



## SURVEILLANCE REPORT

Annual Epidemiological Report for 2015

# Healthcare-associated infections: surgical site infections

### Key facts

- Surgical site infections (SSIs) are among the most common healthcare-associated infections (HAIs). They are associated with longer post-operative hospital stays, additional surgical procedures, treatment in intensive care units and higher mortality.
- In 2015, 15 EU Member States and one EEA country reported SSIs for seven types of surgical procedure to ECDC.
- During this period, 10 709 SSIs were reported from a total of 568 479 surgical procedures.
- The percentage of SSIs per 100 surgical procedures varied from 0.6% to 9.6%, depending on the type of surgical procedure.
- The incidence density of in-hospital SSIs per 1 000 post-operative patient-days varied from 0.2 to 6.0 depending on the type of surgical procedure.
- From 2012 to 2015, a significantly increasing trend was observed for both the yearly percentage and incidence density of SSIs in laminectomy operations.

### Methods

This report is based on data for 2015 retrieved from The European Surveillance System (TESSy) on 26 June 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].

SSI surveillance data for 2015 were reported to ECDC by 16 countries (15 EU Member States and one EEA country).

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Data on SSIs following surgical procedures that took place in 2015 were collected in hospitals participating in national or regional surveillance of SSIs across Europe. The surveillance protocol allowed these hospitals to opt for patient-based or unit-based reporting [5,6]. SSI cases were classified according to the modified 2012 EU case definitions [4,7].

The SSI surveillance protocol includes seven types of surgical procedures: coronary artery bypass graft (CABG), cholecystectomy (CHOL), colon surgery (COLO), caesarean section (CSEC), hip prosthesis (HPRO), knee prosthesis (KPRO) and laminectomy (LAM). SSIs detected within a defined follow-up period, or where the date of onset was reported to precede the date of operation, were included in the analysis. The standardised follow-up period was 30 days. For deep or organ/space infections following orthopaedic operations with an implant in place (HPRO/KPRO), the follow-up period was extended to 90 days (replacing the previous one-year period), reflecting the changes in the surveillance protocol in 2017 [5,6,7].

For all patients with an SSI, basic demographics, infection characteristics and outcome at hospital discharge were collected. In the patient-based surveillance option, these data were collected from all surgical patients. Furthermore, information on each surgical procedure was collected, including whether the operation was urgent (i.e. not planned at least 24 hours in advance). The US National Healthcare Safety Network (NHSN) risk index, which is based on the presence of three major risk factors (duration of the operation, wound contamination class and the American Society of Anesthesiologists physical status classification), was used to assign all surgical patients to one of four categories (0 to 3) [8,9]. In this analysis, categories 2 and 3 were combined because of the low number of operations in these categories.

ECDC checked the reported SSI surveillance data for missing, unknown or discordant values and reported the results back to each country, which then had the option to correct the data.

For each type of surgical procedure under surveillance, two main indicators were calculated:

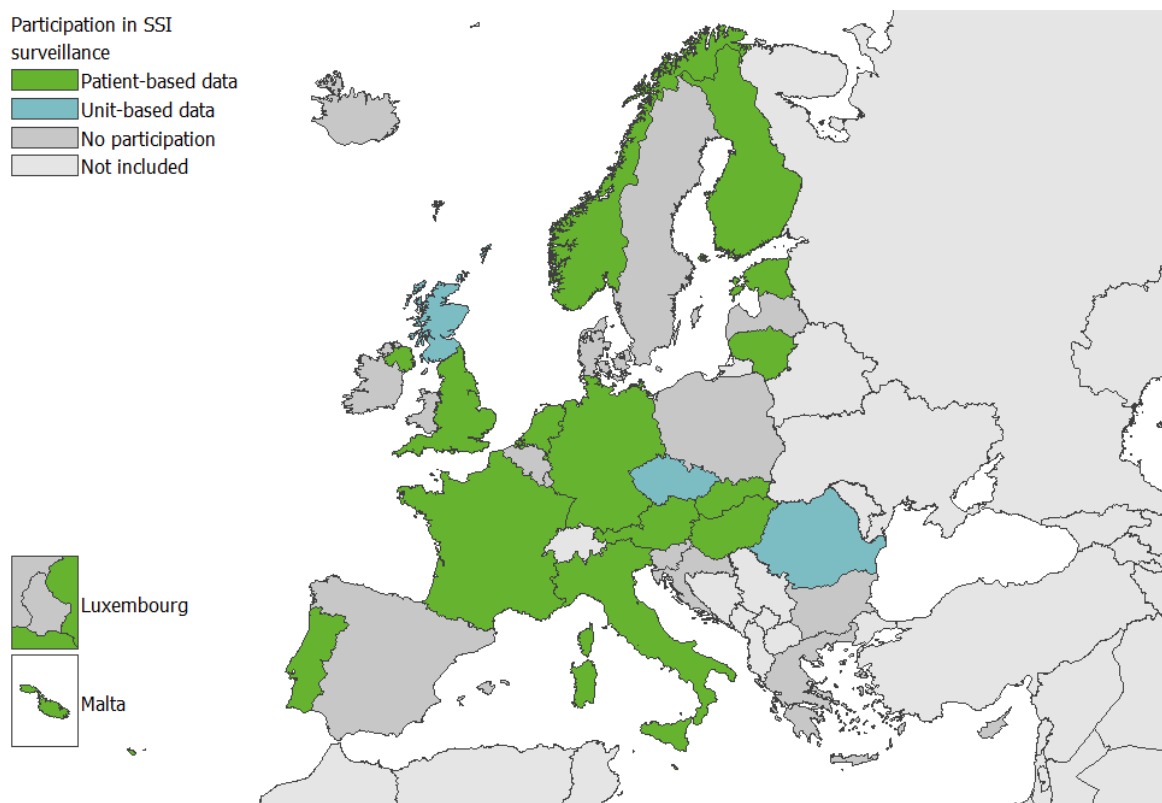
- The percentage of SSIs per 100 operations: an indicator which includes both SSIs diagnosed during hospital stay and after discharge from the hospital (detected at hospital readmission or by post-discharge surveillance).
- The incidence density of in-hospital SSIs per 1 000 post-operative patient-days: an indicator which only includes SSIs diagnosed during hospital stay in patients with a known discharge date from the hospital.

For the patient-based data, both indicators were also stratified by NHSN risk index categories.

For each type of surgical procedure, trends in both the percentage and incidence density of SSIs between 2012 and 2015 were analysed by Poisson regression. Given the dichotomous outcome, a robust sandwich variance estimator was used to correct the standard errors of the Poisson regression coefficients. Only countries that provided data using the same surveillance option (patient-based or unit-based) for at least three years were included in the trend analysis.

