SURVEILLANCE REPORT

Annual Epidemiological Report for 2015

Healthcare-associated infections acquired in intensive care units

Key facts

- In 2015, 11 788 (8.3%) of patients staying in an intensive care unit (ICU) for more than two days presented with at least one ICU-acquired healthcare-associated infection (HAI) under surveillance (pneumonia, bloodstream infection or urinary tract infection).
- Of all patients staying in an ICU for more than two days, 6% presented with pneumonia, 4% with bloodstream infection (BSI) and 2% with urinary tract infection (UTI).
- 97% of pneumonia episodes were associated with intubation, 43% of BSI episodes were catheter-related, and 97% of UTI episodes were associated with presence of a urinary catheter.
- The most frequently isolated microorganism was *Pseudomonas aeruginosa* in ICU-acquired pneumonia episodes, coagulase-negative *Staphylococcus* spp. in ICU-acquired bloodstream infections and *Escherichia coli* in ICU-acquired urinary tract infections.
- 23% of *Staphylococcus aureus* isolates were oxacillin-resistant (MRSA). Resistance to third-generation cephalosporins was reported in 20% of *E. coli* isolates, 43% of *Klebsiella* spp. isolates and 42% of *Enterobacter* spp. isolates. Carbapenem resistance was reported in 11% of *Klebsiella* spp. isolates, 24% of *P. aeruginosa* isolates and 69% of *Acinetobacter baumannii* isolates.

Methods

This report is based on data for 2015 retrieved from The European Surveillance System (TESSy) on 29 September 2017. TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. EU Member States and EEA countries contribute to the system by uploading their infectious disease surveillance data at regular intervals.

For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1].

An overview of the national surveillance systems is available online [2].

Additional data on this topic are accessible from ECDC's online *Surveillance atlas of infectious diseases* [3].

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Stockholm, December 2017

A patient-based ('standard') protocol and a unit-based ('light') protocol are used for European surveillance of healthcare-associated infections (HAIs) acquired in intensive care units (ICUs). The patient-based protocol is used to collect data for all patients, regardless of infection, including information on risk factors allowing for risk-adjusted inter-hospital comparisons. With the unit-based protocol, denominator data, i.e. patient-days, are collected at ICU level, while patient data are recorded only for patients with HAIs.

Inclusion criteria, risk factors and case definitions of ICU-acquired HAIs are described in detail in the protocol [4]. Infections occurring after 48 hours in the ICU are considered as ICU-acquired in both protocols. With admission day being counted as day 1, infections with onset from day 3 onwards should therefore be reported. One record per HAI is collected together with antimicrobial resistance markers for isolated microorganisms. ICUs with fewer than 20 patients in the surveillance database were excluded from unit-based analyses.

The minimal requirement for surveillance of ICU-acquired HAIs is to include BSI and pneumonia. Collection of data on urinary tract infections (UTIs) and central venous catheter (CVC)-related infections is optional.

A case of pneumonia is defined in accordance with clinical criteria (X-ray, fever >38 °C, leucocytosis >12 000 white blood cells (WBC)/mm^3, purulent sputum) and further subcategorised in five categories according to the level of microbiological confirmation: PN1, minimally contaminated lower respiratory tract sample with quantitative culture (10^4 colony-forming units (CFU)/ml for bronchoalveolar lavage, 10^3 CFU/ml for protected brush samples or distal protected aspirate); PN2, non-protected sample (endotracheal aspirate, ETA) with quantitative culture (10^6 CFU/ml); PN3, alternative microbiological criteria (e.g. positive blood culture); PN4, sputum bacteriology or non-quantitative ETA; and PN5, no microbiological documentation, clinical signs and symptoms only.

A BSI is defined as a positive blood culture of a recognised pathogen or the combination of clinical symptoms (fever >38°C, chills, hypotension) and two positive blood cultures of a common skin contaminant from two separate blood samples drawn within 48 hours.

A UTI is defined as either (a) a microbiologically confirmed symptomatic UTI (UTI-A) whereby the presence of at least one sign or symptom coincides with a positive urine culture (defined as $\geq 10^5$ microorganisms per ml of urine, with no more than two species of microorganisms), or (b) a non-microbiologically-confirmed symptomatic UTI (UTI-B), whereby the presence of at least two signs or symptoms coincide with other criteria, e.g. a positive dipstick for leukocyte esterase and/or nitrate (see protocol for details of case definitions).

