



National Public Health
Service for Wales
Gwasanaeth Iechyd Cyhoeddus
Cenedlaethol Cymru

**NPHS Communicable Disease
Surveillance Centre**

Orthopaedic Surgical Site Infection Report

January – December 2005

This report includes surgical site infection (SSI) related to the four core procedures performed by orthopaedic surgeons in Wales.

Data are included for trusts / hospitals from January 2005 – December 2005

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Introduction

In November 2002 the NHS Management Board in Wales agreed to adopt measures to reduce healthcare associated infections. The first step was to make orthopaedic surgical site infection surveillance mandatory in all Trusts in Wales performing joint replacement. A Welsh Health Circular (WHC (2003) 43) was issued to Chief Executives informing them of this.

Surgical site infections (SSI) are a substantial cause of mortality and morbidity among hospitalised patients. Studies on orthopaedic surgical site infections have shown them to result in considerable increases in lengths of stay, high re-hospitalisation rates, increased healthcare costs and significant reductions in health-related quality of life^{1,2}.

Surveillance of orthopaedic SSI and participation in national surveillance schemes have previously been shown to contribute to significant reductions in SSI rates, by allowing units to recognise whether they have a problem and monitoring the affects of interventions introduced^{3,4}.

This is the third national report on surgical site infections (SSI) following orthopaedic procedures in Wales, since the surveillance was made mandatory in September 2003. The data presented here is a summary of information reported by 10 Trusts in Wales in the calendar year 2005.

The surveillance incorporates data collected by clinical teams and uses internationally agreed definitions⁵, allowing Welsh data to be compared with and be incorporated into other international databases, such as the HELICS⁶ European SSI database. The purpose of the surveillance is to assist Trusts in monitoring their infection rates so that risk can be assessed and communicated and variations from the expected mean recognised and investigated.

Results

Exclusions

Although some Trusts carry out surveillance on all orthopaedic procedures, this report is restricted to the surveillance of the 4 mandatory procedures:

- Arthroplasty of the hip
- Arthroplasty of the knee
- Hemiarthroplasty
- Internal fixation of trochanteric fractures of the femur (#NOF)

A total of 3863 questionnaires were received for the 4 mandatory procedures with procedure dates in 2005. 306 of these reports were not analysed because the question on whether the patient had an SSI had not been completed.

Table 1. Orthopaedic SSI questionnaires received and analysed in 2005

Procedure Category	No of questionnaires received	No of questionnaires analysed*
All mandatory procedures	3863	3557
Hip arthroplasty	1540	1437
Knee arthroplasty	1514	1381
Hemiarthroplasty	347	317
# NOF	462	422

*Questionnaires excluded if SSI question not completed Yes or No.

Completion Rates

The completion rates for the data items in the orthopaedic SSI questionnaire are detailed in Table 2 below. Procedure type, SSI and procedure date have not been included, since the 3557 procedures identified for Wales for 2005 were extracted on the basis of being a mandatory procedure, having a procedure date in 2005 and having the SSI field completed.

Table 2. Percentage completion of data items on the orthopaedic SSI questionnaires for 2005

Data Item	Expected	Present	% Completed
Admission date	3557	3425	96.3
Age	3557	3455	97.1
Anaesthesia Type	3557	3033 ¹	85.3
Antibiotic prophylaxis	3557	3227	90.7
Antibiotic route	3203	3196 ²	99.8
Antibiotics continued	3203	2131	66.5
Antibiotic loaded cement	3557	2898	81.5
ASA	3557	3289	92.5
Clinician type	3557	3350	94.2
Closure Time	3557	2921	82.1
Consultant code	3557	2933	82.5
Consultant present	1399	1060	75.8
Criteria for diagnosing infection	138	98 ³	71.0
Date of Death/Discharge	3557	3248	91.3
Diagnosis	3557	3497 ⁴	98.3
Incision Time	3557	3034	85.3
Infection date	138	77	55.8

Operation type (emergency/elective)	3557	3423	96.2
Outcome	3557	2951	83.0
Procedure Code	3557	2847	80.0
Readmission	3557	2853	80.2
Relationship of SSI to death	3	2	66.7
Sex	3557	3550	99.8
Specific site of O/S infection	138	42	30.4
SSI type	138	115	83.3
Thromboprophylaxis	3557	3284	92.3
Wound Class	3557	3228	90.8

1. 524 records had no response in general, local or regional anaesthesia fields.
2. 7 records had no response in any of the 3 antibiotic route fields.
3. 40 records had no response in any of the criteria fields.
4. 60 records had no response in any of the 4 diagnosis fields.

Surveillance Coverage

The number of valid questionnaires received from the surveillance was compared with data reported to Health Solutions Wales on the number of procedures carried out by the different Trusts in Wales. Overall questionnaires were received for approximately 40% of the mandatory orthopaedic surveillance procedures in Wales. This is broken down by Trust in Table 3. The Trust number used in Table 3 matches the survey number on the questionnaires, other than for Trust 9, which incorporates survey numbers 9 and 12 and Trust 10, which incorporates survey numbers 10 and 82.

Table 3. Coverage of Orthopaedic SSI Surveillance compared to procedures reported to the PEDW database at HSW by Trust in Wales in 2005

Trust	No of procedures reported to HSW ¹	No of valid questionnaires received ²	% Coverage
9	1031	600	58
10	2057	557	27
11	469	341	73
25	701	142	20
34	561	283	50
38	649	214	33
39	290	271	93
53	468	40	9
69	973	227	23
99	1442	882	61
All Wales ³	9627	3557	37

1. Procedure codes reported to HSW: hip prosthesis (W37, W38, W39), knee prosthesis (W40, W41, W42), hemiarthroplasty (W46, W47, W48) and internal fixation of trochanteric fractures of the femur (W191).
2. Only questionnaires where SSI field has been completed have been included.
3. 2 Trusts where orthopaedic surgery is carried out have not participated in the surveillance. They contribute 966 procedures to the All Wales total reported to HSW.

1. General Demographics

This section gives information about the gender, age groups, procedures, SSIs and the type of SSI.

1.1 Incidence of SSI by Patient Age Group

Table 4. Orthopaedic Surgical Site Infections by Patient Age Group in Wales in 2005

Age Group	No. of Procedures*	No. of SSI	% SSI
<56	294	9	3.1
56-65	655	34	5.2
66-75	1188	51	4.3
76+	1319	44	3.3

*101 procedures have been excluded because patient age was not completed

Key Summary Points

- The majority of procedures were carried out on patients aged over 65.
- There was very little difference between the infection rates in different age groups.

1.2 Incidence of SSI by Patient Gender

Table 5. Orthopaedic Surgical Site Infections by Patient Gender in Wales in 2005

Procedure Category	Females		Males	
	No of procedures*	% SSI	No of procedures*	% SSI
All Procedures	2157	3.2	1393	5.0
Hip arthroplasty	821	3.2	612	3.3
Knee arthroplasty	784	3.7	594	5.9
Hemiarthroplasty	243	2.1	74	6.8
#NOF	309	2.6	113	8.0

*7 procedures have been excluded because patient gender was not completed.

Key Summary Points

- The majority of procedures are carried out on female patients, overall and within each procedure type.
- Infection rates are higher in males overall and for every procedure type.

