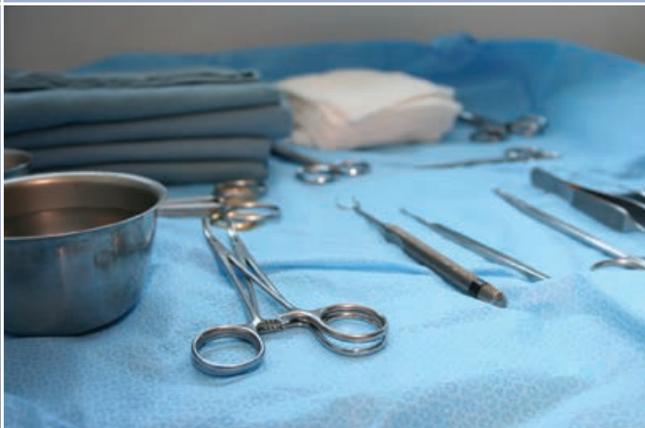


Surveillance of Surgical Site Infection Annual Report

For procedures carried out from: January 2009 - December 2013



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Key Points

- Health Protection Scotland (HPS) continue to facilitate national surveillance of surgical site infection (SSI). All boards (14 NHS boards and one special NHS board) in Scotland participated in the SSI programme in 2013.
- A total of 38 760 procedures have been reported to HPS during 2013. The number of procedures reported to HPS has increased each year, although there has been a decrease in the reporting of some procedures.
- SSI light surveillance methodology was introduced for mandatory and non mandatory procedures from 01 July 2011 and has continued in 2012 and 2013.
- Readmission surveillance and post discharge surveillance for the mandatory procedures (hip arthroplasty and caesarean section) detected the majority (67.7% and 85.5% respectively) of SSIs in those procedures.
- In 2013, the overall incidence of SSI for hip arthroplasty procedures (inpatient and readmission to day 30) was 0.76% (95% CI: 0.59 to 0.97) and for caesarean section procedures (inpatient and post discharge surveillance to day 10) the overall incidence was 1.74% (95% CI: 1.55 to 1.95).
- A total of 212 inpatient infections from 12 surgical categories have been reported to HPS during 2013. The inpatient cumulative incidence of SSI in 2013 varied by surgical procedure: abdominal hysterectomy (0.64%), breast surgery (0.16%), CABG (1.15%), caesarean section (0.25%), cardiac surgery (1.32%), hip arthroplasty (0.24%), knee arthroplasty (0.10%), large bowel (10.16%), major vascular (1.37%), reduction of long bone fracture (0.36%), repair of neck of femur (0.99%) and small bowel (11.54%).
- In the last year, the SSI incidence for all procedures remained stable except for large bowel surgery where there was a significant decrease.
- The incidence of SSI varied by NHS board performing the surgery. This variation may be attributable to the number of procedures performed, case mix of the patient population, length of stay variations and follow up methodology.

Acknowledgement

NHSScotland are to be commended for their dedicated efforts to Surgical Site Infection (SSI) surveillance and reporting SSI data to Health Protection Scotland (HPS). These data form part of the HPS SSI programme of surveillance which aims to improve the care surgical patients receive in NHSScotland.

Abbreviations and Acronyms

AA	Ayrshire & Arran
BR	Borders
CABG	Coronary Arterial Bypass Grafts
CEL	Chief Executive Letter
CI	Confidence Intervals
DG	Dumfries & Galloway
ECDC	European Centre for Disease Prevention and Control
FF	Fife
FV	Forth Valley
GR	Grampian
GGC	Greater Glasgow & Clyde
HAI	Healthcare Associated Infection
HDL	Health Department Letter
HPS	Health Protection Scotland
HG	Highland
IPC	Infection Prevention Control
IPCT	Infection Prevention Control Teams
LN	Lanarkshire
LO	Lothian
NES	NHS Education for Scotland
NHS	National Health Service
NWTC	National Waiting Times Centre
OPCS	Office of Population, Censuses and Surveys
OR	Orkney
PPS	Point Prevalence Survey
PDS	Post Discharge Surveillance
PHE	Public Health England
SGHSCD	Scottish Government Health and Social Care Directorate
SH	Shetland
SIGN	Scottish Intercollegiate Guideline Network
SSHAIP	Scottish Surveillance of HAI Programme
SSI	Surgical Site Infection
SSIRS	Surgical Site Infection Reporting System
TY	Tayside
WI	Western Isles

1. Introduction

Surgical site infection (SSI) is one of the most common healthcare associated infections (HAI), estimated to account for 18.6% of inpatient HAI within NHSScotland.¹ Excess morbidity and mortality arise from these SSIs and are estimated on average to double the cost of treatment, mainly due to the resultant increase in length of stay.² These infections have serious consequences for patients as they can result in pain, suffering and in some cases require additional surgical intervention.³ SSI rates are an important surgical outcome measure and the two key aims of SSI surveillance are to provide participating hospitals with robust SSI rates for comparison and monitoring and to use these data to improve the quality of patient care. Evidence suggests that actively feeding back data to clinicians contributes to reductions in rates of infection and that SSI is the most preventable of all HAI.^{1,4}

The Scottish Surveillance of HAI Programme (SSHAIP) within Health Protection Scotland (HPS) coordinates the SSI surveillance programme that is mandatory in NHSScotland. All NHS boards participate in SSI surveillance for at least two procedures from a list of twelve.⁵ Prospective readmission surveillance for hip arthroplasty, for 30 post operative days, and post discharge surveillance (PDS) for caesarean section procedures, for 10 post operative days, is mandatory.⁶⁻⁸ The Scottish Government Health and Social Care Directorate (SGHSCD) issued temporary amendments to the national surveillance requirements to support the point prevalence survey (PPS) in 2011. This enabled SSI light surveillance methodology to be applied to mandatory and non mandatory procedures from 1st July 2011. These amendments were extended in December 2011.⁹

SSI light surveillance involves collecting denominator data for each procedure category plus detailed patient level data on each SSI as per the current methodology i.e. SSI forms are completed for SSIs diagnosed and not for all patients undergoing a procedure.

This report contains data contributed by NHS boards for surveillance of mandatory and voluntary procedures and also presents the results of the analysis of both the cumulative data from January 2009 to December 2013 and the most recent year's data, January to December 2013. It also describes some of the activities undertaken in HPS in support of NHS boards towards the reduction in SSI incidences within NHSScotland.

2. Aims and Objectives

The aim of this report is to estimate the magnitude of SSI risk in selected surgical patients in NHSScotland.

The objectives of this report are:

- To present SSI incidences by surgical procedure in the most recent year of surveillance and from January 2009 to December 2013.
- To describe the characteristics of inpatient SSI identified within the surveillance programme.
- To identify trends in SSI incidences over the period 2003 to 2013.
- To describe the variation in SSI incidences between NHS boards and highlight boards with higher than expected incidences.
- To describe the characteristics of SSI identified by post discharge and readmission surveillance since these components of surveillance were made mandatory.