## Epidemiology

Of the 16 EU/EEA countries that participated in surveillance of SSIs in 2015, 14 countries reported patient-based data (for the UK, UK–England and UK–Northern Ireland) whereas two countries (and UK–Scotland) reported unit-based data (Figure 1). The representation of hospitals varied between countries, showing noticeable differences in the national coverage of the surveillance systems (Table 1). Ten of the 16 EU/EEA countries reported performing post-discharge surveillance [2].

**Figure 1. Participation in the surveillance of surgical site infections (SSIs), EU/EEA, 2015**

Source: ECDC, HAI-Net, 2015

Overall, 568 479 surgical procedures from 1 507 hospitals were reported in 2015. Of these procedures, 531 545 were reported using patient-based surveillance, and 36 934 used the unit-based surveillance (Table 1). The most common surgical procedure types under surveillance were HPRO operations, followed by KPRO operations and CSEC operations.

**Table 1. Number of reporting hospitals and reported surgical procedures by country/network and type of surgical procedure, EU/EEA, 2015**

Country/network	Number of reporting hospitals	Number of procedures							Total
		CABG	CHOL	COLO	CSEC	HPRO	KPRO	LAM	
<b>Patient-based data</b>									
Austria	32	463	717	356	2 629	4 327	2 913	.	11 405
Estonia	2	117	.	.	819	.	.	.	936
Finland	12	.	.	.	.	7 033	5 795	.	12 828
France	299	1 149	8 031	3 594	13 627	17 485	11 808	1 318	57 012
Germany	476	13 086	16 927	10 201	16 545	64 236	35 699	4 770	161 464
Hungary	41	363	2 642	717	3 536	691	643	868	9 460
Italy	83	1 194	6 775	4 784	8 700	1 969	461	1 292	25 175
Lithuania	22	351	912	375	1 524	695	353	.	4 210
Malta	2	.	.	161	86	299	676	.	1 222
Netherlands	86	948	5 572	5 075	5 810	24 956	19 654	1 403	63 418
Norway	58	1 808	5 373	3 428	9 204	11 664	.	.	31 477
Portugal	47	42	4 338	3 066	2 877	2 752	2 160	944	16 179
Slovakia	7	.	532	.	.	.	.	.	532
UK-England	291	5 069	789	4 447	.	54 560	55 011	7 091	126 967
UK-Northern Ireland	10	.	.	.	5 577	1 934	1 350	399	9 260
<b>Subtotal</b>	<b>1 468</b>	<b>24 590</b>	<b>52 608</b>	<b>36 204</b>	<b>70 934</b>	<b>192 601</b>	<b>136 523</b>	<b>18 085</b>	<b>531 545</b>
<b>Unit-based data</b>									
Czech Republic	1	.	.	251	.	.	.	.	251
Romania	6	505	2 299	831	.	156	.	1 129	4 920

Country/network	Number of reporting hospitals	Number of procedures							Total
		CABG	CHOL	COLO	CSEC	HPRO	KPRO	LAM	
UK–Scotland	32	.	.	.	17 135	8 444	6 184	.	31 763
<b>Subtotal</b>	<b>39</b>	<b>505</b>	<b>2 299</b>	<b>1 082</b>	<b>17 135</b>	<b>8 600</b>	<b>6 184</b>	<b>1 129</b>	<b>36 934</b>
<b>EU/EEA</b>	<b>1 507</b>	<b>25 095</b>	<b>54 907</b>	<b>37 286</b>	<b>88 069</b>	<b>201 201</b>	<b>142 707</b>	<b>19 214</b>	<b>568 479</b>

Source: Country reports from Austria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland, and Scotland).

CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy

Patient characteristics per surgical procedure type were only available for the patient-based data. The ratio of male to female patients was the highest in CABG operations (4.1:1) and the lowest in CHOL and HPRO operations (0.6:1), excluding CSEC operations (Table 2). The median age of patients varied from 32 years in CSEC operations to 72 years in HPRO operations. The post-operative in-hospital case fatality (3.9%) and the proportion of contaminated or dirty operations (29.3%) were the highest among COLO operations. The median duration of operation was the longest in CABG operations (198 minutes), and the median length of post-operative stay was the longest in CABG and COLO operations (nine days). The proportion of urgent operations varied from 1.9% in KPRO operations to 53% in CSEC operations. In all types of surgical procedures, and with the exception of CHOL operations, more than 80% patients received antibiotic prophylaxis. Among all CHOL operations, 86% were reported as endoscopic operations compared with 33% of COLO operations.

**Table 2. Characteristics of patients by type of surgical procedure, patient-based data, EU/EEA, 2015**

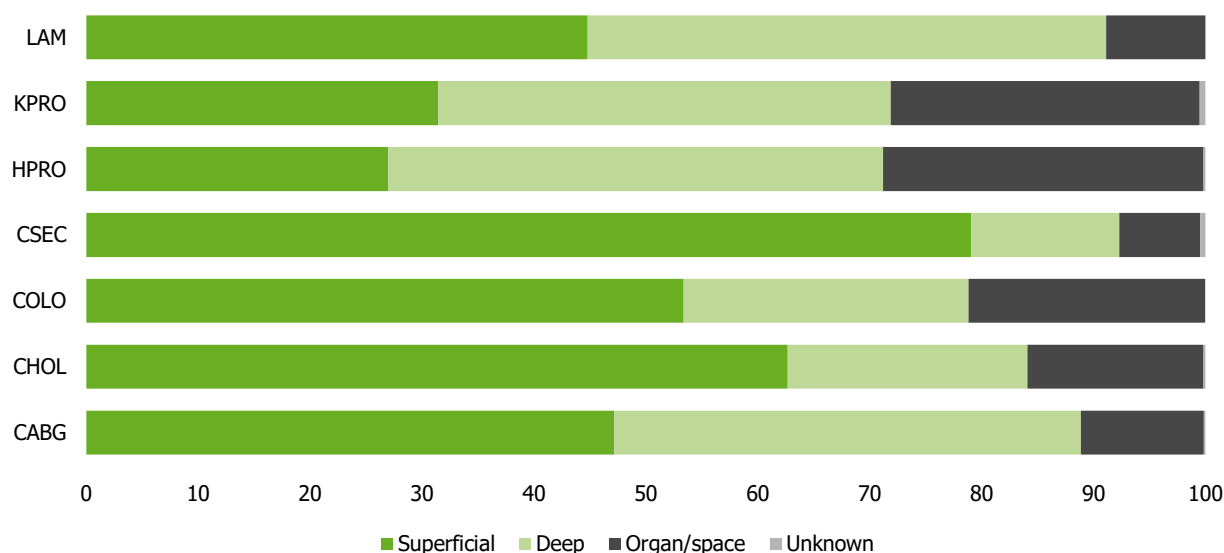
Characteristics	CABG (n=24 590)	CHOL (n=52 608)	COLO (n=36 204)	CSEC (n=70 934)	HPRO (n=192 601)	KPRO (n=136 523)	LAM (n=18 085)
Sex ratio (male:female)	4.1	0.6	1.1	0	0.6	0.7	1.1
Median age (years)	69	56	69	32	72	70	57
Post-operative in-hospital case fatality (%)	1.6	0.4	3.9	0	1.4	0.1	0.3
Contaminated or dirty operations (%)	4.7	15.7	29.3	5.3	0.8	0.4	1.5
Median duration of operation (minutes)	198	60	140	38	71	76	85
Median length of post-operative stay (days)	9	3	9	5	7	6	4
Urgent operations (%)	9.8	17.1	19.1	52.8	12	1.9	3.8
Antibiotic prophylaxis (%)	99.1	52.1	88.6	87.5	98	98.6	88.9

Source: Country reports from Austria, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England and Northern Ireland).

