SURVEILLANCE REPORT

Healthcare-associated infections: surgical site infections

Annual Epidemiological Report for 2017

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 2017, 12 EU Member States and one EEA country reported SSIs for nine types of surgical procedure to ECDC.
- During this period, 10 149 SSIs were reported from a total of 648 512 surgical procedures.
- The percentage of SSIs varied from 0.5% to 10.1%, depending on the type of surgical procedure.
- The incidence density of in-hospital SSIs per 1 000 post-operative patient-days varied from 0.1 to 5.7, depending on the type of surgical procedure.
- From 2014 to 2017, a statistically significant increasing trend was observed for both the percentage of SSIs and the incidence density of in-hospital SSIs following laparoscopic cholecystectomy (CHOL).

Methods

This report is based on data for 2017 retrieved on 18 July 2019 from The European Surveillance System (TESSy) and ECDC's decentralised data storage for antimicrobial resistance and healthcare-associated infections (ARHAI). TESSy is a system for the collection, analysis and dissemination of data on communicable diseases. EU/EEA countries contribute to the system by uploading their infectious disease surveillance data at regular intervals. The ARHAI decentralised data storage is a system allowing EU/EEA countries to store their surveillance data on their national servers in TESSy data format.

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 2017 were reported to ECDC by 13 countries (12 EU Member States and one EEA country).

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Stockholm, October 2019

Data on SSIs following surgical procedures that took place in 2017 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 [4,5]. SSI cases were classified according to the modified 2012 EU case definitions [6,7].

The SSI surveillance protocol includes nine types of surgical procedures: coronary artery bypass graft (CABG), open and laparoscopic cholecystectomy (CHOL), open and laparoscopic colon surgery (COLO), caesarean section (CSEC), hip prosthesis (HPRO), knee prosthesis (KPRO) and laminectomy (LAM). SSIs detected within a defined follow-up period were included in the analysis. The standardised follow-up period was 31 days. For deep or organ/space infections following orthopaedic operations with an implant in place (HPRO/KPRO), the follow-up period was extended to 91 days [5].

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 from low to high risk (0, 1, 2 and 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 date of discharge from the hospital.

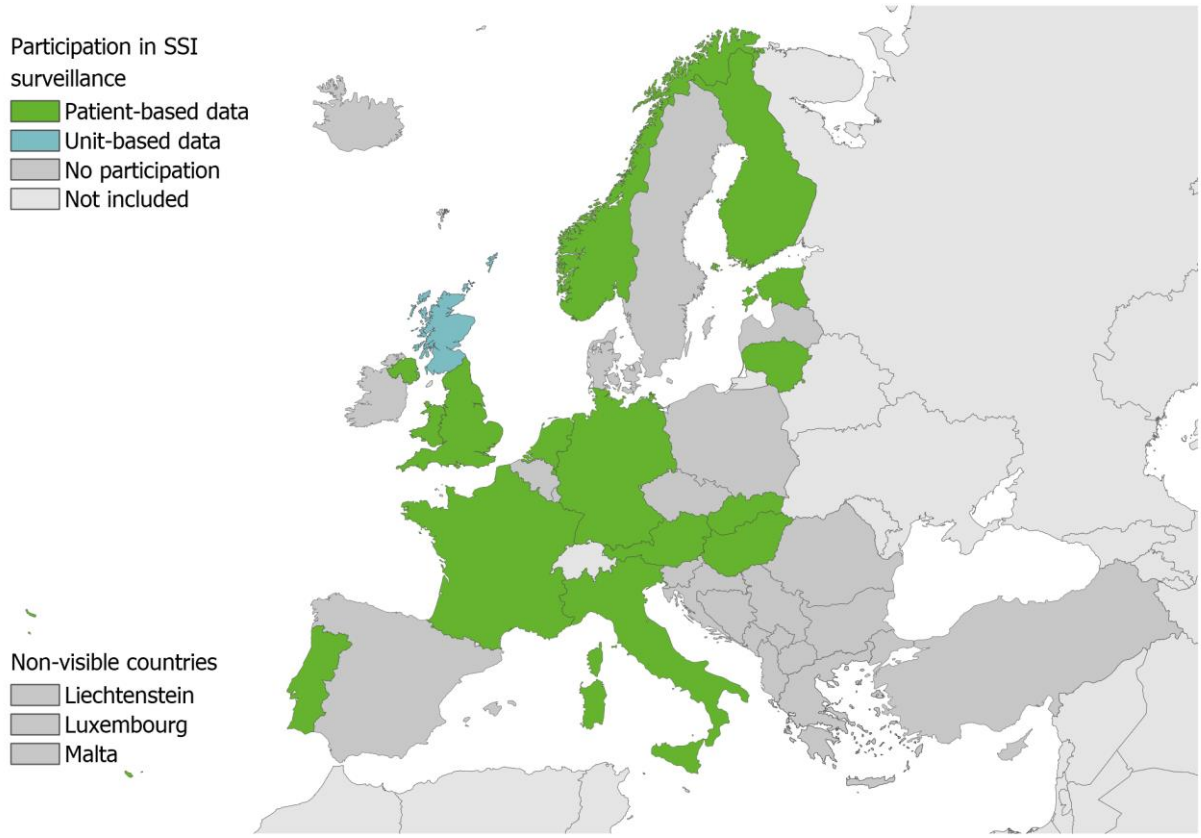
For the patient-based data, both indicators were also stratified by NHSN risk index categories (shown by type of surgical procedure in the annexed Tables A2.2-A10.2).

For each type of surgical procedure, trends in both the percentage and incidence density of SSIs between 2014 and 2017 were analysed by Poisson regression; a sandwich variance estimator was used to acquire robust standard errors of the regression coefficients. Only hospitals that provided data using the same surveillance option (patient-based or unit-based) for all four years were included in the trend analysis.

Epidemiology

All 13 EU/EEA countries that participated in surveillance of SSIs in 2017 reported patient-based data (for the UK, UK–England, UK–Northern Ireland and UK–Wales reported patient-based data whereas UK–Scotland reported unit-based data) (Figure 1). The number of participating hospitals as well as country representativeness varied between countries, with noticeable differences in the national coverage of the surveillance systems (Table 1). Eleven of the 13 EU/EEA countries reported performing post-discharge surveillance, using different methods varying from SSIs reported by the patient to SSI reported by the surgeon or general practitioner [2].