3. Methods

3.1. Surveillance methodology

In order to obtain robust national data, SSI surveillance in NHSScotland is conducted according to the SSHAIP standard national protocol⁵ which includes the protocol for SSI light surveillance, with adherence to the definitions for SSI, which are internationally comparable.

During 2010, HPS encompassed the 4th version of Office of Population, Censuses and Surveys (OPCS) codes, which resulted in adjustments to the list of OPCS codes in the SSHAIP standard national protocol.⁵ This report includes only the data for the adjusted OPCS codes from June 2010 and therefore results for hip arthroplasty should be interpreted with care when compared to previous years published SSI incidences which used data with the previous OPCS codes. As a result of quarterly internal validation by HPS and the fact that Surgical Site Infection Reporting System (SSIRS) is a live system, data and SSI incidences might be subject to change, thus this should be taken account of when comparing previously published reports.

The results provided in this report do not represent infection incidences in NHSScotland as a whole, only for selected categories of surgery. The data are heavily biased towards results from those NHS boards that have contributed large numbers of reports, thus these data should be interpreted with due caution.

3.2. Post discharge and readmission surveillance

This report contains incidences of SSI for caesarean section procedures detected until day 10 post operatively which was made mandatory from the 1st April 2009. All NHS boards have established methods to monitor caesarean section patients for the first 10 days after surgery and all SSI identified through PDS are reported to HPS.

Each NHS board has established methods to identify patients readmitted with an SSI within 30 days following hip arthroplasty; thus identifying additional and more serious SSIs so that relevant improvement measures can be applied.

The report indicates where caesarean section PDS infections or hip arthroplasty readmission infections are included in analyses.

3.3. Analysis presented in this report

This report includes the last five years of SSI surveillance data and describes cumulative data from 2009 to 2013 and the most recent year's data from 2013. A total of 15 NHS boards, 14 territorial and one special NHS board participated in the mandatory programme of SSI surveillance.

The SSI incidences described in this report are presented as cumulative incidence (number of SSI/ number of procedures x 100).

All incidences described in this report are inpatient SSI incidences unless otherwise stated. With the introduction of SSI light surveillance, analysis can only be performed on those patients with an SSI. Only significant increases or decreases in SSI incidence will be reported.

Funnel plots have been produced to compare NHS boards SSI incidences over the last year for the two mandatory procedures caesarean section and hip arthroplasty.^{10;11} The funnel plots in this report show the upper and lower 95% confidence limits as curved lines. If an individual NHS board's incidence was outwith the 95% confidence limit, this is regarded as an outlier, suggesting a SSI incidence which was significantly different to other NHS boards.

All confidence limits in this report were produced using the Wilson's approximation to the binomial distribution.¹²

As all coronary arterial bypass grafts (CABG) and cardiac procedures reported to the SSI programme were undertaken within one NHS board and surveillance for small bowel procedures have small numbers (<30 procedures reported), data for these procedures are therefore presented nationally and are not included in more detailed analyses. Cranial surgery SSI surveillance has not been selected by any NHS board and was therefore not included in the results.

4. Results

4.1. Procedures

The annual number of procedures by surgical category are shown in Table 1.

TABLE 1: Annual number of procedures included in the surveillance programme by procedure category

Procedure	2009	2010	2011	2012	2013	Total
Abdominal hysterectomy	821	845	592	825	468	3 551
Breast surgery	798	893	1 147	1 216	1 284	5 338
CABG	850	826	781	596	609	3 662
Caesarean section	14 498	15 237	15 801	15 768	16 254	77 558
Cardiac surgery	334	406	519	574	606	2 439
Hip arthroplasty	9 501	8 397	7 918	7 886	8 191	41 893
Knee arthroplasty	4 901	4 870	5 701	5 835	5 798	27 105
Large bowel	-	-	234	298	748	1 280
Major vascular surgery	244	312	368	562	582	2 068
Reduction of long bone fracture	1 595	1 344	1 366	1 320	553	6 178
Repair of neck of femur	-	1 520	2 603	2 660	3 641	10 424
Small bowel	-	-	-	4	26	30
Total	33 542	34 650	37 030	37 544	38 760	181 526

The total number of procedures included in the surveillance programme has increased year on year from 2009 to 2013. The decrease in abdominal hysterectomy and reduction of long bone fracture procedures was due to boards discontinuing SSI surveillance for these voluntary categories.

4.2. Incidence of SSI in 2013

A total of 38 760 procedures were reported during 2013. Table 2 shows the inpatient cumulative incidence of SSI by procedure over this period with 95% confidence intervals (CI).

TABLE 2: Number of participating boards, procedures, inpatient SSI and inpatient cumulative incidence of SSI by procedure category, 2013*

Procedure	No of NHS boards	No of procedures	Inpatient SSI	Inpatient SSI incidence (%)	95% Confidence Interval
Abdominal hysterectomy	5	468	3	0.64	0.22 to 1.87
Breast surgery	4	1 284	2	0.16	0.04 to 0.57
Caesarean section	14	16 254	41	0.25	0.19 to 0.34
Hip arthroplasty	14	8 191	20	0.24	0.16 to 0.38
Knee arthroplasty	10	5 798	6	0.10	0.05 to 0.23
Large bowel	4	748	76	10.16	8.19 to 12.53
Major vascular	3	582	8	1.37	0.70 to 2.69
Reduction of long bone fracture	4	553	2	0.36	0.10 to 1.31
Repair of neck of femur	11	3 641	36	0.99	0.72 to 1.37

* In 2013, the national inpatient SSI incidence for CABG was 1.15% (95% CI: 0.56 to 2.35), for cardiac surgery was 1.32% (95% CI: 0.67 to 2.58) and for small bowel surgery was 11.54% (95% CI: 4.00 to 28.98).

The inpatient cumulative incidence of SSI ranged from 0.10% for knee arthroplasty to 11.54% for small bowel surgery.

4.3. Incidence of SSI from 2009 to 2013

A total of 181 529 procedures were reported during the surveillance period 2009 to 2013. Table 3 shows the inpatient cumulative incidence of SSI by procedure over this period.

TABLE 3: Number of procedures, inpatient SSI and inpatient cumulative incidence of SSI by procedure category, 2009 to 2013*

Procedure	No of procedures	Inpatient SSI	Inpatient SSI Incidence (%)	95% Confidence Interval
Abdominal hysterectomy	3 551	34	0.96	0.69 to 1.33
Breast surgery	5 338	18	0.34	0.21 to 0.53
Caesarean section	77 558	252	0.32	0.29 to 0.37
Hip arthroplasty	41 893	180	0.43	0.37 to 0.50
Knee arthroplasty	27 105	45	0.17	0.12 to 0.22
Large bowel	1 280	163	12.73	11.02 to 14.67
Major vascular	2 068	59	2.85	2.22 to 3.66
Reduction of long bone fracture	6 178	39	0.63	0.46 to 0.86
Repair of neck of femur	10 424	117	1.12	0.94 to 1.34

* The national inpatient SSI incidence, for 2009 to 2013, for CABG was 2.76% (95% CI: 2.28 to 3.34), for cardiac surgery was 1.35% (95% CI: 0.97 to 1.89) and for small bowel surgery was 10.0% (95% CI: 3.46 to 25.62).