See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.

CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy

In 2015, 10 709 SSIs were reported using patient- and unit-based surveillance. Of these, 5 286 (50%) were superficial, 3 243 (30%) deep and 2 161 (20%) organ/space SSIs. In 19 (0.2%) SSIs, the type of SSI was unknown. The proportion of deep or organ/space SSIs was 20% in CSEC operations, 37% in CHOL operations, 47% in COLO operations, 53% in CABG operations, 55% in LAM operations, 68% in KPRO operations and 73% in HPRO operations (Figure 2). Forty-three per cent of the SSIs were diagnosed in hospitals, whereas 49% were detected after discharge; for 8% the discharge date was unknown. The proportion of SSIs diagnosed in-hospital varied from 17% in CSEC operations to 67% in COLO operations.

**Figure 2. Types of SSI by type of surgical procedure, EU/EEA, 2015**

*CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy*

*Source: Country reports from Austria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland and Scotland). See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.*

The percentage of SSIs varied greatly by type of surgical procedure from 0.6% in KPRO operations to 9.6% in COLO operations. Similar variations between types of surgical procedure were observed for the incidence density of in-hospital SSIs (Table 3). Both in CHOL and COLO operations the percentage of SSIs as well as the incidence density was lower in endoscopic procedures than in open procedures.

**Table 3. Percentage of SSIs and incidence density of in-hospital SSIs by year and type of surgical procedure, EU/EEA, 2015**

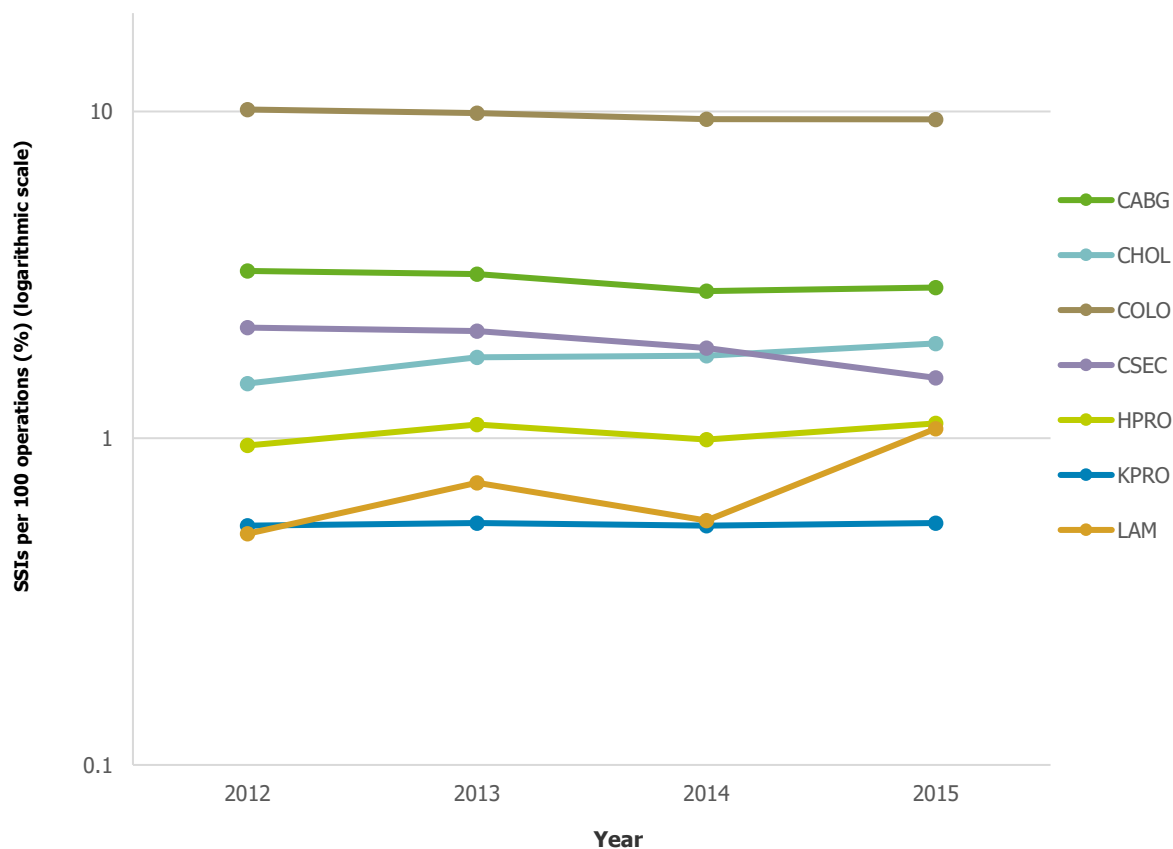
Surgical procedure type	Percentage of SSIs per 100 operations (inter-country range)	Incidence density of in-hospital SSIs per 1 000 post-operative patient-days (inter-country range)
CABG	2.9 [0.7-6.0]	1.5 [0.0-4.2]
CHOL	2.0 [0.0-5.8]	1.8 [0.0-6.8]
Endoscopic CHOL*	1.8 [0.0-5.2]	0.9 [0.0-2.1]
Open CHOL*	4.8 [0.0-16.3]	3.7 [0.0-13.4]
COLO	9.6 [6.4-17.7]	6.0 [1.9-17.0]
Endoscopic COLO*	6.8 [2.5-9.5]	4.2 [1.2-5.7]
Open COLO*	10.1 [7.0-17.3]	5.8 [2.1-9.8]
CSEC	1.7 [0.3-6.1]	0.6 [0.2-2.2]
HPRO	1.1 [0.1-4.7]	0.4 [0.0-1.6]
KPRO	0.6 [0.0-2.6]	0.2 [0.0-0.5]
LAM	1.0 [0.2-3.2]	0.7 [0.0-1.8]

\* Endoscopic/open procedures only include patient-based data for which the variable 'endoscopic procedure (yes/no)' was documented.