Figure 1. Participation in the surveillance of surgical site infections (SSIs), EU/EEA, 2017



Source: ECDC, HAI-Net, 2017

Overall, 648 512 surgical procedures from 1 639 hospitals were reported in 2017. Of these procedures, 622 999 were reported using patient-based surveillance, and 25 513 used the unit-based surveillance (Table 1). The most frequently reported types of surgical procedure 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, 2017

Country/network	Number of reporting hospitals	Number of procedures									Total
		CABG	Laparoscopic CHOL	Open CHOL	Laparoscopic COLO	Open COLO	CSEC	HPRO	KPRO	LAM	
Patient-based data											
Austria	32	428	1 494	807	56	401	2 920	5 309	4 085		15 464
Estonia	2	139					162				301
Finland	12							8 776	7 342		16 118
France	339	1 365	7 255	1 031	1 585	2 013	13 140	17 755	11 652	1 433	57 229
Germany	541	12 738	18 354	1 286	4 460	7 831	26 776	75 264	48 367	7 479	202 555
Hungary	33	362	1 259	142	177	409	2 841	615	335	802	6 942
Italy	94	978	5 135	1 076	1 735	3 065	9 166	10 471	3 439	2 063	37 128
Lithuania	23	547	925	19	6	122	659	1 335	1 105		4 718
Netherlands	80	1 932	5 429	126	2 946	1 212	6 568	26 695	21 180	1 088	67 176
Norway	61	1 523	5 872	284	1 649	1 528	8 867	12 629			32 352
Portugal	51	38	4 217	304	581	2 712	3 490	2 889	3 001	1 115	18 347
Slovakia	5		356	156							512
UK–England	316	6 311		176		3 326		61 910	65 855	9 541	147 127
UK–Northern Ireland	10						5 959	2 072	1 602	421	10 054
UK–Wales	12						6 699				6 699
Subtotal	**1 611**	**26 361**	**50 296**	**5 407**	**13 195**	**22 619**	**87 488**	**225 720**	**167 963**	**23 950**	**622 999**

Country/network	Number of reporting hospitals	Number of procedures									Total
		CABG	Laparoscopic CHOL	Open CHOL	Laparoscopic COLO	Open COLO	CSEC	HPRO	KPRO	LAM	
Unit-based data											
UK–Scotland	28						16 900	8 613			25 513
Subtotal	**28**						**16 900**	**8 613**			**25 513**
EU/EEA	**1 639**	**26 361**	**50 296**	**5 407**	**13 195**	**22 619**	**104 388**	**234 333**	**167 963**	**23 950**	**648 512**

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

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 type of surgical procedure were only available for the patient-based data. The ratio of male to female patients was the highest in CABG operations (4.3:1) and the lowest in HPRO operations (0.6:1); this ratio was not reported for 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 (5.2%) and the proportion of contaminated or dirty operations (35.0%) were the highest among open COLO operations. The median duration of operation was the longest in CABG operations (205 minutes), and the median length of post-operative stay was the longest in open COLO operations (ten days). The proportion of urgent operations varied from 0.3% in KPRO operations to 49.7% in CSEC operations. For most types of surgical procedures, over 80% and up to 99% patients received antibiotic prophylaxis, with the exception of CHOL operations, for which 44% patients with a laparoscopic procedure and 66% patients with an open procedure received antibiotic prophylaxis.

Table 2. Characteristics of patients by type of surgical procedure, patient-based data, EU/EEA, 2017

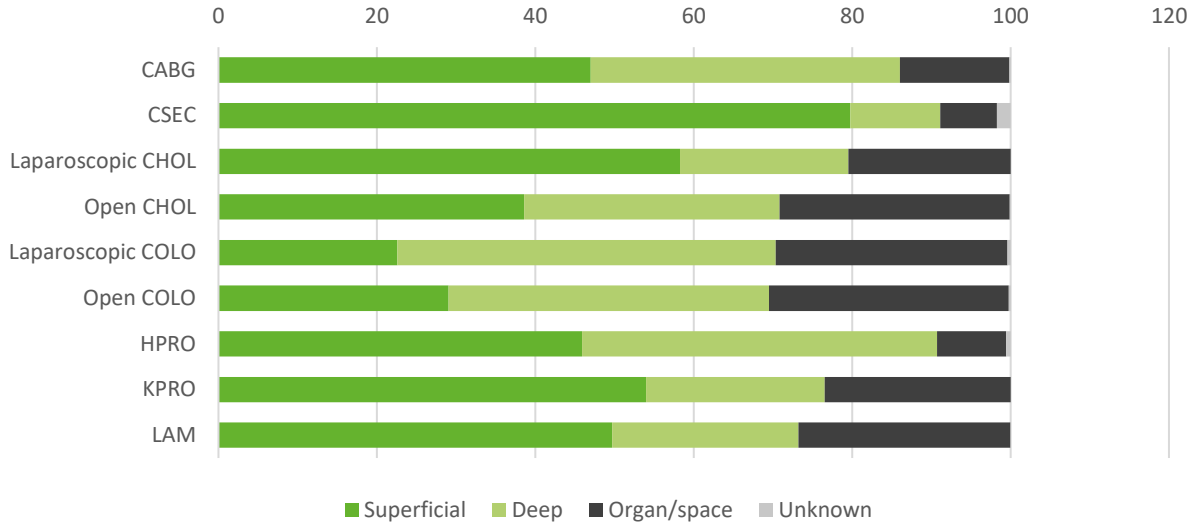
Characteristics	CABG (n=26 361)	Laparoscopic CHOL (n=50 296)	Open CHOL (n=5 407)	Laparoscopic COLO (n=13 195)	Open COLO (n=22 619)	CSEC (n=87 488)	HPRO (n=225 720)	KPRO (n=167 963)	LAM (n=23 950)
Sex ratio (male:female)	4.3	0.5	0.8	1.0	1.1	0	0.6	0.7	1.1
Median age (years)	69	55	65	68	70	32	72	70	56
Post-operative in-hospital case fatality (%)	1.8	0.2	2.1	1.6	5.2	0	1.4	0.1	0.2
Contaminated or dirty operations (%)	8.4	16.0	27.8	25.4	35.0	7.2	0.8	0.5	3.7
Median duration of operation (minutes)	205	57	81	145	137	38	70	75	82
Median length of post-operative stay (days)	9	3	6	7	10	5	6	5	4
Urgent operations (%)	7.2	17.5	22.2	8.6	25.1	49.7	9.8	0.3	3.7
Antibiotic prophylaxis (%)	99.1	44.1	65.9	86.9	82.7	86.0	97.3	98.3	87.7

Source: Country reports from Austria, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England, Northern Ireland and Wales).
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 2017, 10 149 SSIs were reported using patient-based or unit-based surveillance. Of these, 4 739 (47%) were superficial, 3 088 (30%) deep and 2 274 (22%) organ/space SSIs. In 48 (0.5%) SSIs, the type of SSI was unknown. The proportion of deep or organ/space SSIs was 19% in CSEC operations, 42% in laparoscopic CHOL operations, 46% in open CHOL operations, 50% in open COLO operations, 53% in CABG operations, 54% in LAM operations, 61% in laparoscopic COLO, 71% in KPRO operations and 77% in HPRO operations (Figure 2). Thirty-four per cent of the SSIs were diagnosed in hospitals, whereas 52% were detected after discharge; for 14% the discharge date was unknown. The proportion of SSIs diagnosed in-hospital varied from 12% in KPRO operations to 67% in open COLO operations.