The highest overall inpatient incidence of SSI over this period was in large bowel surgery at 12.73% and the lowest inpatient incidence of SSI was found in knee arthroplasty at 0.17%.

The annual inpatient cumulative incidence of SSI by procedure category is shown in Table 4.

TABLE 4: Inpatient cumulative incidence of SSI by procedure category, 2009 to 2013

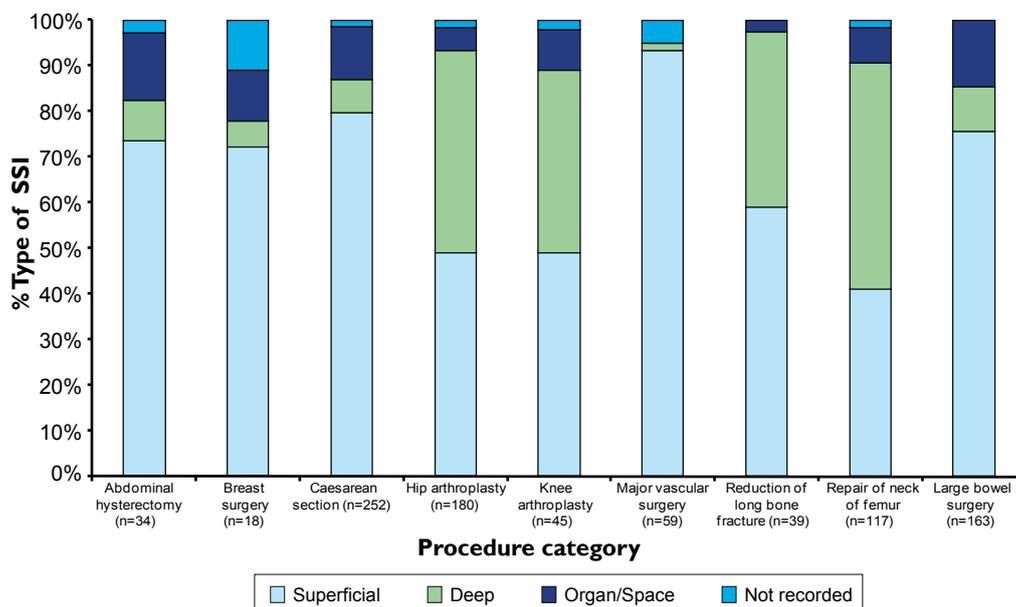
Procedure	2009	2010	2011	2012	2013
Abdominal hysterectomy	1.83	1.07	0.68	0.36	0.64
Breast surgery	0.50	0.56	0.44	0.16	0.16
Caesarean section	0.42	0.35	0.31	0.30	0.25
Hip arthroplasty	0.80	0.40	0.35	0.29	0.24
Knee arthroplasty	0.31	0.18	0.11	0.15	0.10
Large bowel	-	-	17.5	15.4	10.16
Major vascular	3.28	5.45	2.45	3.02	1.37
Reduction of long bone fracture	0.56	0.60	0.81	0.68	0.36
Repair of neck of femur	-	1.58	1.19	0.98	0.99

In the last year the SSI incidence for all procedures remained stable except for large bowel procedures where there was a significant decrease (34.2%, $p=0.017$).

4.4. Characteristics of SSI

The distribution of the type of SSI detected during the inpatient stay for 2009 to 2013 is presented in Figure 1. As all CABG and cardiac procedures were undertaken within one NHS board and surveillance for small bowel procedures have small numbers (<30 procedures reported), data for these procedures are not included in these analyses.

FIGURE 1: Infection type by procedure, inpatient SSI 2009 to 2013



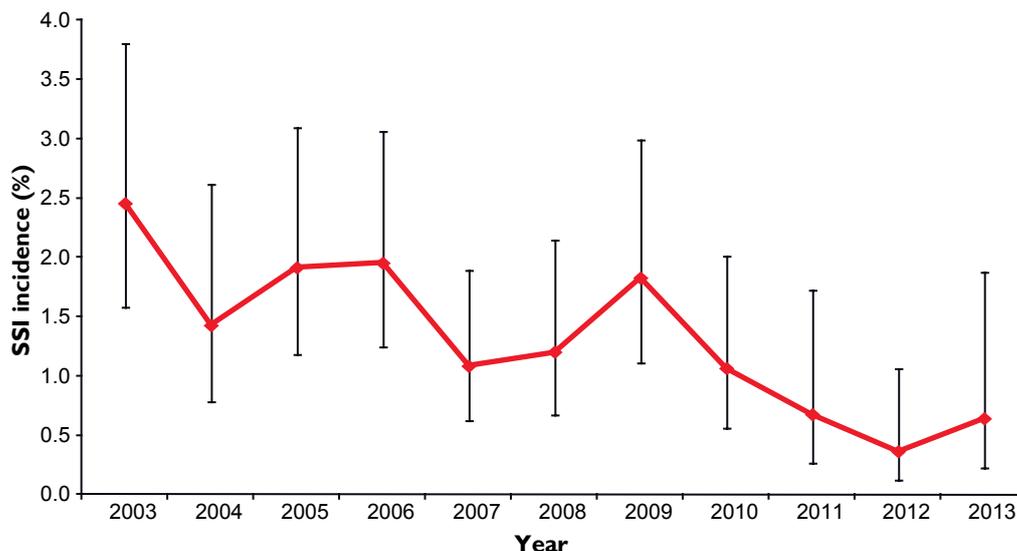
The proportion of inpatient SSIs that were classed as superficial varied by surgical category ranging from 41.0% in repair of neck of femur to 93.2% in major vascular surgery. The observed proportions will be affected by the differences in the length of post operative hospital stay between categories and also the small number of infections.

4.5. Inpatient incidence of SSI, by year of surveillance, 2003 to 2013

Figures 2 to 8 describe the inpatient incidence of SSI from 2003 to 2013 for each procedure. Trend analysis was not performed for CABG, cardiac, small bowel, large bowel and repair of neck of femur procedures due to these procedures either being performed within one NHS board or data only available for four years or less.

Figure 2 shows the annual inpatient SSI incidence with 95% confidence intervals for abdominal hysterectomy procedures.

