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Caesarean Section Surgical Site Infection Surveillance

2019 Annual Report:

All Wales

Includes data from 01/01/2019 – 31/12/2019

Version 1

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Summary

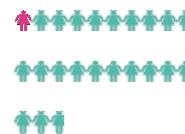
NOTE: The information in this annual report may differ from that found in the C section quarterly reports. This annual report should be used when quoting annual figures and for comparison across countries.

NOTE: This report contains data for 2019, where the Covid-19 pandemic may have impacted data quality and reporting of C-section SSIs in the last quarter.

SSI rate



1 in 23 mothers had an SSI attributable to their C section procedure

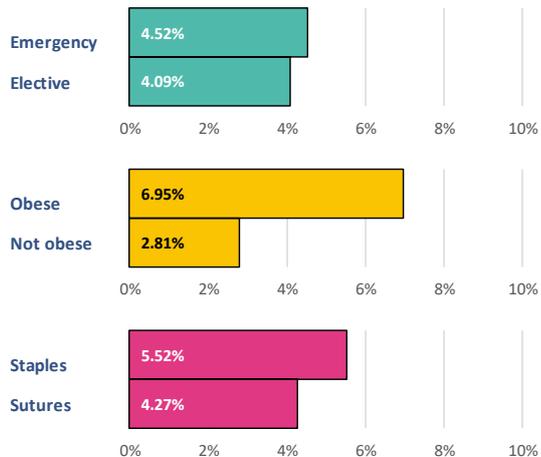


59% reduction in SSI rate since 2009, which equates to **2374** infections prevented (based on 2009 rates)

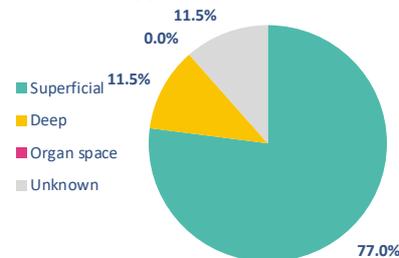
Compliance



Risk factors



Infection type



7623 procedures were performed in 2019 and forms were completed for 88% of these procedures (n=6732). Of these forms, 87% were valid forms that could be used for analysis (n=5845).

There were 253 SSIs reported in 2019, which equates to an SSI rate of 4.3%. 28 of these were complicated infections (deep or organ space), approximately 11% of all infections.

55% of procedures performed in 2019 were emergencies. The SSI rate in emergency procedures was not significantly higher than elective procedures.

Introduction

The Healthcare Associated Infections team at Public Health Wales Health Protection were instructed by the Welsh Government to develop and support the implementation of surveillance following Caesarean section procedures undertaken in NHS hospitals in Wales. This process has been mandatory since January 2006.

Surgical Site Infection (SSI) is an important area for surveillance and remains a complication of surgery where human and financial costs are high (Plowman, 2000) (Jenks, Laurent, McQuarry, & Watkins, 2014). Additionally, most infections are preventable (National Institute for Health and Care Excellence, 2019). An SSI is the second most common infection following a C section, within a group of patients who are generally young, fit and well females (Sykes, Brodribb, McLaws, & McGregor, 2005).

Serious patient consequences can result from SSIs, including pain, suffering and, on some occasions, they require additional surgical interventions (Sykes, Brodribb, McLaws, & McGregor, 2005). It is important to recognise that SSIs can range from a relatively trivial wound discharge with no other complications, to a life-threatening condition. Other clinical outcomes of SSIs include poor scars that are cosmetically unacceptable, persistent pain and itching, restriction of movement and a significant impact on emotional wellbeing.

This report includes data captured both during hospital stay and post-discharge within the community. The surveillance incorporates data collected by clinical teams and midwives and uses internationally agreed definitions (Horan, Gaynes, Martone, Jarvis, & Emori, 1992), allowing Welsh data to be compared with and incorporated into other international databases, such as the ECDC European SSI database. This report details results obtained for surveillance data capture in 2018.

Data interpretation

Surgical site infection (SSI) rates in this report are calculated as the number of infections (inpatient and post-discharge) as a proportion of valid procedures. This is reported as a rate per 100 procedures.

$$SSI\ rate = \frac{\textit{number of SSI}}{\textit{number of valid procedures}} \times 100\%$$

A valid procedure is one where an SSI is recorded, or one where there is confirmation of no SSI on both inpatient and post-discharge forms. "Number of procedures" refers only to valid procedures, unless otherwise specified.

In keeping with the regular reports, all SSI rates reported in this document are those that occurred up to 14 days post-procedure. Due to the different discharge policies and treatment plans in place at all health boards, we are confident in the consistency of rates up to 14 days, but we are unable to guarantee consistency between hospitals after this point.

Section 1: Data completeness

Compliance

The proportion of valid forms being returned has decreased compared to 2018, with 77% of the expected number of forms being valid, this makes up 87% of all forms received. Due to less hospitals directly reporting procedure numbers for compliance purposes we have had to move back to PEDW figures as the denominator for the majority of our compliance rates.

$$\text{Compliance rate} = \frac{\text{number of returned forms}}{\text{number of procedures reported to PEDW}} \times 100\%$$

$$\begin{aligned} \text{If Compliance rate} > 1 \text{ then Compliance rate} \\ &= \frac{\text{number of returned forms}}{\text{mean(number of procedures reported in previous 3 years)}} \times 100\% \end{aligned}$$

Table 1 – Coverage of the C section SSI surveillance compared to the expected number of forms.

	2017	2018	2019
Expected number of forms*	8266	8871	7623
Surveillance forms returned	7062	7597	6732
Valid surveillance forms	6810	7364	5845
Forms returned	85%	86%	88%
Valid forms returned	82%	83%	77%

*Total number of procedures performed at hospital, irrespective of whether or not a form was received.

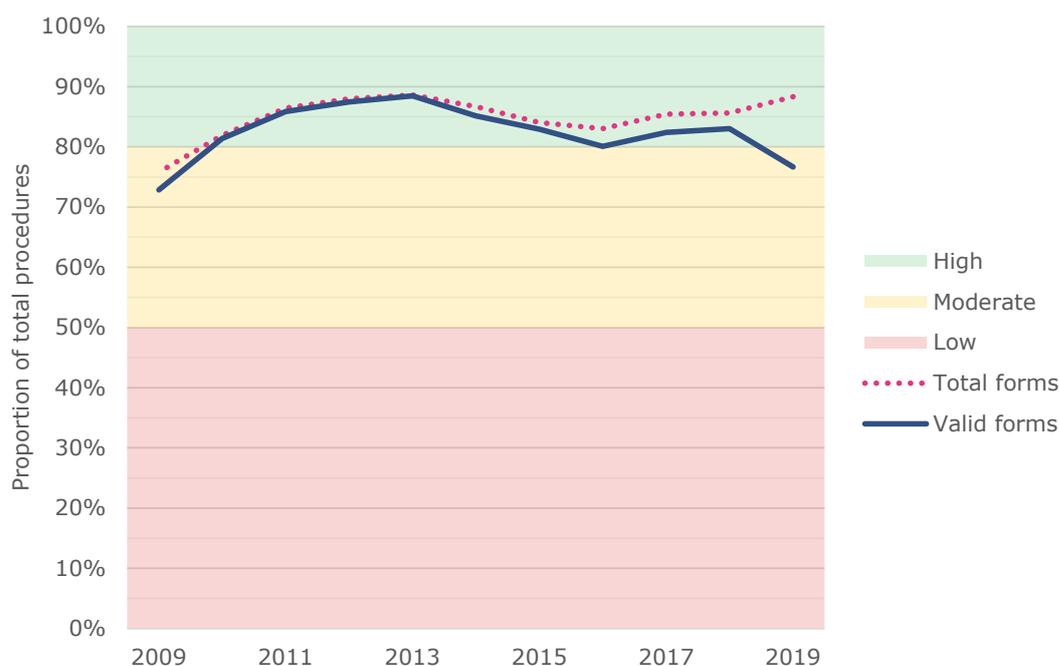


Figure 1 – Trend rate for compliance over the last 10 years, 2009-2019.

Completion rates of surveillance forms

The vast majority of inpatient forms received at Public Health Wales have a completed SSI status field (where either yes or no are selected), with 6213 of forms having a completed SSI field (of 6732 forms, 92.3%). Following on from these inpatient forms, 96.9% of post-discharge forms were received (6523/6732) with the remaining 3.1% either not sent in at all, or being sent in blank. Of the post discharge forms that were sent in, 89.6% had a completed SSI field.

The additional information on post-discharge SSIs (type and date) is provided in most cases, with a small number of forms missing this information. The additional information is provided less often in the case of inpatient SSIs, however, the numbers involved are too small to extrapolate any real meaning from them.

Table 2 – Completion rates of the SSI field (along with its associated type and infection date fields) 2019.

Data Item	Expected	Completed	Proportion
Inpatient SSI (Yes/No)	6732	6213	92.3%
If yes, SSI type	43	29	67.4%
If yes, infection date	43	39	90.7%
Post-discharge SSI* (Yes/No)	6523	5845	89.6%
If yes, SSI type	371	333	89.8%
If yes, infection date	371	356	96.0%

Section 2: SSI rate

Incidence of inpatient, post-discharge and overall SSI

The following table provides the SSI rates separated out as an inpatient and a post-discharge rate. A total of 39 inpatient SSIs were recorded, giving an inpatient SSI rate of 0.67%. The vast majority of SSIs (84.58%) occurred following hospital discharge, giving a rate of 3.66%.

The length of hospital stay is shorter now than it was at the start of the surveillance period as more of an emphasis is being placed on community midwifery care. As a result, fewer inpatient SSIs are being identified than previously, and these are instead being picked up in the community.

All SSIs are captured up to 14 days post procedure.

Table 3 – Incidence of inpatient and post-discharge SSIs, 2019.

	No. of procedures	SSI	SSI rate (95% CI)
Inpatient	5845	39	0.67% (0.46-0.88)
Post-discharge	5845	214	3.66% (3.18-4.14)
Overall	5845	253	4.33% (3.82-4.88)

Annual SSI rates

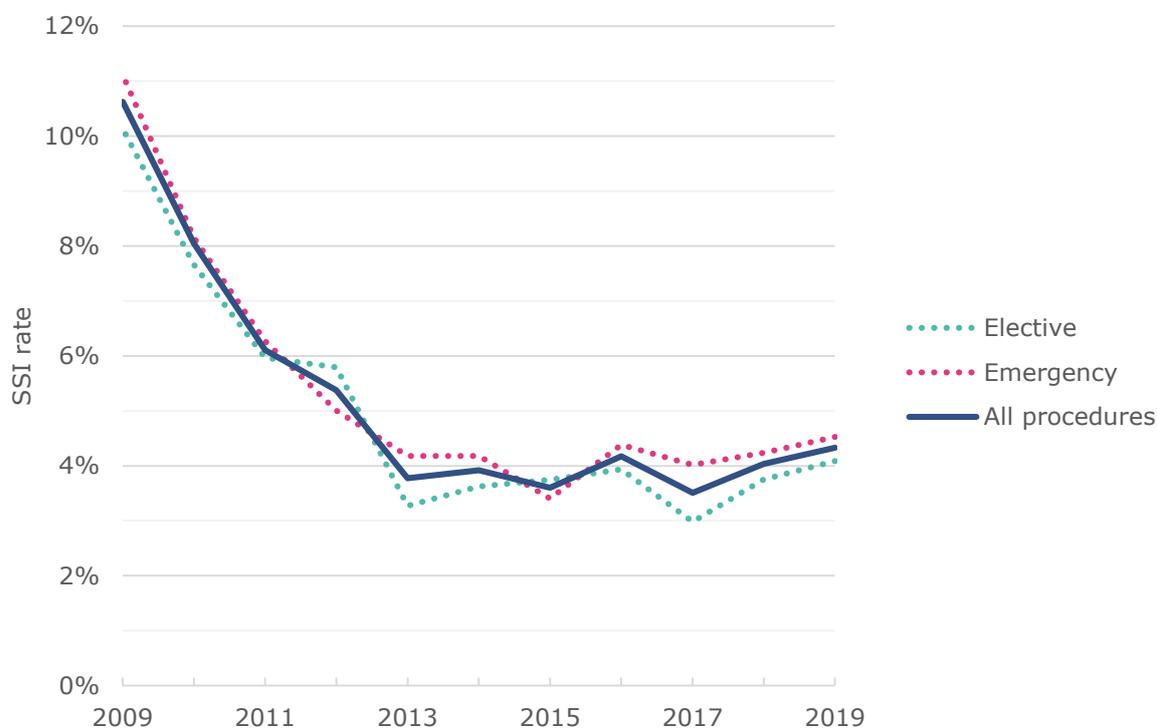


Figure 2 – Overall, elective and emergency SSI rates for 2009-2019.

Table 4 – Overall, elective and emergency SSI rates for the last five years. (Unknowns excluded).

Operation type	Year	No. of procedures	SSI	SSI rate (95% CI)
All C-section procedures	2019	5845	253	4.33% (3.81-4.85)
	2018	7362	297	4.03% (3.58-4.48)
	2017	6700	235	3.51% (3.07-3.95)
	2016	7072	295	4.17% (3.71-4.64)
	2015	7217	260	3.60% (3.17-4.03)
Elective	2019	2641	108	4.09% (3.33-4.84)
	2018	3413	128	3.75% (3.11-4.39)
	2017	3150	94	2.98% (2.39-3.58)
	2016	3302	130	3.94% (3.27-4.60)
	2015	3229	121	3.75% (3.09-4.40)
Emergency	2019	3183	144	4.52% (3.80-5.25)
	2018	3894	165	4.24% (3.60-4.87)
	2017	3458	139	4.02% (3.36-4.67)
	2016	3672	161	4.38% (3.72-5.05)
	2015	3909	133	3.40% (2.83-3.97)

The SSI rate across Wales has increased this year from 4.03% in 2018 to 4.33% in 2019 (Table 4). The SSI rate back in 2009 was 10.62% and, when using this rate as a baseline, there has been a reduction of 59% in the years following. This represents an estimated 2,374 mothers who have been saved from an infection (Figure 2).