Figure 2. Types of SSI by type of surgical procedure, EU/EEA, 2017



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, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England, Northern Ireland, Scotland and Wales).
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 0.5% in KPRO operations to 10.1% in open 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 laparoscopic 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, 2017

Type of surgical procedure	Percentage of SSIs per 100 operations [intercountry range]	Incidence density of in-hospital SSIs per 1 000 post-operative patient-days [intercountry range]
CABG	2.6 [0.0-5.5]	1.2 [0.0-3.2]
Laparoscopic CHOL*	1.5 [0.4-3.1]	1.0 [0.3-1.8]
Open CHOL*	3.9 [1.1-10.9]	3.5 [1.6-7.6]
Laparoscopic COLO*	6.4 [0.0-12.5]	4.1 [0.0-8.4]
Open COLO*	10.1 [4.1-16.9]	5.7 [2.8-11.1]
CSEC	1.8 [0.5-5.3]	0.6 [0.1-1.7]
HPRO	1.0 [0.4-2.2]	0.3 [0.2-0.9]
KPRO	0.5 [0.2-2.7]	0.1 [0.1-0.5]
LAM	0.8 [0.2-2.7]	0.4 [0.0-2.2]

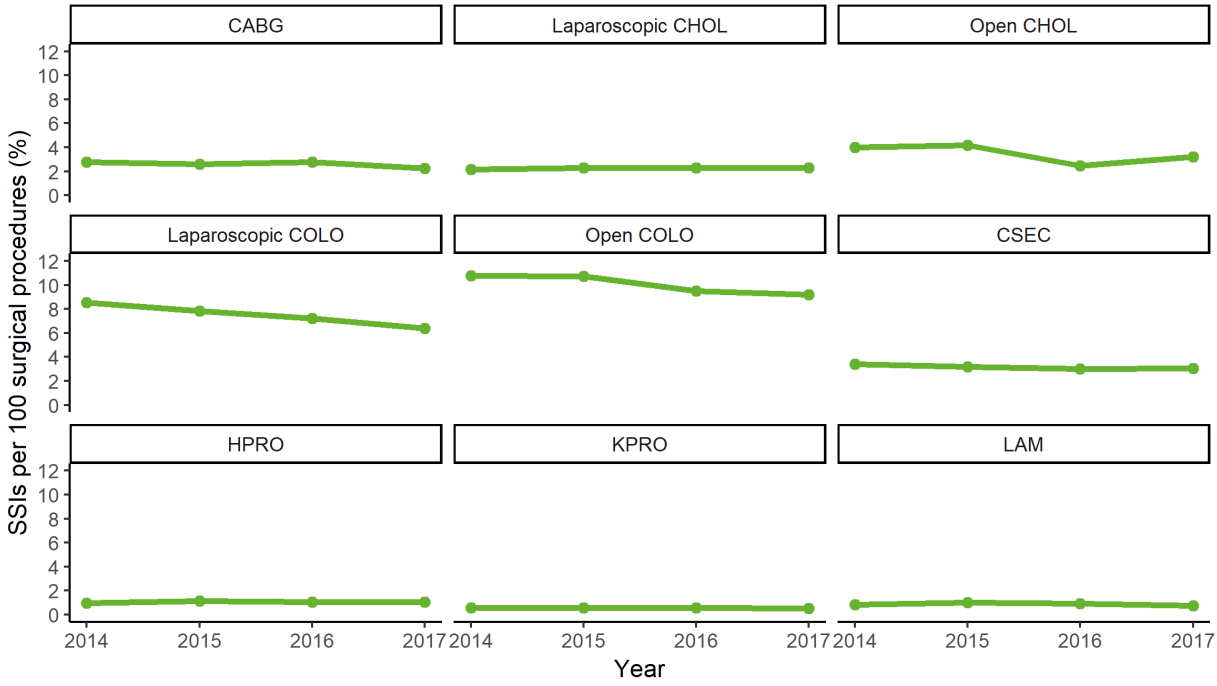
** Laparoscopic/open procedures only include patient-based data for which the variable 'endoscopic procedure (yes/no)' was documented.*

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, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England, Northern Ireland, Scotland and Wales).
See Table 1 for reporting hospitals and reported surgical procedures in EU/EEA countries.

Trend analyses of the yearly percentage of SSIs in 2014–2017 show a statistically significant yet very slightly increasing trend only for laparoscopic CHOL ($p=0.01$). A statistically significant decreasing trend was observed for CABG ($p<0.001$), open CHOL ($p=0.02$), both laparoscopic COLO ($p<0.001$) and open COLO ($p<0.001$), CSEC ($p<0.001$) and KPRO ($p=0.002$), albeit in several procedure types the changes between the surveillance years were relatively small (Figure 3).

Figure 3. Trends of percentage of SSIs by year and type of surgical procedure, EU/EEA, 2014–2017