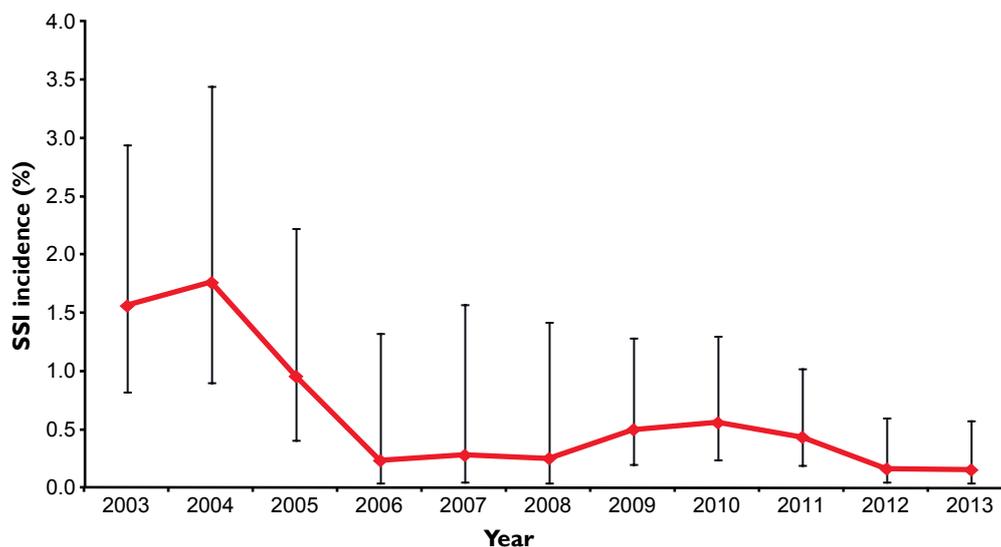
FIGURE 2: Trends in the annual inpatient incidence of SSI in abdominal hysterectomy procedures with upper and lower 95% confidence intervals, 2003 to 2013



The confidence intervals around these incidences are wide for abdominal hysterectomy procedures due to the relatively small number of procedures reported each year. There was a significant year on year decrease of 12.2% ($p < 0.0001$) in the inpatient SSI incidence for abdominal hysterectomy procedures since 2003.

The annual inpatient SSI incidences for breast surgery procedures from 2003 to 2013 are shown in Figure 3.

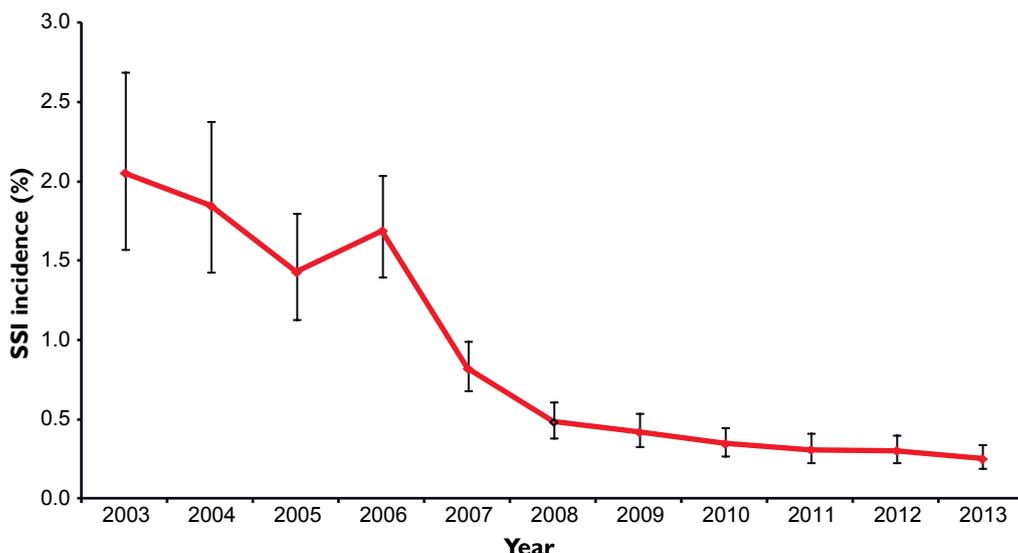
FIGURE 3: Trends in the annual inpatient incidence of SSI in breast surgery procedures with upper and lower 95% confidence intervals, 2003 to 2013



There was a significant year on year decrease of 11.9% ($p < 0.0001$) over the period 2003 to 2013 in the SSI incidence for breast surgery procedures.

The annual inpatient SSI incidences for caesarean section procedures are shown in Figure 4.

FIGURE 4:Trends in the annual inpatient incidence of SSI in caesarean section procedures with upper and lower 95% confidence intervals, 2003 to 2013

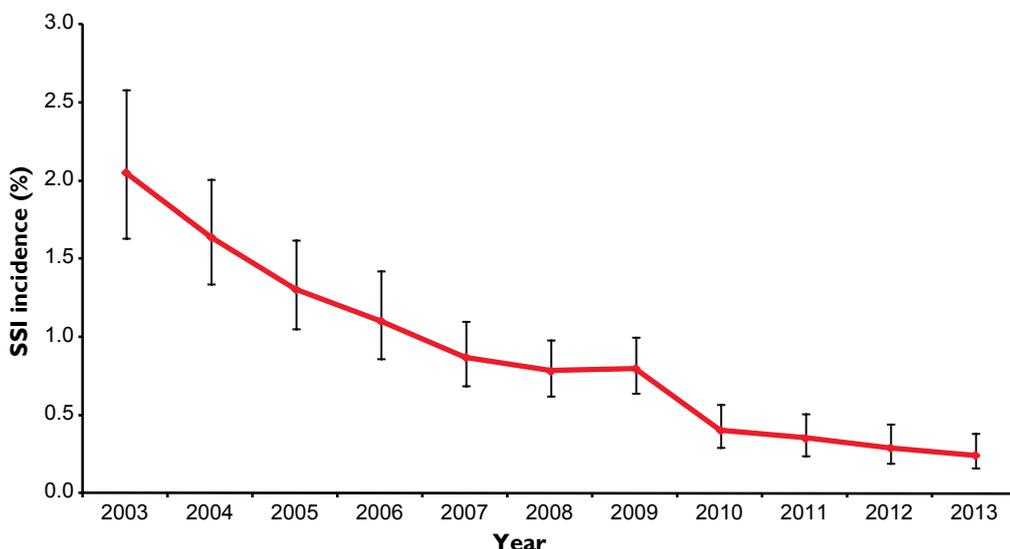


The number of procedures reported for caesarean section increased from 2007, when reporting became mandatory and this is reflected in the narrower confidence intervals since 2006.

There was a significant year on year decrease of 22.1% ($p < 0.0001$) since 2003.

The annual inpatient SSI incidences for hip arthroplasty procedures from 2003 to 2013 are shown in Figure 5.

