastitis

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

- patient has a positive culture of affected breast tissue or fluid obtained by incision and drainage or needle aspiration;
- patient has a breast abscess or other evidence of infection seen during a surgical operation or histopathologic examination;

patient has fever (> 38 °C) and local inflammation of the breast and physician diagnosis of breast abscess.

SYS: SYSTEMIC INFECTION

SYS-DI: disseminated infection

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

Reporting instructions

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

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

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

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 EU PPS.
- Report the origin of the neonatal BSI in the field BSI origin.
- If both the case definitions for NEO-LCBI and NEO-CNSB are matched, report NEO-LCBI.

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

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

and

- CNS is cultured from blood or catheter tip;

and

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

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 EU PPS.
- Report the origin of the neonatal BSI in the field BSI origin.
- If both the case definitions for NEO-LCBI and NEO-CNSB are matched, report NEO-LCBI.

NEO-PNEU: pneumonia

- respiratory compromise;

and

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

and

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

NEO-NEC: necrotising enterocolitis

- Histopathological evidence of necrotising enterocolitis;

or

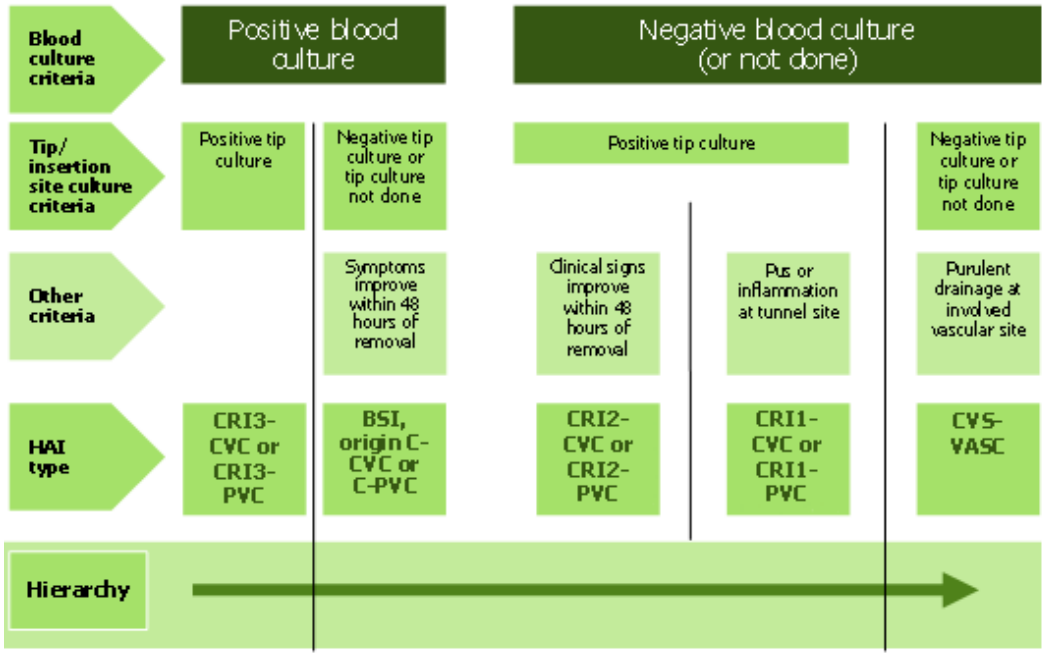
- at least one characteristic radiographic abnormality (pneumoperitoneum, pneumatosis intestinalis, unchanging 'rigid' loops of small bowel)

  plus at least two of the following without other explanation:

  vomiting, abdominal distention, prefeeding residuals, persistent microscopic or gross blood in stools.