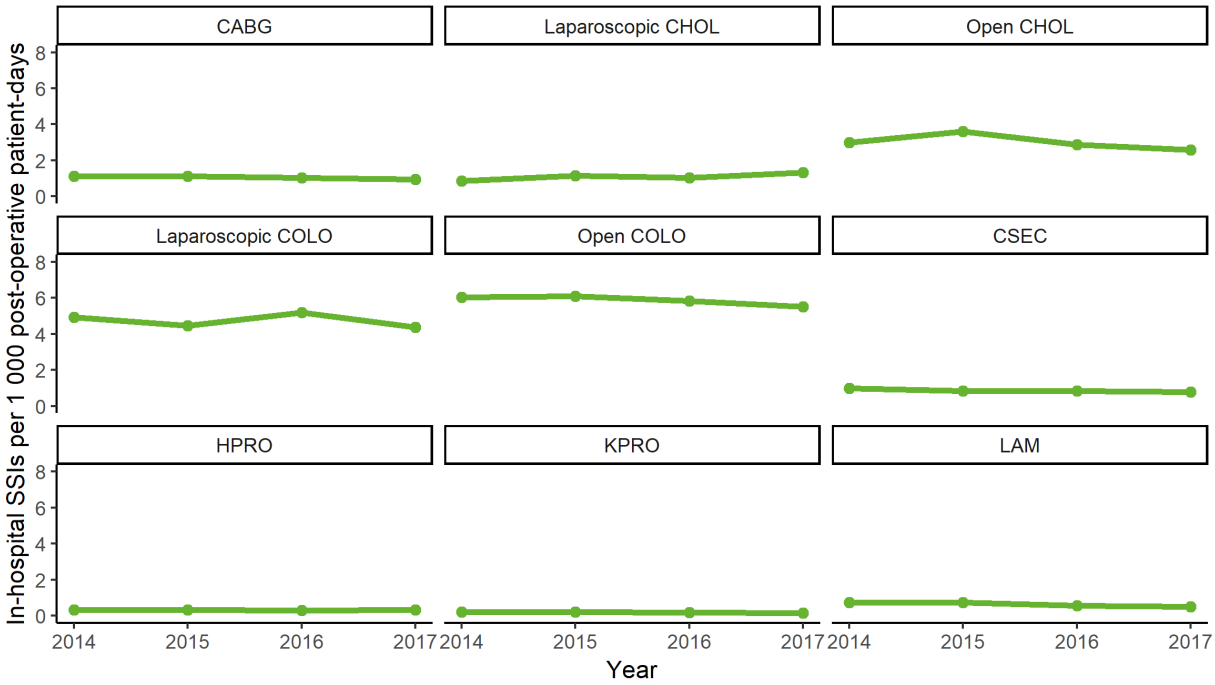


CABG: coronary artery bypass graft, CHOL: cholecystectomy, COLO: colon surgery, CSEC: caesarean section, HPRO: hip prosthesis surgery, KPRO: knee prosthesis surgery, LAM: laminectomy

Source: Country reports from Austria, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England, Northern Ireland, Scotland and Wales).
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 2014–2017 showed a statistically significant increasing trend for laparoscopic CHOL ($p<0.001$) (Figure 4). A statistically significant decreasing trend was observed for CABG ($p<0.001$), open COLO ($p<0.001$), CSEC ($p<0.001$) and KPRO ($p<0.001$) (Figure 4).

Figure 4. Trends of incidence density of in-hospital SSIs by year and type of surgical procedure, EU/EEA, 2014–2017



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, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia and the United Kingdom (England, Northern Ireland and Wales).
See Table 1 for the details of countries participating in the surveillance in each operation type.

Data on microorganisms were reported for 4 727 microorganisms in 3 311 SSIs from 11 countries using patient- or unit-based surveillance. Overall, *Staphylococcus aureus* (21.5%) and *Escherichia coli* (13.9%) were the most frequently reported microorganisms (Table 4). The distribution of microorganisms varied by type of surgical procedure. For CHOL and COLO operations, the most frequently reported microorganisms were Enterobacteriaceae. For all other types of surgical procedure, gram-positive cocci were the most frequently reported microorganisms.

Table 4. Percentages of microorganisms identified in SSIs by type of surgical procedure, pooled data from 10 EU/EEA countries, 2017 (n=4 727)

Microorganisms	CABG (n=269)	Laparoscopic CHOL (n=151)	Open CHOL (n=65)	Laparoscopic COLO (n=378)	Open COLO (n=1 146)	CSEC (n=592)	HPRO (n=1 409)	KPRO (n=581)	LAM (n=136)	Total (n=4 727)
Gram-positive cocci	50.6	30.7	38.5	26.7	31.4	52.5	67.1	72.6	66.2	51.6
Staphylococcus aureus	16.4	5.3	3.1	2.1	4.2	30.7	31.9	38.7	38.2	21.5
Coagulase-negative staphylococci	26.4	2.7	4.6	1.3	2.4	3.5	18.9	17.6	15.4	11.0
Enterococcus species	3.7	14.0	27.7	16.7	21.5	8.3	7.7	7.1	3.7	11.9
Streptococcus species	1.5	8.0	3.1	5.6	2.6	9.0	5.0	6.4	2.9	4.9
Other gram-positive cocci	2.6	0.7	0	1.1	0.7	1.0	3.7	2.9	5.9	2.2
Gram-positive bacilli	2.2	2.0	0	0.5	0.5	1.0	4.1	4.8	0.7	2.3
Gram-negative bacilli, Enterobacteriaceae	32.3	44.7	50.8	50.8	46.6	25.7	19.3	15.5	17.6	30.7
Escherichia coli	5.2	25.3	23.1	31.7	22.5	13.7	6.9	4.6	5.1	13.9
Citrobacter species	1.9	2.7	6.2	3.2	1.8	0.7	0.6	0.7	1.5	1.4
Enterobacter species	5.6	4.7	4.6	6.3	7.2	3.0	3.0	2.4	1.5	4.4
Klebsiella species	6.7	7.3	10.8	5.6	7.2	2.9	2.3	2.4	2.9	4.4
Proteus species	5.6	2.7	1.5	2.4	2.4	3.9	4.0	2.2	4.4	3.3
Serratia species	3.7	0.7	1.5	0.3	0.8	0.3	1.5	1.5	0.7	1.2
Other Enterobacteriaceae	3.7	1.3	3.1	1.3	4.7	1.2	1.0	1.5	1.5	2.2

Microorganisms	CABG (n=269)	Laparoscopic CHOL (n=151)	Open CHOL (n=65)	Laparoscopic COLO (n=378)	Open COLO (n=1 146)	CSEC (n=592)	HPRO (n=1 409)	KPRO (n=581)	LAM (n=136)	Total (n=4 727)
Gram-negative non-fermentative bacilli	9.3	4.0	0	6.6	11.2	3.9	5.0	2.1	6.6	6.3
Acinetobacter species	1.1	0	0	0.3	0.2	0.2	0.4	0	0	0.3
Haemophilus species	0	0	0	0	0	0.3	0	0	0	0
Pseudomonas aeruginosa	6.7	3.3	0	5.8	8.8	1.0	3.6	1.9	6.6	4.7
Pseudomonadaceae family, other	1.1	0	0	0	1.8	1.2	0.9	0.2	0	1.0
Stenotrophomonas maltophilia	0	0.7	0	0	0	0.2	0	0	0	0
Other gram-negative non-fermentative bacilli	0.4	0	0	0.5	0.3	1.0	0.1	0	0	0.3
Anaerobes	0.7	9.3	1.5	8.7	4.4	13.5	2.9	3.1	5.1	5.2
Bacteroides species	0	1.3	1.5	6.9	3.2	1.2	0.2	0.3	0	1.7
Other anaerobes	0.7	8.0	0	1.9	1.1	12.3	2.7	2.8	5.1	3.6
Other bacteria	1.9	8.7	4.6	4.5	3.0	1.4	0.8	1.7	0.7	2.2
Fungi, parasites	2.6	0.7	4.6	2.1	2.7	1.5	0.5	0.2	2.2	1.5
Candida species	2.2	0.7	4.6	2.1	2.7	1.2	0.5	0	2.2	1.4
Other fungi or parasites	0.4	0	0	0	0	0.3	0	0.2	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 Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Portugal, Slovakia and the United Kingdom (England, Northern Ireland, Scotland and Wales).