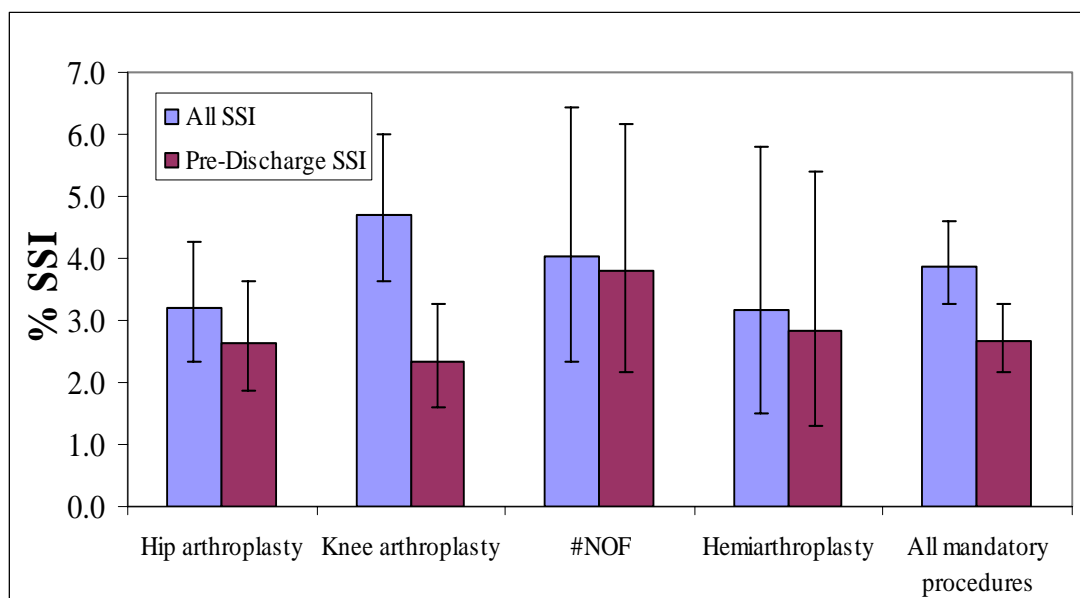
1.3 Incidence of SSI by Category of Surgical Procedure

There were 138 surgical site infections recorded in the 3557 analysable procedures. The crude SSI rate was 3.9%, which includes infections that occurred pre- and post-discharge from hospital. 31% of the infections were detected post-discharge. The crude pre-discharge SSI rate was 2.7%.

Table 6. Orthopaedic Surgical Site Infections by Category of Surgical Procedure in Wales in 2005

Procedure Category	No. procedures	No. SSI (All)	% SSI (95% CI)	No. Pre Dis. SSI	% Pre Dis. SSI
All mandatory procedures	3557	138	3.9 (3.3-4.6)	95	2.7 (2.2-3.3)
Hip arthroplasty	1437	46	3.2 (2.3-4.3)	38	2.6 (1.9-3.6)
Knee arthroplasty	1381	65	4.7 (3.6-6.0)	32	2.3 (1.6-3.3)
Hemiarthroplasty	317	10	3.2 (1.5-5.8)	9	2.8 (1.3-5.4)
#NOF	422	17	4.0 (2.3-6.4)	16	3.8 (2.2-6.2)

Figure 1. % SSI and % Pre-Discharge SSI by Procedure Category in Wales in 2005



Key Summary Points

- There were no significant differences between the rates of SSI in different procedure types.
- Approximately a third of the SSIs were identified post-discharge.
- The overall rate of SSI was significantly higher than the pre-discharge rate for knee arthroplasties only.
- Numbers of reports of hemiarthroplasty and #NOF procedures were small so data for these procedure types should be treated with caution.
- The pre-discharge rates of surgical site infection in Wales are comparable to those reported in the Pan Celtic data and for Scotland and Northern Ireland individually, where post-discharge surveillance was not undertaken (e.g. Hip prosthesis: Pan-Celtic⁷ = 1.8%; Scotland⁸ = 1.6%; Northern Ireland⁹ = 0.9%).

1.3.1 Incidence of SSI by Category of Surgical Procedure and OPCS Code

80% of the 3557 analysable questionnaires had an OPCS IV¹⁰ code completed. A description for each code is provided in the Appendix.

Table 7. Orthopaedic Surgical Site Infections by Category of Surgical Procedure and OPCS Code in Wales in 2005

Procedure category	No. records with codes	No. records with appropriate codes for the procedure type	No. without codes
Hemiarthroplasty	149	140	168
Hip arthroplasty	1278	1196	159
Knee arthroplasty	1249	1195	132
#NOF	171	110	251

Figure 2. No. of hemiarthroplasties, SSIs and % SSI by OPCS code in Wales in 2005

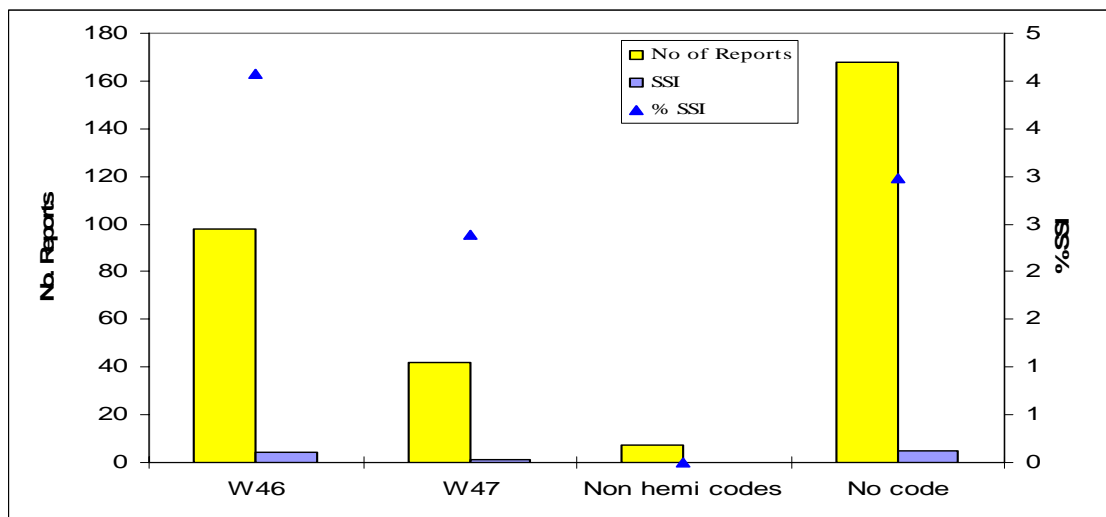


Figure 3. Reports of SSI following hip arthroplasty by OPCS code in Wales in 2005

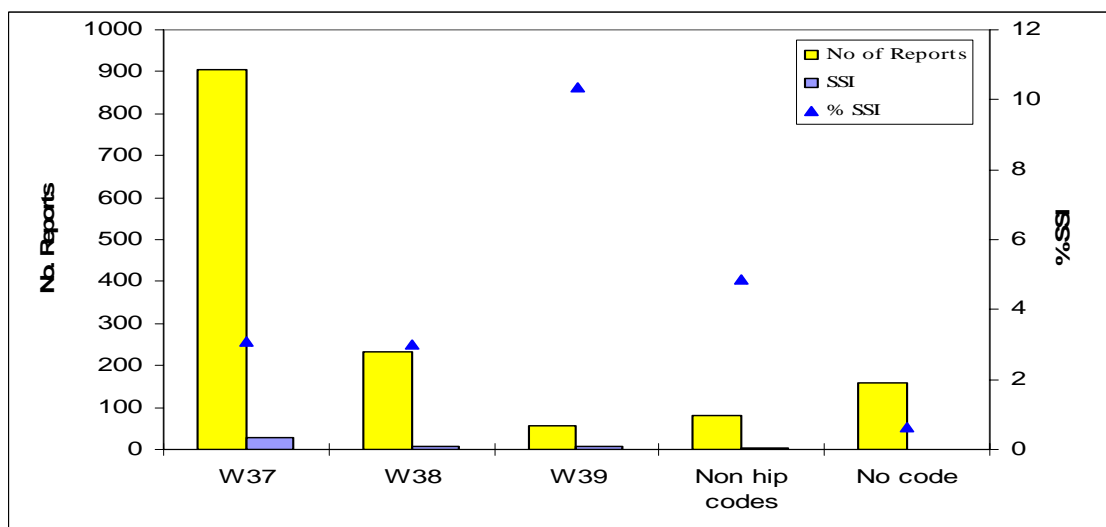


Figure 4. Reports of SSI following knee arthroplasty by OPCS code in Wales in 2005