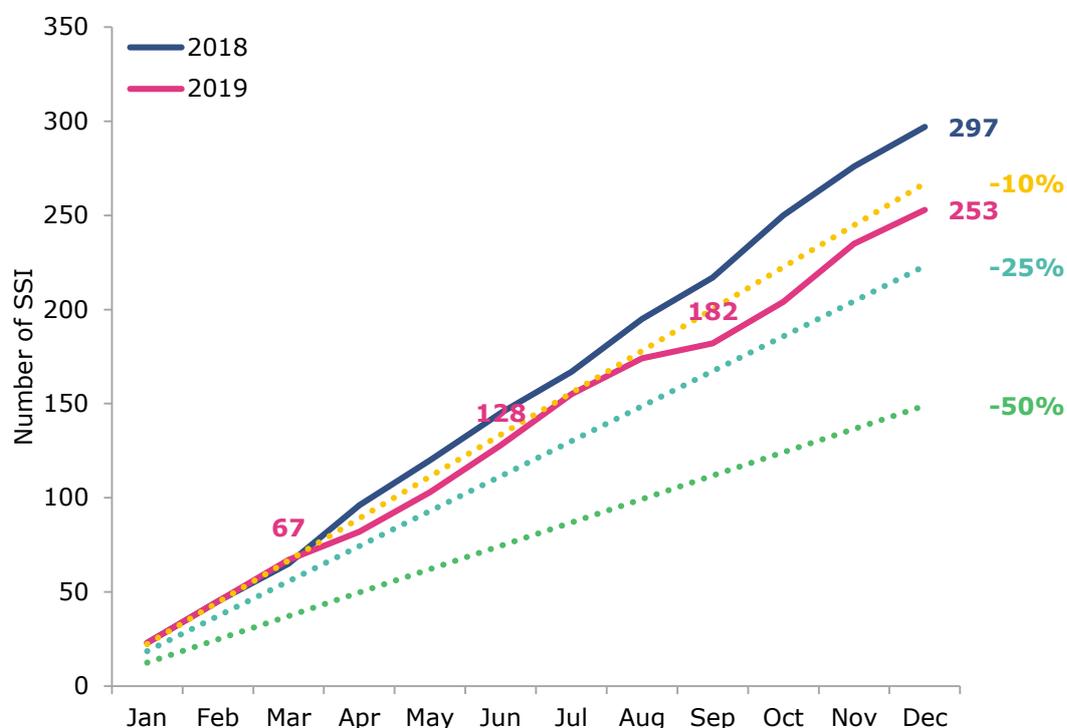


Figure 3 – Cumulative SSI number for 2019, and their relative change compared to the previous year.

Throughout Wales, there were 253 SSIs reported in 2019. When compared to the previous year's 297 SSIs, this is a 15% reduction in raw SSI numbers (i.e. without factoring in the denominator) and means there were 44 fewer infections in 2019 than in 2018. Cumulative SSI numbers for 2018 and 2019 are found in Figure 3.

Incidence of SSI by infection type

The type of SSI recorded on the surveillance form can be categorised into either superficial, deep seated or organ space infections. These all have specific definitions and diagnostic criteria and remain standardised across Europe. The following tables show the split between different SSI types, and their corresponding rates.

Table 5 – Types of SSI in C section procedures by proportion, 2019.

SSI type	n	%
Superficial infection	188	77.0%
Deep infection	28	11.5%
Organ space infection	0	0.0%
Unknown	28	11.5%

Table 6 – SSI rates broken down by type, 2019.

SSI type	No. of procedures	SSI	SSI rate (95% CI)
Superficial infection	5845	188	3.22% (2.76-3.67)
Deep infection	5845	28	0.48% (0.30-0.66)
Organ space infection	5845	0	0.00% (0.00-0.00)
Unknown	5845	28	0.48% (0.30-0.66)

The split between different types of infection is as expected – the vast majority of infections reported are superficial (3.22%), with a small number of deep infections (0.48%), and no organ space infections (0.00%).

Section 3: Demographics

This section provides information about the mother which is not affected by the current procedure itself and is known beforehand; namely age, BMI and the number of prior C section procedures.

Incidence of SSI by age



Figure 4 – Graph showing the incidence of SSI by age group, 2019.

Table 7 – Incidence of SSI by age group, 2019.

Age group	No. of procedures	SSI	SSI rate (95% CI)
<20	106	6	5.66% (2.11-11.91)
20-24	700	37	5.29% (3.75-7.21)
25-29	1569	65	4.14% (3.21-5.25)
30-34	1875	75	4.00% (3.16-4.99)
35-39	1191	44	3.69% (2.70-4.93)
≥40	377	22	5.84% (3.69-8.70)
Unknown	27	4	14.81% (4.19-33.73)

In 2019, there was a higher SSI rate in women in the <20 age group (5.66%), and the >40 age group (5.84%). The mean age for all procedures was 30.9 (30.5 in 2018), but this decreased to 30.7 when only those with an SSI were included, however this was not significant (P=0.632).

Incidence of SSI by BMI

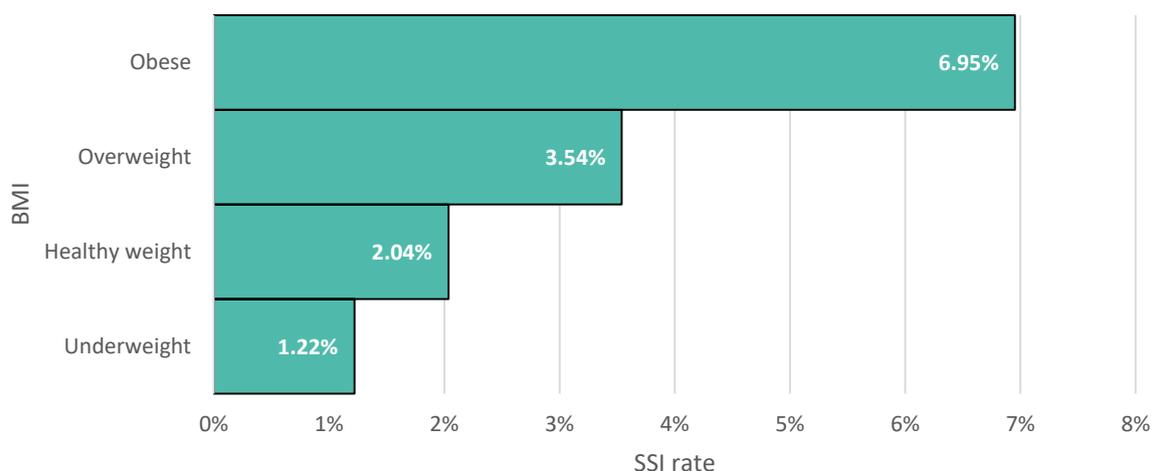


Figure 5 – Graph showing the incidence of SSI by BMI category, 2019.

Table 8 – Incidence of SSI by BMI category 2019.

BMI	No. of procedures	SSI	SSI rate (95% CI)
Underweight	<18.5	82	1.22% (0.03-6.61)
Healthy weight	18.5-24.9	1768	2.04% (1.43-2.81)
Overweight	25.0-29.9	1751	3.54% (2.73-4.52)
Obese	≥30.0	2143	6.95% (5.91-8.11)
Unknown		101	4.95% (1.63-11.18)

In 2019, the mean BMI for all procedures was 29.5 (median 27.8), but this increased to 33.1 (median 31.9) when only those with an SSI were included. When comparing BMI groups, the SSI rate in overweight mothers (including obese mothers) was significantly higher ($P < 0.001$), and this was also true when comparing obese mothers to all other BMI groups ($P < 0.001$). While the SSI rate in underweight mothers was substantially lower, this group was very small compared to the other groups, so this was not significant ($P = 0.165$) and differs with findings from previous years.

Incidence of SSI by number of previous C sections

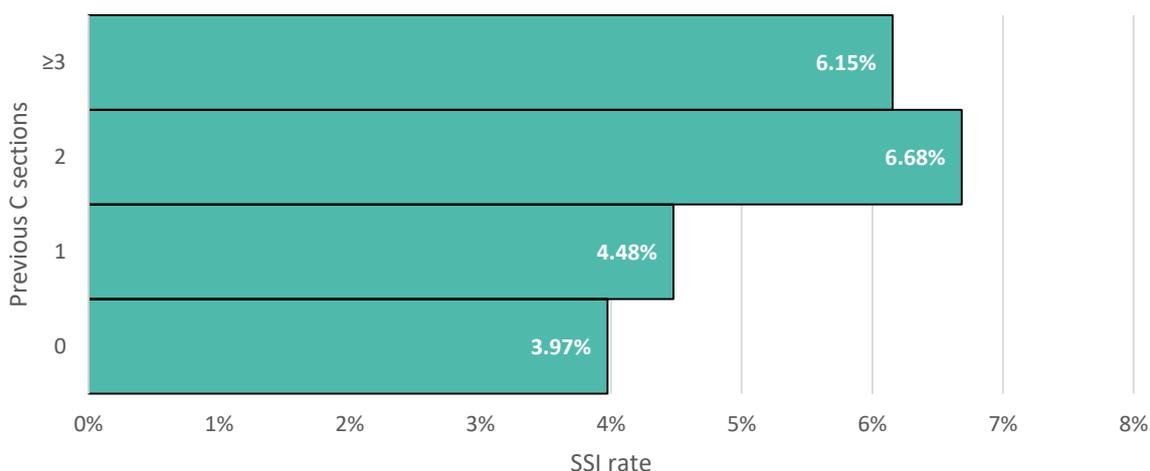


Figure 6 – Graph showing incidence of SSI by the number of previous C sections, 2019.

Table 9 – Incidence of SSI by the number of previous C sections, 2019.

Previous C sections	No. of procedures	SSI	SSI rate (95% CI)
0	3676	146	3.97% (3.36-4.65)
1	1608	72	4.48% (3.52-5.61)
2	404	27	6.68% (4.45-9.57)
≥3	130	8	6.15% (2.69-11.77)
Unknown	25	0	0.00% (0.00-13.72)

When comparing the number of C sections a mother has undergone prior to the current procedure, the SSI rate is higher in those that had 2 previous C sections (6.68%), and >3 previous C sections (6.15%). It should be noted that this could be due to the smaller sample size of this group.

Section 4: Details of the surgical procedure

The following section provides information on the variables relating to the procedure itself (including procedure type, prophylaxis and skin closure).

SSI risk score

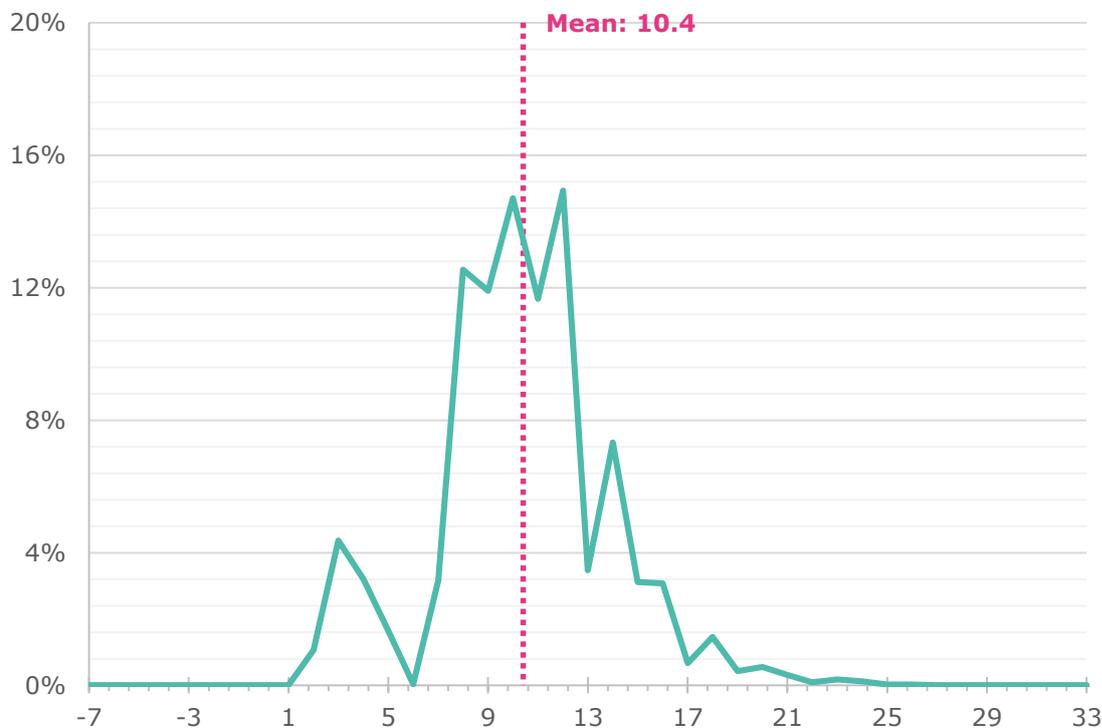


Figure 7 – Graph showing spread of risk score across all procedures (as percentage of all procedures reported). The score has a theoretical range of -7 to 33 for C section procedures in Wales.

The SSI risk score (van Walraven & Musselman, 2013) is based on a number of different factors; including procedure type, wound type, ASA class, BMI and procedure duration¹. This yields a score that categorises mothers by their risk of developing an SSI (with higher scores equating to higher risk).

In 2019, the mean risk score for all mothers undergoing C section was 10.4 (median 10). When counting only those who have developed an SSI, the mean risk score increases to 11.8 (median 12), which means that mothers who developed an SSI had a significantly higher aggregate risk score than those who did not ($P < 0.001$), this risk is higher than in 2018 (11.3, median 11).

While we can see that presence of a combination of risk factors evidently increases risk for the development of an SSI, no individual risk factor is associated with an increased risk of SSI.

¹ There are additional metrics used in the calculation of this score which we are unable to use since they are not reported as part of our surveillance. These are the number of concurrent procedures, type of anaesthetic, smoking status, presence of metastatic cancer or peripheral vascular disease, and use of steroids.

Incidence of SSI by procedure type

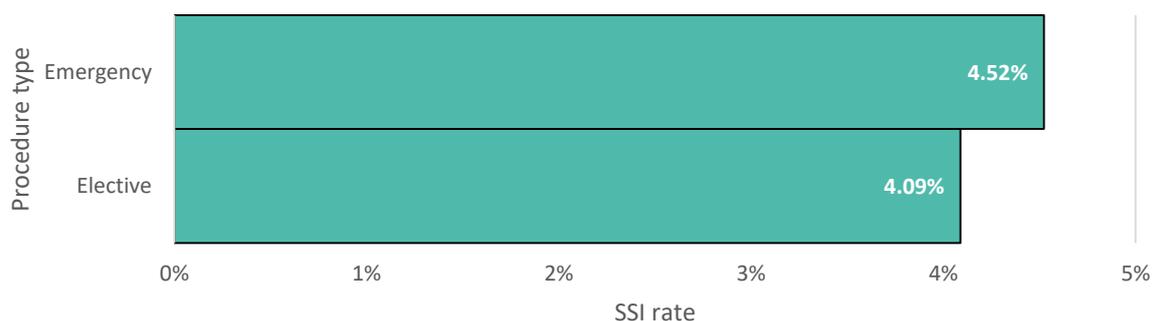


Figure 8 – Graph showing incidence of SSI by type of procedure, 2019.

Table 10 – Incidence of SSI by procedure type, 2019.

Age group	No. of procedures	SSI	SSI rate (95% CI)
Elective	2641	108	4.09% (3.37-4.92)
Emergency	3183	144	4.52% (3.83-5.30)
Unknown	21	1	4.76% (0.12-23.82)

In 2019, the SSI rate in emergency procedures was not significantly higher than in elective procedures (11% increase, $P=0.41708$). The split of procedures is also fairly even, with 54.7% of procedures being classed as emergencies (CS1, CS2 and CS3) and the remaining 45.3% being classed as elective (CS4).²

² CS1 – Immediate threat to life of woman or foetus, e.g. cord prolapse, significant placental abruption or maternal cardiorespiratory distress.