Discussion

The results presented in this report constitute the most up-to-date source for information on the incidence of SSIs in the EU/EEA. Even though the number of reporting EU/EEA countries decreased in 2017 compared with 2015–2016, the number of reported operations still increased for several types of procedures. Nevertheless, the observed intercountry variation, and the fact that not all EU/EEA countries participate, does limit the extent to which the results can be considered representative of the overall EU/EEA situation.

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. Surveillance-related factors influencing the percentage of SSIs reported in each surveillance system are the length of stay in the hospital after surgery, and the differences in post-discharge surveillance methods, as well as the surgical procedures selected to be included in the national surveillance. The length of stay especially affects the rate of superficial SSIs that are mostly diagnosed in-hospital and easily missed after hospital discharge (depending on the selected post-discharge surveillance method), and the post-discharge surveillance methods make the largest difference in those surgical procedures where a large proportion of SSIs can be only detected after hospital discharge. Intercountry comparisons should therefore focus on the incidence density of in-hospital SSIs; even though comparisons of incidence density are still limited by differences in post-operative discharge policies, they are not affected by the varying post-discharge surveillance methods.

As in the previous years, 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 procedures because of the different population groups that undergo these operations and because of the different proportions of clean and contaminated operations for each type of procedure. Therefore, comparisons of SSI rates across countries and between years can only be made for a specific types of surgical procedures.

In 2014–2017, when only including data from hospitals reporting consistently for all four years, a statistically significant increasing trend was observed for the SSI percentage and the incidence density of SSIs following laparoscopic CHOL operations. However, as seen in Figures 3 and 4, the changes from 2014 to 2017 for laparoscopic CHOL remain very small. It is important to note that in the earlier reports the trends were calculated for all CHOL and COLO operations combined, and without taking into account continuous hospital participation [10, 11, 12].

The 2014–2017 surveillance data show statistically significant decreasing trends of SSIs for several types of procedure, and for both the percentage and the incidence density of SSIs. A comparison of the 2014–2017 trends with the results of trend analyses from previous reports shows that the previous increasing trend in SSIs following LAM operations could no longer be observed. However, for CHOL operations, increasing trends of SSIs had already been reported for 2014 and 2015, but not for 2016 data [11, 12, 13]. In most cases, however, the trends are

driven by a small subset of countries with a decreasing or increasing trend, and changes in post-operative discharge policies or intensity of surveillance can affect the incidence of SSIs.

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 [14]. Regular surveillance of SSIs in the participating EU/EEA countries may therefore have been a contributing factor to some of the observed decreasing trends for most types of surgical procedures. The increasing trend in the SSIs after laparoscopic CHOL operations should be investigated further, especially since an increasing trend was already reported for all CHOL operations for 2012–2015 [10]. It should also be noted that the increasing trend previously observed for SSIs after LAM operations turned, at least for the in-hospital incidence density of SSIs, into a decreasing trend for 2014–2017 [12]. This trend will need to be monitored further.

To further strengthen the surveillance of SSIs in Europe, ECDC has started collecting data on structure and process indicators of SSI prevention, with a 2017 protocol update that was implemented in several national surveillance systems in 2018. These data will be first reported together with the 2018–2019 surveillance data, with the goal to improve the usefulness of the SSI surveillance as a measure for SSI prevention [5, 15]. ECDC will also continue to provide support to countries that want to establish or improve their national surveillance networks.

Finally, further efforts have been made at European and national level to increase the representativeness of SSI surveillance data by including more participating hospitals in several countries. This has led to a continuously increasing number of reported surgical procedures from the countries and also supported new hospitals and areas in Europe starting SSI surveillance.

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Tables

Table A1. Percentage of unknown or missing values by TESSy variable and year, patient-based data, 2017

Variable	Name of TESSy variable	Unknown or missing values (%)*
Gender	Gender	0.003
In-hospital outcome	OutcomeHospital	48.5
Date of operation	DateOfOperation	0
Date of hospital admission	DateOfHospitalAdmission	36.6
Date of hospital discharge	DateOfHospitalDischarge	12.0
Operation code	OPCode	0
ICD-9-CM code	ICD9CMCode	44.0
Endoscopic operation	EndoscopicProc	6.2
Wound class	WoundClass	1.2
Duration of operation	OperationDur	0.9
ASA score	ASAClassification	3.2
Urgent operation	UrgentOperation	36.7
Prophylaxis	Prophylaxis	46.7
Type of infection	SSIType	0.5

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

** n= 622 963 surgical procedures and n= 10 148 SSIs*

Table A2.1. Percentage of SSIs and incidence density of in-hospital SSIs after coronary artery bypass graft operations by country, EU/EEA, 2017

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	428	12	2.8 [1.4-4.9]				
Estonia	139	5	3.6 [1.2-8.4]	139	1 673	5 (100)	3.0 [1.0-7.0]
France	1 365	47	3.4 [2.5-4.6]	1 365	16 270	24 (51)	1.5 [0.9-2.2]
Germany	12 738	344	2.7 [2.4-3.0]	8 281	104 268	100 (29)	1.0 [0.8-1.2]
Hungary	362	8	2.2 [1.0-4.4]	362	3 460	5 (62)	1.4 [0.5-3.4]
Italy	978	23	2.4 [1.5-3.5]	978	10 541	14 (61)	1.3 [0.7-2.2]
Lithuania	547	30	5.5 [3.7-7.8]	546	9 459	30 (100)	3.2 [2.1-4.5]
Netherlands	1 932	19	1.0 [0.6-1.5]	1 932	14 361	6 (32)	0.4 [0.2-0.9]
Norway	1 523	53	3.5 [2.6-4.6]	1 523	10 736	7 (13)	0.7 [0.3-1.3]
Portugal	38	0	0.0 [0.0-9.7]	38	418	0 (-)	0.0 [0.0-8.8]
UK–England	6 311	140	2.2 [1.9-2.6]	6 311	59 503	77 (55)	1.3 [1.0-1.6]
EU/EEA	**26 361**	**681**	**2.6 [2.4-2.8]**	**21 475**	**230 689**	**268 (39)**	**1.2 [1.0-1.3]***

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, 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; (6) 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.