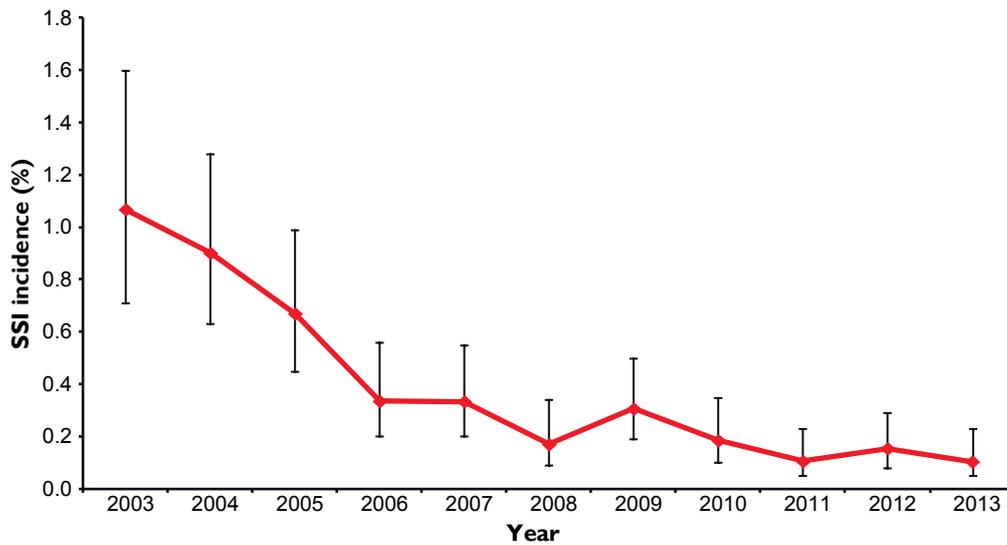
FIGURE 5:Trends in the annual inpatient incidence of SSI in hip arthroplasty procedures with upper and lower 95% confidence intervals, 2003 to 2013



There was a significant year on year decrease of 19.7% ($p < 0.0001$) since 2003. The decrease for hip arthroplasty procedures from 0.8% in 2009 to 0.4% in 2010 is partly due to the adjustment of OPCS codes in 2010. When the previous OPCS codes are included the inpatient SSI incidence for hip arthroplasty procedures for 2010 was 0.6%.

Figure 6 presents the annual inpatient SSI incidences from 2003 to 2013 for knee arthroplasty procedures.

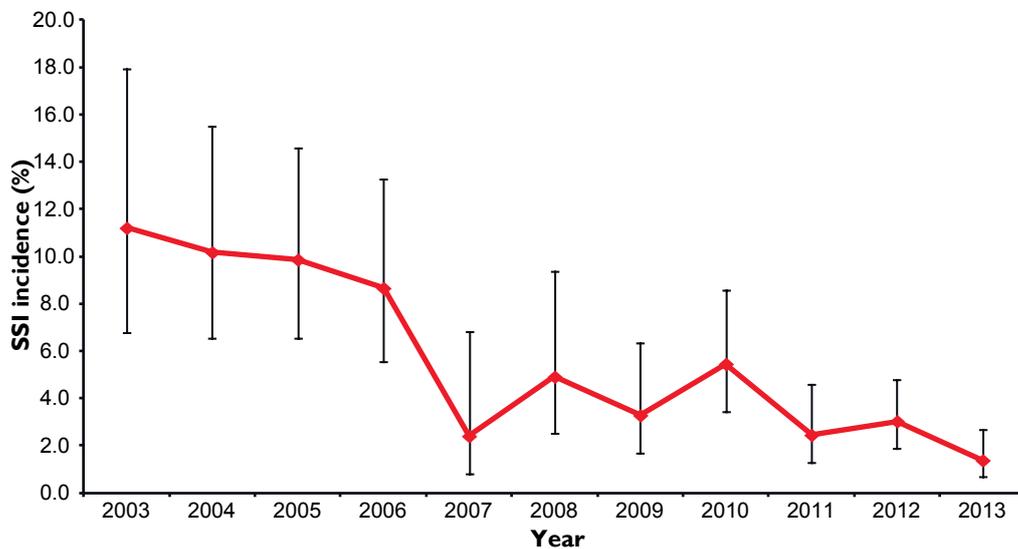
FIGURE 6: Trends in the annual inpatient incidence of SSI in knee arthroplasty procedures with upper and lower 95% confidence intervals, 2003 to 2013



There was a significant year on year decrease of 22.0% ($p < 0.0001$) for knee arthroplasty since 2003.

The annual inpatient SSI incidences from 2003 to 2013 for major vascular surgery are presented in Figure 7.

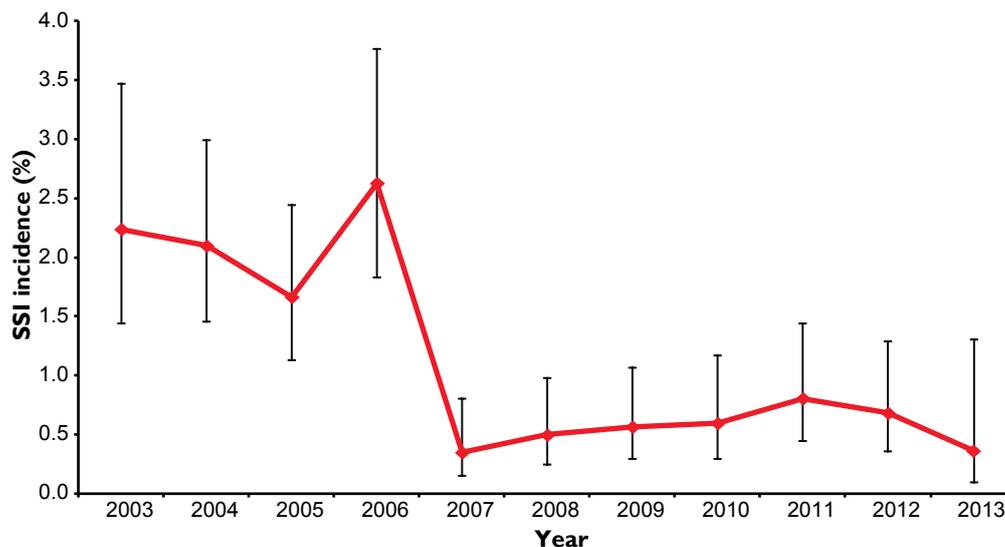
FIGURE 7: Trends in the annual inpatient incidence of SSI in major vascular procedures with upper and lower 95% confidence intervals, 2003 to 2013



There was a significant year on year decrease of 17.5% ($p < 0.0001$) for major vascular surgery since 2003.

The annual inpatient SSI incidences from 2003 to 2013 for reduction of long bone fracture surgery are presented in Figure 8.

FIGURE 8: Trends in the annual inpatient incidence of SSI in reduction of long bone fracture procedures with upper and lower 95% confidence intervals, 2003 to 2013



There was a significant year on year decrease of 17.3% ($p < 0.0001$) for reduction of long bone fracture since 2003. The largest individual decrease in inpatient SSI incidence was observed between 2006 and 2007.

4.6. Post discharge surveillance (PDS) for Caesarean Section

Post discharge surveillance (PDS) until day 10 was made mandatory in April 2009 and this section covers the period since this introduction. Table 5 shows the number of procedures performed and SSI incidences for caesarean section, 2009 to 2013.