CS2 – Late foetal heart rate decelerations, CS pre-booked to avoid vaginal delivery but woman presents in advanced labour.

CS3 – Deteriorating but compensated maternal medical condition.

CS4 – Operation at short notice but no clinical urgency, Elective.

Incidence of SSI by antibiotic prophylaxis

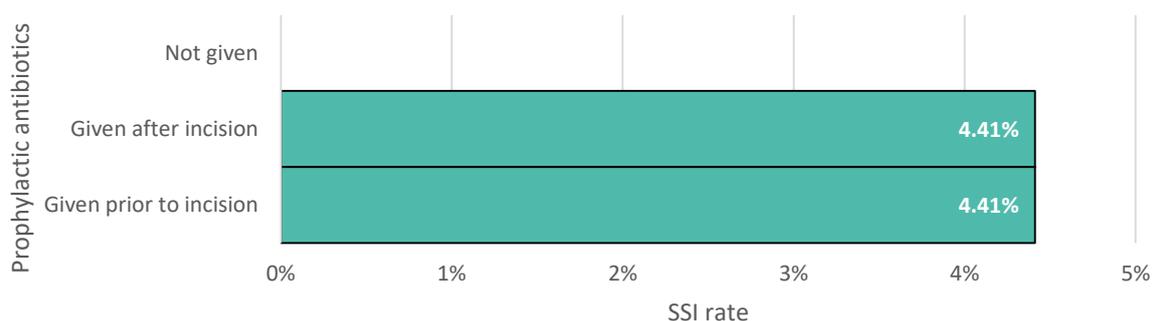


Figure 9 – Graph showing incidence of SSI by timing of prophylactic antibiotics, 2019.

Table 11 – Incidence of SSI by timing of prophylactic antibiotics, 2019.

Prophylactic antibiotics	No. of procedures	SSI	SSI rate (95% CI)
Given prior to incision	5440	240	4.41% (3.88-4.99)
Given after incision	204	9	4.41% (2.04-8.21)
Not given	31	0	0.00% (0.00-11.22)
Unknown	170	4	2.35% (0.64-5.91)

99.5% of mothers were given prophylactic antibiotics and, of these, 96.4% were given prior to surgical incision. There is no change in SSI rate when antibiotics are administered after incision, and the SSI rate is not significantly higher in procedures where prophylaxis is given after incision (0% increase).

We continue to recommend that antibiotics are administered prior to incision where possible, in accordance with NICE guidelines (National Institute for Health and Care Excellence, 2019). It is also worth taking into consideration that the serum half-life of Cefuroxime is 80 minutes, and NICE recommend that a repeat dose is administered when the length of the procedure exceeds this time. (In the case of mothers on second line antibiotics, both Clindamycin and Gentamicin have a serum half-life of two hours).

1st line	If allergic to penicillin
Cefuroxime 1.5g IV	Clindamycin 600mg IV/PO
+	+
Metronidazole 500mg IV	Gentamicin 1.5mg/kg IV

Incidence of SSI by skin closure type

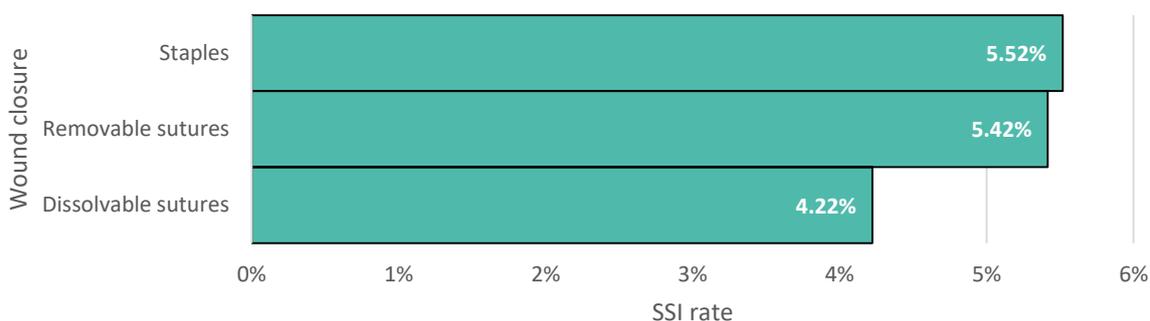


Figure 10 – Graph showing incidence of SSI by type of skin closure used, 2019.

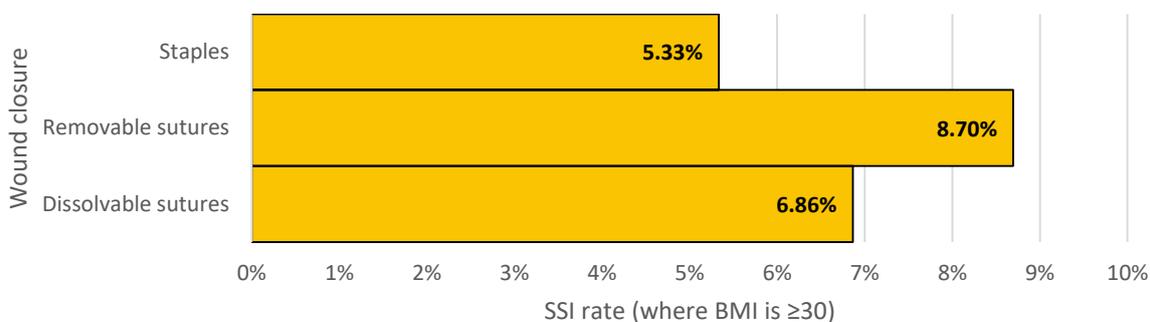


Figure 11 – Graph showing the incidence of SSI by skin closure in mothers with BMI ≥ 30, 2019.

Table 12 – Incidence of SSI by type of skin closure, 2019.

Type of wound closure	No. of procedures	SSI	SSI rate (95% CI)
Sutures (all types)	5639	241	4.27% (3.75-4.80)
Dissolvable sutures	5399	228	4.22% (3.70-4.79)
Removable sutures	240	13	5.42% (2.92-9.08)
Staples	145	8	5.52% (2.41-10.58)
Unknown	61	4	6.56% (1.82-15.95)

Table 13 – Incidence of SSI by type of skin closure in mothers with BMI ≥ 30, 2019.

Type of wound closure	No. of procedures	SSI	SSI rate (95% CI)
Sutures (all types)	2044	142	6.95% (5.84-8.05)
Dissolvable sutures	1952	134	6.86% (5.78-8.08)
Removable sutures	92	8	8.70% (3.83-16.42)
Staples	75	4	5.33% (1.47-13.10)
Unknown	24	3	12.50% (2.66-32.36)

In 2019, the SSI rate when staples were used as a method of skin closure was 29% higher than when sutures were used, however this association was not significant ($p=0.46646$). The overall SSI rate for the use of staples was 5.52% in 2019, whereas the SSI rate for removable sutures was 5.42%. This differs to findings from the previous year, where the overall SSI rate for the use of staples was much higher at 13.42%, compared to 5.18% for removable sutures in 2018.

This trend is more pronounced when the mother is obese ($BMI \geq 30$), with the SSI rate being 30% higher when staples are used, although there is not a significantly higher SSI rate when staples are used instead of sutures in Mother's whose $BMI \geq 30$ ($P=0.58806$). There is a higher SSI rate when removable sutures are used in Mother's with $BMI \geq 30$ (8.70%).

It may be argued that both staples and removable sutures provide an opportunity for the wound to be inspected as they are being removed.

Section 5: Post-procedure details and onset of infection

This section deals with the time period after the procedure has occurred and the time to onset of infection.

Length of stay in hospital

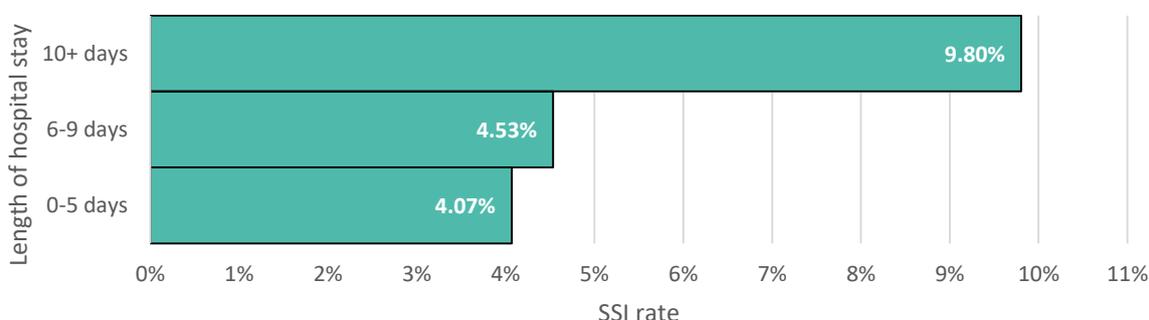


Figure 12 – Graph showing incidence of SSI by length of hospital stay, 2019.

Table 14 – Incidence of SSI by length of hospital stay, 2019.

Length of hospital stay	No. of procedures	SSI	SSI rate (95% CI)
0-5 days	4990	203	4.07% (3.54-4.65)
6-9 days	419	19	4.53% (2.75-6.99)
10+ days	102	10	9.80% (4.80-17.29)
Unknown	334	21	6.29% (3.93-9.45)

For all patients undergoing a C section, the mean hospital stay following the procedure is 2.8 days (median of 2). When only mothers who have had an SSI are included, this increases to a mean of 3.1 days (median of 2). This would suggest that those who have been discharged from the hospital later are more likely to develop an SSI, not because of the length of stay itself, but due to the same factors that resulted in the extended stay. The trend between the two is weak however, and the length of stay is not an accurate predictor of SSI rate on its own (P=0.268).

Length of midwifery care

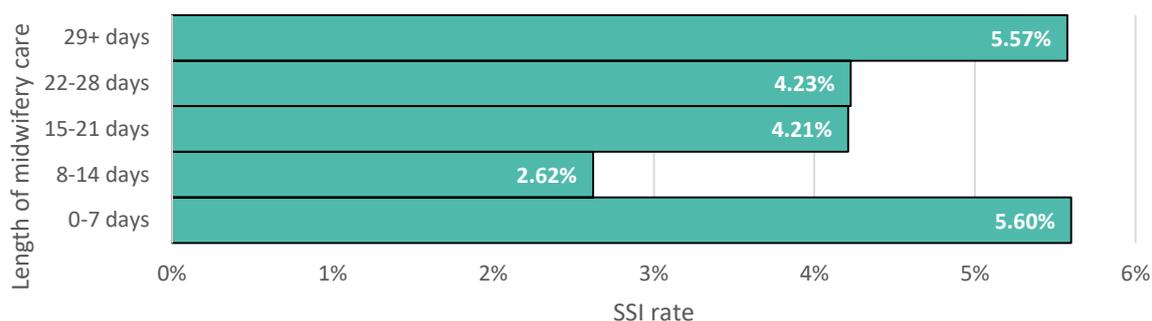


Figure 13 – Graph showing incidence of SSI by length of midwifery care post-procedure, 2019.

Table 15 – Incidence of SSI by length of midwifery care post-procedure, 2019.

Length of midwifery care	No. of procedures	SSI	SSI rate (95% CI)
0-7 days	125	7	5.60% (2.28-11.20)
8-14 days	1373	36	2.62% (1.84-3.61)
15-21 days	1615	68	4.21% (3.28-5.31)
22-28 days	1372	58	4.23% (3.23-5.43)
29+ days	574	32	5.57% (3.84-7.78)
Unknown	786	52	6.62% (4.98-8.59)

NOTE: All SSIs in this report occurred in the first 14 days post-procedure. Even in mothers who spent 29 or more days in care, the SSI rate does not include any SSIs occurring day 15 or later.

Following the procedure, women spend a mean length of 19.9 days under the care of a midwife (median of 19), including both the time spent in the hospital and the time spent at home with regular visits from a community midwife. If there has been an SSI, this rises to a mean of 21.2 days (median of 21), and the relationship is significant ($P=0.016$).

Time to onset of infection

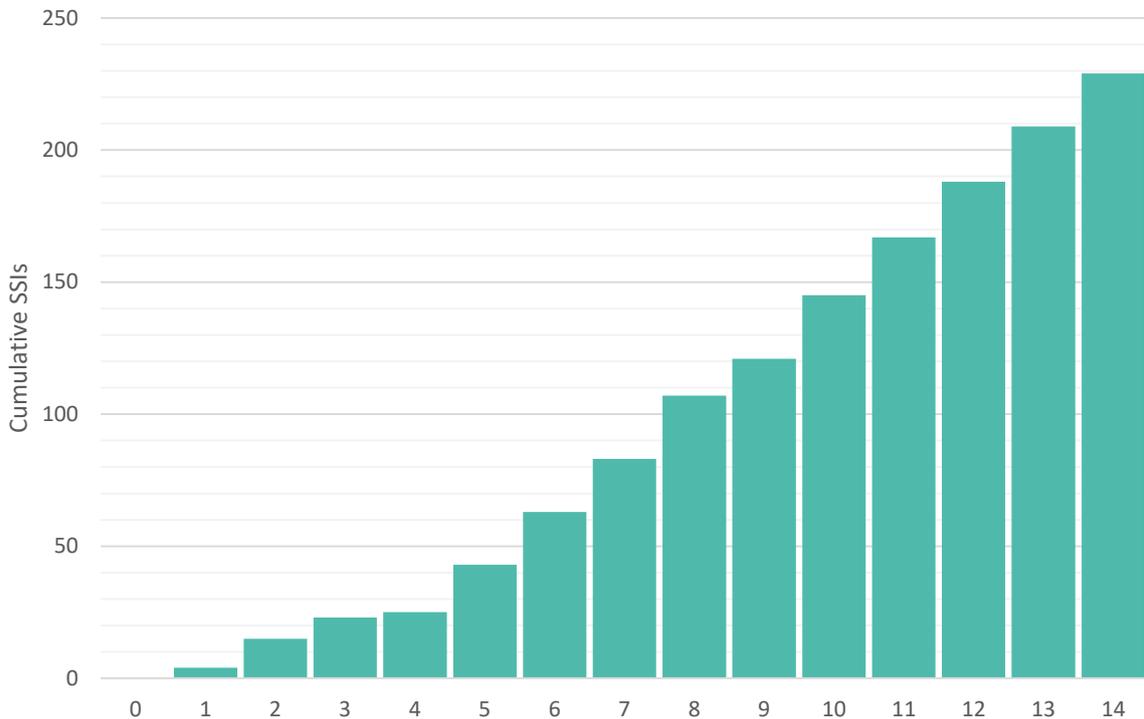


Figure 14 – Graph showing cumulative SSIs up to 14 days post-procedure. Blank infection dates excluded, 2019.

While SSIs can be reported on our forms up to 30 days post-procedure, we are only including those up to 14 days for consistency across Wales. Despite this, we do request that hospitals continue reporting up to 30 days as normal, as infections occurring on days 15-30 are still counted and reported to the European Centre for Disease Prevention and Control (ECDC).