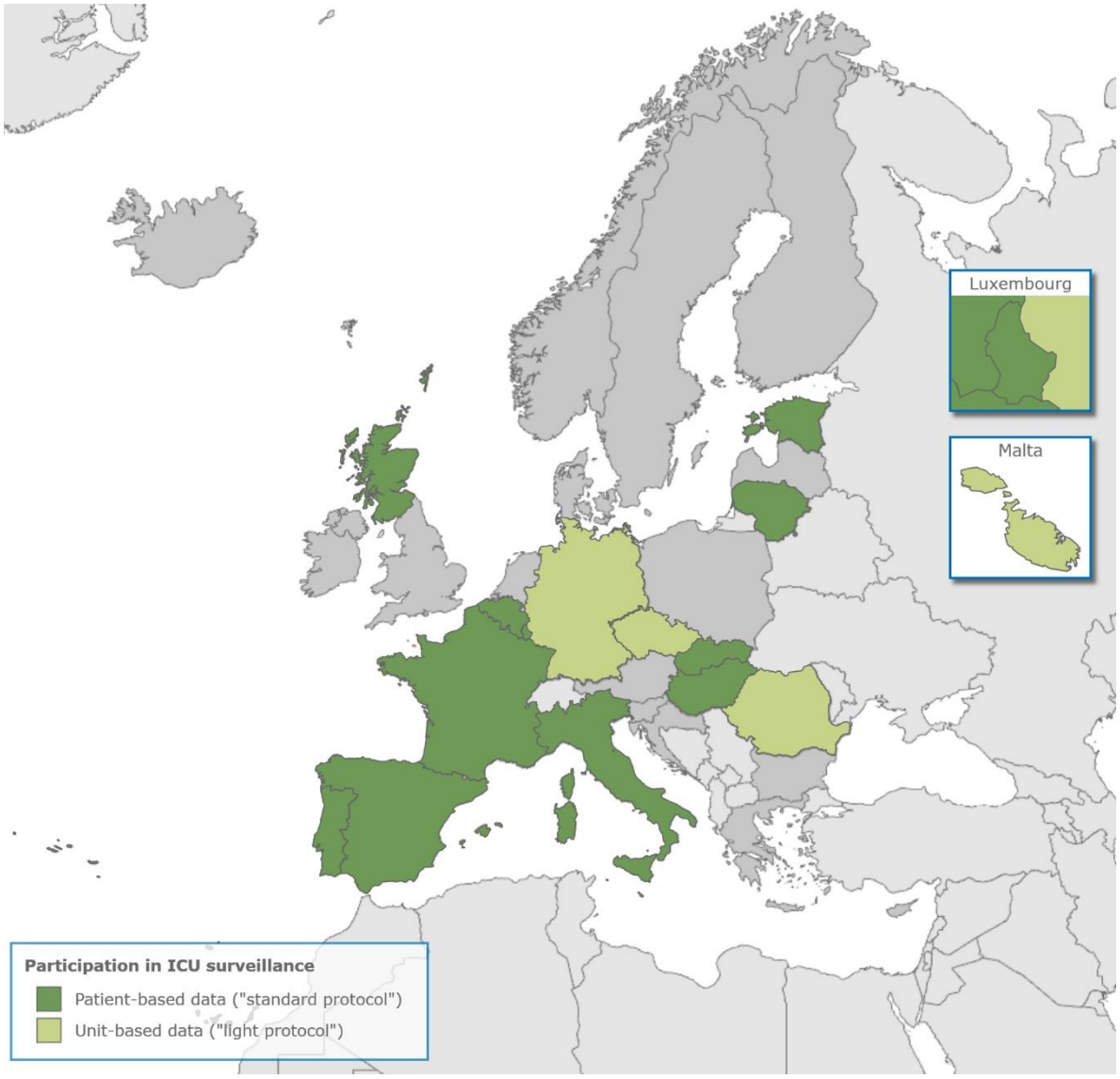
An HAI was defined as device-associated when the relevant device was used (even intermittently) in the 48 hours (two days) before onset of infection. For countries performing surveillance of catheter-related infections (CRIs), a microbiologically confirmed central vascular catheter (CVC)-related BSI was defined as a BSI occurring 48 hours before or after catheter removal, and a positive culture with the same microorganism of either: (a) quantitative CVC culture $\geq 10^3$ CFU/ml or semi-quantitative CVC culture >15 CFU, or (b) quantitative blood culture ratio CVC blood sample/peripheral blood sample >5, or (c) differential delay of positivity of blood cultures, or (d) positive culture with the same microorganism from pus from insertion site. A central line-associated bloodstream infection (CLABSI) was defined as a primary BSI with use of a central vascular catheter in the 48 hours (two days) before the onset of the infection. For the calculation of device-associated BSI rates, CLABSIs were used rather than catheter-related BSIs only, as not all participating countries performed surveillance of CRIs.