*Source: Country reports from Austria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland, and Scotland). See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.*

*CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy*

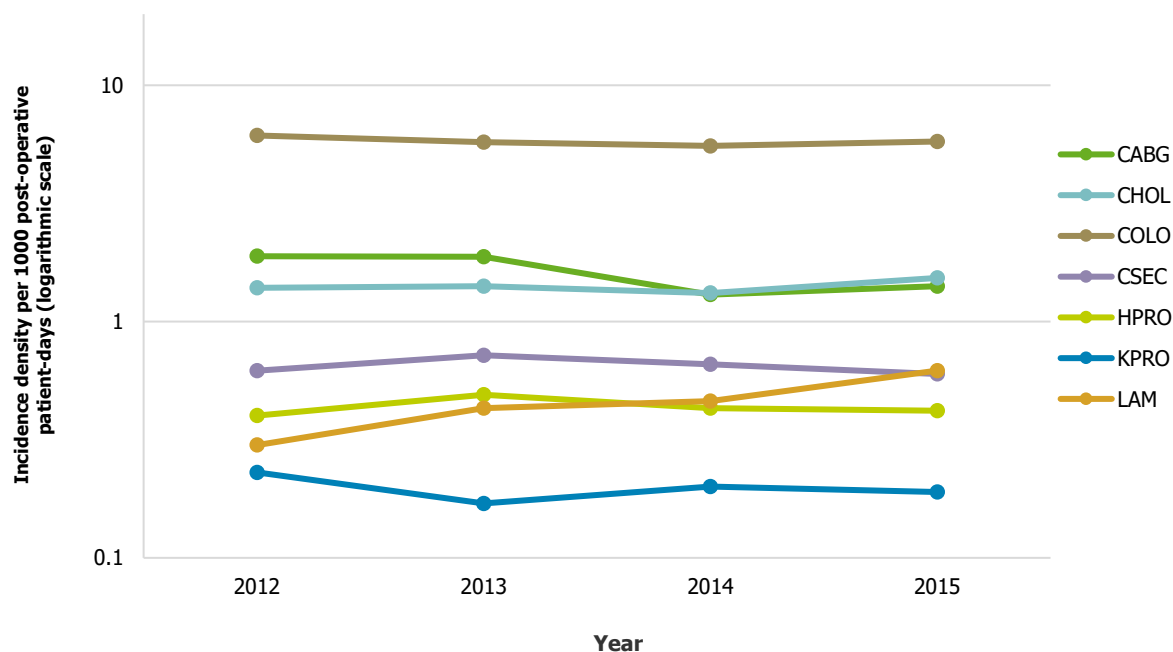
Trend analyses of the yearly percentage of SSIs in 2012–2015 showed an increasing trend for CHOL ( $p < 0.001$ ), HPRO ( $p = 0.03$ ) and LAM operations ( $p < 0.001$ ), and a decreasing trend for CABG ( $p < 0.001$ ), COLO ( $p < 0.001$ ) and CSEC operations ( $p < 0.001$ ) (Figure 3). For KPRO operations, no significant trend was observed in 2012–2015.

**Figure 3. Trends of percentage of SSIs by year and type of surgical procedure, EU/EEA, 2012–2015**

*CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy*

*Source: Country reports from Austria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland, and Scotland). See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.*

Trend analyses of yearly incidence density of in-hospital SSIs in 2012–2015 showed an increasing trend in LAM operations ( $p < 0.001$ ) and a decreasing trend for CABG ( $p < 0.001$ ) and KPRO operations ( $p < 0.001$ ), although for CABG operations the incidence density of in-hospital SSIs remained roughly the same during 2012–2013, with a slight decrease in 2014 (Figure 4). No significant trends were observed for CHOL, COLO, CSEC and HPRO operations in 2012–2015.

**Figure 4. Trends of incidence density of in-hospital SSIs by year and type of surgical procedure, EU/EEA, 2015**

CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy

Note: Only SSIs diagnosed in-hospital were included.

Source: Country reports from Austria, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland, and Scotland). See Table 1 for the details of countries participating in the surveillance in each operation type.

Data on microorganisms were reported for 5 508 (51.4%) SSIs from 13 countries using patient- or unit-based surveillance. Overall, *Staphylococcus aureus* (20.3%) and *Escherichia coli* (16.1%) were the most commonly reported microorganisms (Table 4). The distribution of microorganisms varied by type of surgical procedure. For CHOL and COLO operations, the majority of the reported microorganisms were Enterobacteriaceae. For all other types of surgical procedure, gram-positive cocci were the most commonly reported microorganisms.

**Table 4. Percentages of microorganisms identified in SSIs by type of surgical procedure, pooled data from 13 EU/EEA countries, 2015 (n=6 580)**

Microorganisms	CABG (n=517)	CHOL (n=486)	COLO (n=2 427)	CSEC (n=431)	HPRO (n=1 879)	KPRO (n=677)	LAM (n=163)	Total (n=6 580)
<b>Gram-positive cocci</b>	68.9	38.5	29.9	44.8	67.6	75.5	62.0	50.8
<i>Staphylococcus aureus</i>	20.1	10.5	6.0	24.1	32.4	39.1	33.7	20.3
Coagulase-negative staphylococci	40.6	3.7	2.0	4.9	19.9	19.9	19.0	12.7
<i>Enterococcus</i> species	6.8	18.7	19.3	7.7	8.7	6.4	3.1	12.7
<i>Streptococcus</i> species	0.6	5.1	2.1	7.4	4.8	8.3	3.1	4.0
Other gram-positive cocci	0.8	0.4	0.5	0.7	1.9	1.8	3.1	1.1
<b>Gram-positive bacilli</b>	0.8	0.4	0.6	1.6	2.8	1.8	1.2	1.4
<b>Gram-negative bacilli, Enterobacteriaceae</b>	18.8	42.8	51.1	24.6	17.9	14.2	22.7	32.2
<i>Escherichia coli</i>	5.4	22.4	30	11.6	5.6	4.0	8.6	16.1
<i>Citrobacter</i> species	0.6	2.7	1.9	1.2	0.6	0	0	1.2
<i>Enterobacter</i> species	4.6	2.5	5.5	2.6	3.0	2.1	2.5	3.9
<i>Klebsiella</i> species	3.5	9.1	6.6	4.9	2.9	1.8	4.9	4.9
<i>Proteus</i> species	1.9	1.4	1.9	3.2	3.1	3.4	4.3	2.5
<i>Serratia</i> species	1.4	1.4	0.4	0.7	1.0	0.7	0.6	0.8
Other Enterobacteriaceae	1.4	3.3	4.7	0.5	1.7	2.2	1.8	2.9
<b>Gram-negative non-fermentative bacilli</b>	3.9	7.6	8.7	3.0	4.2	3.1	6.1	5.9
<i>Acinetobacter</i> species	0.4	4.7	0.1	0	0.5	0.3	1.2	0.6
<i>Haemophilus</i> species	0.2	0.2	0	0	0.1	0	0	0