Any SSIs reported without an infection date are counted as occurring on day 0 and are included in the SSI rates. There were 24 (9%) infections where the date of onset was not recorded. Within the first 14 days, the mean time to infection was 8.8 days, with a median of 9. The greatest number of infections were reported on day 8 (n=24).

Anonymised Hospital SSI rates

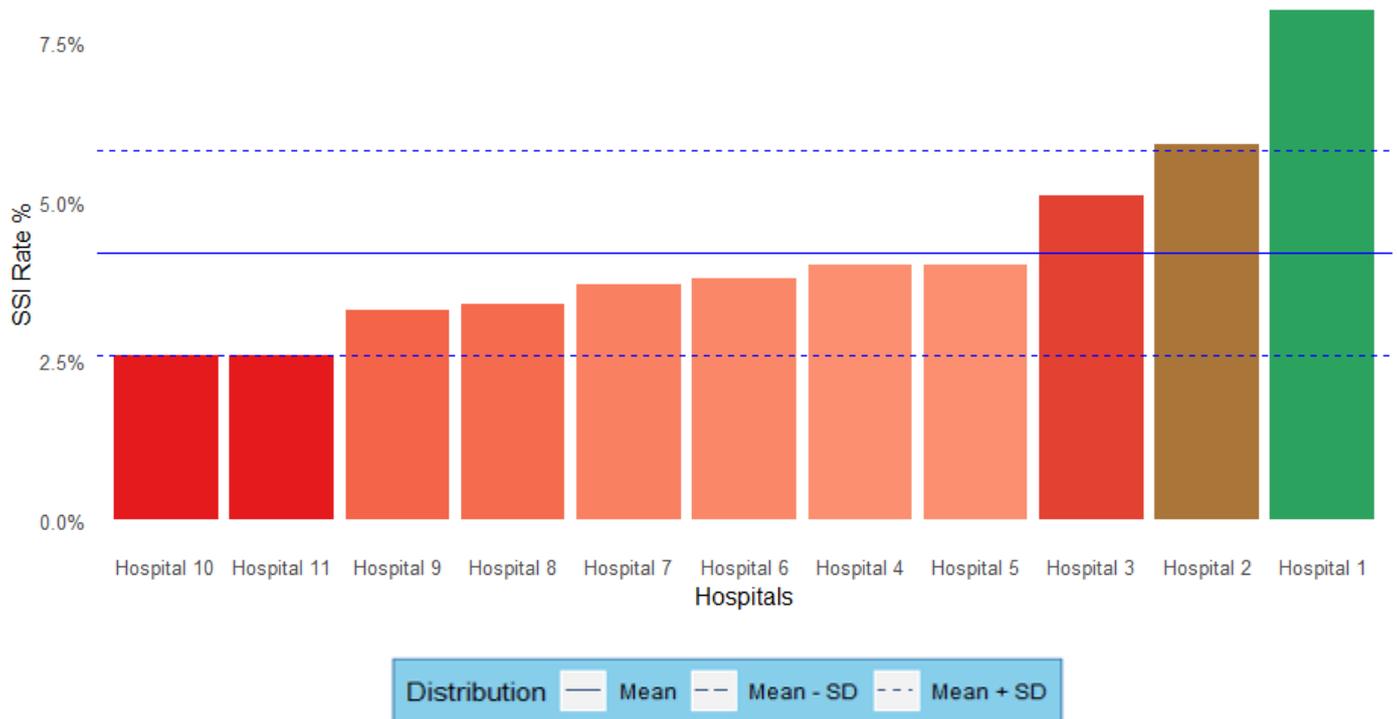


Figure 15 - Anonymised SSI rates for each Hospital participating in the C section surveillance scheme as of 2019, from the lowest to highest rate.

Figure 15 shows anonymised SSI rates for each hospital reporting C section procedures in 2019. The solid blue line represents the mean (4.2%) and the dashed blue lines represent the + and - standard deviation (1.6%). At the highest end the rate is 8.0%, compared to 2.6% at the lowest end. A total of 3 hospitals had an SSI rate higher than the mean, and higher than the all Wales rate.

Discussion

Compliance with the C section SSI surveillance has increased in 2019 with 88% of expected forms being returned (86% in 2018) with a decrease in the proportion of valid forms at 77% (83% in 2018). As explained in last year's report, these rates are lower than those in the period 2010-2015, due to a change in the data source for the denominator, with hospitals self-reporting procedure numbers due to the inaccuracies identified in the PEDW dataset, therefore, comparisons of 2016-2018 compliance data to previous years is difficult.

The overall SSI rate for 2019 was 4.33%, an increase from 4.02% 2018. The SSI rate has increased since 2017, which was 3.51%. 2017 was a historic low for C section SSI rates, where 2016 reported an SSI rate of 4.2%, it is likely the rate in 2017 was abnormally low and doesn't necessarily represent the true trend. Due to the higher SSI rate, the overall reduction over time has decreased to 59% (62% in 2018) and decreased in real numbers, representing 2374 infections being prevented for mothers (2842 in 2018). Both Elective and Emergency procedures have seen an increase in SSI rates, with Elective procedures seeing the greatest increases (3.75% to 4.09%) compared to Emergency procedures (4.24% to 4.52%) in 2019.

Across all patient demographics, the one factor which still has the largest impact on SSI rates is BMI. Across the years, a general trend has been observed in which higher BMIs are associated with an increased risk of SSI. In 2019, the mean BMI for all procedures was 29.5, when including only procedures that had an SSI associated with them, this increased to 33.1. Obese mothers have an SSI rate of 6.95% while healthy weight mothers have an SSI rate of 2.04%.

There is no significant association between age and risk of SSI, although younger mothers have a higher SSI rate, with those under 20 having an SSI rate of 5.66% and those between 20 and 24 having an SSI rate of 5.29%. The SSI rate decreases in each age bracket until we reach the above 40 bracket where the SSI rate is 5.84%. This compares to 4.14%, 4.00% and 3.69% for 25-29, 30-34 and 35-39 respectively. It should be noted that the above 40 age group is also one of the smallest age groups.

Since 2015, Public Health Wales has been monitoring the use of staples in post procedure closure. While usage has been decreasing over the last three years, there is still localised pockets of heavy usage. Differing to previous years, our data did not indicate a strong risk of SSI associated with the usage of staples instead of sutures. Obese mothers see an SSI rate of 5.33% when staples are used, compared to 6.95% for all types of sutures, increasing to 8.70% when removable sutures are used. While we do acknowledge sutures are a more time consuming process, ***we recommend that staples are not used as a routine method of closure.***

Similar to 2018, 99.5% of mothers in Wales were given antibiotic prophylaxis for their procedure, with 96.4% having it administered prior to incision. As mentioned in last year's report, hospitals are adopting the recommending antibiotics and those hospitals that differed in dosage of the recommended antibiotics have adopted the recommendation in full. Continuing with the adoption of these recommendations in line with NICE and AWMSG is encouraged.

Inpatient SSIs are still relatively uncommon, increasing from 9.1% of all infections in 2018 (n = 27) to 15.4% in 2019 (n = 39). Deep and organ space infections continue to be rare, with deep SSIs making up 11.5% of all infections (n = 28) and organ space SSIs making up 0.0% (n = 0), while the proportion of organ space SSIs has increased this year, we have seen similar fluctuations across the years and is of little concern.

In terms of time spent in hospital, the mean time that mothers spend under the care of a midwife is 19.9 days. This mean increases to 21.2 days in the event of an SSI occurrence. In a change from previous years, this increase in added time spent under the care of a midwife is significant ($P = 0.016$). As always, infection data is captured up to and including 14 days post-operatively. The mean time to infection is 8.8 days, with the most infections reported on day 8 ($n=24$), this is a decrease in mean time to infection from 13 days ($n = 39$) in 2018.

In conclusion, there was an increase in SSI rate in 2019 compared to 2018, (4.33% from 4.03%), this is still a 59% reduction in infection numbers from 2009. In order to maintain these SSI rates, health boards in Wales have continued their excellent work in local infection prevention and the introduction of novel interventional methods. Despite still seeing a regular occurrence of SSIs (1 in 23) in mothers post-surgery, these rates are far below those in 2007/2008. Public Health Wales will continue to work together with all hospitals in Wales to strive to continue the progress we have made and reduce infections further.

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Appendix

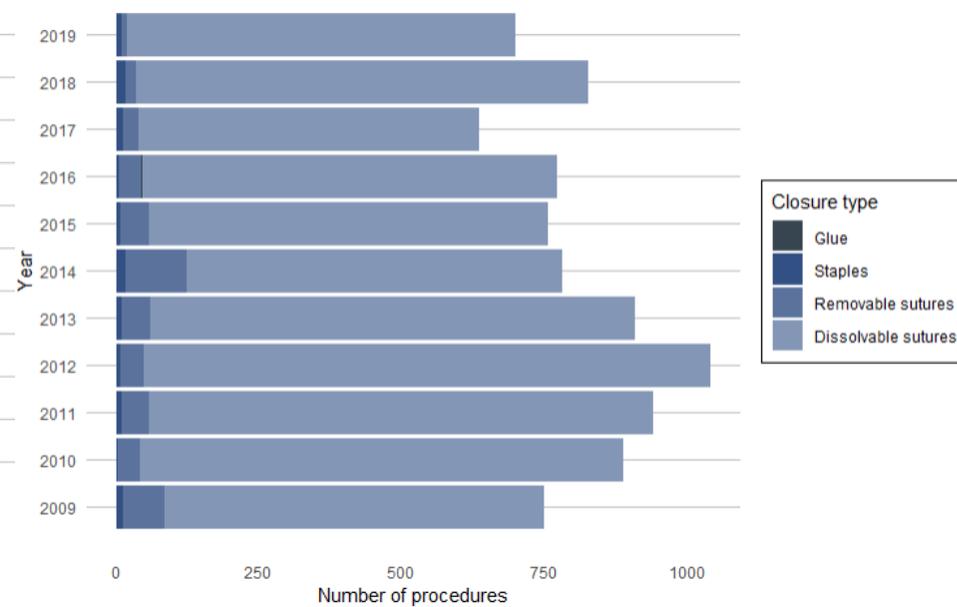
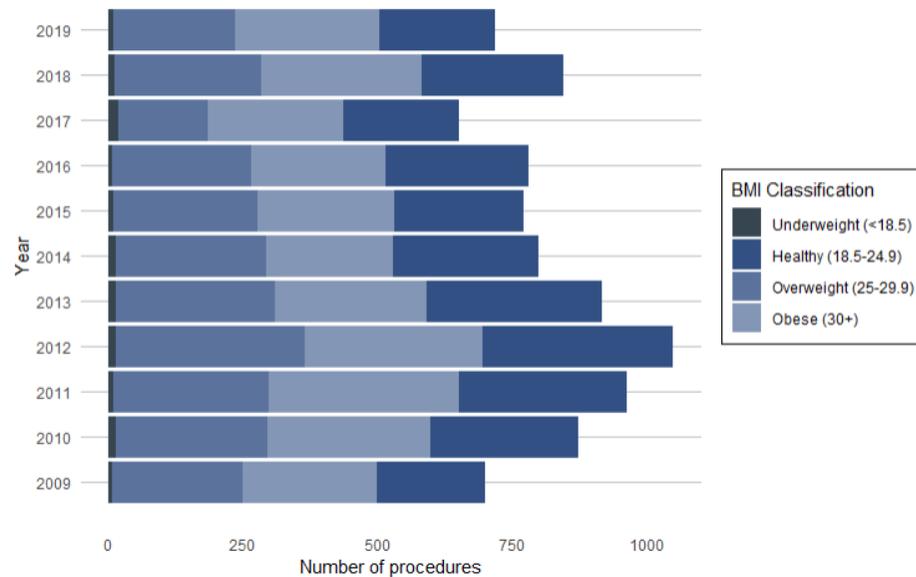
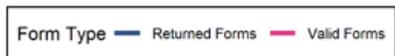
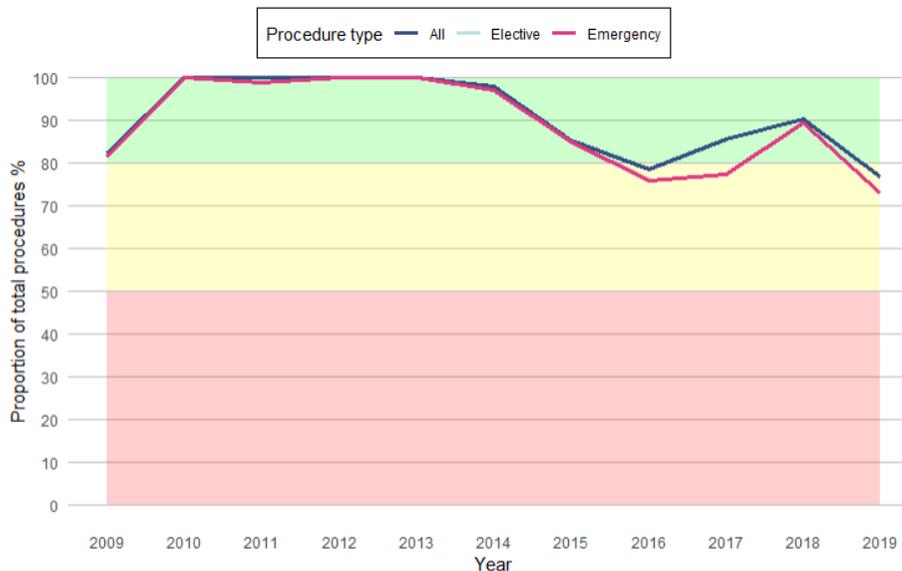
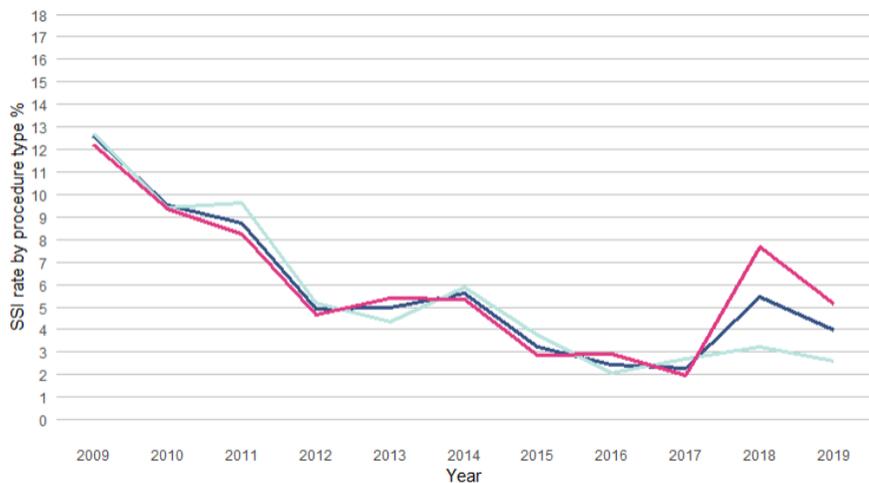
This appendix contains hospital level data for 2019, including; Annual SSI rates for elective and emergency procedures, Compliance rates for each hospital based on forms received by the HARP team at Public Health Wales. In combination with total procedure numbers reported to the Patient Episode Database Wales (PEDW) and breakdowns for each hospital by BMI and closure type.