The number of HAIs, percentage of HAIs associated with the presence of a relevant device, the incidence density of HAIs per 1 000 patient-days and the incidence density of HAIs adjusted per 1 000 days of device use were estimated. The ten most frequently isolated microorganisms for each type of HAI and antimicrobial resistance percentages for *Staphylococcus aureus, Enterococcus* spp., *Enterobacteriaceae, Pseudomonas aeruginosa* and *Acinetobacter baumannii* are presented.

In 2015, 15 countries reported data from 1 103 hospitals and 1 365 ICUs (Figure 1): Belgium, the Czech Republic, Estonia, France, Germany, Hungary, Italy, Lithuania, Luxembourg, Malta, Portugal, Romania, Slovakia, Spain and the United Kingdom (UK–Scotland). The median size of the participating ICUs was nine beds ranging from 1 to 45 beds. Four countries (the Czech Republic, Germany, Malta and Romania) only provided unit-based data, and one country (Belgium) provided both patient-based and unit-based data. The remaining ten countries provided patient-based data.

As in previous years, Germany did not provide selective denominator data for patients staying in an ICU for more than two days. Therefore, data from Germany were only included in the descriptive analysis of ICU-acquired HAIs and excluded from the calculation of HAI rates.

Figure 1. Participation in surveillance of healthcare-associated infections in intensive care units, EU/EEA, 2015



Source: ECDC, HAI-Net, 2015

Epidemiology

Of 141 955 patients staying in an ICU for more than two days (patient-based data), 11 788 patients (8.3%) presented with at least one HAI.

ICU-acquired pneumonia

Of 9 123 reported cases of pneumonia, 97.4% were associated with intubation. Among patients staying in an ICU for more than two days, 6.4% were affected by at least one episode of pneumonia.

The incidence of pneumonia was 6.6 episodes per 1 000 patient-days.

The mean incidence density per ICU was 4.0 pneumonia episodes per 1 000 patient-days (ICU IQR:0.9-5.3), varying from 1.6 in ICUs with less than 30% intubated patients to 3.7 in ICUs with 30–59% intubated patients, and 6.8 in ICUs with more than 60% intubated patients.

In patient-based surveillance, the mean device-adjusted rate was 10.0 intubation-associated pneumonia episodes per 1 000 intubation-days and varied between 2.1 in Luxembourg and 18.0 per 1 000 intubation-days in Italy-SPIN-UTI (Table 1).

Table 1. ICU-acquired intubation-associated pneumonia rates by country/network, EU/EEA, 2015

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	Intubation use (days per 100 patient-days)	Intubation-associated pneumonia rate (episodes per 1 000 intubation-days)			
					Country mean	25th percentile	Median	75th percentile
Belgium	8	1 370	9.1	43.2	12.7	6.2	12.1	15.1
Estonia	8	1 600	9.9	60.4	7.5	6.2	7.5	10.9
France	188	63 240	11.6	53.9	13.5	9.1	12.6	16.6
Italy GiViTI	74	15 616	10.0	58.7	6.0	2.4	4.9	8.8
Italy SPIN-UTI	18	1 160	10.9	57.0	18.0	8.1	13.4	30.3
Hungary	12	1 497	9.8	58.4	15.9	8.3	12.2	26.2
Lithuania	30	2 823	9.1	42.6	14.0	0.6	10.6	21.1
Luxembourg	8	2 788	9.5	31.5	2.1	0.8	1.6	3.5
Portugal	37	6 047	12.4	64.7	9.8	5.1	8.4	14.1
Slovakia	7	361	9.1	63.9	13.8	3.1	15.8	22.2
Spain	191	38 009	8.1	41.3	4.5	0.9	3.4	6.4
United Kingdom – Scotland	24	6 916	7.9	63.6	2.6	1.2	2.0	3.9

Source: ECDC, HAI-Net patient-based data 2015
Percentiles: distribution of incidence per ICU

The most frequently isolated microorganisms in ICU-acquired pneumonia episodes were *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*, *Klebsiella* spp. and *Escherichia coli* (Table 2).