Microorganisms	CABG (n=517)	CHOL (n=486)	COLO (n=2 427)	CSEC (n=431)	HPRO (n=1 879)	KPRO (n=677)	LAM (n=163)	Total (n=6 580)
<i>Pseudomonas aeruginosa</i>	2.7	2.7	7.8	2.1	2.8	2.4	4.3	4.6
Pseudomonadaceae family, other	0.2	0	0.4	0.5	0.5	0.4	0.6	0.4
<i>Stenotrophomonas maltophilia</i>	0.4	0	0.1	0	0.3	0	0	0.2
Other gram-negative non-fermentative bacilli	0	0	0.2	0.5	0	0	0	0.1
<b>Anaerobes</b>	1.0	3.3	4.1	20.4	1.2	1.2	1.2	3.7
<i>Bacteroides</i> species	0.2	1.9	3.0	1.4	0.3	0.3	0	1.4
Other anaerobes	0.8	1.4	1.2	19.0	1.0	0.9	1.2	2.2
<b>Other bacteria</b>	5.8	5.6	3.0	3.5	5.8	3.8	6.7	4.4
<b>Fungi, parasites</b>	1.0	1.6	2.7	1.2	0.4	0.3	0	1.4
<i>Candida</i> species	1.0	1.4	2.6	1.2	0.4	0.1	0	1.3
Other fungi or parasites	0	0.2	0.1	0	0	0.1	0	0.1

CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy

See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.

Source: Country reports from the Czech Republic, Estonia, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Portugal, Romania, Slovakia and the United Kingdom (England, Northern Ireland and Scotland).

## Discussion

The results of SSI surveillance presented in this report constitute a useful source of information. The number of reporting EU/EEA countries remained stable in comparison with 2013–2014. However, the observed inter-country variation and the fact that not all EU/EEA Member States participated, limits the extent to which the results can be considered representative of the overall EU/EEA situation. For example, some European countries, which according to the 2011–2012 ECDC point prevalence survey reported a low proportion of SSIs among all healthcare-associated infections, do not participate in SSI surveillance [6]. In addition, national representativeness, surgical practices and surveillance methods vary considerably from country to country, which makes it very difficult to compare data across countries. Important factors influencing the percentage of SSIs are the length of the in-hospital follow-up period after surgery, and the differences in post-discharge surveillance methods. This is the case especially for superficial SSIs that are mostly diagnosed in-hospital, and for those surgical procedures where a large proportion of SSIs can be only detected after hospital discharge. Inter-country comparisons should therefore focus on the incidence density of in-hospital SSIs, or specifically on the incidence density of deep or organ/space SSIs. Even though comparisons of incidence density are still limited by differences in post-operative discharge policy, they are not affected by the post-discharge surveillance methods.

Both the percentage and incidence density of SSIs were the highest in COLO operations and the lowest in KPRO operations. However, the risk of SSI differs between the various types of surgical procedure because of the different population groups that undergo these operations and because of the different proportions of clean and contaminated operations for each operation type. Therefore, comparisons of SSI rates across countries and between years should only be attempted within a specific type of surgical procedure.

In 2012–2015, a statistically significant increasing trend was observed in the percentage of SSIs in CHOL, HPRO and LAM operations. For LAM operations, there was also a significant trend in the incidence density of SSIs. In all of these types of surgical procedures, the changes were mainly driven by two or three countries with significantly higher incidences, which indicates that these increases are either national trends or reflect changes in SSI surveillance at national level (e.g. improved case finding). However, it is important to note that a decreasing trend for LAM operations in 2008–2011 was followed by an increasing trend after 2012 [7,8].

The 2012–2015 surveillance data show statistically significant decreasing trends in SSIs associated with four other types of surgery. A comparison of the 2012–2015 trends with those reported from EU/EEA countries for 2008–2011 shows a continuous downward trend in the percentage of SSIs in CSEC operations and in the incidence density of in-hospital SSIs in COLO operations throughout the entire 2008–2015 timespan [7].

When comparing the incidences of deep incisional or organ/space SSIs in the EU/EEA with those reported from the United States for 2014, the incidences were higher in the EU/EEA for most types of surgical procedure. However, these differences can, at least in part, be explained by the intensity of post-discharge surveillance, especially in certain EU/EEA countries, as well as by the differences in the SSI case definitions between the surveillance systems [9].



## Public health implications

Surveillance is a key component in the prevention of healthcare-associated infections and an important tool for monitoring the effectiveness of prevention and control measures [10]. Surveillance of SSIs in participating EU/EEA countries may therefore have been a factor in some of the observed improvements.

Increasing trends in certain types of surgical procedures need to be closely monitored, and further analysis is required to improve the comparisons between networks, countries and geographical areas. To further strengthen the surveillance of SSIs in Europe, ECDC has updated its surveillance protocol in 2017, adding structure and process indicators for the prevention of SSIs [2]. This updated protocol provides participating hospitals with an improved tool to compare their performance with similar hospitals, both nationally and internationally. These changes aim to increase the usefulness of national SSI surveillance networks and increase hospital participation in SSI surveillance across the EU/EEA.

Further efforts are needed to increase the representativeness of European SSI surveillance data by extending surveillance to other EU/EEA countries. ECDC will continue to provide support to countries that want to establish or improve their national surveillance networks. In addition to the SSI protocol update, ECDC has produced a free software package (HelicsWin.Net) for SSI surveillance, which was made available to network coordination centres and hospitals in November 2017. In autumn 2018, ECDC will intensify its disease surveillance efforts to support the collection of SSI surveillance data in all EU/EEA countries and promote the use of the structure and process indicators for the prevention of SSIs included in the surveillance protocol.

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## Tables

**Table A1. Percentage of missing values by TESSy variable and year, patient-based data, 2015**

Variable	Name of TESSy variable	Missing values (%)*
Gender	Gender	<0.1
In-hospital outcome	OutcomeHospital	49.4
Date of operation	DateOfOperation	0
Date of hospital admission	DateOfHospitalAdmission	32.9
Date of hospital discharge	DateOfHospitalDischarge	8.6
Data of last follow-up	DateOfLastFollowup	52.9
Operation code	OPCode	0
ICD-9-CM code	ICD9CMCode	44
Endoscopic operation	EndoscopicProc	21
Wound class	WoundClass	1
Duration of operation	OperationDur	0.6
ASA score	ASAClassification	3
Urgent operation	UrgentOperation	26.6
Prophylaxis	Prophylaxis	50.7
Type of infection	SSIType	0.2

Source: Country reports from Austria, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England and Northern Ireland)