** Austria not included as no discharge dates provided.*

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, 2017

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	803	20	3.1	0	0	0	1.1	10.1	6 148	7	0.2	0	0	0	0	0.2
1	16 746	450	2.6	0	0.1	2.1	3.7	5.5	141 142	164	1.1	0	0	0.3	1.3	3.1
2 and 3	5 481	169	3.1	0	0	2.1	4.6	9.2	54 481	79	1.5	0	0	0	1.9	4.5
Unknown	3 331	42	1.3	0	0	0	1.1	2	28 918	18	1.2	0	0	0	0.4	1.9
Overall	**26 361**	**681**	**2.7**	**0**	**1.1**	**2.1**	**3.6**	**5.7**	**230 689**	**268**	**1.2**	**0**	**0**	**0.7**	**1.4**	**2.9**

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania. 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 laparoscopic cholecystectomy operations by country, EU/EEA, 2017

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	1 494	8	0.5 [0.2-1.1]				
France	7 255	67	0.9 [0.7-1.2]	7 255	21 411	18 (27)	0.8 [0.5-1.3]
Germany	18 354	186	1.0 [0.9-1.2]	14 557	70 794	57 (31)	0.8 [0.6-1.0]
Hungary	1 259	15	1.2 [0.7-2.0]	1 259	4 592	2 (13)	0.4 [0.1-1.6]
Italy	5 135	38	0.7 [0.5-1.0]	5 036	18 050	12 (32)	0.7 [0.3-1.2]
Lithuania	925	4	0.4 [0.1-1.1]	919	3 802	1 (25)	0.3 [0.0-1.5]
Netherlands	5 429	174	3.2 [2.7-3.7]	5 429	11 856	21 (12)	1.8 [1.1-2.7]
Norway	5 872	184	3.1 [2.7-3.6]	5 869	13 672	22 (12)	1.6 [1.0-2.4]
Portugal	4 217	59	1.4 [1.1-1.8]	4 217	14 027	20 (34)	1.4 [0.9-2.2]
Slovakia	356	3	0.8 [0.2-2.5]	356	1 257	1 (33)	0.8 [0.0-4.4]
EU/EEA	**50 296**	**738**	**1.5 [1.4-1.6]**	**44 897**	**159 461**	**154 (21)**	**1.0 [0.8-1.1]***

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal and Slovakia

(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; (6) 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.

** Austria not included as no discharge dates provided.*

Table A3.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after laparoscopic cholecystectomy operations in hospitals stratified by NHSN risk index, EU/EEA, 2017

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	34 963	457	1.2	0	0	0	1.9	3.4	92 347	60	0.5	0	0	0	0	2.1
1	11 499	203	1.9	0	0	0	1.8	6.2	46 924	62	1.3	0	0	0	0	3.5
2 and 3	2 310	59	4.7	0	0	0	0	12.5	14 787	27	2.6	0	0	0	0	3.7
Unknown	1 524	19	1.2	0	0	0	0	1.1	5 403	5	0.7	0	0	0	0	0
Overall	**50 296**	**738**	**1.3**	**0**	**0**	**0.6**	**2**	**3.5**	**159 461**	**154**	**0.8**	**0**	**0**	**0**	**1**	**3.3**

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal and Slovakia

(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 open cholecystectomy operations by country, EU/EEA, 2017

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	807	9	1.1 [0.5-2.1]				
France	1 031	27	2.6 [1.7-3.8]	1 031	4 985	18 (67)	3.6 [2.1-5.7]
Germany	1 286	66	5.1 [4.0-6.5]	956	10 221	33 (50)	3.2 [2.2 4.5]
Hungary	142	11	7.7 [3.9-13.9]	142	1 108	7 (64)	6.3 [2.5-13.0]
Italy	1 076	24	2.2 [1.4-3.3]	1 074	9 400	15 (62)	1.6 [0.9-2.6]
Lithuania	19	1	5.3 [0.1-29.3]	19	172	1 (100)	5.8 [0.1-32.4]
Netherlands	126	6	4.8 [1.7-10.4]	126	669	1 (17)	1.5 [0.0-8.3]
Norway	284	25	8.8 [5.7-13.0]	284	2 609	17 (68)	6.5 [3.8-10.4]
Portugal	304	33	10.9 [7.5-15.2]	304	3 431	21 (64)	6.1 [3.8-9.4]
Slovakia	156	4	2.6 [0.7-6.6]	156	838	3 (75)	3.6 [0.7-10.5]
UK–England	176	7	4.0 [1.6-8.2]	176	655	5 (71)	7.6 [2.5-17.8]
EU/EEA	**5 407**	**213**	**3.9 [3.4-4.5]**	**4 268**	**34 088**	**121 (57)**	**3.5 [2.9-4.2]***

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal, Slovakia 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; (6) 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.

** Austria not included as no discharge dates provided.*

Table A4.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after open cholecystectomy operations in hospitals stratified by NHSN risk index, EU/EEA, 2017

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	2 679	60	2.5	0	0	0	2.9	8.8	9 874	26	1.8	0	0	0	0	5.8
1	1 700	97	4.4	0	0	0	8.7	11.1	14 055	64	4.2	0	0	0	6.3	13.2
2 and 3	810	51	5.9	0	0	0	6.9	18.2	8 448	28	3.3	0	0	0	3.2	9.1
Unknown	218	5	6.3	0	0	0	0	2.9	1 711	3	5	0	0	0	0	0.9
Overall	**5 407**	**213**	**3.8**	**0**	**0**	**1.6**	**5.4**	**9.7**	**34 088**	**121**	**3.2**	**0**	**0**	**0**	**4.2**	**8.4**

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 A5.1. Percentage of SSIs and incidence density of in-hospital SSIs after laparoscopic colon surgery by country, EU/EEA, 2017

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	56	7	12.5 [5.0-25.8]				
France	1 585	124	7.8 [6.5-9.3]	1 585	15 885	88 (71)	5.5 [4.4-6.8]
Germany	4 460	237	5.3 [4.7-6.0]	3 741	37 918	94 (40)	2.5 [2.0-3.0]
Hungary	177	7	4.0 [1.6-8.1]	177	1 562	4 (57)	2.6 [0.7-6.6]
Italy	1 735	51	2.9 [2.2-3.9]	1 732	15 994	36 (71)	2.3 [1.6-3.1]
Lithuania	6	0	0.0 [0.0-61.5]	6	56	0 (-)	0.0 [0.0-65.9]
Netherlands	2 946	230	7.8 [6.8-8.9]	2 946	22 701	125 (54)	5.5 [4.6-6.6]

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)
Norway	1 649	127	7.7 [6.4-9.2]	1 649	10 740	60 (47)	5.6 [4.3-7.2]
Portugal	581	67	11.5 [8.9-14.6]	581	6 038	51 (76)	8.4 [6.3-11.1]
EU/EEA	**13 195**	**850**	**6.4 [6.0-6.9]**	**12 417**	**110 894**	**458 (54)**	**4.1 [3.8-4.5]***

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway and Portugal

(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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

** Austria not included as no discharge dates provided.*

Table A5.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after laparoscopic colon surgery in hospitals stratified by NHSN risk index, EU/EEA, 2017