Table 2. Number of isolates and percentages of the ten most frequently isolated microorganisms in ICU-acquired pneumonia episodes, by country, EU/EEA, 2015

Microorganism	Belgium (n=181)	Estonia (n=85)	France (n= 7 841)	Germany (n= 5 531)	Hungary (n=114)	Italy (n=1 093)	Lithuania (n=292)	Luxembourg (n=13)	Portugal (n=534)	Romania (n=368)	Slovakia (n=39)	Spain (n=644)	United Kingdom (n=76)	Total (n=16 811)
Pseudomonas aeruginosa	18.2	3.4	25.0	14.3	25.8	19.1	12.7	20.0	23.5	15.9	17.1	28.1	3.4	20.1
Staphylococcus aureus	16.8	20.3	15.9	19.1	20.4	17.5	14.4	30.0	18.3	8.2	5.7	17.3	22.4	17.0
Klebsiella spp.	15.4	16.9	12.1	16.6	16.1	17.6	21.6	30.0	18.3	22.0	40.0	14.7	12.1	14.9
Escherichia coli	18.9	13.6	12.3	17.1	6.5	10.1	5.1	0	5.7	4.4	2.9	11.0	12.1	13.2
Enterobacter spp.	13.3	16.9	12.5	9.5	5.4	6.0	7.2	10.0	9.9	0.5	0	9.5	19.0	10.5
Candida spp.	2.1	11.9	3.7	9.6	7.5	3.1	7.2	10.0	1.5	0	5.7	1.4	10.3	5.6
Acinetobacter spp.	0	1.7	2.5	1.5	16.1	16.5	26.7	0	7.8	48.9	28.6	3.0	5.2	5.2
Serratia spp.	4.9	1.7	3.9	6.6	0	3.9	1.7	0	5.3	0	0	5.5	3.4	4.7
Stenotrophomonas maltophilia	3.5	5.1	6.1	3.0	1.1	2.2	1.3	0	5.3	0	0	5.8	3.4	4.4
Haemophilus spp.	7.0	8.5	6.0	2.7	1.1	4.2	2.1	0	4.6	0	0	3.7	8.6	4.4

n = number of isolates
Source: ECDC, HAI-Net patient-based and unit-based data, 2015. United Kingdom: data from UK–Scotland only

ICU-acquired bloodstream infections (BSIs)

A total of 5 360 cases of ICU-acquired BSI were reported. On average, ICU-acquired BSIs occurred in 3.8% of patients staying in an ICU for more than two days. The mean incidence density per ICU was 2.0 BSI episodes per 1 000 patient-days (ICU IQR: 0.4–3.1). The respective mean incidence density of primary BSIs (including catheter-related infections and infections of unknown origin) per ICU was 1.3 episodes per 1 000 patient-days (ICU IQR: 0.1–2.1) (Table A4). BSIs were catheter-related in 42.6% of cases, secondary to another infection in 34.8% of cases, and of unknown origin in 21.5% of cases. When the BSI was secondary to another infection, the primary infection site was pulmonary in 43.1%, gastrointestinal (22.5%), the urinary tract (16.6%), a surgical site (3.6%), skin and soft tissues (5.0%), and other in the remaining 9.4%. In patient-based surveillance, the central vascular

catheter (CVC) utilisation rate was on average 70.7 CVC-days per 100 patient-days. It was the lowest (62.1) in Luxembourg and the highest (82.9) in Estonia. The mean device-adjusted rate in patients staying in an ICU for more than two days was 3.6 central line-associated BSI (CLABSI) episodes per 1 000 CVC-days (ICU IQR: 0.7–5.0), varying from 1.4 in Luxembourg to 8.0 in Slovakia (Table 3).

Table 3. ICU-acquired central line-associated bloodstream infection (CLABSI) rates by country, EU/EEA, 2015

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	CVC use (days per 100 patient days)	CLABSI rate (episodes per 1 000 catheter-days)			
					Country mean	25th percentile	Median	75th percentile
Belgium	8	1 370	9.1	76.6	1.8	1.3	1.9	2.4
Estonia	8	1 600	9.9	82.9	2.1	1.1	1.9	2.4
France	188	63 240	11.6	65.9	2.3	0.9	1.9	3.2
Hungary	12	1 497	9.8	65.2	6.0	2.1	3.9	6.7
Italy GiViTI	74	15 616	10.0	82.6	2.7	0.9	2.1	3.9
Italy SPIN-UTI	18	1 160	10.9	79.6	7.2	0.0	3.8	13.3
Lithuania	28	2 739	9.3	63.4	1.6	0.0	0.0	2.4
Luxembourg	8	2 788	9.5	62.1	1.4	0.9	1.5	2.2
Portugal	37	6 047	12.4	80.1	3.2	0.7	2.9	3.9
Slovakia	7	361	9.1	58.6	8.0	1.4	3.6	5.0
Spain	191	38 009	8.1	74.6	2.2	0.0	1.8	3.4
United Kingdom – Scotland	24	6 916	7.9	59.7	2.0	0.5	1.8	2.7