Algorithm for diagnosis of catheter-related infections

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



Microorganism code list

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

Microorganism code list (PPS selection), by category

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

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

Family	Microorganism	Code
	Pasteurella spp.	PASSPP
	Gram-negative bacilli, not specified	GNBNSP
	Other Gram-negative bacilli, non enterobacteriaceae	GNBOTH
Anaerobic bacilli	*Bacteroïdes fragilis*	BATFRA
	Bacteroïdes other	BATOTH
	Clostridium difficile	CLODIF
	Clostridium other	CLOOTH
	Propionibacterium spp.	PROSPP
	Prevotella spp.	PRESPP
	Anaerobes, not specified	ANANSP
	Other anaerobes	ANAOTH
Other bacteria	Mycobacterium, atypical	MYCATY
	Mycobacterium tuberculosis complex	MYCTUB
	Chlamydia spp.	CHLSPP
	Mycoplasma spp.	MYPSPP
	Actinomyces spp.	ACTSPP
	Nocardia spp.	NOCSPP
	Other bacteria	BCTOTH
Fungi	*Candida albicans*	CANALB
	Candida glabrata	CANGLA
	Candida krusei	CANKRU
	Candida parapsilosis	CANPAR
	Candida tropicalis	CANTRO
	Candida spp., other	CANOTH
	Candida spp., not specified	CANNSP
	Aspergillus fumigates	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:

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

New method to collect AMR markers:

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

Staphylococcus aureus:

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

Enterococcus spp.:

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

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

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

Pseudomonas aeruginosa:

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

Acinetobacter spp.:

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

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

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

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

Report susceptibility collected using the old dichotomic method as S (susceptible), **IR** (non-susceptible, I or R) or unknown (U); exception: report oxacillin resistance in *S. aureus* as R.

Note: the method for collecting AMR marker data was modified to allow comparative analysis between ECDC ARHAI networks.

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

Microorganism code	LABEL
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
ENCOTH	ENTEROCOCCUS SP., OTHER
ESCCOL	ESCHERICHIA COLI

Microorganism code	LABEL
ETBNSP	ENTEROBACTERIACEAE, NOT SPECIFIED
ETBOTH	OTHER ENTEROBACTERIACEAE
FILOTH	FILAMENTS OTHER
FLASPP	FLAVOBACTERIUM SPECIES
FUNNSP	FUNGI, NOT SPECIFIED
FUNOTH	FUNGI OTHER
GARSPP	GARDNERELLA SPECIES
GNBNSP	G-BAC, 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

Microorganism code	LABEL
PSEOTH	PSEUDOMONADACEAE FAMILY, OTHER
SALENT	SALMONELLA ENTERITIDIS
SALNSP	SALMONELLA SP., NOT SPECIFIED
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
VIRINA	INFLUENZA A VIRUS
VIRINB	INFLUENZA B VIRUS
VIRINC	INFLUENZA C 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.