\*  $n = 531\ 062$  operations and  $n = 10\ 156$  SSIs

**Table A2.1. Percentage of SSIs and incidence density of in-hospital SSIs after coronary artery bypass graft operations by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	463	22	4.8 [3.0- 7.2]	453	7 820	16 (73)	2.0 [1.2-3.3]
Estonia	117	3	2.6 [0.5- 7.5]	117	1 518	3 (100)	2.0 [0.4-5.8]
France	1 149	48	4.2 [3.1- 5.5]	1 149	14 745	26 (54)	1.8 [1.2-2.6]
Germany	13 086	381	2.9 [2.6- 3.2]	9 941	129 364	211 (55)	1.6 [1.4-1.9]
Hungary	363	14	3.9 [2.1- 6.5]	363	3 909	8 (57)	2.0 [0.9-4.0]
Italy	1 194	57	4.8 [3.6- 6.2]	1 149	12 238	7 (12)	0.6 [0.2-1.2]
Lithuania	351	21	6.0 [3.7- 9.1]	351	6 194	21 (100)	3.4 [2.1-5.2]
Netherlands	948	7	0.7 [0.3- 1.5]	948	6 334	2 (29)	0.3 [0.0-1.1]
Norway*	1 808	76	4.2 [3.3- 5.3]	1 804	12 848	12 (16)	0.9 [0.5-1.6]
Portugal	42	1	2.4 [0.1-13.3]	42	411	0 (0)	0.0 [0.0-9.0]
UK-England	5 069	75	1.5 [1.2- 1.9]	5 069	54 765	46 (61)	0.8 [0.6-1.1]
Unit-based data							
Romania	505	23	4.6 [2.9- 6.8]	505	5 480	23 (100)	4.2 [2.7-6.3]
EU/EEA	25 095	728	2.9 [2.7- 3.1]	21 891	255 626	375 (52)	1.5 [1.3-1.6]

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, Malta, Norway, Portugal, Romania and the United Kingdom (England)

(1) Only SSIs diagnosed within 30 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation + 1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

\* Data from Norway include patient-reported SSIs.

**Table A2.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after coronary artery bypass graft operations in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	No. of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	1 233	40	2.6	0	0	0	0	5.2	15 659	31	0.5	0	0	0	0	2.2
1	18 959	562	4.5	0	1.1	2.6	4.7	6.9	180 189	268	2.6	0	0	1	2.1	3.2
2 and 3	1 723	66	5.8	0	0	0	7	16.7	24 657	37	1.7	0	0	0	1.6	6.2
Unknown	2 675	36	2.8	0	0	0	1.8	6	29 641	15	0.7	0	0	0	0	0.9
Overall	24 590	704	3.2	0	1.1	2.4	4.5	6.9	250 146	351	1.5	0	0	1	2	3.1

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, Malta, Norway, Portugal and the United Kingdom (England)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.

**Table A3.1. Percentage of SSIs and incidence density of in-hospital SSIs after cholecystectomy operations by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	717	0	0.0 [0.0-0.5]	717	3 716	0 (NaN)	0.0 [0.0-1.0]
France	8 031	74	0.9 [0.7-1.2]	8 031	29 499	28 (38)	0.9 [0.6-1.4]
Germany	16 927	204	1.2 [1.0-1.4]	14 456	99 266	123 (60)	1.2 [1.0-1.5]
Hungary	2 642	46	1.7 [1.3-2.3]	2 642	10 727	24 (52)	2.2 [1.4-3.3]
Italy	6 775	80	1.2 [0.9-1.5]	5 718	26 788	14 (18)	0.5 [0.3-0.9]
Lithuania	912	6	0.7 [0.2-1.4]	912	3 661	5 (83)	1.4 [0.4-3.2]
Netherlands	5 572	168	3.0 [2.6-3.5]	5 572	13 476	32 (19)	2.4 [1.6-3.4]
Norway*	5 373	311	5.8 [5.2-6.5]	5 368	15 374	49 (16)	3.2 [2.4-4.2]
Portugal	4 338	104	2.4 [2.0-2.9]	4 338	16 987	56 (54)	3.3 [2.5-4.3]
Slovakia	532	15	2.8 [1.6-4.7]	532	2 338	8 (53)	3.4 [1.5-6.7]
UK-England	789	12	1.5 [0.8-2.7]	789	2 036	5 (42)	2.5 [0.8-5.7]
Unit-based data							
Romania	2 299	82	3.6 [2.8-4.4]	2 299	12 044	82 (100)	6.8 [5.4-8.5]
EU/EEA	54 907	1 102	2.0 [1.9-2.1]	51 374	235 912	426 (39)	1.8 [1.6-2.0]

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Romania, Slovakia and the United Kingdom (England)

**Table A3.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after cholecystectomy operations in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	No. of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	33 607	506	1.4	0	0	0	1.6	4.5	104 170	107	0.9	0	0	0	0	3.5
1	12 660	285	2.5	0	0	0	3.6	7.6	72 707	119	2.4	0	0	0	0	8.1
2 and 3	4 214	186	5.1	0	0	0	3.5	16.8	39 989	115	2.9	0	0	0	0	9.2
Unknown	2 127	43	1.3	0	0	0	0	2.9	7 002	3	0.2	0	0	0	0	0
Overall	52 608	1 020	1.8	0	0	0.8	2.7	4.6	223 868	344	1.6	0	0	0	2.2	5.1

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.

**Table A4.1. Percentage of SSIs and incidence density of in-hospital SSIs after colon surgery by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	356	27	7.6 [5.0-11.0]	356	4 813	26 (96)	5.4 [3.5-7.9]
France	3 594	245	6.8 [6.0-7.7]	3 594	42 521	187 (76)	4.4 [3.8-5.1]
Germany	10 201	793	7.8 [7.2-8.3]	9 026	125 898	635 (80)	5.0 [4.7-5.5]
Hungary	717	67	9.3 [7.2-11.9]	717	7 772	53 (79)	6.8 [5.1-8.9]
Italy	4 784	304	6.4 [5.7-7.1]	3 735	45 892	87 (29)	1.9 [1.5-2.3]
Lithuania	375	31	8.3 [5.6-11.7]	375	4 452	30 (97)	6.7 [4.5-9.6]
Malta	161	24	14.9 [9.6-22.2]	161	2 186	14 (58)	6.4 [3.5-10.7]
Netherlands	5 075	572	11.3 [10.4-12.2]	5 075	49 600	372 (65)	7.5 [6.8-8.3]
Norway*	3 428	452	13.2 [12.0-14.5]	3 419	30 882	204 (45)	6.6 [5.7-7.6]
Portugal	3 066	543	17.7 [16.3-19.3]	3 066	35 939	391 (72)	10.9 [9.8-12.0]
UK-England	4 447	383	8.6 [7.8-9.5]	4 447	51 198	323 (84)	6.3 [5.6-7.0]
Unit-based data							
Czech Republic	251	20	8.0 [4.9-12.3]	251	2 962	15 (75)	5.1 [2.8-8.4]
Romania	831	132	15.9 [13.3-18.8]	831	7 751	132 (100)	17.0 [14.2-20.2]
EU/EEA	37 286	3 593	9.6 [9.3-10.0]	35 053	411 866	2 469 (69)	6.0 [5.8-6.2]

Source: Country reports from: Austria, the Czech Republic, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania and the United Kingdom (England)

(1) Only SSIs diagnosed within 30 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation + 1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

\* Data from Norway include patient-reported SSIs.