Source: ECDC, HAI-Net patient-based data 2015.
Percentiles: Distribution of incidence per ICU

The incidence of microbiologically confirmed central vascular catheter-related BSIs among countries performing catheter-related infection surveillance is presented in Table A4. The incidence of BSIs that were classified as catheter-related either through microbiological confirmation or due to clinical improvement after removal of the catheter is displayed in Table A5.

The most frequently isolated microorganisms in BSI episodes were coagulase-negative staphylococci followed by *Enterococcus* spp., *Klebsiella* spp. and *Staphylococcus aureus* (Table 4).

Table 4. Number of isolates and percentages of the ten most frequently isolated microorganisms in ICU-acquired bloodstream infection (BSI) episodes by country, EU/EEA, 2015

Microorganism	Belgium (n=61)	Czech Republic (n=110)	Estonia (n=52)	France (n=2 955)	Germany (n=2 361)	Hungary (n=111)	Italy (n=931)	Lithuania (n=67)	Luxembourg (n=29)	Malta (n=16)	Portugal (n=335)	Romania (n=75)	Slovakia (n=14)	Spain (n=1 081)	United Kingdom (n=99)	Total (n=8 297)
Coagulase-negative staphylococci	3.5	37.6	16.0	20.0	24.8	21.2	16.8	23.4	44.4	0.0	17.7	0.0	28.6	29.1	21.4	22.4
Enterococcus spp.	21.1	12.9	14.0	10.7	20.3	15.4	8.7	6.2	14.8	0.0	10.3	10.7	7.1	13.1	4.8	13.7
Klebsiella spp.	15.8	16.8	12.0	11.8	8.2	15.4	18.8	17.2	3.7	41.7	16.1	24.0	28.6	14.0	10.7	12.3
Staphylococcus aureus	14.0	7.9	4.0	11.4	16.7	12.5	10.4	7.8	11.1	0.0	9.0	17.3	7.1	5.5	16.7	11.9
Escherichia coli	17.5	8.9	10.0	12.0	8.8	2.9	9.1	12.5	3.7	16.7	8.1	8.0	0.0	5.3	14.3	9.5
Pseudomonas aeruginosa	10.5	4.0	6.0	11.5	5.7	14.4	9.9	7.8	3.7	16.7	12.3	13.3	21.4	9.6	1.2	9.1
Candida spp.	8.8	5.0	16.0	8.4	7.3	3.8	7.6	4.7	14.8	8.3	7.7	0.0	0.0	9.1	14.3	8.0
Enterobacter spp.	5.3	5.9	16.0	11.2	4.8	3.8	7.4	3.1	3.7	8.3	9.4	1.3	0.0	6.9	7.1	7.8
Serratia spp.	3.5	0.0	2.0	2.3	2.7	1.9	3.3	1.6	0.0	8.3	5.5	0.0	0.0	5.6	6.0	3.1
Acinetobacter spp.	0.0	1.0	4.0	0.7	0.7	8.7	8.1	15.6	0.0	0.0	3.9	25.3	7.1	1.8	3.6	2.1

n = number of isolates
** Data from Germany only on primary bloodstream infections*

Source: ECDC, HAI-Net patient-based and unit-based data 2015. United Kingdom: data from UK–Scotland only.
Coagulase-negative staphylococci: includes unspecified Staphylococcus *spp.*

ICU-acquired urinary tract infections (UTIs)

A total of 1 338 cases of ICU-acquired UTI were reported. On average, ICU-acquired UTIs occurred in 1.9% of patients staying in an ICU for more than two days, with 97.4% of UTI episodes being associated with the use of a urinary catheter. The mean incidence density per ICU was 1.1 UTI episodes per 1 000 patient-days (ICU IQR: 0–1.6).

On average, urinary catheters were used in 81% of the patient-days. The mean device-adjusted rate in patients staying in an ICU for more than two days was 3.6 catheter-associated UTI episodes per 1 000 catheter-days (ICU IQR: 0–4.4)

The most frequently isolated microorganisms in urinary tract infection episodes were *Escherichia coli* followed by *Enterococcus* spp., *Pseudomonas aeruginosa* and *Klebsiella* spp. (Table 5).