Some individual hospital SSI rate trends follow that of the All Wales 2019 trend, seeing slight increases in SSI rate compared to 2018, with some hospitals seeing a decrease in SSI rates.

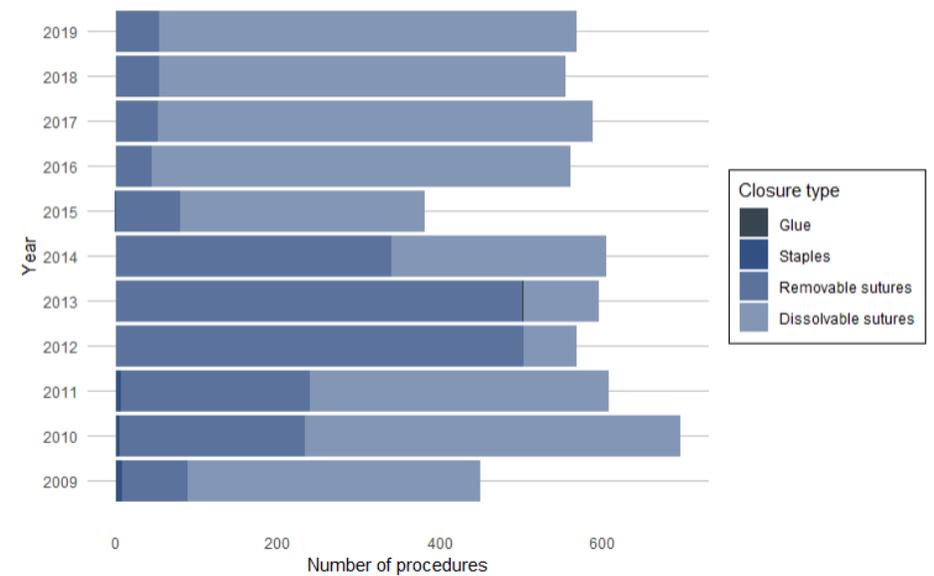
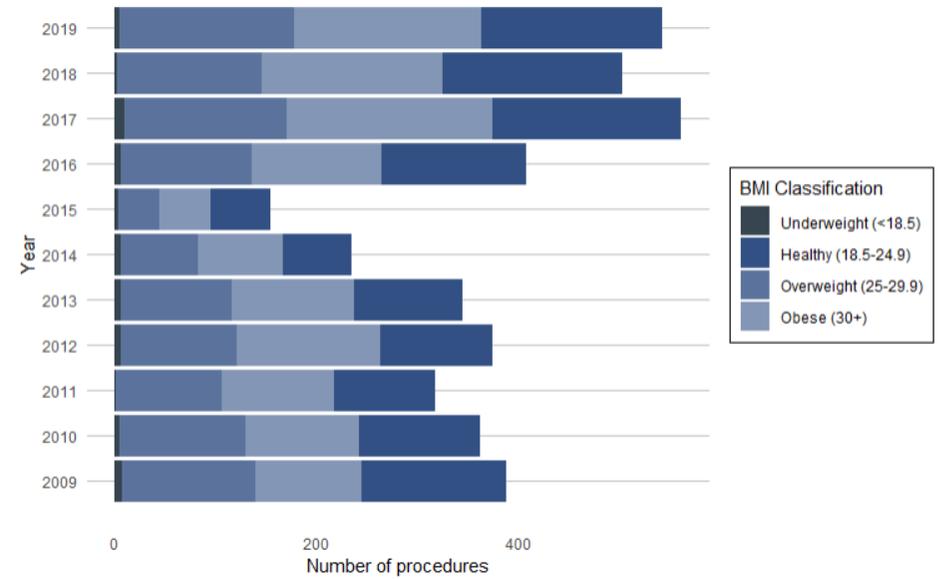
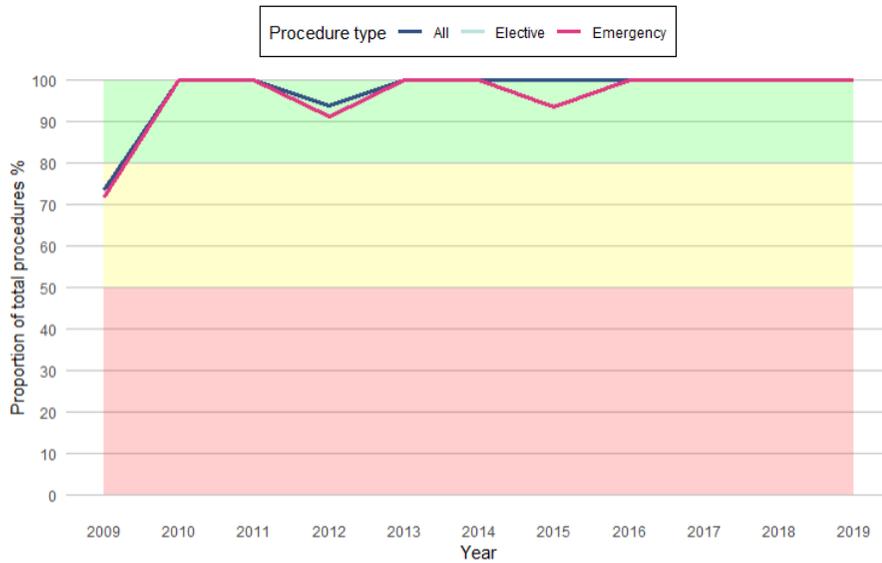
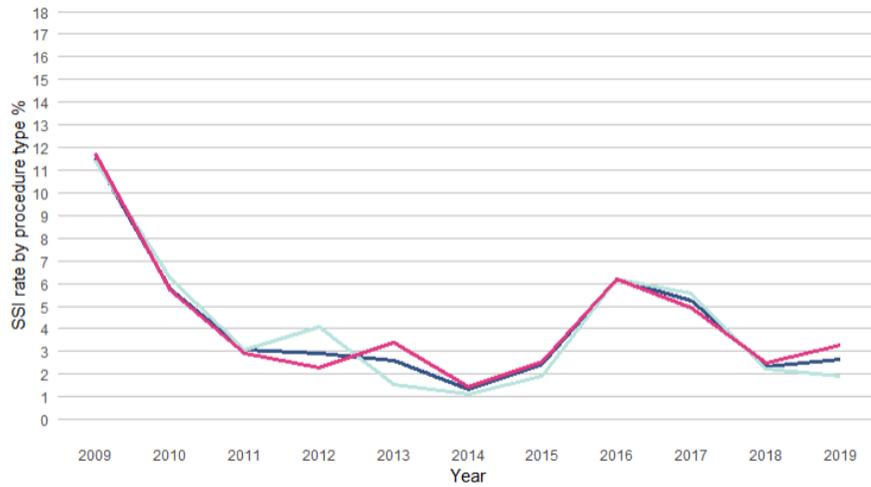
Data for each hospital is in the following order:

Order	Hospital
1	Singleton Hospital
2	Nevill Hall Hospital
3	Royal Gwent Hospital
4	Ysbyty Glan Clwyd
5	Ysbyty Gwynedd
6	Wrexham Maelor Hospital
7	University Hospital of Wales
8	Prince Charles Hospital
9	Princess of Wales Hospital
10	Bronglais Hospital
11	Glangwili Hospital