**Table A4.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after colon surgery in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	No. of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	10 712	835	6.7	0	0	4.5	10	16.7	93 316	476	4.3	0	0	2.1	7.1	11.4
1	15 036	1 438	9.4	0	3	7.7	13.8	19.3	166 657	1 000	5.7	0	0	4.8	8.6	12.9
2 and 3	8 874	1 034	13	0	0	10	18.8	28.6	125 399	767	7.3	0	0	5	10.4	16.5
Unknown	1 582	134	8.1	0	0	0	6.3	25	15 781	79	4.3	0	0	0	3.9	13.8
Overall	36 204	3 441	9.2	1.1	4.3	8.1	12.9	17.7	401 153	2 322	5.7	0	2.4	5.1	8.6	11.8

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal and the United Kingdom (England)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.

**Table A5.1. Percentage of SSIs and incidence density of in-hospital SSIs after Caesarean sections by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	2 629	9	0.3 [0.2-0.6]	2 629	16 388	9 (100)	0.5 [0.3-1.0]
Estonia	819	19	2.3 [1.4-3.6]	819	3 740	3 (16)	0.8 [0.2-2.3]
France	13 627	193	1.4 [1.2-1.6]	13 627	84 506	49 (25)	0.6 [0.4-0.8]
Germany	16 545	78	0.5 [0.4-0.6]	15 404	89 828	20 (26)	0.2 [0.1-0.3]
Hungary	3 536	42	1.2 [0.9-1.6]	3 536	19 437	17 (40)	0.9 [0.5-1.4]
Italy	8 700	53	0.6 [0.5-0.8]	7 668	33 555	6 (11)	0.2 [0.1-0.4]
Lithuania	1 524	9	0.6 [0.3-1.1]	1 524	8 018	7 (78)	0.9 [0.4-1.8]
Malta	86	5	5.8 [1.9-13.6]	86	446	1 (20)	2.2 [0.1-12.5]

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Netherlands	5 810	78	1.3 [1.1- 1.7]	5 810	25 000	17 (22)	0.7 [0.4- 1.1]
Norway*	9 204	424	4.6 [4.2- 5.1]	9 202	46 516	68 (16)	1.5 [1.1- 1.9]
Portugal	2 877	49	1.7 [1.3- 2.3]	2 877	13 150	8 (16)	0.6 [0.3- 1.2]
UK–Northern Ireland	5 577	341	6.1 [5.5- 6.8]	5 368	19 705	11 (3)	0.6 [0.3- 1.0]
Unit-based data							
UK–Scotland	17 135	219	1.3 [1.1- 1.5]				
EU/EEA	88 069	1 519	1.7 [1.6- 1.8]	68 550	360 289	216 (14)	0.6 [0.5- 0.7]**

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania and the United Kingdom (Northern Ireland and Scotland)

(1) Only SSIs diagnosed within 30 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation +1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

\* Data from Norway include patient-reported SSIs. \*\*Scotland not included as no denominator provided.

**Table A5.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after Caesarean sections in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	Number of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	56 470	998	1.6	0	0	0.7	2.3	4.6	288 261	151	0.5	0	0	0	0	1.7
1	9 869	205	2.6	0	0	0	1.5	8.8	51 058	40	0.9	0	0	0	0	0
2 and 3	576	23	6.5	0	0	0	0	23	2 856	12	5.2	0	0	0	0	0
Unknown	4 019	73	1.2	0	0	0	0	4	18 114	12	0.4	0	0	0	0	0
Overall	70 934	1 299	1.7	0	0	0.9	2.5	4.9	360 289	215	0.6	0	0	0	0.7	1.9

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal and the United Kingdom (Northern Ireland and Wales)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.

**Table A6.1. Percentage of SSIs and incidence density of in-hospital SSIs after hip prosthesis operations by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	4 327	52	1.2 [0.9-1.6]	4 323	53 781	28 (54)	0.5 [0.3-0.8]
Finland	7 033	175	2.5 [2.1-2.9]	5 342	24 913	12 (7)	0.5 [0.2-0.8]
France	17 485	205	1.2 [1.0-1.3]	17 485	140 939	22 (11)	0.2 [0.1-0.2]
Germany	64 236	636	1.0 [0.9-1.1]	51 866	614 653	356 (56)	0.6 [0.5-0.6]
Hungary	691	10	1.4 [0.7-2.7]	691	6 562	5 (50)	0.8 [0.2-1.8]
Italy	1 969	29	1.5 [1.0-2.1]	1 413	18 134	4 (14)	0.2 [0.1-0.6]
Lithuania	695	1	0.1 [0.0-0.8]	695	5 923	1 (100)	0.2 [0.0-0.9]
Malta	299	14	4.7 [2.6-7.9]	299	3 311	4 (29)	1.2 [0.3-3.1]
Netherlands	24 956	399	1.6 [1.4-1.8]	24 956	114 238	31 (8)	0.3 [0.2-0.4]
Norway*	11 664	305	2.6 [2.3-2.9]	11 639	58 979	18 (6)	0.3 [0.2-0.5]
Portugal	2 752	51	1.9 [1.4-2.4]	2 752	25 272	13 (25)	0.5 [0.3-0.9]
UK–England	54 560	336	0.6 [0.6-0.7]	54 560	423 382	139 (41)	0.3 [0.3-0.4]
UK–Northern Ireland	1 934	3	0.2 [0.0-0.5]	1 292	6 928	0 (0)	0.0 [0.0-0.5]
Unit-based data							
Romania	156	2	1.3 [0.2-4.6]	156	1 263	2 (100)	1.6 [0.2-5.7]

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
UK-Scotland	8 444	61	0.7 [0.6-0.9]				
EU/EEA	201 201	2 279	1.1 [1.1-1.2]	177 469	1 498 278	635 (28)	0.4 [0.4-0.5]**

Source: Country reports from: Austria, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal, Romania and the United Kingdom

(1) Only superficial SSIs diagnosed within 30 days or deep or organ/space SSIs diagnosed within 90 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation +1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

\* Data from Norway include patient-reported SSI. \*\*Scotland not included as no denominator provided.

**Table A6.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after hip prosthesis operations in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	Number of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	119 976	949	0.9	0	0	0	1.2	2.8	787 877	183	0.2	0	0	0	0	0.9
1	61 758	1 018	1.6	0	0	0	2.3	4.5	594 455	355	0.4	0	0	0	0	1.5
2 and 3	5 749	166	3.6	0	0	0	0	11.1	58 281	61	0.8	0	0	0	0	0
Unknown	4 814	74	1.2	0	0	0	0	2	31 489	18	0.4	0	0	0	0	0
Overall	192 297	2 207	1.2	0	0	0.7	1.8	3.3	1 472 102	617	0.4	0	0	0	0.5	1.2

Source: Country reports from: Austria, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Norway, Portugal and the United Kingdom (England, Northern Ireland and Wales)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.