Table 5. Percentages of the ten most frequently isolated microorganisms in ICU-acquired urinary tract infection (UTI) episodes, by country, EU/EEA, 2015

Microorganism	Estonia (n=24)	Germany (n=2 250)	Hungary (n=49)	Italy (n=34)	Lithuania (n=99)	Luxembourg (n=29)	Portugal (n=136)	Romania (n=146)	Slovakia (n=30)	Spain (n=885)	Total (n=3 682)
Escherichia coli	37.5	33.3	10.2	18.2	22.7	16.0	26.9	14.2	6.9	28.0	26.0
Enterococcus spp.	25	22.9	20.4	9.1	12.4	24.0	11.5	21.8	34.5	18.9	18.0
Pseudomonas aeruginosa	12.5	11.5	28.6	24.2	5.2	24.0	22.3	14.2	17.2	14.4	15.6
Klebsiella spp.	4.2	11.1	6.1	9.1	16.5	20.0	14.6	39.3	17.2	14.3	14.0
Candida spp.	4.2	6.8	8.2	3.0	12.4	0	13.8	0	6.9	10.0	9.9
Proteus spp.	0	6.5	4.1	3.0	16.5	4.0	3.1	0	10.3	4.9	5.6
Enterobacter spp.	16.7	5.8	0	0	4.1	4.0	1.5	0.5	3.4	5.4	4.7
Acinetobacter spp.	0	0.1	10.2	24.2	8.2	0	4.6	9.0	3.4	1.6	3.4
Coagulase-negative staphylococci	0	0.9	4.1	9.1	0	4.0	0	0	0	2.0	1.9
Staphylococcus aureus	0	1.1	8.2	0	2.1	4.0	1.5	0.9	0	0.5	1.0

n = number of isolates
Source: ECDC, HAI-Net ICU 2015

Antimicrobial resistance

The reported percentages of antimicrobial-resistant isolates in selected bacteria associated with ICU-acquired HAIs were: oxacillin resistance (MRSA) in 23.1% of *S. aureus* isolates (n=1 870); vancomycin resistance in 3.4% of *Enterococcus* spp. isolates (n=965); ceftazidime resistance in 23.7% of *P. aeruginosa* isolates (n=2 642); and resistance to third-generation cephalosporins in 20.2% of *E. coli* isolates (n=2 166), 42.9% of *Klebsiella* spp. isolates (n=2532) and 42% of *Enterobacter* spp. isolates (n=1720). Carbapenem resistance was reported in 11.3% of *Klebsiella* spp. isolates (n=1889), 0.5% of *E. coli* isolates (n=1652), 2.2% of *Enterobacter* spp. isolates (n=1438), 23.7% of P. aeruginosa isolates (n=2757) and 69.2% of *Acinetobacter baumannii* (n=451) isolates.

Discussion

Fourteen countries submitted data on ICU-acquired infections in 2015. The number of included ICU patients increased compared with the last report, which was based on 2014 data [5].

HAI surveillance at the local and national levels is an essential component of HAI prevention and control. Participating ICUs benefit from a standardised tool which enables them to compare their own performance to that of other ICUs. In addition, participation in the European surveillance network encourages compliance with existing guidelines and helps correct or improve specific practices as well as evaluate new preventive practices. Participation in the European network may also produce additional benefits at the local level, allowing for comparisons with a wide range of ICUs nationally and at the European level. Nevertheless, inter-country

differences in surveillance methods persist, and there is an ongoing effort to further harmonise the methodology for surveillance of HAIs in ICUs in Europe.

Pneumonia is the most common HAI acquired in ICUs and in the majority of cases associated with intubation. Among BSIs, a substantial proportion is catheter-related. Device-adjusted HAI rates of ICU-acquired pneumonia, BSIs and UTIs remained stable in 2015 compared with 2014 [2]. However, there is a continuing decreasing trend in the incidence of primary BSIs since 2008 [3], which may reflect increased efforts to prevent catheter-related infections.

There is substantial variability in HAI rates across the EU/EEA. Part of this variability can be attributed to variation in diagnostic practices. Characteristics of the participating ICUs and patient population, such as clinical severity and infection control practices may also affect the reported incidence of HAIs. Quality indicators for infection prevention and control and antimicrobial stewardship are included in the new protocol for surveillance of HAIs in ICUs [7] and will allow for a more comprehensive assessment of the observed variability. In addition, the inclusion of metrics for HAI outcomes in the new protocol will allow for a better estimation of the burden of HAIs in ICUs.