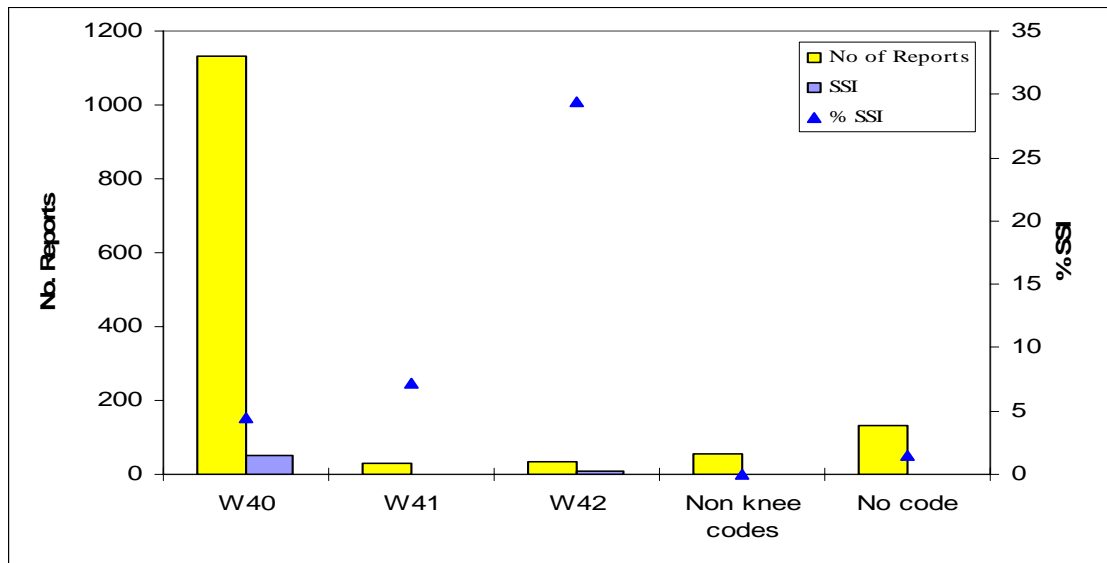
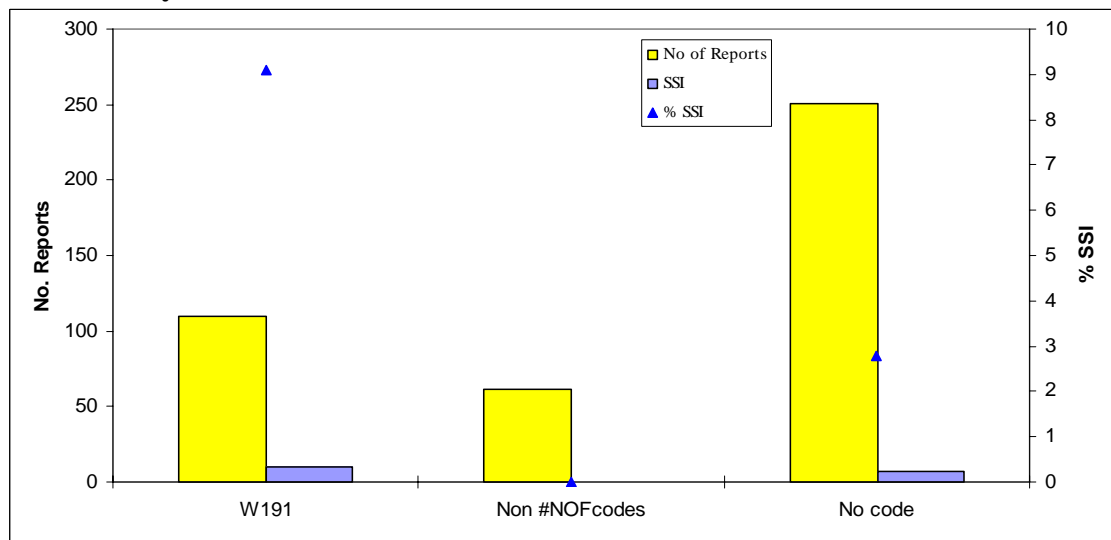


Figure 5. Reports of SSI following internal fixation of trochanteric fractures of the femur by OPCS code in Wales in 2005



Key Summary Points

- In many cases the OPCS code on the questionnaire did not match the procedure category selected. For this report, where they do not match, we have assumed that the procedure category is correct.
- For the #NOF codes, many of the OPCS codes provided were for fractures of bones other than the neck of the femur.
- 97 OPCS codes covering revision procedures were reported. % SSI for hip revision procedures was 1.7% (61 procedures) and for knee procedures was 1.0% (36 procedures).

1.4 Incidence of SSI following Elective and Emergency Procedures

Table 8. Orthopaedic Surgical Site Infections in Elective and Emergency Surgical Procedures in Wales in 2005

Operation Type	No. Procedures*	No. SSI	% SSI (95% CI)
Elective Procedures	2638	100	3.8 (3.1-4.6)
Emergency Procedures	785	34	4.3 (3.0-6.1)

*134 procedures have been excluded because the operation type was not completed

Key Summary Points

- The proportion of emergency procedures in Wales was higher than in the Pan Celtic dataset (22.9% in Wales; 3.6% in PanCeltic⁷ data)
- There was no significant difference between the rates of SSI in elective and emergency procedures in Wales, whereas in the Pan Celtic dataset the SSI rate for elective procedures was significantly lower.

1.5 Type of Surgical Site Infection

Three types of surgical site infection have been defined depending on whether the incisional site (superficial and deep infections) or other structures (organ/space infections) are involved. 115 of the 138 infections reported in Wales in 2005 had an infection type identified.

Table 9. Type of Surgical Site Infection by procedure category in Wales in 2005

Procedure Category	No. with type of SSI completed (total SSI)	Type of SSI		
		% Superficial	% Deep	% Organ/Space
All mandatory procedures	115 (138)	82.6	16.5	0.9
Hemiarthroplasty	9 (10)	66.7	33.3	0
Hip arthroplasty	36 (46)	75.0	22.2	2.8
Knee arthroplasty	56 (65)	87.5	12.5	0
#NOF	14 (17)	92.9	7.1	0

Key Summary Points

- Over 80% of the infections reported were of the superficial type.
- One organ/space infection was reported in 2005, following a hip arthroplasty procedure.

2. Incidence of SSI by Patient Risk Index

Although the results are grouped by category of clinically similar procedures, they do not take into account factors that may influence the risk of infection. The American National Nosocomial Infections Surveillance (NNIS) system risk index¹¹ is the most widely used method internationally of risk adjusting surgical patients. The risk index uses three risk factors to score each patient from 0 to 3, namely the American Society of Anaesthesiologists (ASA) pre-operative assessment score, the wound classification and the duration of surgery. 854 procedures have been excluded from the risk index analysis because one or more of the risk index component fields have not been completed and the risk index could therefore not be calculated.

Table 10 gives the proportion of records scoring 1 for each of the components of the risk index. Table 11 shows the numbers of records falling into each risk index category for all mandatory orthopaedic procedures. Figure 6 shows the percentage SSI by risk index for the different procedure categories. Because there were so few procedures with a risk index of 2 or 3, risk index 2 and 3 have been combined in the graphs.