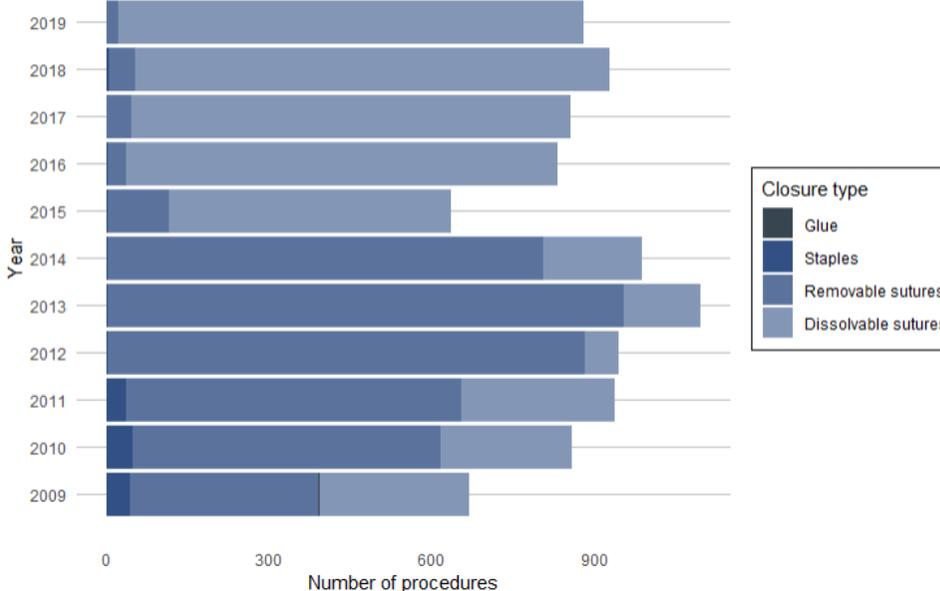
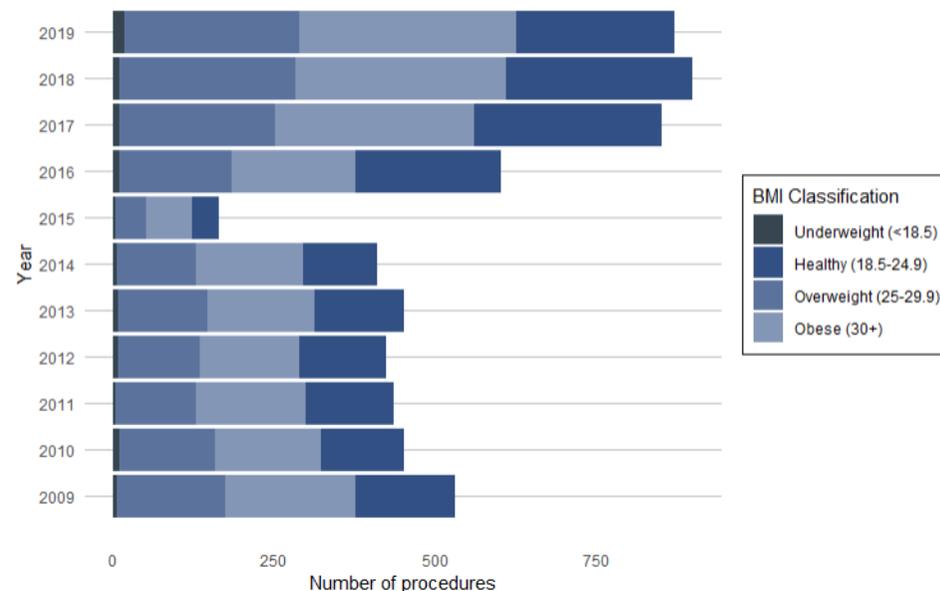
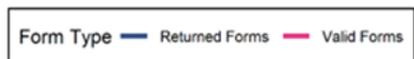
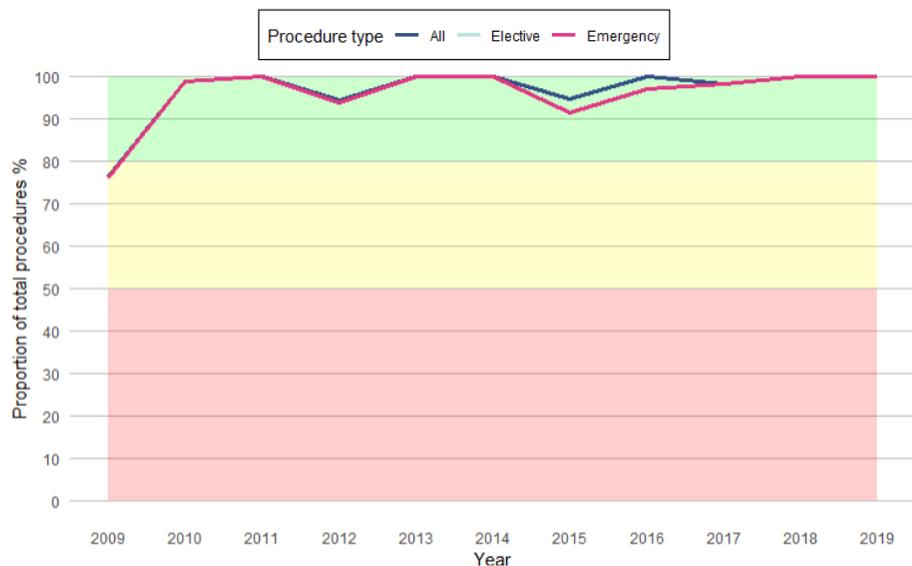
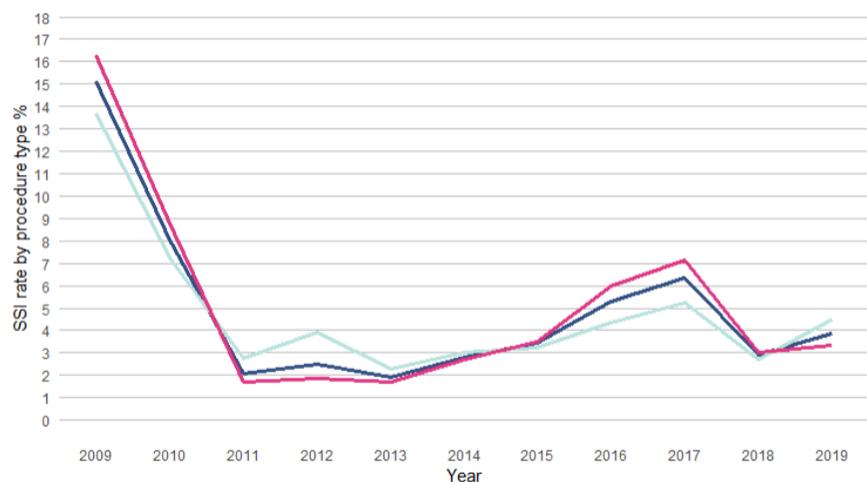
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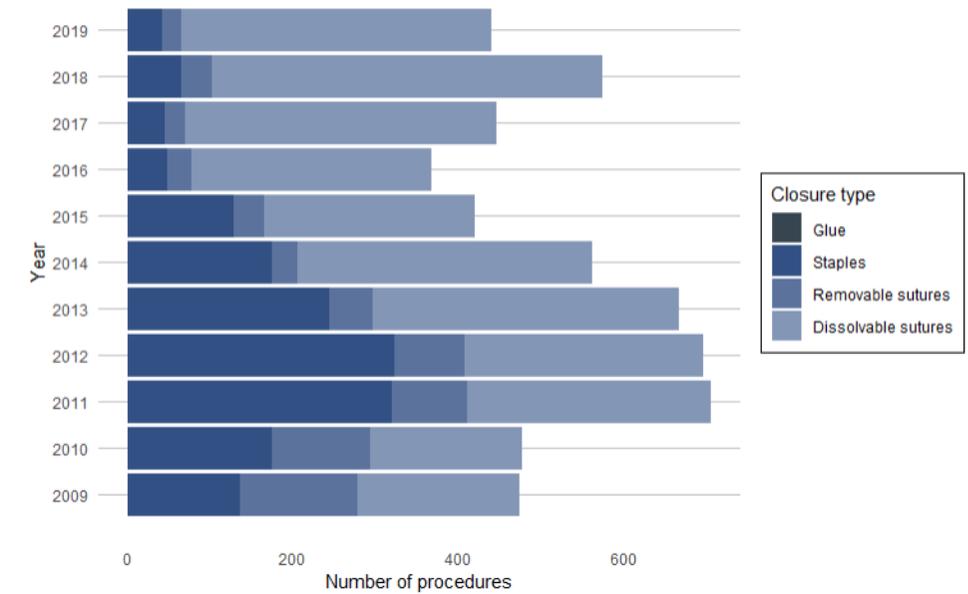
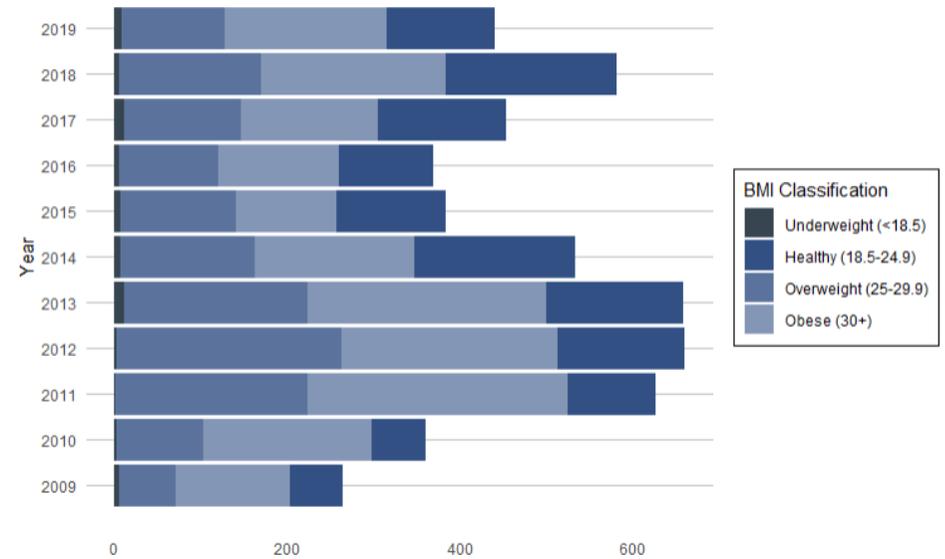
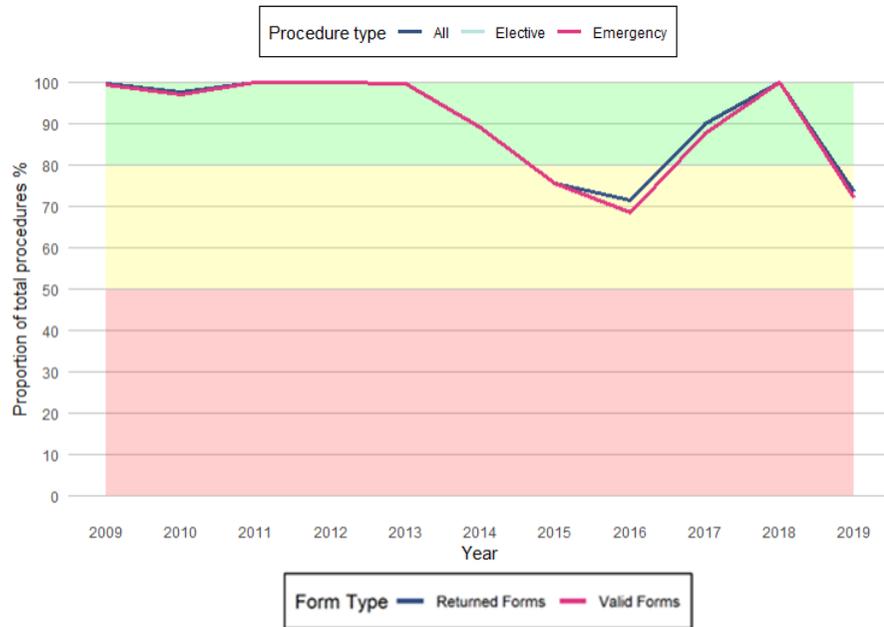
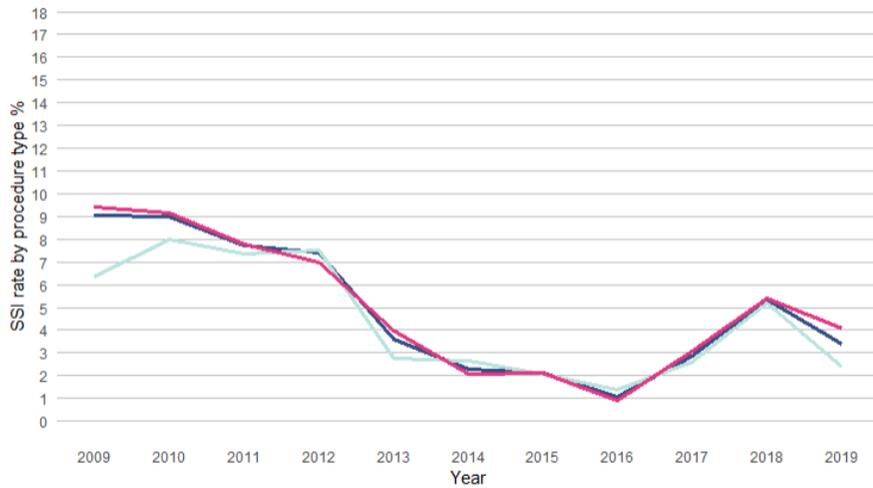
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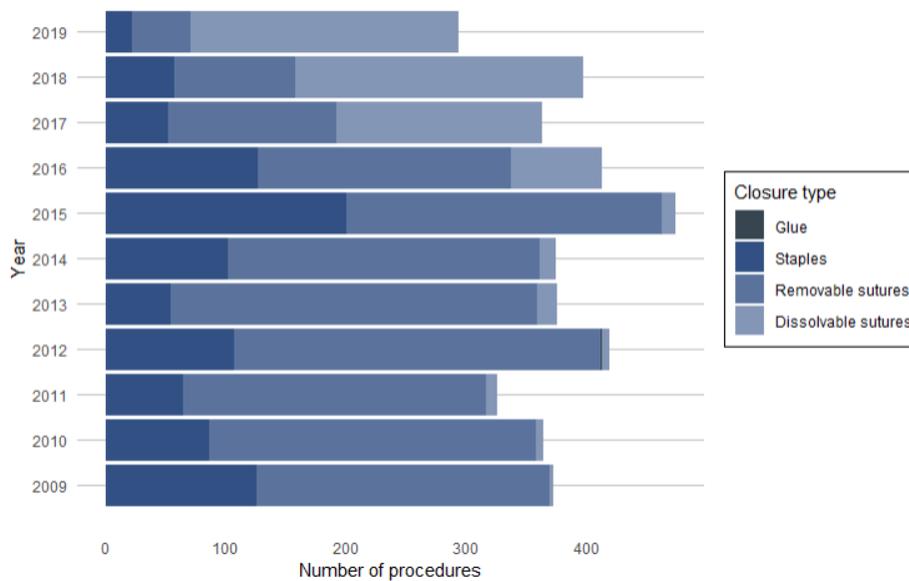
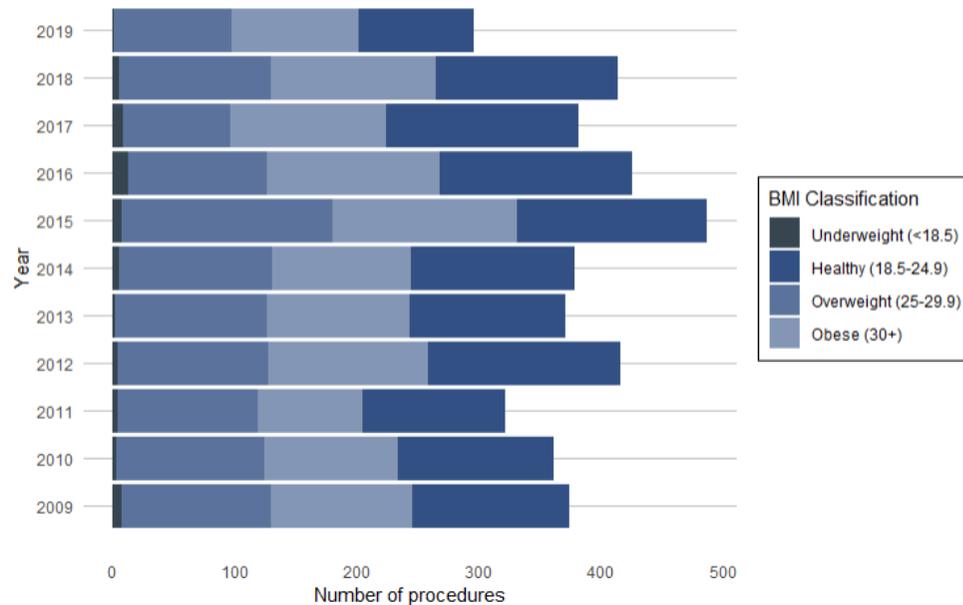
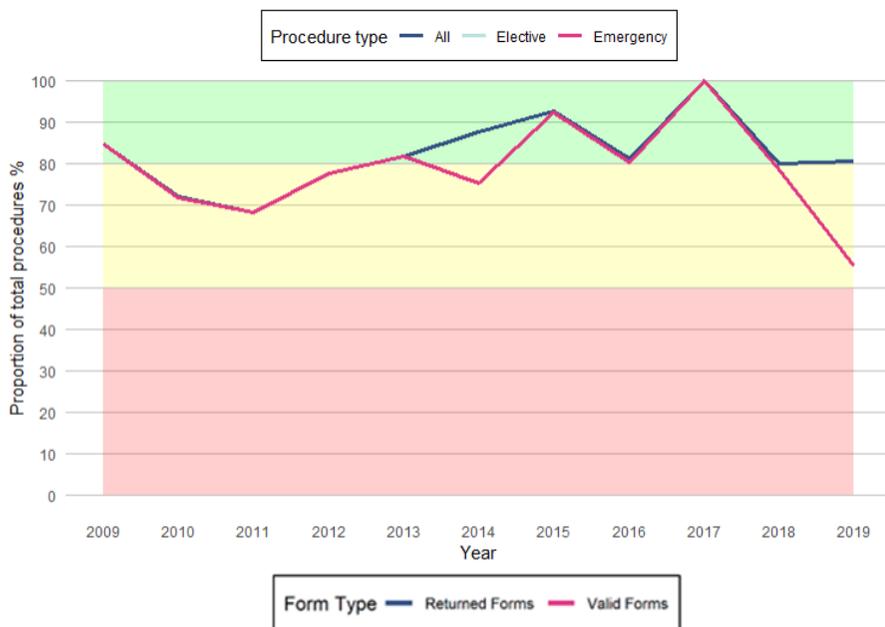