The distribution of microorganisms associated with HAIs in 2015 remained virtually unchanged compared with 2014. The relative contribution of gram-negative bacteria as a cause of HAIs in ICUs continues to vary geographically, with higher proportions of HAIs caused by *Klebsiella* spp. and *Acinetobacter* spp. in some countries.

This report confirms the importance of antimicrobial resistance in gram-negative bacteria in European ICUs in 2015, with resistance percentages being comparable to the report for 2014. The high percentages of resistance to carbapenems of *P. aeruginosa*, *A. baumannii* and *K. pneumoniae* isolates reflect the challenges of treatment of ICU patients, a highly vulnerable patient population.

Public health implications

ICUs are the hospital wards with the highest prevalence of HAIs [8]. The majority of HAIs in ICUs are associated with the use of invasive devices (e.g. endotracheal tubes, vascular and urinary catheters), and a significant proportion of these HAIs is considered preventable. Moreover, the burden of antimicrobial resistance is high in ICUs, due to the severity of the clinical condition of the patients, the frequent use of antibiotics and varying infection prevention and control practices.

Strengthening infection prevention and control practices and implementing antimicrobial stewardship are essential measures to prevent HAIs and the emergence and spread of antimicrobial resistance in ICUs. Further understanding of the variation in incidence and of the burden of HAIs in ICUs will be facilitated through the use of quality indicators and information on outcome. These are included in the new ECDC protocol for surveillance of HAIs in ICUs and are expected to increase the usefulness of surveillance data.

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Tables

Table A1. Characteristics of intensive care units (ICUs), unit-based and patient-based surveillance, EU/EEA, 2015

Country/ Network	Number of ICUs	ICU size (median no. beds)	Type of ICU (%)				
			Medical	Surgical	Mixed	Coronary	Other/unknown
Belgium	12	10.5	0.0	0.0	83.3	0.0	16.7
Czech republic	11	8	9.1	27.3	36.4	9.1	9.1
Germany	726	12	14.2	18.0	55.9	1.7	8.7
Estonia	8	17	0.0	12.5	75	12.5	0.0
France	188	11	8.5	11.2	77.7	0.0	0.0
Italy GiViTI	74	6	0.0	10.8	82.4	0.0	4.1
Italy SPIN-UTI	21	8	0.0	4.8	76.2	9.5	4.8
Hungary	12	9	0.0	0.0	100	0.0	0.0
Lithuania	35	8	5.7	2.9	68.6	5.7	14.3
Luxembourg	10	10.5	0.0	0.0	80.0	10.0	0.0
Malta	1	20	0.0	0.0	100	0.0	0.0
Portugal	37	8	2.7	2.7	94.6	0.0	0.0
Romania	8	35	0.0	0.0	100	0.0	0.0
Slovakia	7	8.5	0.0	0.0	100	0.0	0.0
Spain	193	12	0.0	0.0	0.0	0.0	100
United Kingdom – Scotland	24	7	0.0	0.0	95.8	0.0	0.0

Table A2. Patient demographics and risk factors at admission for patients staying more than two days in the intensive care unit; countries/networks that provided patient-based data, EU/EEA, 2015

Country/ Network	Number of patients	Number of patient - days	Females (%)	Median age (years)	SAPS II score median	Patient from hospital (%)	Trauma (%)	Type of admission (%)			Intubation (%)	Urinary catheter (%)	Central vascular catheter (%)	Impaired immunity (%)	Mortality (%)
								Medical	Scheduled surgery	Urgent surgery					
Belgium	1370	12643	40.1	70	35	62.6	10.1	61.8	22.4	15.3	45.8	72.3	70.8	7.3	13.2
Estonia	1600	14027	39.5	67.5	NA	61.6	11.0	58.1	19.5	22.3	69.5	88.6	75.8	6.1	8.4
France	63240	697436	37.2	67	43	37.9	8.4	68.8	12.6	18.3	62.9	84.8	65	15.2	17.8
Hungary	1497	13580	46.8	68	36.5	75.6	14.8	51.4	5.6	19.5	59.6	75.5	54.2	56.2	20.4
Italy-GiViTI	15616	149153	40.4	68	37	58.3	11.6	50.8	23	26.1	73.9	NA	77	2.1	16.2
Italy-SPIN-UTI	1191	12159	35.5	68	38	64.1	3.6	52.6	24.7	21.7	66.8	72.2	63.4	6.5	18.6
Lithuania	2915	26212	41.5	63	32	67.5	10.4	58.3	18.5	23.1	54.3	80.0	59.5	4.0	17.2
Luxembourg	3170	29340	42.2	69	35	58.9	5.7	53.1	29.7	17.2	33.9	71.3	54.3	NA	8.5
Portugal	6047	72324	36.6	66	45	39.4	12.2	62.9	11.9	25.2	77.5	97.8	89.9	14.0	15.8
Slovakia	361	3119	34.3	64	52	50.1	19.7	74.5	8.6	16.1	78.1	94.2	64.5	10.0	19.4
Spain	38032	306953	35.8	66	33	43.3	6.9	68.4	18.8	12.8	45.6	78.1	67.3	7.1	12.6
United Kingdom – Scotland	6916	54053	41.3	61	NA	68.7	7.0	54.1	14.4	23.7	64.2	NA	69.8	NA	14.8