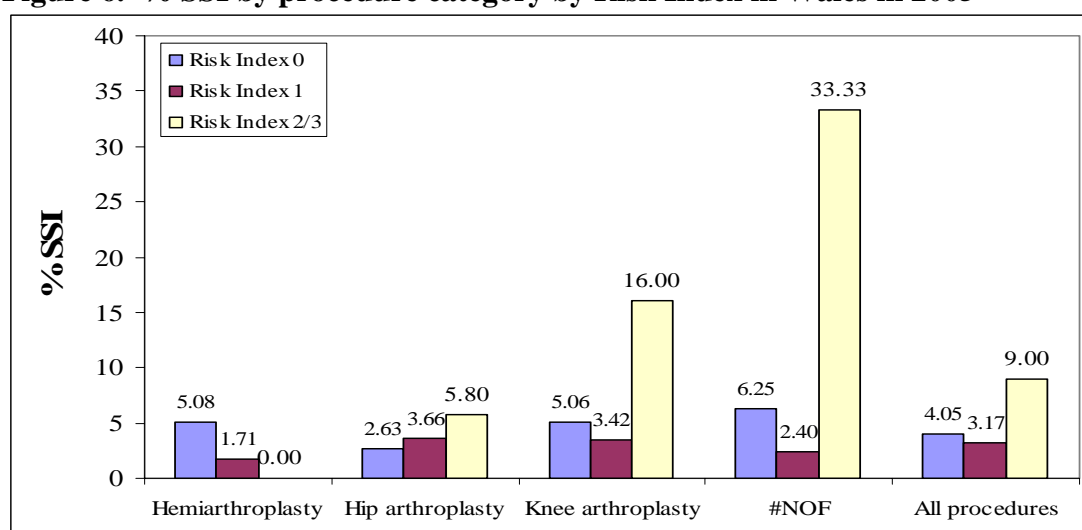
Table 10. Proportion of procedures scoring 1 for each of the components making up the NNIS system risk index in Wales in 2005

Risk Factor	Proportion of Procedures scoring 1
ASA of 3,4,5	35.0
Wound class Contaminated or Dirty/Infected	0.4
Duration of surgery over T value	10.1

Table 11. Surgical Site Infections by Patient Risk Index for all mandatory orthopaedic procedures in Wales in 2005

Patient Risk Index	Number of Procedures	Number of SSI	% SSI (95% CI)
0	1656	67	4.0 (3.1-5.1)
1	947	30	3.2 (2.1-4.5)
2/3	100	9	9.0 (4.1-17.1)

Figure 6. % SSI by procedure category by Risk Index in Wales in 2005



Key Summary Points

- The majority of patients were in the lowest risk category for infection: 61% of all records, 70% of knee arthroplasties and 61% of hip arthroplasties, but only a third of patients undergoing hemiarthroplasty or #NOF procedures had risk classifications of 0.
- The % SSI only increased with increasing risk index for hip arthroplasty procedures.
- Numbers of patients in the higher risk index categories (2 and 3) are very small at the present time. Further data collection is required before meaningful analysis of these categories can take place.

3. Incidence of SSI by Grade of Surgeon

The grade of surgeon (clinician type) performing the operation was completed in 94% (3350/3557) of analysable questionnaires in Wales in 2005. Table 12 gives the numbers of procedures carried out by each surgeon grade and the numbers of SSIs. Table 13 gives this information by orthopaedic procedure category. All surgeon grades except SHO include locums. Figures 7 and 8 compare rates of SSI for consultants and junior surgeon grades by patient risk index and by procedure type. The Junior Surgeon Grades category is an aggregate of the results for staff grades, associate specialists, SPRs and SHOs. In Table 14, the affect of a surgeon's presence in the theatre is examined, when surgery is performed by a junior surgeon grade.

Table 12. Surgical Site Infections by grade of surgeon performing mandatory orthopaedic procedures in Wales in 2005

Surgeon Grade	Number of procedures	Number of SSI	% SSI	95% CI
Consultant	1951	79	4.0	3.2-5.0
All Junior Surgeon Grades	1353	56	4.1	3.1-5.4
Staff Grade	452	28	6.2	4.1-9.0
Associate Specialist	311	9	2.9	1.3-5.5
SPR	558	19	3.4	2.1-5.3
Locum Ukn Grade	46	1	2.2	0.1-12.1
SHO	32	0	0	0-11.5

Table 13. Surgical Site Infections by grade of surgeon by category of orthopaedic procedure in Wales in 2005

Surgeon Grade	No of Procedures (% SSI)			#NOF
	Hemiarthroplasty	Hip Prosthesis	Knee Prosthesis	
Consultant	47 (0)	974 (3.7)	859 (4.5)	71 (5.6)
All Junior Surgeon Grades	257 (3.5)	324 (2.8)	436 (6.0)	336 (3.6)
Staff Grade	58 (1.7)	116 (4.3)	224 (9.4)	54 (1.9)
Associate Specialist	28 (3.6)	113 (1.8)	138 (2.2)	32 (9.4)
SPR	161 (4.3)	95 (2.1)	74 (2.7)	228 (3.5)
SHO	10 (0)	0	0	22 (0)

Figure 7. Percentage SSI in orthopaedic procedures performed by consultants and junior surgeon grades by patient risk index in Wales in 2005

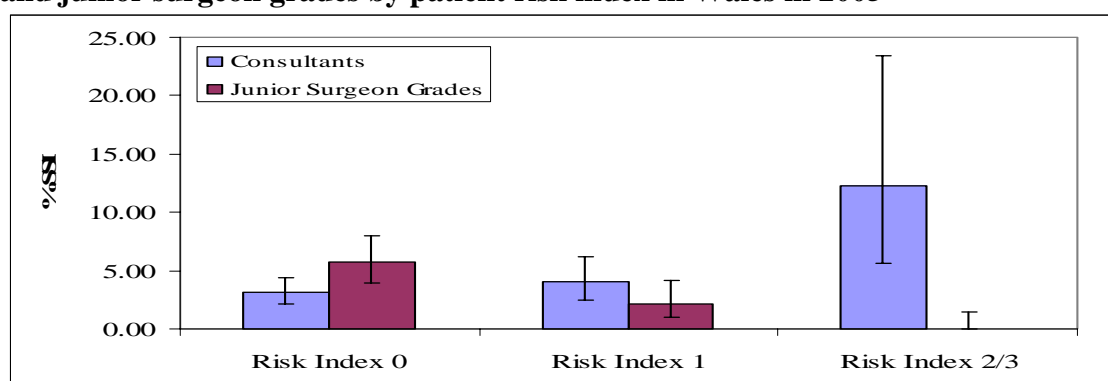


Figure 8. Percentage SSI in orthopaedic procedures performed by consultants and junior surgeon grades by procedure type in Wales in 2005