TABLE 5: SSI incidence for caesarean section (inpatient and PDS to day 10) procedures, 2009 to 2013

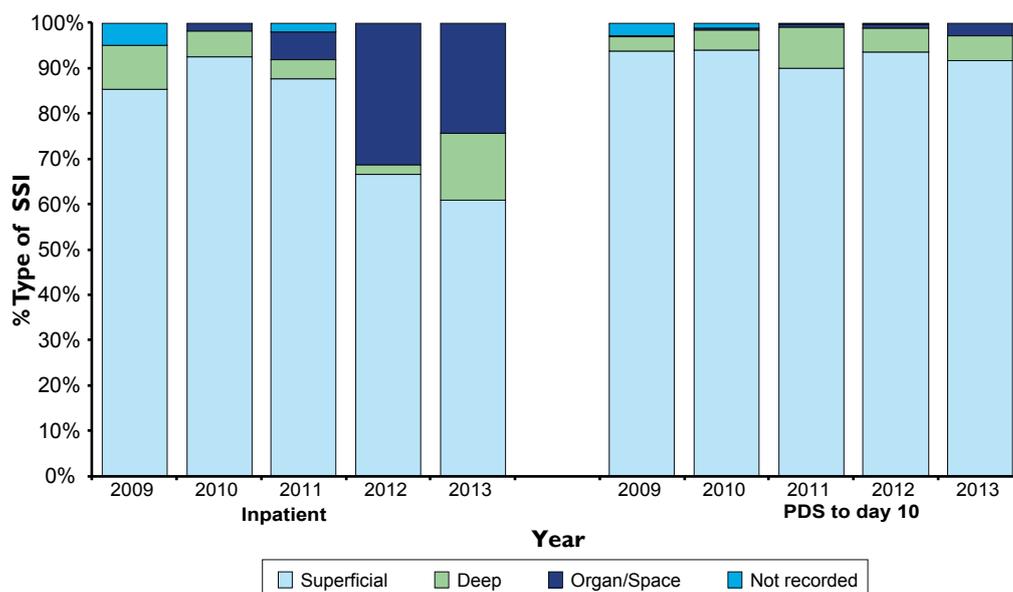
Year	Number of procedures	Inpatient SSI	PDS to day 10 SSI	Total SSI	Total SSI Incidence %	95% Confidence Interval
2009	14 498	61	349	410	2.83	2.57 to 3.11
2010	15 237	53	379	432	2.84	2.58 to 3.11
2011	15 801	49	292	341	2.16	1.94 to 2.40
2012	15 768	48	261	309	1.96	1.75 to 2.19
2013	16 254	41	242	283	1.74	1.55 to 1.95
Total	77 558	252	1 523	1 775	2.29	2.19 to 2.40

The SSI incidences for caesarean section (inpatient and PDS to day 10) remained stable between 2012 and 2013. A total of 283 cases of SSI following caesarean section procedures (n=16 254) were reported during 2013 with an overall incidence of 1.74% (95% CI: 1.55 to 1.95). Forty one of these SSI were diagnosed during the inpatient stay. The remaining SSI (n=242) were diagnosed following discharge from hospital. Therefore the majority of SSI were diagnosed using PDS methods (85.5%).

As previously stated, with the introduction of SSI light surveillance, analysis can only be performed on those patients with an SSI therefore information on compliance with PDS for non SSI cases is not available.

Figure 9 presents the type of SSI detected by inpatient and PDS to day 10 surveillance for caesarean section procedures 2009-2013.

FIGURE 9: Proportion of SSI involving superficial or deep or organ space infections, for caesarean section procedures (inpatient and PDS to day 10), 2009 to 2013



Data on inpatient SSI for caesarean section procedures, 2013, indicates that the majority of the inpatient detected infections were superficial (61.0%). An increase in the proportion of deep SSI for inpatient caesarean section procedures was observed in 2013 and HPS will be exploring reasons for this variation. SSI detected among patients using PDS to day 10 in 2013 also showed the majority of infections detected were superficial (91.7%).

4.7. Readmission Surveillance for Hip Arthroplasty Procedures

Table 6 shows the number of procedures performed and SSI incidences for hip arthroplasty, 2009 to 2013.

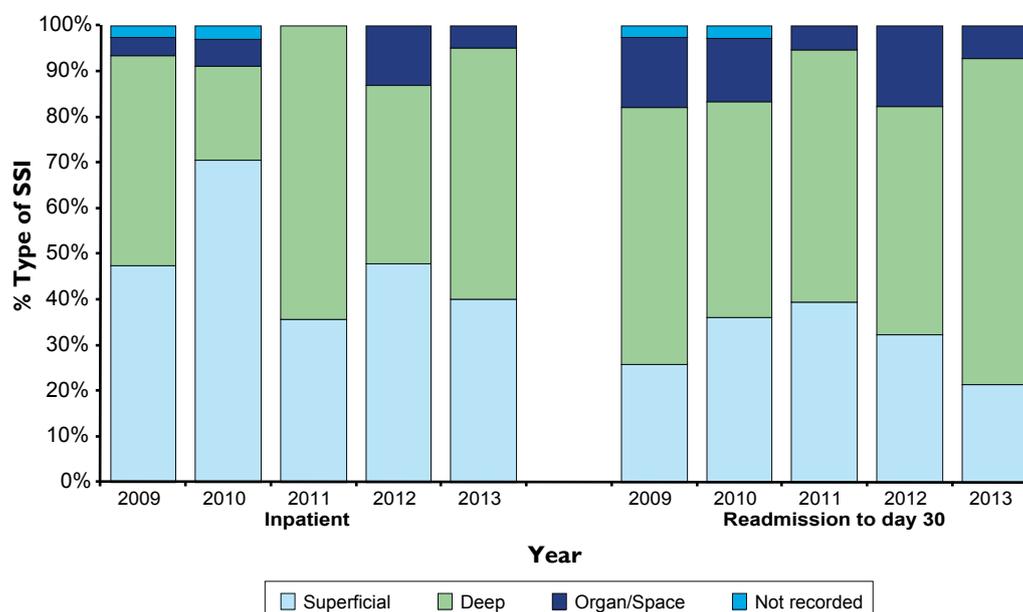
TABLE 6: SSI incidence for hip arthroplasty (inpatient and readmission to day 30) procedures, 2009 to 2013

Year	Number of procedures	Inpatient SSI	Readmission to day 30 SSI	Total SSI	Total SSI incidence %	95% Confidence Interval
2009	9 501	76	39	115	1.21	1.01 to 1.45
2010	8 397	34	36	70	0.83	0.66 to 1.05
2011	7 918	28	38	66	0.83	0.66 to 1.06
2012	7 886	23	34	57	0.72	0.56 to 0.94
2013	8 191	20	42	62	0.76	0.59 to 0.97
Total	41 893	181	189	370	0.88	0.80 to 0.98

The proportion of SSI being detected following discharge from hospital has increased for hip arthroplasty since the introduction of readmission surveillance. In 2009, 33.9% of hip arthroplasty SSI were detected by readmission surveillance until day 30 post operatively compared to 67.7% in 2013. In 2013, the overall incidence of SSI (inpatient and readmission to day 30) for hip arthroplasty was 0.76% (95% CI: 0.59 to 0.97). The overall incidence of SSI had remained stable between 2010 and 2013.

Figure 10 presents the type of SSI detected by inpatient and readmission surveillance for hip arthroplasty procedures in 2009 to 2013.