NA: Not available

Table A3. ICU-acquired primary bloodstream infection rates by country/network, EU/EEA, 2015

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	Primary bloodstream infection rate (episodes per 1 000 patient-days)			
				Mean	25th percentile	Median	75th percentile
Belgium	8	1 370	9.1	1.7	1.4	1.8	2.3
Estonia	8	1 600	9.9	1.7	1.0	1.5	2.1
France	188	63 240	11.6	2.0	0.9	1.6	2.8
Hungary	12	1 497	10.0	3.4	1.6	2.4	4.8
Italy GiViTI	74	15 616	10.9	2.6	0.9	2.2	3.9
Italy SPIN-UTI	18	1 160	9.8	6.9	0.5	3.9	11.1
Lithuania	28	2 739	9.1	1.5	0.0	0.3	2.6

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	Primary bloodstream infection rate (episodes per 1 000 patient-days)			
				Mean	25th percentile	Median	75th percentile
Luxembourg	8	2 788	9.5	1.0	0.6	0.9	1.4
Portugal	37	6 047	12.4	2.6	0.7	2.6	3.4
Slovakia	7	361	9.1	2.6	1.0	2.9	3.1
Spain	191	38 009	8.1	1.8	0.0	1.5	3.0
United Kingdom – Scotland	24	6 916	7.9	1.5	0.5	1.0	2.5

Table A4. ICU-acquired microbiologically confirmed central venous catheter related bloodstream infection rates among countries performing catheter-related infections surveillance, EU/EEA, 2015

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	Central venous catheter-related bloodstream infection rate (episodes per 1 000 catheter-days)			
				Country mean	25th percentile	Median	75th percentile
Estonia	8	1600	9.9	0.7	0.0	0.0	0.5
France	188	63240	11.6	0.9	0.3	0.7	1.3
Hungary	12	1497	9.8	6.2	0.0	1.7	6.6
Italy GiViTI	74	15616	10.0	1.6	0.0	1.1	2.3
Italy SPIN-UTI	18	1160	11.0	3.4	0.0	0.0	3.7
United Kingdom – Scotland	24	6916	7.9	0.4	0.0	0.0	0.7

Table A5. ICU-acquired central venous catheter-related bloodstream infection rates by country (microbiologically confirmed or with clinical improvement after removal of the catheter), EU/EEA, 2015

Country/ Network	Number of ICUs	Number of patients	Average length of ICU stay (days)	Central venous catheter related bloodstream infection rate (episodes per 1 000 patient-days)			
				Mean	25th percentile	Median	75th percentile
Belgium	8	1 370	9.1	0.4	0.0	0.0	0.6
Estonia	8	1 600	9.9	1.0	0.0	0.5	1.8
France	188	63 240	11.6	1.1	0.4	0.9	1.7
Hungary	12	1 497	10.0	6.2	0.0	1.7	6.6
Italy GiViTI	74	15 616	10.9	1.6	0.0	1.1	2.3
Italy SPIN-UTI	18	1 160	9.8	4.1	0.0	0.0	6.7
Lithuania	28	2 739	9.1	0.5	0.0	0.0	0.0
Luxembourg	8	2 788	9.5	1.1	0.7	1.0	1.5
Portugal	37	6 047	12.4	1.9	0.0	0.9	2.1
Slovakia	7	361	9.1	0.9	0.0	0.0	1.4
Spain	191	38 009	8.1	1.1	0.0	0.5	1.6
United Kingdom – Scotland	24	6 916	7.9	0.4	0.0	0.0	0.7