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	6 673	407	5.1	0	0	3.5	8	14.3	50 925	220	3.6	0	0	0	6.7	10.3
1	5 147	341	7	0	0	4.9	10.9	18.3	46 495	177	4.1	0	0	0	6.9	11.7
2 and 3	1 027	81	9.3	0	0	0	7.1	35.4	10 285	49	4.3	0	0	0	0	16
Unknown	348	21	3.4	0	0	0	0	16.4	3 189	12	2.3	0	0	0	0	7.9
Overall	**13 195**	**850**	**6.2**	**0**	**2.1**	**4.8**	**10**	**14.3**	**110 894**	**458**	**4.1**	**0**	**0**	**2.9**	**6.4**	**10.3**

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway and Portugal

(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 open colon surgery by country, EU/EEA, 2017

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	401	30	7.5 [5.0-10.7]				
France	2 013	149	7.4 [6.3-8.7]	2 013	25 848	101 (68)	3.9 [3.2-4.7]
Germany	7 831	736	9.4 [8.7-10.1]	5 893	83 100	327 (44)	3.9 [3.5-4.4]
Hungary	409	41	10.0 [7.2-13.6]	409	4 598	31 (76)	6.7 [4.6-9.6]
Italy	3 065	206	6.7 [5.8-7.7]	3 065	41 692	158 (77)	3.8 [3.2-4.4]
Lithuania	122	5	4.1 [1.3-9.6]	122	1 441	4 (80)	2.8 [0.8-7.1]
Netherlands	1 212	201	16.6 [14.4-19.0]	1 212	14 925	165 (82)	11.1 [9.4-12.9]
Norway	1 528	194	12.7 [11.0-14.6]	1 527	16 738	98 (51)	5.9 [4.8-7.1]
Portugal	2 712	458	16.9 [15.4-18.5]	2 712	36 141	387 (84)	10.7 [9.7-11.8]
UK–England	3 326	271	8.1 [7.2-9.2]	3 326	37 434	235 (87)	6.3 [5.5-7.1]
EU/EEA	**22 619**	**2 291**	**10.1 [9.7-10.6]**	**20 279**	**261 917**	**1 506 (66)**	**5.7 [5.5-6.0]***

Source: Country reports from: Austria, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Portugal 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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

** Austria not included as no discharge dates provided.*

Table A6.2. Mean and percentile distributions of percentage of SSIs and incidence density of in-hospital SSIs after open colon surgery in hospitals stratified by NHSN risk index, EU/EEA, 2017

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	7 581	624	8.2	0	0	6.7	12.1	19.5	74 308	391	4.9	0	0	0	7.4	12.7
1	9 577	1 052	10.4	0	2.5	8.6	15.7	23.2	114 699	693	5.4	0	0	4.1	8.3	13.7
2 and 3	4 208	504	12.4	0	0	6.2	19.1	33.3	56 102	338	5.6	0	0	0	8.9	17.8
Unknown	1 217	110	10.7	0	0	0	11.6	32.8	16 808	84	5.7	0	0	0	7.1	20.6
Overall	**22 583**	**2 290**	**9.9**	**0.6**	**4.6**	**8.6**	**13.6**	**19**	**261 917**	**1 506**	**5.3**	**0**	**1.6**	**4**	**7.9**	**12.1**

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 A7.1. Percentage of SSIs and incidence density of in-hospital SSIs after caesarean sections by country, EU/EEA, 2017

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	2 920	33	1.1 [0.8-1.6]				
Estonia	403	8	2.0 [0.9-3.9]	403	1 817	3 (38)	1.7 [0.3-4.8]
France	13 140	207	1.6 [1.4-1.8]	13 140	78 834	49 (24)	0.6 [0.5-0.8]
Germany	26 776	153	0.6 [0.5-0.7]	20 980	128 384	26 (17)	0.2 [0.1-0.3]
Hungary	2 841	51	1.8 [1.3-2.4]	2 841	13 964	8 (16)	0.6 [0.2-1.1]
Italy	9 166	50	0.5 [0.4-0.7]	9 166	41 562	4 (8)	0.1 [0.0-0.2]
Lithuania	659	4	0.6 [0.2-1.6]	656	3 299	3 (75)	0.9 [0.2-2.7]
Netherlands	6 568	98	1.5 [1.2-1.8]	6 568	27 604	8 (8)	0.3 [0.1-0.6]
Norway	8 867	362	4.1 [3.7-4.5]	8 864	44 030	65 (18)	1.5 [1.1-1.9]
Portugal	3 490	46	1.3 [1.0-1.8]	3 490	15 938	10 (22)	0.6 [0.3-1.2]
UK–Northern Ireland	5 959	318	5.3 [4.8-6.0]	5 959	20 498	11 (3)	0.5 [0.3-1.0]
UK–Wales	6 699	356	5.3 [4.8-5.9]	5 593	46 645	47 (13)	1.0 [0.7-1.3]
Unit-based data							
UK–Scotland	16 900	232	1.4 [1.2-1.6]				
EU/EEA	**104 388**	**1 918**	**1.8 [1.8-1.9]**	**77 660**	**422 575**	**234 (12)**	**0.6 [0.5-0.6]***

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

(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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

** Scotland not included as no denominator provided; Austria not included as no discharge dates provided.*

Table A7.2. 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, 2017

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	58 331	1 066	1.6	0	0	0.6	2.6	4.4	271 250	135	0.6	0	0	0	0	1.7
1	22 464	473	2.1	0	0	0	2.5	6.7	114 337	83	0.7	0	0	0	0	2.1
2 and 3	1 594	39	3	0	0	0	0	8.4	8 828	5	0.5	0	0	0	0	0
Unknown	5 099	108	1.2	0	0	0	0	5	28 160	11	0.3	0	0	0	0	0
Overall	**87 488**	**1 686**	**1.7**	**0**	**0**	**0.9**	**2.8**	**4.5**	**422 575**	**234**	**0.6**	**0**	**0**	**0**	**0.5**	**1.9**

Source: Country reports from: Austria, Estonia, France, Germany, Hungary, Italy, Lithuania, 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 A8.1. Percentage of SSIs and incidence density of in-hospital SSIs after hip prosthesis operations by country, EU/EEA, 2017