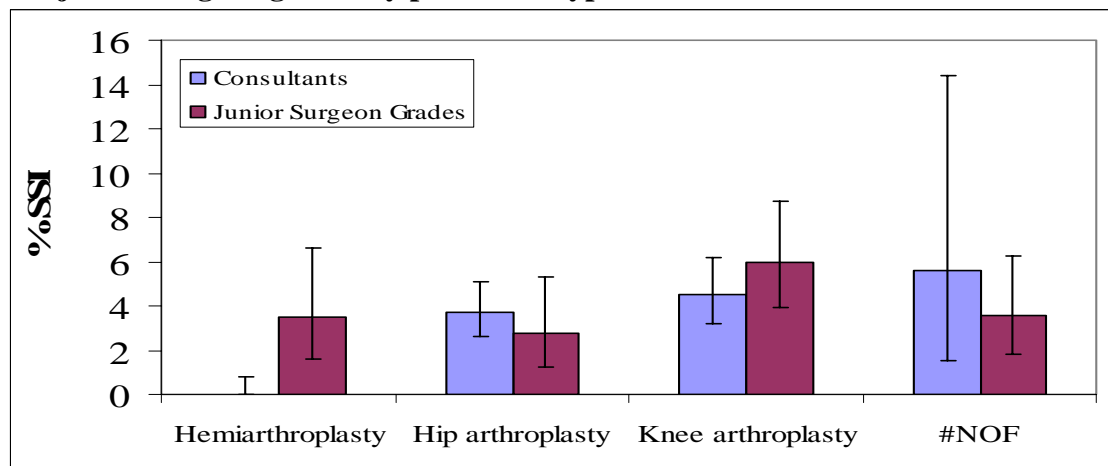


Table 14. Surgical Site Infections by consultant presence in Wales in 2005

	No. procedures	No. SSI	% SSI (95% CI)
Procedures not performed by consultant surgeons	1353	56	4.1 (3.1-5.4)
Procedures not performed by consultant but consultant present in theatre	498	23	4.6 (2.9-6.9)
Procedures not performed by consultant and consultant not present in theatre	517	20	3.9 (2.4-6.0)

NB 338 procedures performed by non-consultants did not record whether a consultant was present in theatre.

Key Summary Points

- Just under 55% of all procedures were carried out by Consultant surgeons.
- There were no significant differences between the rates of infection in procedures carried out by consultants and junior surgeon grades.
- There were no significant differences in the rates of infection when consultants were present in the theatre or not, in procedures carried out by non-consultant surgeons.

4. Duration of Procedure

The duration of surgery is used to calculate the patient risk index. Each surgical category has been assigned a T-value; procedures that take longer than the T-value for that procedure are assigned a point towards their risk index total. The T-values are calculated as the 75th percentile of duration of the surgical procedure, based on surgeon performance in the United States¹¹. For all the mandatory orthopaedic procedures, the T-value is 2 hours. It would be expected that 25% of the procedures should lie above the T-value, but in Wales only 10% of procedures took longer than the T value. The durations of procedure categories in Wales are given in Table 15 and durations of procedures with specific OPCS codes are given in Table 16.

Table 15. Duration of Procedure Categories in Minutes and proportion over T value

Procedure Category	Number with Procedure start and end times	Mean	Median	Range	Proportion > T-value	75 th Percentile of Welsh data (minutes)
Hemiarthroplasty	192	55	50	20 - 148	2%	64
Hip arthroplasty	1260	97	90	8 - 709	16%	110
Knee arthroplasty	1248	85	80	5 - 370	7%	96
#NOF	216	52	45	10 - 225	2%	60

Table 16. Duration in minutes of most frequently reported OPCS codes for each procedure category and the proportion over T value

Procedure Category	Procedure Code	No. with Procedure start and end times	Mean	Median	Range	Proportion > T-value	75 th Percentile of Welsh data (minutes)
Hemiarthroplasty	W461	95	53	50	20 - 122	1%	60
Hip arthroplasty	W371	789	94	90	15 - 319	12%	107
Knee arthroplasty	W401	1026	83	80	5 - 370	5%	94
#NOF	W191	101	48	45	10 - 125	1%	60

Key Summary Points

- As found in the Pan Celtic aggregate data⁷, Welsh surgeons performed operations in a shorter time than their US counterparts, therefore US derived T-values are not representative of surgery here.
- UK T-values need to be produced for procedures performed by UK surgeons, as this will have a substantial bearing on SSI rates stratified by risk.

5. Durations of Stay

5.1 Pre-operative length of stay

The pre-operative length of stay is the number of days from date of admission to hospital to the date of procedure. The pre-operative lengths of stay by procedure category are given in Table 17 and a comparison of the pre-operative lengths of stay for procedures that resulted in an SSI and those that did not are given in Table 18.

Table 17. Pre-operative length of stay for orthopaedic procedures by procedure category in Wales in 2005

Procedure	Pre-operative Length of Stay	No. Procedures* (%)	
All procedures	0-1 days	2913	(85.1)
	2-3 days	281	(8.2)
	4+ days	231	(6.7)
Hemiarthroplasty	0-1 days	147	(49.0)
	2-3 days	78	(26.0)
	4+ days	75	(25.0)
Hip arthroplasty	0-1 days	1296	(93.6)
	2-3 days	46	(3.3)
	4+ days	42	(3.0)
Knee arthroplasty	0-1 days	1282	(95.6)
	2-3 days	39	(2.9)
	4+ days	20	(1.5)
#NOF	0-1 days	188	(47.0)
	2-3 days	118	(29.5)
	4+ days	94	(23.5)

*132 procedures excluded because admission date not completed

Table 18. Pre-operative length of stay for patients with and without an SSI following orthopaedic procedures in Wales in 2005.

	Admission to Procedure (days)		
	Mean	Median	Range
All patients	1.6	1	0 - 74
Patients without SSI	1.5	1	0 - 74
Patients with SSI	2.2	1	0 - 46

Key Summary Points

- 85% of patients who underwent one of the 4 mandatory orthopaedic surveillance procedures were in hospital 1 day or less before they had their surgery.
- There were differences in the pre-operative lengths of stay by procedure category, with hemiarthroplasty and #NOF patients in hospital longer before they received surgery.
- There were no differences in the median pre-operative length of stay between patients who developed an SSI and those that did not.

5.2 Total length of stay

The total length of stay is the number of days from date of admission to hospital to the date of discharge or death. A comparison of the total lengths of stay for procedures that resulted in an SSI and those that did not are given in Table 19.

Table 19. Total length of stay for patients with and without an SSI following orthopaedic procedures in Wales in 2004

	Admission to Discharge (days)		
	Mean	Median	Range
All patients	13.2	8	1 - 198
Patients without SSI	12.7	8	1 - 198
Patients with SSI	26.9	15	2 - 194
Patients with SSI pre-discharge	34.3	21	3 - 194

Key Summary Points

- Approximately 80% of hip/knee prosthesis patients in Wales in 2005 were discharged from hospital 12 days after admission; total lengths of stay for hemiarthroplasty and #NOF patients were much longer, with 80% of patients discharged after more than 38 days in hospital.
- Lengths of stay for hip/ knee arthroplasty and hemiarthroplasty patients were longer in Wales than in the Pan Celtic dataset (80% discharged at 10 days for hip/knee prosthesis and 20 days for hemiarthroplasties)⁷.
- The median total length of stay for patients who developed a pre-discharge SSI was 13 days longer than for those that did not.

5.3 Post-operative length of stay

The post-operative length of stay is the number of days from the date of procedure to the date of discharge or death. The post-operative lengths of stay by procedure category are given in Figure 9. The post-operative lengths of stay for procedures that resulted in an SSI and those that did not, stratified by risk index are given in Table 20.