FIGURE 10: Proportion of SSI involving superficial or deep or organ space infections, for hip arthroplasty procedures (inpatient and readmission to day 30), 2009 to 2013

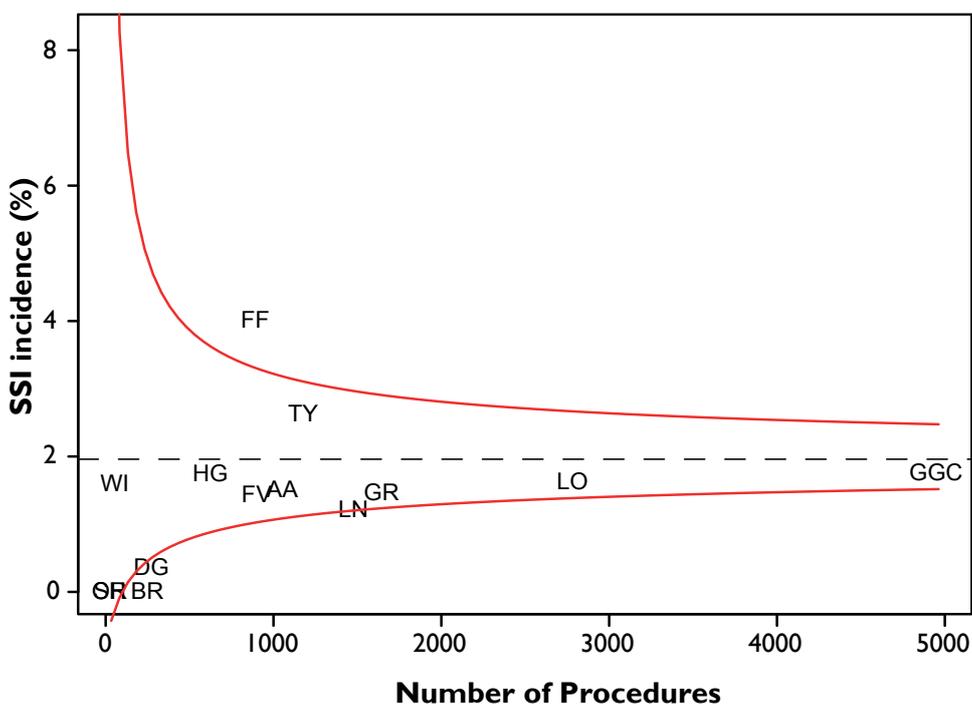


Data on inpatient SSI for hip arthroplasty procedures, January to December 2013, indicates that the largest proportion of infections were deep (55.0%). For patients readmitted to hospital the largest proportion of infections were deep (71.4%).

4.8. Variation in SSI Incidence by NHS board

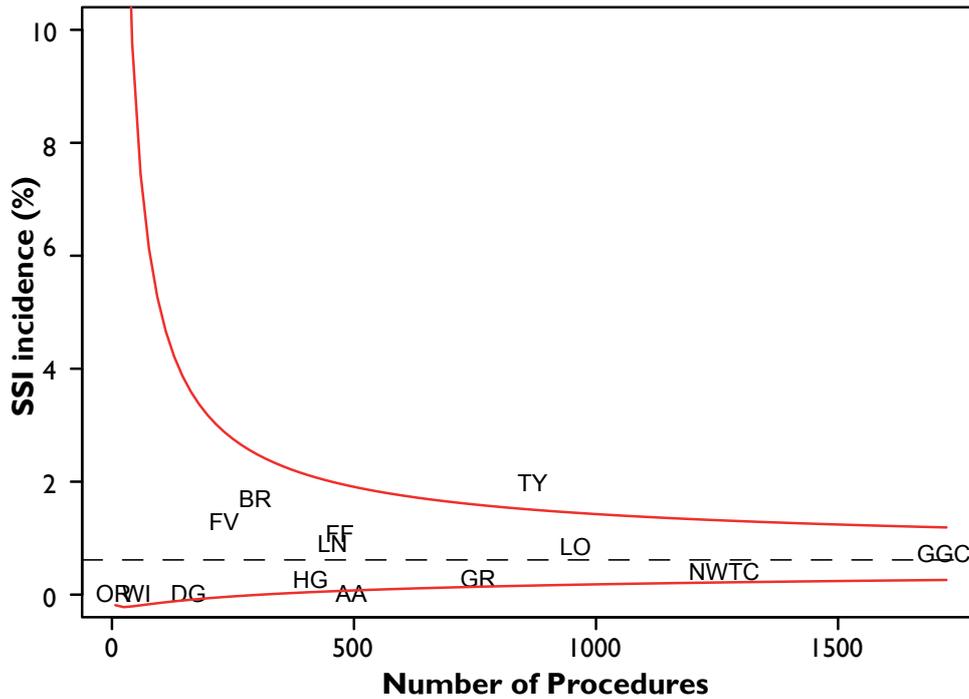
When making comparisons between NHS boards it is important to take into account the precision of the estimated incidence of SSI. The precision of the estimate increases with the number of procedures. Figures 11 and 12 indicate the variation in SSI incidences by NHS board within selected categories of surgery and represent data from January to December 2013. The statistical analysis in Figures 11 and 12 was based on an over-dispersed binomial model. The funnel plots in Figures 11 and 12 show the SSI incidence for the respective procedures within each NHS board plotted against the number of procedures on which the incidence is based. The red lines represent the 95% confidence limits and the horizontal line is the mean incidence of infection. The probability that incidences above the high control limit or below the low limit have occurred by chance is low. Nonetheless these results should be interpreted with due caution as not all risk factors including length of stay have been taken account of in these analyses. Not all NHS boards are included as the National Waiting Times Centre does not perform caesarean section procedures.

FIGURE 11: Cumulative incidence (number of SSI per 100 procedures) for caesarean section (inpatient and PDS until day 10) procedures, by NHS board in 2013



* Note that in the figure above NHS Borders, NHS Orkney and NHS Shetland overlap

FIGURE 12: Cumulative incidence (number of SSI per 100 procedures) for hip arthroplasty (inpatient and readmission to day 30), by NHS board in 2013*



* Note that in the figure above NHS Orkney, NHS Shetland and NHS Western Isles overlap and NHS Fife and NHS Lanarkshire overlap

Key to NHS boards

AA Ayrshire & Arran	GGC Greater Glasgow & Clyde	NWTC National Waiting Times Centre
BR Borders	GR Grampian	OR Orkney
DG Dumfries & Galloway	HG Highland	SH Shetland
FF Fife	LN Lanarkshire	TY Tayside
FV Forth Valley	LO Lothian	WI Western Isles

For caesarean section procedures, for 2013, one NHS board (NHS Fife) was above the 95% confidence limit for SSI detected during inpatient stay and until day 10 post operatively. For hip arthroplasty procedures, for 2013, one NHS board (NHS Tayside) was above the 95% confidence limit for SSI detected during inpatient stay and readmission to day 30. These NHS boards have been alerted by HPS that they were identified as an outlier in the annual funnel plot analysis of SSI incidences.