NHSN code	Operative procedure	Description	ICD-9-CM Codes
NHSN-AAA	Abdominal aortic aneurysm repair	Resection of abdominal aorta with anastomosis or replacement	38.34, 38.44, 38.64
NHSN-AMP	Limb amputation	Total or partial amputation or disarticulation of the upper or lower limbs, including digits	84.00-84.19, 84.91
NHSN-APPY	Appendix surgery	Operation of appendix (not incidental to another procedure)	47.01, 47.09, 47.2, 47.91, 47.92, 47.99
NHSN-AVSD	Shunt for dialysis	Arteriovenostomy for renal dialysis	39.27, 39.42
NHSN-BILI	Bile duct, liver or pancreatic surgery	Excision of bile ducts or operative procedures on the biliary tract, liver or pancreas (does not include operations only on gallbladder)	50.0, 50.12, 50.14, 50.21-50.23, 50.25, 50.26, 50.29, 50.3, 50.4, 50.61, 50.69, 51.31-51.37, 51.39, 51.41-51.43, 51.49, 51.51, 51.59, 51.61-51.63, 51.69, 51.71, 51.72, 51.79, 51.81-51.83, 51.89, 51.9151.95, 51.99, 52.09, 52.12, 52.22, 52.3, 52.4, 52.51-52.53, 52.5952.6, 52.7, 52.92, 52.95, 52.96, 52.99
NHSN-BRST	Breast surgery	Excision of lesion or tissue of breast including radical, modified, or quadrant resection, lumpectomy, incisional biopsy, or mammoplasty.	85.12, 85.20-85.23, 85.31-85.36, 85.41-85.48, 85.50, 85.53, 85.54, 85.6, 85.70-85.76, 85.79, 85.9385.96
NHSN-CARD	Cardiac surgery	Procedures on the valves or septum of heart; does not include coronary artery bypass graft, surgery on vessels, heart transplantation, or pacemaker implantation	35.00 - 35.04, 35.10-35.14, 35.20-35.28, 35.31-35.35, 35.39, 35.42, 35.50, 35.51, 35.53, 35.54, 35.60-35.63, 35.7035.73, 35.81-35.84, 35.91-35.95, 35.98-35.99, 37.10, 37.11, 37.24, 37.31-37.33, 37.35, 37.36, 37.41, 37.49, 37.60*
NHSN-CEA	Carotid endarterectomy	Endarterectomy on vessels of head and neck (includes carotid artery and jugular vein)	38.12
NHSN-CBGB	Coronary artery bypass graft with both chest and donor site incisions	Chest procedure to perform direct revascularisation of the heart; includes obtaining suitable vein from donor site for grafting.	36.10-36.14, 36.19
NHSN-CBGC	Coronary artery bypass graft with chest incision only	Chest procedure to perform direct vascularisation of the heart using, for example the internal mammary (thoracic) artery	36.15-36.17, 36.2
NHSN-CHOL	Gallbladder surgery	Cholecystectomy and cholecystotomy	51.03, 51.04, 51.13, 51.21-51.24
NHSN-COLO	Colon surgery	Incision, resection, or anastomosis of the large intestine; includes large-tosmall and small-to-large bowel anastomosis; does not include rectal operations	17.31-17.36, 17.39, 45.03, 45.26, 45.41, 45.49, 45.52, 45.71-45.76, 45.79, 45.81-45.83, 45.92-45.95, 46.03, 46.04, 46.10, 46.11, 46.13, 46.14, 46.43, 46.52, 46.75, 46.76, 46.94
NHSN-CRAN	Craniotomy	Incision through the skull to excise, repair, or explore the brain; does not include taps or punctures	01.12, 01.14, 01.21-01.25, 01.28, 01.31, 01.32, 01.39, 01.41, 01.42, 01.51-01.53, 01.59, 02.11-02.14, 02.91-02.93, 07.51-07.54, 07.59, 07.61-07.65, 07.68, 07.69, 07.71, 07.72, 07.79, 38.01, 38.11, 38.31, 38.41, 38.51, 38.61, 38.81, 39.28
NHSN-CSEC	Cesarean section	Obstetrical delivery by Cesarean section	74.0, 74.1, 74.2, 74.4, 74.91, 74.99
NHSN-FUSN	Spinal fusion	Immobilisation of spinal column	81.00-81.08

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

NHSN code	Operative procedure	Description	ICD-9-CM Codes
NHSN-THOR	Thoracic surgery	Noncardiac, nonvascular thoracic surgery; includes pneumonectomy and diaphragmatic or hiatal hernia repair.	32.09, 32.1, 32.20, 32.21-32.23, 32.25, 32.26, 32.29, 32.30, 32.39, 32.41, 32.49, 32.50, 32.59, 32.6, 32.9, 33.0, 33.1, 33.20, 33.25, 33.28, 33.31-33.34, 33.39, 33.41 - 33.43, 33.48, 33.49, 33.98, 33.99, 34.01-34.03, 34.06, 34.1, 34.20, 34.26, 34.3, 34.4, 34.51, 34.52, 34.59, 34.6, 34.81-34.84, 34.89, 34.93, 34.99, 53.80-53.84
NHSN-THYR	Thyroid and/or parathyroid surgery	Resection or manipulation of thyroid and/or parathyroid	06.02, 06.09, 06.12, 06.2, 06.31, 06.39, 06.4, 06.50-06.52, 06.6, 06.7, 06.81, 06.89, 06.91-06.95, 06.98, 06.99
NHSN-VHYS	Vaginal hysterectomy	Vaginal hysterectomy; includes that by laparoscope	68.51, 68.59, 68.71, 68.79
NHSN-VSHN	Ventricular shunt	Ventricular shunt operations, including revision and removal of shunt	02.2, 02.31-02.35, 02.39, 02.42, 02.43, 54.95^
NHSN-XLAP	Exploratory laparotomy	Procedures involving an incision through abdominal wall to gain access into the abdominal cavity; diagnostic procedure on abdominal region	53.71-53.72, 53.75, 54.0, 54.11, 54.12, 54.19, 54.3, 54.4, 54.51, 54.59, 54.61, 54.63, 54.64, 54.7154.75, 54.92, 54.93

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

Examples of non-NHSN surgery

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

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