Figure 9. Proportion of patients in hospital by days post surgery for orthopaedic procedures in Wales in 2005

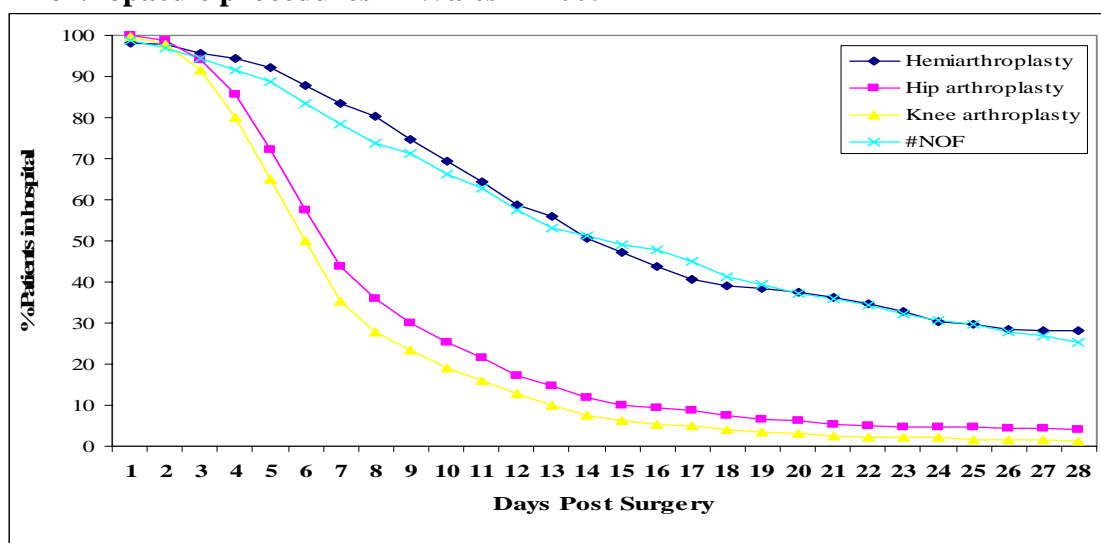


Table 20. Post-operative length of stay for patients with and without an SSI following orthopaedic procedures in Wales in 2005

		Procedure to Discharge (days)		
		Mean	Median	Range
All Procedures	All patients (n = 3248)	11.7	7	0 - 197
	Patients without SSI (n=3126)	11.2	7	0 - 197
	Patients with SSI (n=122)	24.6	14	1 - 175
	Patients with SSI pre-discharge (n=85)	31.2	18	2 - 175
Risk Index 0	All patients (n=1558)	8.8	7	0 - 128
	Patients without SSI (n=1495)	8.4	7	0 - 109
	Patients with SSI (n=63)	17.9	11	1 - 128
	Patients with SSI pre-discharge (n=36)	25.6	16	2 - 128
Risk Index 1	All patients (n=884)	11.9	8	0 - 107
	Patients without SSI (n=859)	11.5	8	0 - 107
	Patients with SSI (n=25)	27.5	18	6 - 65
	Patients with SSI pre-discharge (n=16)	34.3	30	9 - 65
Risk Index 2/3	All patients (n=92)	17.8	12	3 - 119
	Patients without SSI (n=83)	15.2	11	3 - 77
	Patients with SSI (n=9)	41.0	18	12 - 119
	Patients with SSI pre-discharge (n=9)	41.0	18	12 - 119

Key Summary Points

- In all procedures, the median length of post-operative stay for patients who developed a SSI during the hospital admission was 7 days longer than for those that did not, and was 11 days longer for patients who developed an SSI pre-discharge.
- In patients with no pre-disposing risk factors for the development of a SSI i.e. risk index of 0, the median length of post-operative stay for patients who developed a SSI during the hospital admission was 4 days longer than for those that did not, and was 9 days longer for patients who developed an SSI pre-discharge.

5.4 Onset of Infection

Figure 10 details the number of days from the date of the orthopaedic procedure to the onset of infection. Tables 21 and 22 give the median numbers of days from admission date to onset of infection and procedure date to onset of infection.

Figure 10. Number of days from procedure date to onset of surgical site infection following orthopaedic procedures in Wales in 2005

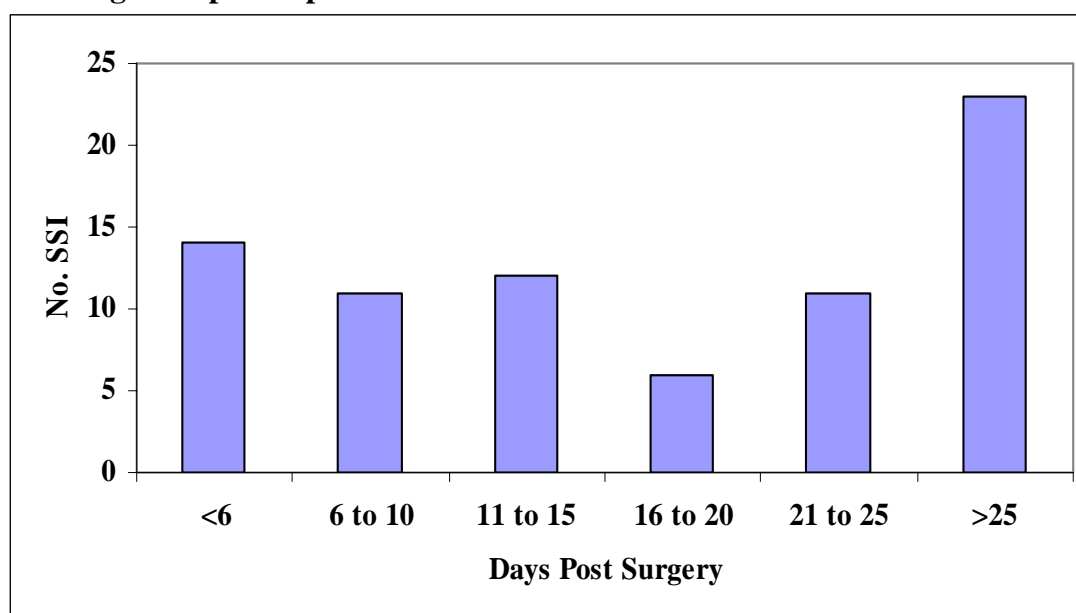


Table 21. Number of days from date of hospital admission to onset of surgical site infection in patients with an SSI following orthopaedic procedures in Wales in 2005

	Admission to Infection (days)		
	Mean	Median	Range
All patients with SSI (n=76)	21.9	21	2 - 57
Patients with SSI pre-discharge (n=41)	16.0	12	2 - 55
Patients with SSI post-discharge (n=35)	28.8	29	6 - 57

Table 22. Number of days from date of procedure to onset of surgical site infection in patients with an SSI following orthopaedic procedures in Wales in 2005

	Procedure to Infection (days)		
	Mean	Median	Range
All patients with SSI (n=77)	19.7	18	1 - 54
Patients with SSI pre-discharge (n=42)	13.0	10	1 - 45
Patients with SSI post-discharge (n=35)	27.7	28	5 - 54

Key Summary Points

- The median number of days from procedure to onset of infection was 21, whereas the median length of stay for all patients following surgery is 7 days. Post-discharge surveillance is therefore essential to identify infections.
- Infection data was only based on 138 records and should therefore be treated with caution.

6. Incidence of SSI by Trust

Tables 23 to 27 compare the overall SSI rate and the pre-discharge SSI rates in different Trusts in Wales for the different categories of orthopaedic procedure. The Trust number used matches the survey number on the questionnaires, other than for Trust 9, which incorporates survey numbers 9 and 12 and Trust 10, which incorporates survey numbers 10 and 82.