5. Discussion

This report summarises data submitted by the 15 NHS boards, 14 territorial and one special NHS board, participating in the SSI surveillance programme. The results provided in this report do not represent SSI incidences in NHSScotland as a whole, only for selected categories of surgery. These data are heavily biased towards results from those NHS boards that have contributed large numbers of reports, thus these data must be interpreted with due caution. The number of procedures reported to HPS has increased each year, since the introduction of the SSI surveillance programme, and in 2013 a total of 38 760 procedures were reported to HPS. The inpatient SSI incidences in 2013 varied by surgical procedure and ranged from 0.10% for knee arthroplasty to 11.54% for small bowel surgery.

Comparisons with other countries are challenged by varying definitions and methods used. The European Centre for Disease Prevention and Control (ECDC) have harmonised these in the European Union in recent years. European data on surveillance of SSIs have been published since 2008 as part of the ECDC Annual Epidemiological Reports.¹³ The ECDC report 'Surveillance of surgical site infections in Europe 2010–2011',¹³ includes surveillance data reported for 2010–2011 from 20 networks in 16 European countries (15 European Union Member States and one European Economic Area country). Data from Europe were similar to Scotland as it showed the percentage of SSI varied according to the type of operation and the highest incidences were in colon surgery (9.6%) and the lowest incidences in knee prosthesis (0.8%). The Public Health England (PHE) report published on data collected by NHS hospitals and independent sector NHS treatment centres in England from April 2008 until March 2013¹⁴ shows comparable incidences with NHSScotland over this time period.¹⁴

Due to advances in surgical techniques, length of stay following surgery has decreased over the years the surveillance programme has been in place. For hip arthroplasty the median length of post operative stay in hospital in 2010 (last complete year of full surveillance nationally) was five days compared to seven days in 2003. For caesarean section the median length of post operative stay in hospital in 2010 was three days compared to four days in 2003. This decreasing length of post operative stay means that surveillance based on inpatient SSI is likely to underestimate the true rate of SSI. As a result of this decreasing post operative length of stay, PDS of SSI is necessary if accurate rates of SSI following surgery are to be reported. Readmission surveillance until day 30 post operatively for hip arthroplasty has resulted in a higher proportion of SSI being detected following discharge from hospital. In 2009, 33.9% of hip arthroplasty SSI were detected by readmission surveillance until day 30 post operatively compared to 67.7% in 2013. This shows the importance of continuing surveillance after the patient has been discharged from hospital. Data on inpatient SSI for hip arthroplasty procedures, January to December 2013, indicates that the largest proportion of infections detected were deep infections for both inpatient and among patients readmitted to hospital. However for readmission surveillance the higher proportion of deep infections could be due to patients with this type of SSI more likely to be readmitted to hospital compared to patients with a superficial SSI. The proportion of caesarean section SSI detected by PDS to day 10, not including inpatient infections, accounted for 85.5% of all the SSI detected for caesarean section during 2013. Data on inpatient SSI for caesarean section procedures, 2013, indicates that the majority of the inpatient detected infections were superficial for both inpatient and those detected by PDS methods.

As part of ongoing work to assess and improve PDS for caesarean section procedures within NHSScotland a number of initiatives were introduced within the last year by HPS. In October 2013, NHS Boards carrying out SSI light surveillance for caesarean section were asked to record the number of completed PDS records to day 10. This allows HPS to determine where patients were lost to follow up and if the percentage of patients being followed up post discharge is comparable between boards thus ensuring that all SSIs are being successfully captured.

A review of the methods used to collect caesarean section PDS data was also conducted by HPS in 2014 to ensure consistency and comparability between NHS boards. A telephone questionnaire on PDS methods was conducted by HPS with a surveillance coordinator from each of the boards. Questions included the methods used to capture PDS data (paper, electronic or telephone) definition training and midwife involvement. Results from this study, which will be published later this year, will help inform and improve practice within NHSScotland to ensure that PDS methods currently used across NHSScotland adequately capture the patient population and that data presented in the public domain are accurate thus ensuring comparability between NHS boards.

SSI light surveillance was introduced within NHSScotland for mandatory and non mandatory procedures from 01 July 2011 to support the PPS, and was subsequently extended after the PPS was completed.⁹ However NHS boards had the option to continue with full surveillance for any procedures of their choice. In order to ensure local mechanisms for conducting the light surveillance methodology are consistent with the national SSI protocol for light surveillance a case note validation exercise across NHSScotland was conducted by HPS during 2013/2014. SSI light surveillance data for 2012 was validated for all hospitals within NHSScotland conducting light surveillance for caesarean section procedures with local validation reports and a national report issued to each board and a peer review publication to follow.

A key aim of SSI surveillance is to encourage NHS boards to use local data to evaluate local practice and institute improvement changes where the results indicate this may be necessary. NHS boards receive local individual SSI reports that contain their results both monthly and quarterly. In order to promote good practice and identify areas for improvement any NHS boards identified as having higher than expected SSI incidences at the end of each surveillance quarter are alerted to this by the production of an individual exception report highlighting the changes in incidences. These reports are intended to highlight to local infection prevention control teams (IPCT) that their SSI incidence is higher than would be expected. IPCT should share the report locally with the clinical teams directly responsible for surgical procedures to encourage local review of data, risk factors and clinical practices, to identify the reason for variation with a view to improving surgical practice and reducing future SSI incidences.

In 2013, there were two quarterly exception reports issued for caesarean section procedures to one NHS board in order to alert them to higher than expected incidences of SSI. There were no quarterly exception reports issued for any other procedure. Whilst these increased incidences of SSI may have been reflective of risk factors in the local population, reasons for these changes were investigated by local IPCT with support provided by HPS.

In order to benchmark and align with national and international surveillance centres, and to further understand the epidemiology of SSI within Scotland, HPS will include the collection of SSI organism and antimicrobial resistance data across NHSScotland. This was introduced as a pilot for colorectal procedures in January 2014 to test the collection process and was rolled out for all procedures on the 01 July 2014.

In 2013, HPS facilitated meetings for NHS boards to discuss best working practices. The aim of these meetings was to use SSI data linked with improvement methodologies to reduce SSI and to share lessons learned. These meetings will continue in 2014 and NHS boards interested in participating can contact the SSHAIP team for further information.

In December 2013, HPS organised a SSI surveillance training session for both new and existing SSI surveillance staff. The purpose of this training was to ensure that the quality of the information collected by surveillance staff was robust and consistent across all NHS boards, providing confidence for clinical staff implementing improvement changes based on these data. Feedback from the training was extremely positive. In 2014, HPS in collaboration with NHS Education for Scotland (NES) will develop an online surveillance training module which will be based on the content of the training session.

The SSI quality improvement tool is available on the HPS website <http://www.documents.hps.scot.nhs.uk/hai/infection-control/evidence-for-care-bundles/literature-reviews/ssi-review.pdf>. This literature review was published in 2012, following a review of previously issued care bundles and published literature. In October 2013 the bundle for preventing surgical site infections was published on the HPS website <http://www.documents.hps.scot.nhs.uk/hai/infection-control/bundles/ssi/ssi-bundle-v1.pdf>. The main audience for these documents include clinical staff responsible for performing surgical procedures, IPCT working in NHSScotland and other groups with infection prevention and control (IPC) remits. Implementation of these quality improvement tools should continue to contribute to reducing these clinically significant infections.

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