**Table A7.1. Percentage of SSIs and incidence density of in-hospital SSIs after knee prosthesis operations by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
Austria	2 913	10	0.3 [0.2-0.6]	2 913	36 446	3 (30)	0.1 [0.0-0.2]
Finland	5 795	75	1.3 [1.0-1.6]	4 371	19 741	2 (3)	0.1 [0.0-0.4]
France	11 808	96	0.8 [0.7-1.0]	11 808	94 194	14 (15)	0.1 [0.1-0.2]
Germany	35 699	163	0.5 [0.4-0.5]	28 647	319 951	64 (39)	0.2 [0.2-0.3]
Hungary	643	9	1.4 [0.6-2.7]	643	6 734	2 (22)	0.3 [0.0-1.1]
Italy	461	12	2.6 [1.3-4.5]	341	3 906	2 (17)	0.5 [0.1-1.8]
Lithuania	353	0	0.0 [0.0-1.0]	353	2 997	0 (0)	0.0 [0.0-1.2]
Malta	676	11	1.6 [0.8-2.9]	676	3 642	0 (0)	0.0 [0.0-1.0]
Netherlands	19 654	171	0.9 [0.7-1.0]	19 654	79 688	7 (4)	0.1 [0.0-0.2]
Portugal	2 160	25	1.2 [0.7-1.7]	2 160	17 984	9 (36)	0.5 [0.2-1.0]
UK–England	55 011	210	0.4 [0.3-0.4]	55 011	307 401	62 (30)	0.2 [0.2-0.3]
UK–Northern Ireland	1 350	3	0.2 [0.0-0.6]	1 088	5 688	1 (33)	0.2 [0.0-1.0]
Unit-based data							
UK–Scotland	6 184	4	0.1 [0.0-0.2]				
EU/EEA	142 707	789	0.6 [0.5-0.6]	127 665	898 372	166 (21)	0.2 [0.2-0.2]*

Source: Country reports from: Austria, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Portugal and the United Kingdom

(1) Only superficial SSIs diagnosed within 30 days or deep or organ/space SSIs diagnosed within 90 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation + 1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

\* Scotland not included as no denominator provided.

**Table A7.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after knee prosthesis operations in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	No. of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	94 586	407	0.6	0	0	0	0.5	1.5	570 498	72	0.2	0	0	0	0	0
1	35 309	274	0.8	0	0	0	0	2.6	263 080	65	0.2	0	0	0	0	0
2 and 3	3 338	64	1.6	0	0	0	0	0	29 874	19	0.5	0	0	0	0	0
Unknown	3 111	37	1.6	0	0	0	0	0	15 179	8	0.4	0	0	0	0	0
Overall	136 344	782	0.6	0	0	0	0.9	2	878 631	164	0.2	0	0	0	0	0.6

Source: Country reports from: Austria, Finland, France, Germany, Hungary, Italy, Lithuania, Malta, the Netherlands, Portugal and the United Kingdom (England, Northern Ireland and Wales)

(1) Operations from hospitals with less than 20 operations are excluded; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations, mean and percentiles in hospitals; (3) Patient-days from hospitals with less than 20 operations with a known date of discharge are excluded; (4) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days, mean and percentiles in hospitals.



**Table A8.1. Percentage of SSIs and incidence density of in-hospital SSIs after laminectomy operations by country, EU/EEA, 2015**

Country	No. of operations	No. of SSIs (1)	Percentage of SSIs per 100 operations [95% CI] (2)	No. of operations with a known discharge date	No. of post-operative patient-days (3)	No. of in-hospital SSIs (% of all SSIs) (4)	Incidence density of SSIs per 1000 post-operative patient-days [95% CI] (5)
Patient-based data							
France	1 318	15	1.1 [0.6-1.9]	1 318	8 441	3 (20)	0.4 [0.1-1.0]
Germany	4 770	34	0.7 [0.5-1.0]	4 034	35 294	19 (56)	0.5 [0.3-0.8]
Hungary	868	28	3.2 [2.1-4.7]	868	5 913	10 (36)	1.7 [0.8-3.1]
Italy	1 292	11	0.9 [0.4-1.5]	1 055	4 292	0 (0)	0.0 [0.0-0.9]
Netherlands	1 403	26	1.9 [1.2-2.7]	1 403	4 527	4 (15)	0.9 [0.2-2.3]
Portugal	944	2	0.2 [0.0-0.8]	944	4 085	2 (100)	0.5 [0.1-1.8]
UK-England	7 091	63	0.9 [0.7-1.1]	7 091	43 515	29 (46)	0.7 [0.4-1.0]
UK-Northern Ireland	399	2	0.5 [0.1-1.8]	195	643	1 (50)	1.6 [0.0-8.7]
Unit-based data							
Romania	1 129	12	1.1 [0.5-1.9]	1 126	6 541	12 (100)	1.8 [0.9-3.2]
EU/EEA	19 214	193	1.0 [0.9-1.2]	18 034	113 251	80 (41)	0.7 [0.6-0.9]

Source: Country reports from: France, Germany, Hungary, Italy, the Netherlands, Portugal, Romania and the United Kingdom (England and Northern Ireland)

(1) Only SSIs diagnosed within 30 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation + 1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.

**Table A8.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after laminectomy operations in hospitals stratified by NHSN risk index, EU/EEA, 2015**

NHSN risk index	No. of operations (1)	No. of SSIs	Mean and percentile distribution of percentages in hospitals (2)						No. of post-operative patient-days (3)	No. of in-hospital SSIs	Mean and percentile distribution of incidence densities in hospitals (4)					
			Mean	P10	P25	P50	P75	P90			Mean	P10	P25	P50	P75	P90
0	10 821	70	0.6	0	0	0	0	2.1	53 161	16	0.3	0	0	0	0	0
1	5 217	67	1.5	0	0	0	1.6	4.5	37 532	29	0.8	0	0	0	0	2.6
2 and 3	1 070	36	5.4	0	0	0	0	7.9	12 043	21	2.5	0	0	0	0	5.4
Unknown	977	8	2.2	0	0	0	0	3	3 974	2	0.3	0	0	0	0	0
Overall	18 085	181	1	0	0	0	1.6	3.6	106 710	68	0.6	0	0	0	0.6	1.9

Source: Country reports from: France, Germany, Hungary, Italy, the Netherlands, Portugal, Romania and the United Kingdom (England and Northern Ireland)

(1) Only SSIs diagnosed within 30 days after the operation are included; (2) Percentage of SSIs = (Number of SSIs × 100)/Number of operations; (3) Post-operative patient-days = Date of discharge – date of operation + 1; (4) SSIs reported after discharge from hospital or with an unknown discharge date are excluded; (5) Incidence density of SSIs = (Number of in-hospital SSIs × 1000)/Number of post-operative patient-days.