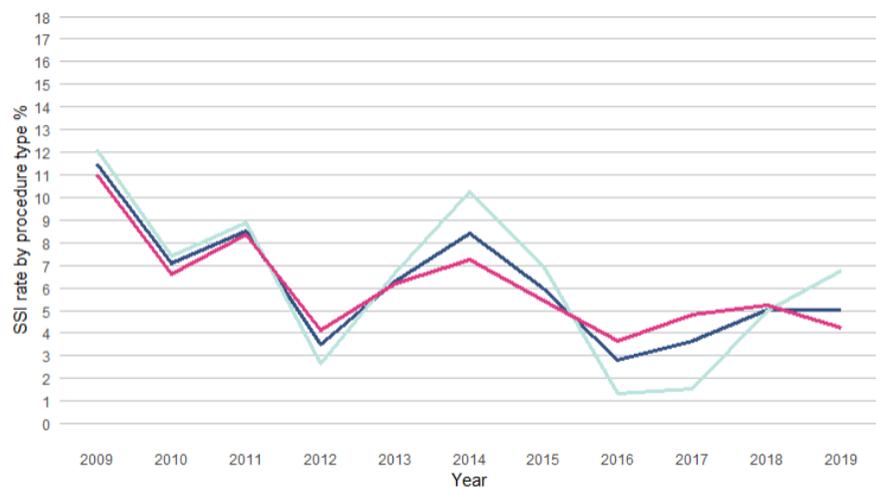
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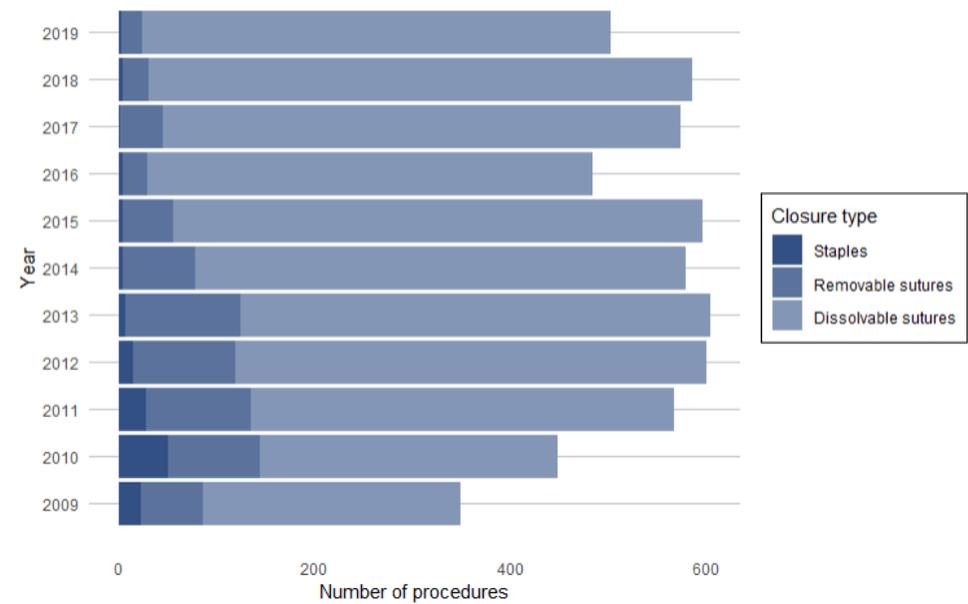
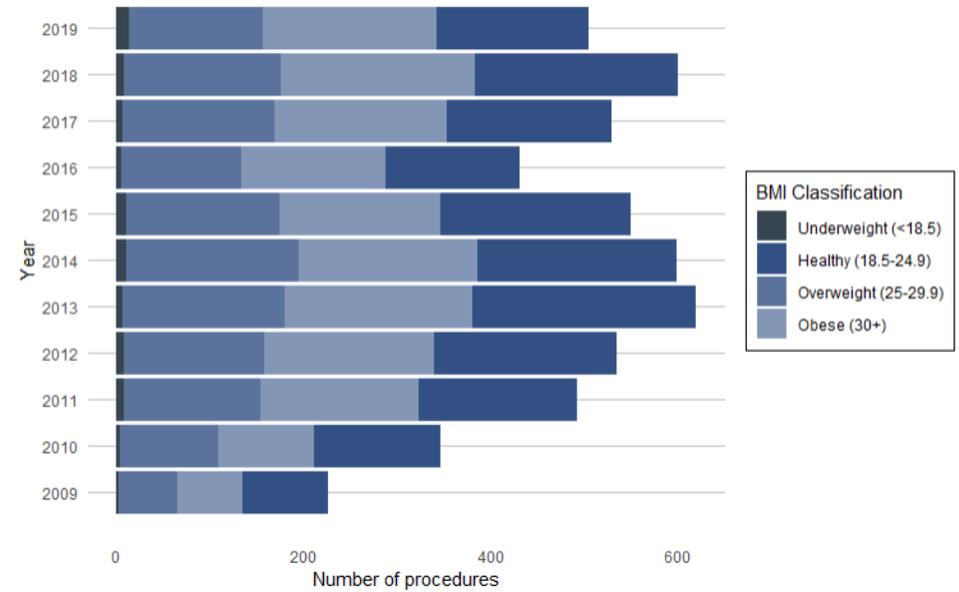
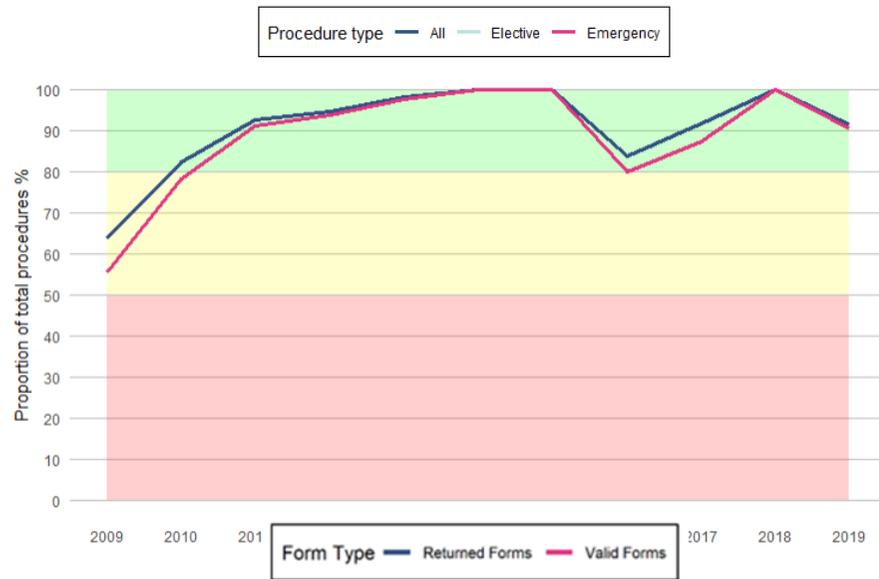
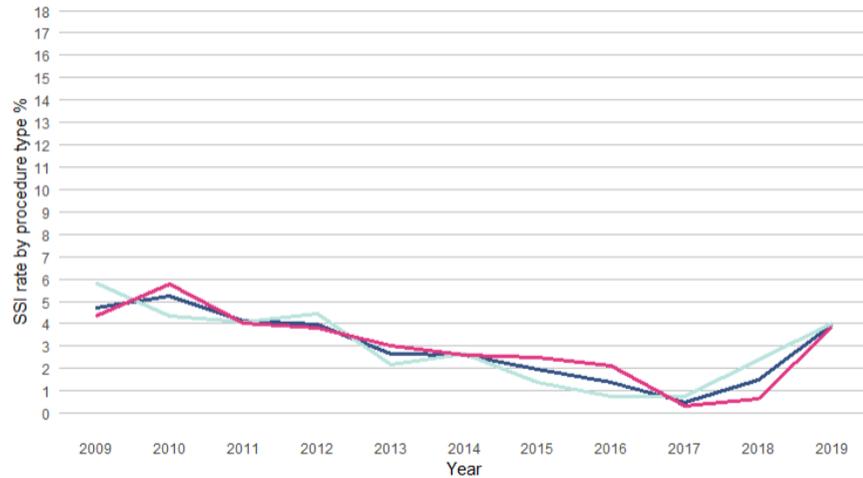
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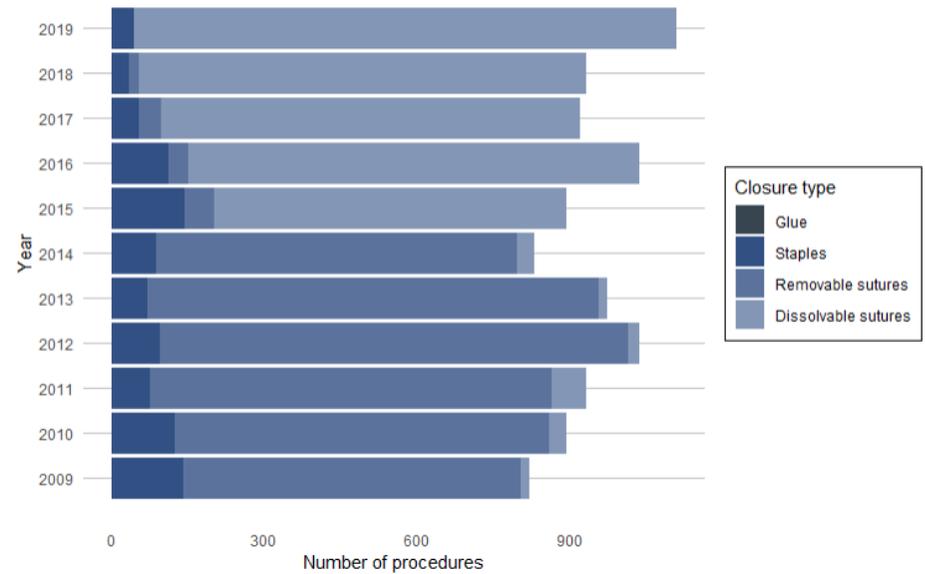
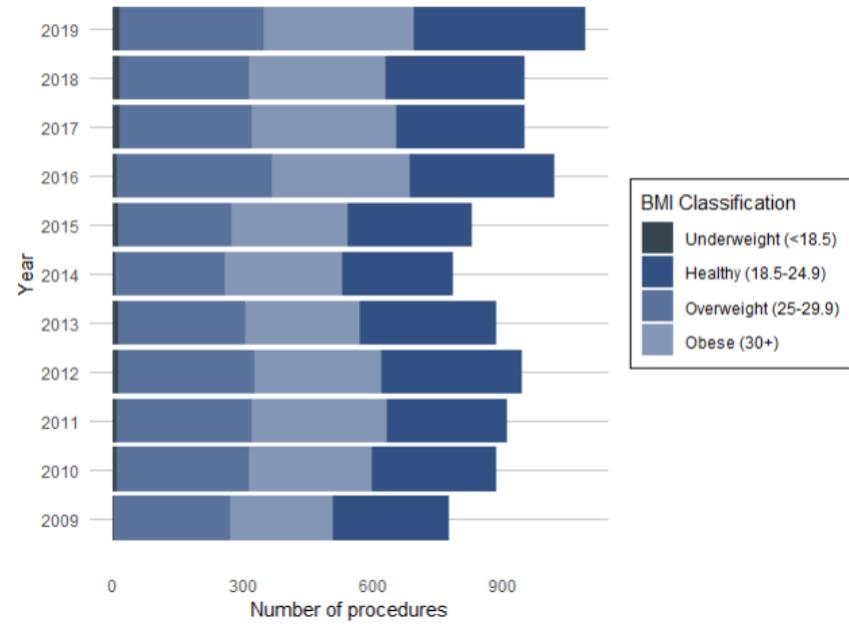
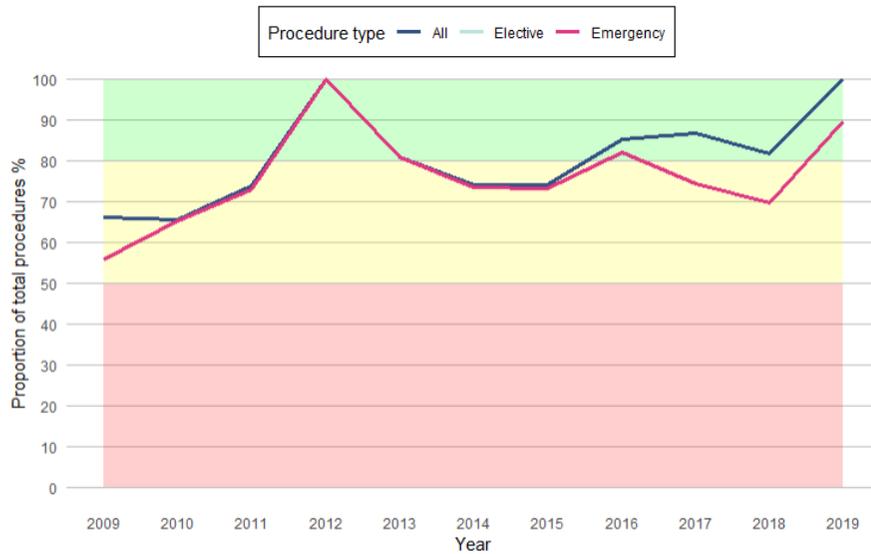
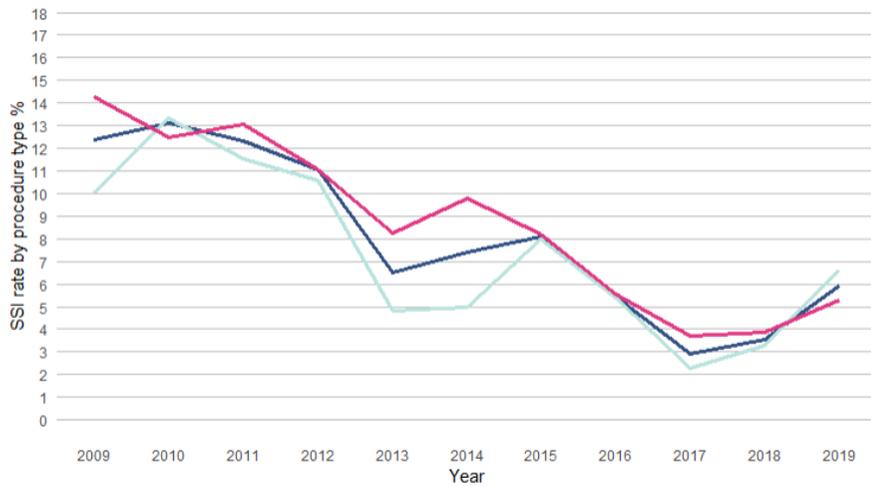
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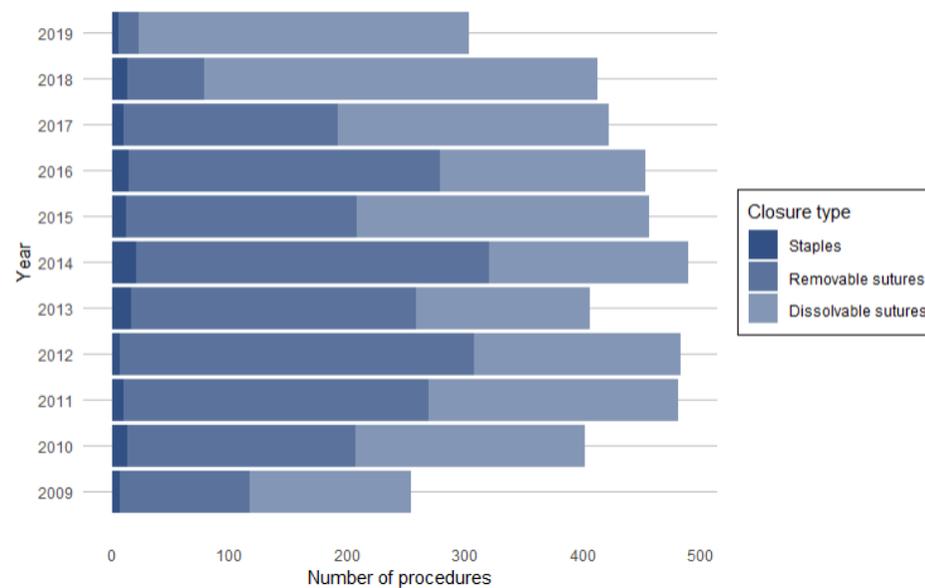
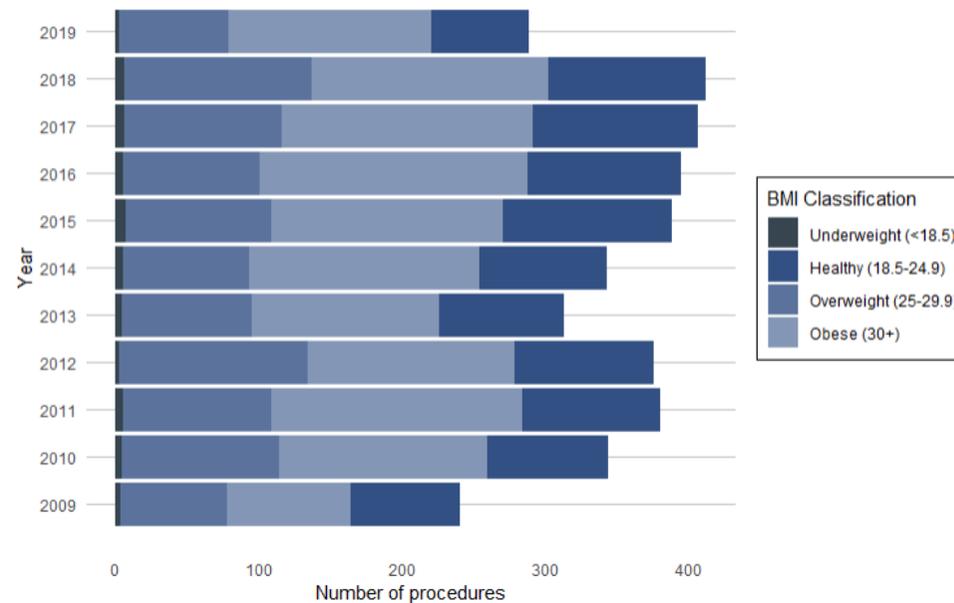