Table 23. Incidence of SSI and pre-discharge SSI following orthopaedic procedures in Wales in 2005 by Trust

Trust	No. valid procedures	% with valid post-discharge update	No. SSI	No. pre-discharge SSI	% SSI (95% CI)	% pre-discharge SSI (95% CI)
9	600	99	55	26	9.2 (6.9-11.9)	4.3 (2.8-6.3)
10	557	25	19	19	3.4 (2.1-5.3)	3.4 (2.1-5.3)
11	341	19	7	6	2.1 (0.8-4.2)	1.8 (0.6-3.8)
25	142	28	8	7	5.6 (2.4-11.1)	4.9 (2.0-10.2)
34	283	63	8	5	2.8 (1.2-5.6)	1.8 (0.6-4.1)
38	214	0	5	5	2.3 (0.8-5.5)	2.3 (0.8-5.5)
39	271	70	3	0	1.1 (0.2-3.2)	0 (0-1.4)
53	40	98	1	1	2.5 (0.1-13.9)	2.5 (0.1-13.9)
69	227	4	1	1	0.4 (0-2.5)	0.4 (0-2.5)
99	882	42	31	25	3.5 (2.4-5.0)	2.8 (1.8-4.2)

Table 24. Incidence of SSI and pre-discharge SSI following hemiarthroplasty procedures in Wales in 2005 by Trust

Trust	No. valid procedures	% with valid post-discharge update	No. SSI	No. pre-discharge SSI	% SSI (95% CI)	% pre-discharge SSI (95% CI)
9	2	50	1	1	50.0 (1.3-278.6)	50.0 (1.3-278.6)
10	20	40	0	0	0 (0-18.4)	0 (0-18.4)
11	51	63	3	2	5.9 (1.2-17.2)	3.9 (0.5-14.2)
25	14	93	1	1	7.1 (0.2-39.8)	7.1 (0.2-39.8)
34	25	4	0	0	0 (0-14.8)	0 (0-14.8)
38	10	0	0	0	0 (0-36.9)	0 (0-36.9)
39	39	49	0	0	0 (0-9.5)	0 (0-9.5)
53	0					
69	9	22	1	1	11.1 (0.3-61.9)	11.1 (0.3-61.9)
99	147	0	4	4	2.7 (0.7-7.0)	2.7 (0.7-7.0)

Table 25. Incidence of SSI and pre-discharge SSI following hip arthroplasty procedures in Wales in 2005 by Trust

Trust	No. valid procedures	% with valid post-discharge update	No. SSI	No. pre-discharge SSI	% SSI (95% CI)	% pre-discharge SSI (95% CI)
9	250	98	18	15	7.2 (4.3-11.4)	6.0 (3.4-9.9)
10	240	22	9	9	3.8 (1.7-7.1)	3.8 (1.7-7.1)
11	130	10	1	1	0.8 (0-4.3)	0.8 (0-4.3)
25	55	7	1	1	1.8 (0-10.1)	1.8 (0-10.1)
34	143	72	4	3	2.8 (0.8-7.2)	2.1 (0.4-6.1)
38	125	0	3	3	2.4 (0.5-7.0)	2.4 (0.5-7.0)
39	109	79	3	0	2.8 (0.6-8.0)	0 (0-3.4)
53	19	100	0	0	0 (0-19.4)	0 (0-19.4)
69	115	2	0	0	0 (0-3.2)	0 (0-3.2)
99	251	71	7	6	2.8 (1.1-5.7)	2.4 (0.9-5.2)

Table 26. Incidence of SSI and pre-discharge SSI following knee arthroplasty procedures in Wales in 2005 by Trust

Trust	No. valid procedures	% with valid post-discharge update	No. SSI	No. pre-discharge SSI	% SSI (95% CI)	% pre-discharge SSI (95% CI)
9	345	100	36	10	10.4 (7.3-14.4)	2.9 (1.4-5.3)
10	260	28	7	7	2.7 (1.1-5.5)	2.7 (1.1-5.5)
11	111	8	2	2	1.8 (0.2-6.5)	1.8 (0.2-6.5)
25	50	4	1	1	2.0 (0.1-11.1)	2.0 (0.1-11.1)
34	79	78	3	1	3.8 (0.8-11.1)	1.3 (0-7.1)
38	69	0	2	2	2.9 (0.4-10.5)	2.9 (0.4-10.5)
39	94	82	0	0	0 (0-3.9)	0 (0-3.9)
53	19	100	1	1	5.3 (0.1-29.3)	5.3 (0.1-29.3)
69	94	0	0	0	0 (0-3.9)	0 (0-3.9)
99	260	73	13	8	5.0 (2.7-8.6)	3.1 (1.3-6.1)

Table 27. Incidence of SSI and pre-discharge SSI following internal fixation of trochanteric fractures of the femur procedures in Wales in 2005 by Trust

Trust	No. valid procedures	% with valid post-discharge update	No. SSI	No. pre-discharge SSI	% SSI (95% CI)	% pre-discharge SSI (95% CI)
9	3	100	0	0	0 (0-123.0)	0 (0-123.0)
10	37	14	3	3	8.1 (1.7-23.7)	8.1 (1.7-23.7)
11	49	22	1	1	2.0 (0.1-11.4)	2.0 (0.1-11.4)
25	23	91	5	4	21.7 (7.1-50.7)	17.4 (4.7-44.5)
34	36	36	1	1	2.8 (0.1-15.5)	2.8 (0.1-15.5)
38	10	0	0	0	0 (0-36.9)	0 (0-36.9)
39	29	24	0	0	0 (0-12.7)	0 (0-12.7)
53	2	50	0	0	0 (0-184.4)	0 (0-184.4)
69	9	56	0	0	0 (0-41.0)	0 (0-41.0)
99	224	0	7	7	3.1 (1.3-6.4)	3.1 (1.3-6.4)

Key Summary Points

- Trusts are following up patients for varying amounts of time, with some not doing any post-discharge surveillance. Comparisons between trusts should therefore be carried out with caution.
- Some significant differences between Trusts in Wales in the pre-discharge rate of SSI for all orthopaedic procedures were identified, but not within individual procedure categories.
- For some Trusts, numbers of procedures reported are still small, particularly when broken down by procedure category. Longer term data collection is required before we can have confidence in these rates.

7. Incidence of SSI over time

Three years of surveillance data is now available on SSI following orthopaedic procedures in Wales. Figure 11 compares the overall rates for 2003 to 2005. Table 28 compares the numbers of reports by procedure category for 2003 to 2005.

Figure 11. Procedures, SSIs and % SSI (95% CI) reported for orthopaedic procedures in Wales, 2003 - 2005

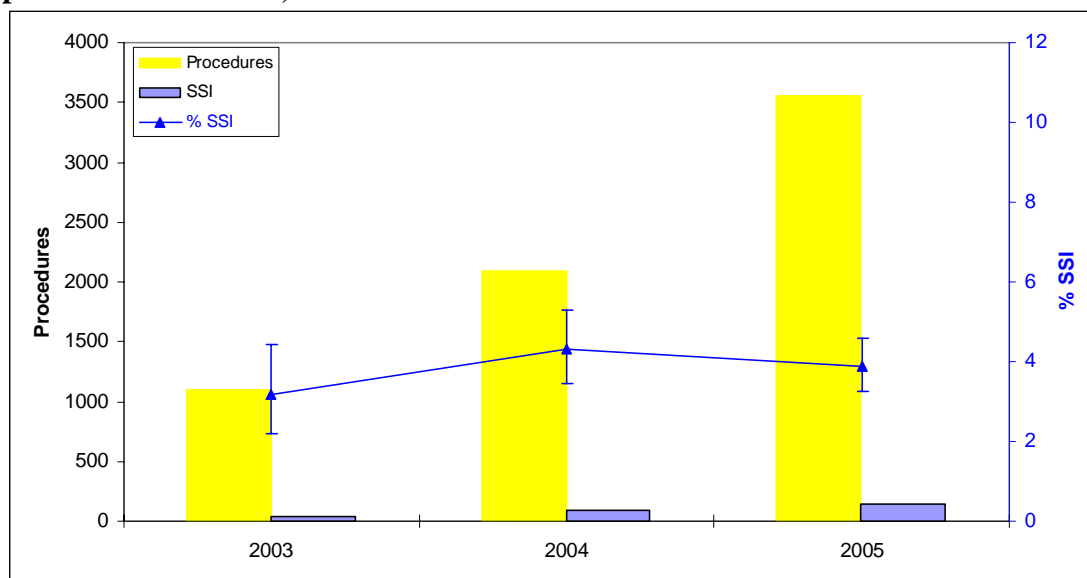


Table 28. Procedures, SSIs and % SSI (95% CI) by procedure category in Wales, 2003 - 2005