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	5 309	49	0.9 [0.7-1.2]				
Finland	8 776	174	2.0 [1.7-2.3]	7 170	29 630	6 (3)	0.2 [0.1-0.4]
France	17 755	285	1.6 [1.4-1.8]	17 755	123 925	55 (19)	0.4 [0.3-0.6]
Germany	75 264	731	1.0 [0.9-1.0]	54 298	620 308	99 (14)	0.2 [0.1-0.2]
Hungary	615	11	1.8 [0.9-3.2]	615	6 529	6 (55)	0.9 [0.3-2.0]
Italy	10 471	85	0.8 [0.6-1.0]	10 459	108 149	37 (44)	0.3 [0.2-0.5]
Lithuania	1 335	6	0.4 [0.2-1.0]	1 325	9 903	3 (50)	0.3 [0.1-0.9]
Netherlands	26 695	424	1.6 [1.4-1.7]	26 695	108 031	24 (6)	0.2 [0.1-0.3]
Norway	12 629	272	2.2 [1.9-2.4]	12 628	61 156	25 (9)	0.4 [0.3-0.6]
Portugal	2 889	38	1.3 [0.9-1.8]	2 889	23 513	14 (37)	0.6 [0.3-1.0]
UK–England	61 910	297	0.5 [0.4-0.5]	61 910	452 555	132 (44)	0.3 [0.2-0.3]
UK–Northern Ireland	2 072	9	0.4 [0.2-0.8]	2 072	8 128	4 (44)	0.5 [0.1-1.3]
Unit-based data							
UK–Scotland	8 613	54	0.6 [0.5-0.8]				
EU/EEA	**234 333**	**2 435**	**1.0 [1.0-1.1]**	**197 816**	**1 551 827**	**405 (17)**	**0.3 [0.2-0.3]***

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

(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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

** Scotland not included as no denominator provided; Austria not included as no discharge dates provided.*

Table A8.2. 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, 2017

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	113 797	771	0.7	0	0	0	0.8	2.4	629 470	78	0.1	0	0	0	0	0
1	85 089	1 117	1.3	0	0	0	1.9	3.8	686 137	197	0.3	0	0	0	0	0.9
2 and 3	19 052	413	2.7	0	0	0	1.1	8.3	177 085	106	0.7	0	0	0	0	0
Unknown	7 782	80	1.4	0	0	0	0	1.6	59 135	24	0.6	0	0	0	0	0
Overall	**225 720**	**2 381**	**1.1**	**0**	**0**	**0.7**	**1.7**	**3**	**1 551 827**	**405**	**0.3**	**0**	**0**	**0**	**0**	**0.9**

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

(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 A9.1. Percentage of SSIs and incidence density of in-hospital SSIs after knee prosthesis operations by country, EU/EEA, 2017

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	4 085	33	0.8 [0.6-1.1]				
Finland	7 342	95	1.3 [1.0-1.6]	5 932	24 096	4 (4)	0.2 [0.0-0.4]
France	11 652	93	0.8 [0.6-1.0]	11 652	77 963	9 (10)	0.1 [0.1-0.2]
Germany	48 367	196	0.4 [0.4-0.5]	33 526	342 008	23 (12)	0.1 [0.0-0.1]
Hungary	335	9	2.7 [1.2-5.1]	335	3 273	1 (11)	0.3 [0.0-1.7]
Italy	3 439	20	0.6 [0.4-0.9]	3 437	32 489	7 (35)	0.2 [0.1-0.4]
Lithuania	1 105	6	0.5 [0.2-1.2]	1 103	8 452	4 (67)	0.5 [0.1-1.2]
Netherlands	21 180	177	0.8 [0.7-1.0]	21 180	76 002	5 (3)	0.1 [0.0-0.2]
Portugal	3 001	26	0.9 [0.6-1.3]	3 001	21 890	9 (35)	0.4 [0.2-0.8]
UK–England	65 855	182	0.3 [0.2-0.3]	65 855	350 935	34 (19)	0.1 [0.1-0.1]
UK–Northern Ireland	1 602	3	0.2 [0.0-0.5]	1 602	7 088	2 (67)	0.3 [0.0-1.0]
EU/EEA	**167 963**	**840**	**0.5 [0.5-0.5]**	**147 623**	**944 196**	**98 (12)**	**0.1 [0.1-0.1]***

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

(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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

**Austria not included as no discharge dates provided.*

Table A9.2. 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, 2017

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	97 370	323	0.4	0	0	0	0	1	492 304	26	0.1	0	0	0	0	0
1	55 135	371	0.6	0	0	0	0.6	2.3	341 174	41	0.1	0	0	0	0	0
2 and 3	11 126	125	1.1	0	0	0	0	3	86 096	26	0.2	0	0	0	0	0
Unknown	4 332	21	0.2	0	0	0	0	0	24 622	5	0.1	0	0	0	0	0
Overall	**167 963**	**840**	**0.6**	**0**	**0**	**0**	**0.8**	**1.7**	**944 196**	**98**	**0.1**	**0**	**0**	**0**	**0**	**0.2**

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

(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 A10.1. Percentage of SSIs and incidence density of in-hospital SSIs after laminectomy operations by country, EU/EEA, 2017

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	1 433	13	0.9 [0.5-1.6]	1 432	8 398	4 (31)	0.5 [0.1-1.2]
Germany	7 479	28	0.4 [0.2-0.5]	5 050	43 458	7 (25)	0.2 [0.1-0.3]
Hungary	802	22	2.7 [1.7-4.2]	802	4 504	10 (45)	2.2 [1.1-4.1]
Italy	2 063	20	1.0 [0.6-1.5]	2 063	9 576	3 (15)	0.3 [0.1-0.9]
Netherlands	1 088	17	1.6 [0.9-2.5]	1 088	3 276	0 (0)	0.0 [0.0-1.1]
Portugal	1 115	6	0.5 [0.2-1.2]	1 115	4 673	1 (17)	0.2 [0.0-1.2]
UK–England	9 549	76	0.8 [0.6-1.0]	9 549	57 517	29 (38)	0.5 [0.3-0.7]
UK–Northern Ireland	421	1	0.2 [0.0-1.3]	421	1 014	0 (0)	0.0 [0.0-3.6]
EU/EEA	**23 950**	**183**	**0.8 [0.7-0.9]**	**21 520**	**132 416**	**54 (30)**	**0.4 [0.3-0.5]**

Source: Country reports from: France, Germany, Hungary, Italy, the Netherlands, Portugal 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; (6) incidence density of SSIs = (number of in-hospital SSIs × 1000)/number of post-operative patient-days.

Table A10.2. 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, 2017

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	13 544	72	0.4	0	0	0	0.4	1.4	60 647	14	0.1	0	0	0	0	0
1	6 605	70	1.2	0	0	0	0.6	3.5	43 579	19	0.3	0	0	0	0	0.4
2 and 3	1 297	37	2.8	0	0	0	0	6.4	15 793	20	0.7	0	0	0	0	1.9
Unknown	2 504	4	0.1	0	0	0	0	0	12 397	1	0.2	0	0	0	0	0
Overall	**23 950**	**183**	**0.7**	**0**	**0**	**0**	**1**	**2.5**	**132 416**	**54**	**0.3**	**0**	**0**	**0**	**0**	**0.8**

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

(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.