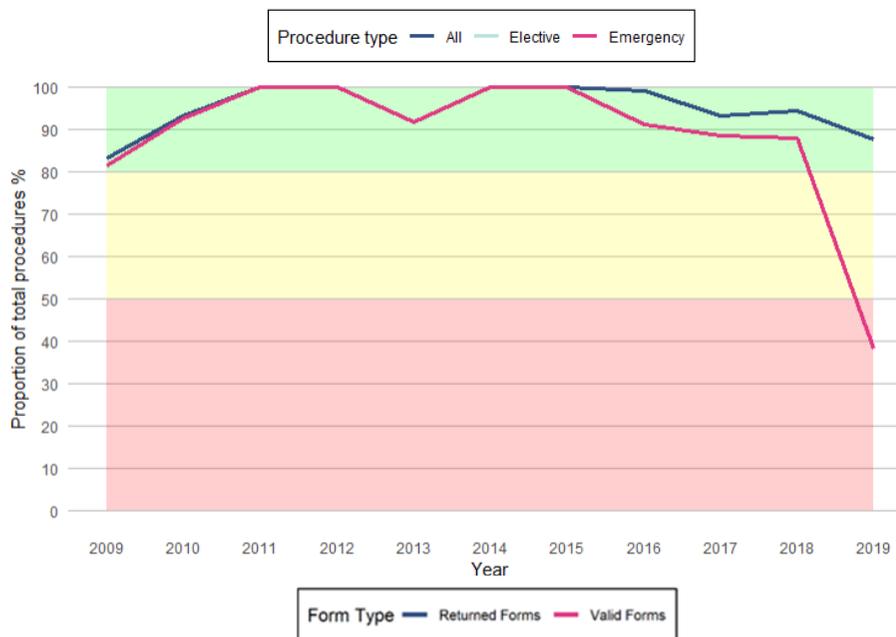
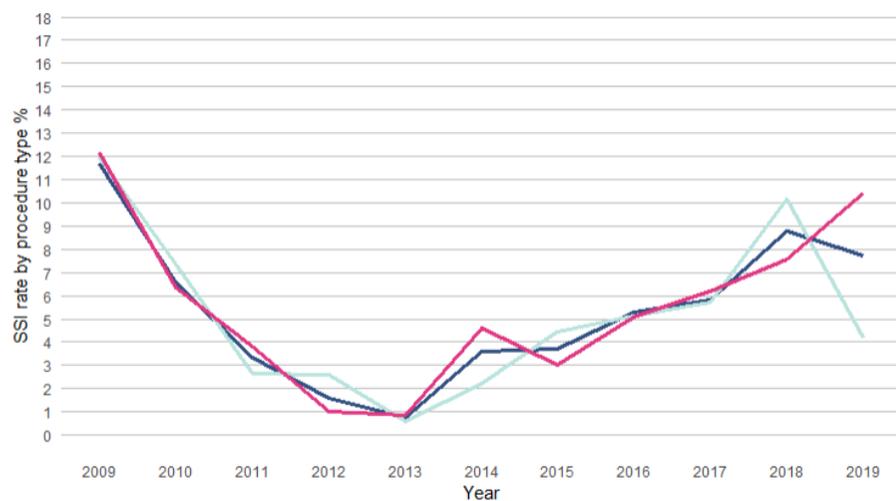
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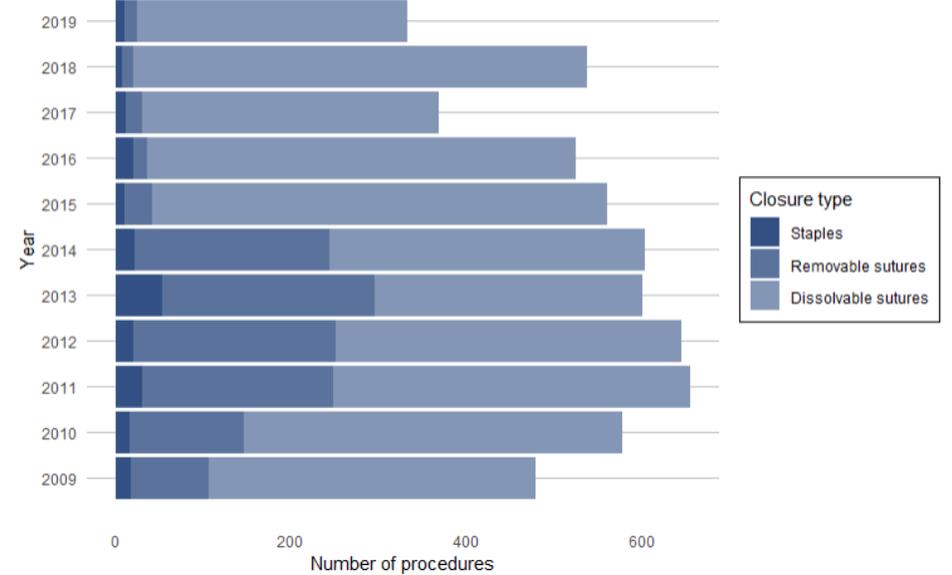
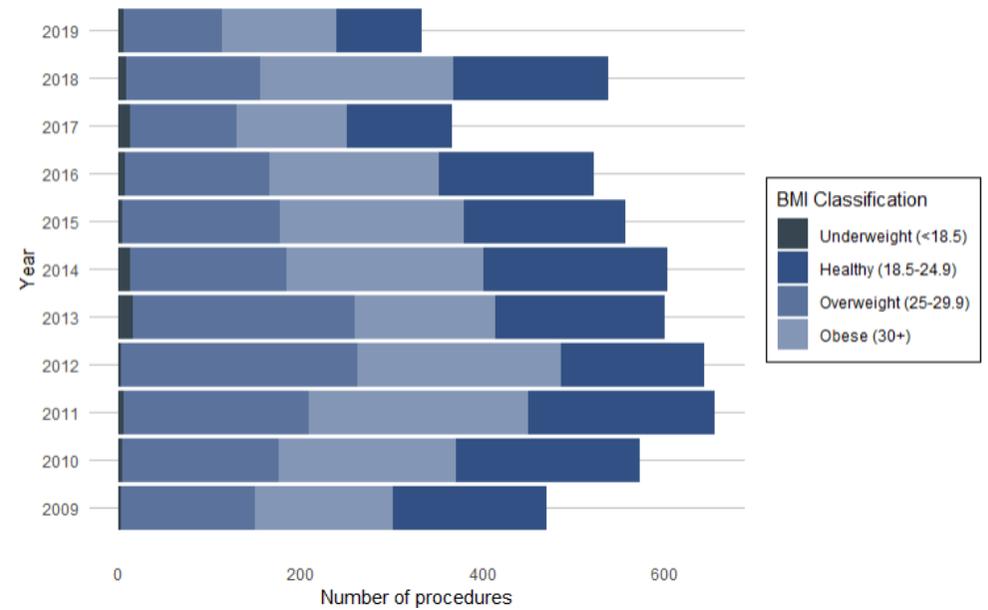
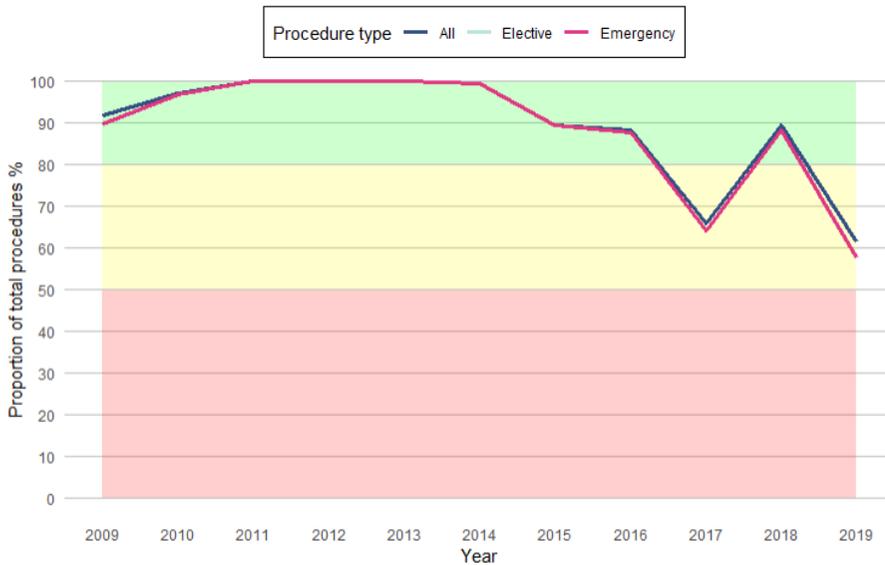
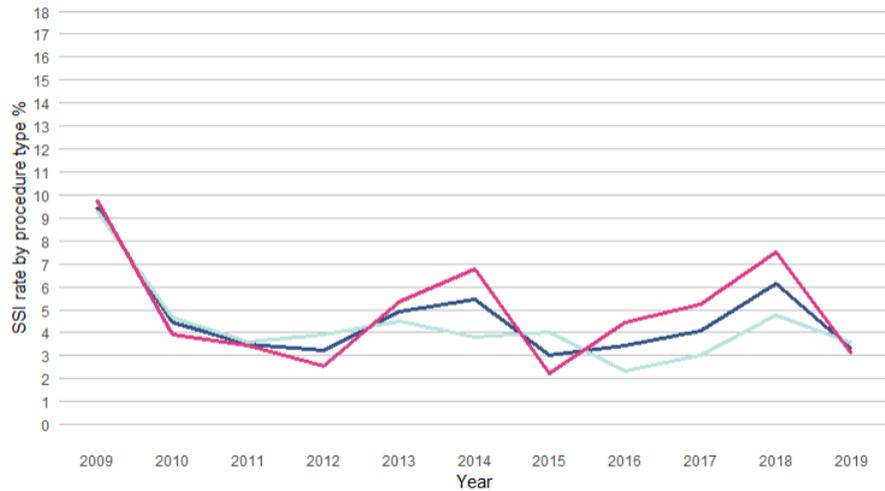
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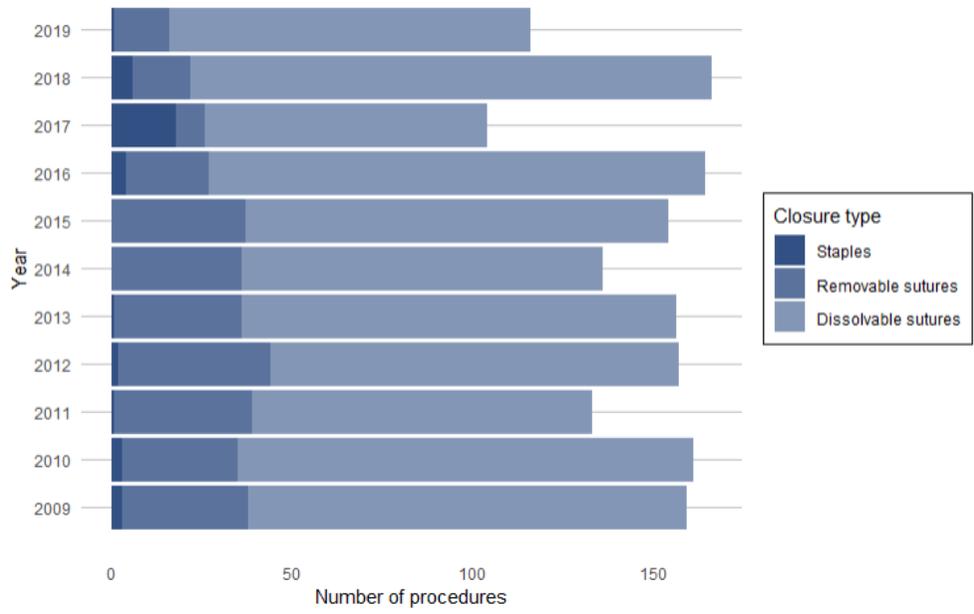
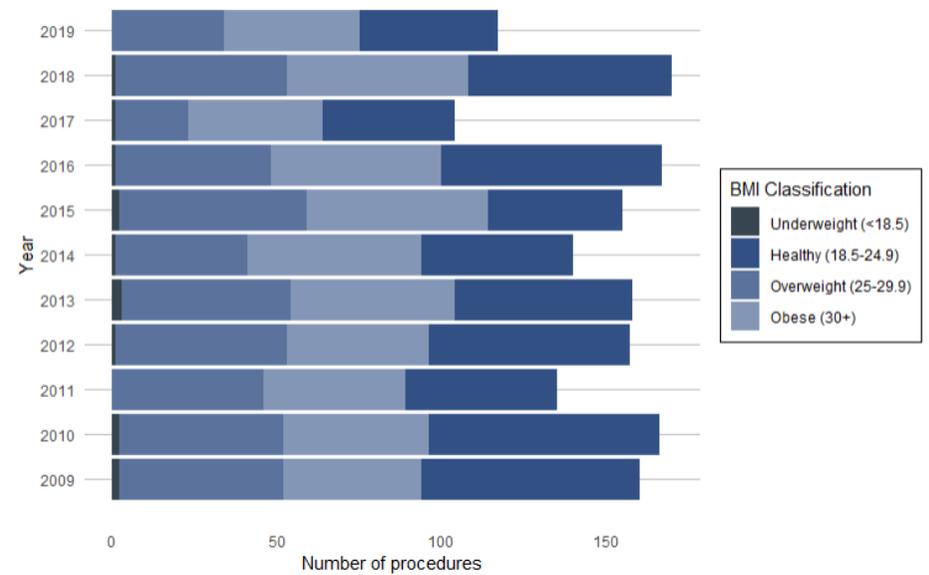
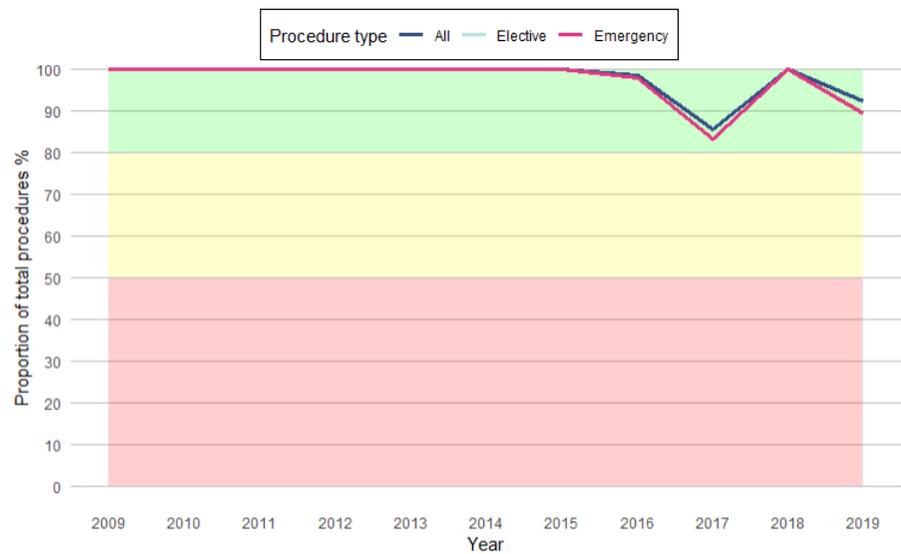
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9. Princess of Wales Hospital



10. Bronglais Hospital



11. Glangwili Hospital