Procedure Category	Year	No. Procedures	No. SSI	% SSI
All Procedures	2005	3557	138	3.9
	2004*	2093	90	4.3
	2003	1101	35	3.2
Hemiarthroplasty	2005	317	10	3.2
	2004*	290	19	6.6
	2003	52	3	5.8
Hip arthroplasty	2005	1437	46	3.2
	2004*	744	20	2.7
	2003	472	17	3.6
Knee arthroplasty	2005	1381	65	4.7
	2004*	624	28	4.5
	2003	370	11	3.0
#NOF	2005	422	17	4.0
	2004*	435	23	5.3
	2003	207	4	1.9

*NB 2004 data has been updated since the 2004 orthopaedic report was released

Key Summary Point

- There are no significant differences between the rates of infection reported between 2003 and 2005.

8. Comparative Results

Table 27 displays the pre-discharge orthopaedic SSI rates in Wales by risk index broken down into the American NNIS procedure categories. The NNIS procedure categories combine data for hip arthroplasties and hemiarthroplasties and only categories with more than 100 procedures are shown. Welsh rates are compared with Pan Celtic, American and English SSI rates.

NNIS Procedure Category	Risk Index	No. Procedures in Wales	Wales pre-discharge SSI Rate	PanCeltic SSI Rate ⁷	American SSI Rate ¹²	English SSI Rate ¹³
Hip prosthesis/ Hemiarthroplasty	0	349	1.4	1.4	0.9	2.3
	1	209	1.4	2.9	1.7	4.0
Knee prosthesis	0	297	1.7	1.4	0.9	1.5
	1	128	3.9	3.6	1.3	2.0

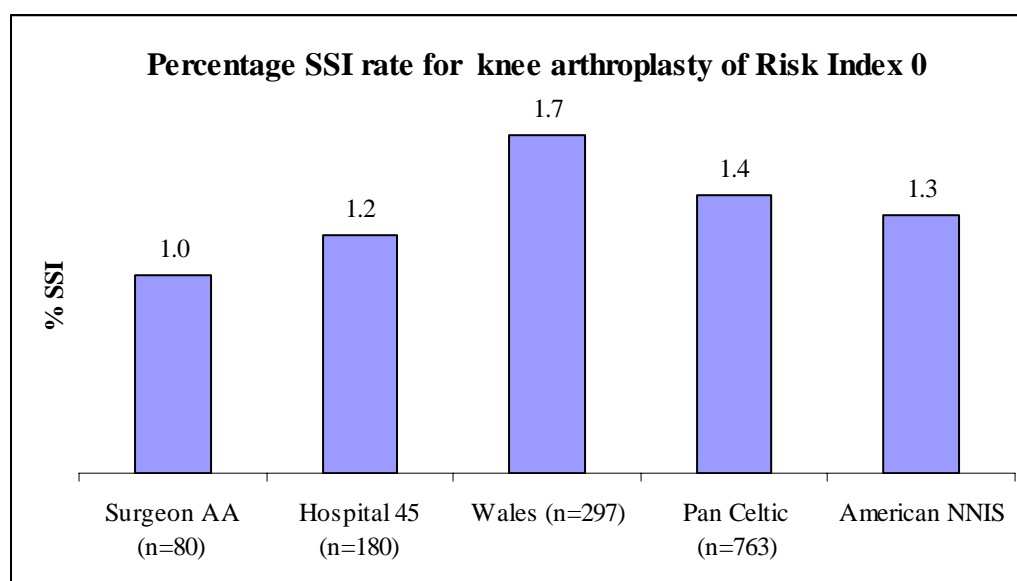
9. Conclusions

The Welsh orthopaedic surgical site infection surveillance scheme provides surgical teams with risk-adjusted measures of performance over time for the four mandatory surveillance procedures.

Overall rates of infection should be interpreted with caution since at this relatively early stage of surveillance for some of the Trusts, there are still concerns about the reliability of the surveillance, in terms of completing and returning data for all the required procedures. Examination of the PEDW data shows that a considerable proportion of the mandatory orthopaedic procedures have not been captured via the surveillance scheme. Those sites with higher form returns will have a disproportionate influence on the overall figures. Additionally not all trusts in Wales carrying out orthopaedic procedures contributed data in 2005. There are also differences between sites in the degree of post-discharge surveillance undertaken, which obviously has a major impact on their infection rates. Primary data collection should take place for 30 days post surgery, unless an implantable device was placed in the patient, in which case surveillance should continue for 1 year. Although included in the mandatory data set, it has taken Trusts varying amounts of time to set up their post-discharge surveillance, therefore differences currently exist between them. Despite these drawbacks, results for 2005 are mainly consistent with those found in 2004 and are similar to those described for other orthopaedic SSI surveillance schemes.

This all-Wales report should be used in conjunction with surgeon specific reports, hospital/Trust specific reports, as well as alongside the Pan Celtic report and reports from SSI schemes in other countries. The surveillance co-ordinator at your hospital, who has access to the data for your hospital, can provide surgeons with individual rates and hospital specific rates. An example of how an individual surgeon may use comparative data is given below:

Figure X. Surgeon AA SSI rates for knee prosthesis with risk index of 0, compared to rates for hospital, country, Pan Celtic collaboration and American NNIS



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11. Acknowledgements

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12. Appendix

Orthopaedic OPCS IV Codes¹⁰.

OPCS IV Code	PROCEDURE	DESCRIPTION
W19	PRIMARY OPEN REDUCTION OF FRACTURE OF BONE AND INTRAMEDULLARY FIXATION	
W19.1		Primary open reduction of fracture of neck of femur and open fixation using pin and plate
W37	TOTAL PROSTHETIC REPLACEMENT OF HIP JOINT USING CEMENT	
W37.0		Conversion from previous cemented total prosthetic
W37.1		Primary total prosthetic replacement of hip joint using
W37.2		Conversion to total prosthetic replacement of hip joint
W37.3		Revision of total prosthetic replacement of hip joint
W37.8		Other specified
W38	TOTAL PROSTHETIC REPLACEMENT OF HIP JOINT NOT USING CEMENT	
W38.1		Primary total prosthetic replacement of hip joint not
W38.2		Conversion to total prosthetic replacement of hip joint
W38.3		Revision of total prosthetic replacement of hip joint not
W39	OTHER TOTAL PROSTHETIC REPLACEMENT OF HIP JOINT	
W39.0		Conversion from previous total prosthetic replacement of
W39.1		Primary total prosthetic replacement of hip joint nec
W39.3		Revision of total prosthetic replacement of hip joint nec
W39.4		Attention to total prosthetic replacement of hip joint nec
W40	TOTAL PROSTHETIC REPLACEMENT OF KNEE JOINT USING CEMENT	
W40.0		Conversion from previous cemented total prosthetic replacement of knee joint
W40.1		Primary total prosthetic replacement of knee joint using

W40.3		Revision of total prosthetic replacement of knee joint
W40.8		Other specified
W41	TOTAL PROSTHETIC REPLACEMENT OF KNEE JOINT NOT USING CEMENT	
W41.1		Primary total prosthetic replacement of knee joint not
W42	OTHER TOTAL PROSTHETIC REPLACEMENT OF KNEE JOINT	
W42.1		Primary total prosthetic replacement of knee joint nec
W42.8		Other specified
W42.9		Unspecified