



HEALTH QUALITY & SAFETY
COMMISSION NEW ZEALAND
Kupu Taurangi Hauora o Aotearoa



National Orthopaedic Surgery Report

October to December 2017

Hip and knee arthroplasties
Surgical Site Infection Improvement Programme

SSII Surgical Site Infection
Improvement Programme

Abbreviations

ASA	American Society of Anaesthesiologists
CHX	Aqueous chlorhexidine
CHX/Alc	Chlorhexidine in alcohol
CI	Confidence interval
DHB	District health board
KTS	Knife to skin
Povi	Aqueous povidone iodine
Povi/Alc	Povidone iodine in alcohol
QSM	Quality and safety marker
SSI	Surgical site infection
SSII	Surgical Site Infection Improvement

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1 Acknowledgements

Thank you to all providers for entering their data on time. This helps us greatly with reporting.

Since February 2016 the Accident Compensation Corporation (ACC) has supported the Health Quality & Safety Commission's Surgical Site Infection Improvement (SSII) Programme to work to reduce the incidence and harm of healthcare associated infections. The funding is being used to complete the programme in public hospitals for hip and knee arthroplasty and cardiac surgeries.

2 Summary of findings

This report presents the results of the SSII Programme for the period 1 October to 31 December 2017. It also provides cumulative data from 1 July 2013 to 31 December 2017.

2.1 October to December 2017

During this surveillance period:

- district health boards (DHBs) performed 2,717 hip and knee arthroplasty procedures, compared with 2,761 in July to September 2017
- there were 35 surgical site infections (SSIs), a rate of 1.3 percent compared with 0.6 percent in the last quarter.
- twenty-two SSIs (0.8 percent) were deep/organ space. Thirteen SSIs (0.5 percent) were superficial
- national performance against the prophylaxis timing quality and safety marker (QSM) for primary procedures was 98 percent, consistent with the previous quarter. The target is 100 percent. Thirteen DHBs achieved 100 percent compliance (compared with seven in the previous quarter) and 17 DHBs recorded 95 percent or greater. Three DHBs had one or more procedures where timing was not recorded. In 1.3 percent of cases, antibiotic prophylaxis was given either early or late (consistent with the last quarter)
- national performance against the dose QSM was 97 percent. The target is 95 percent. Seventeen DHBs achieved the dose QSM, compared with 14 in the last quarter. Nineteen patients received less than 2 g of cefazolin; five (26 percent) were under-dosed as they weighed more than 80 kg
- prophylaxis was stopped within 24 hours in 98 percent of all procedures. Eleven DHBs stopped prophylaxis within 24 hours for all procedures. Forty-four patients received prophylaxis for longer than 24 hours for all procedures. Continuing antibiotic prophylaxis until drains or catheters are removed is of no known benefit to patients and can promote antibacterial resistance. There has been considerable improvement in prophylaxis practice since the start of the SSII Programme, when only 61 percent had prophylaxis stopped in under 24 hours
- twelve DHBs met both QSMs: Bay of Plenty, Capital & Coast, Hawke's Bay, Whanganui, Nelson Marlborough, Southern, West Coast, Hutt Valley, MidCentral, Wairarapa, Canterbury and Taranaki. Congratulations to these DHBs

- thirteen (37 percent) SSIs had staphylococci isolated of which nine were *Staphylococcus aureus* and five were coagulase-negative staphylococcus (one SSI had both coagulase positive and coagulase negative staphylococcus isolated). Of the nine (26 percent) SSIs that had *Staphylococcus aureus* isolated, seven were monomicrobial cultures and two were polymicrobial.

2.2 Cumulative findings

Between July 2013 and December 2017 the cumulative procedure total was 46,362 with 498 SSIs, 1.1 percent (95 percent confidence interval (CI) 1.0–1.2).

3 Change in reporting format

3.1 Cumulative tables

Data from 1 March to 30 June 2013 is no longer included in the cumulative tables. The new beginning date for these tables, 1 July 2013, is the point at which all 20 DHBs were participating in the programme.

3.2 Data privacy review

The Commission has reviewed its procedures around the storage and publication of patient-level data. As a result, the table containing details of the SSIs is no longer included in published SSII reports. DHBs can access this information via the SSII National Monitor.

3.3 Future reporting format

We are continuing to develop the report and welcome your feedback and recommendations on content – please email us at SSIIIP@hqsc.govt.nz.

4 Programme changes

Change	Date effective
The run chart showing the national SSI rate over time has a 12-month baseline period. The beginning of this period was changed from March 2013 to July 2013. This is the point at which all 20 DHBs were participating in the programme.	1 December 2017
Due to the continual high compliance against the related QSM, the SSII Programme made collecting skin preparation data optional from July 2016 and retired the QSM.	1 July 2016
Revision procedures for infection are no longer included.	1 January 2016

Change	Date effective
Prophylaxis up to 24 hours after surgery is acceptable for the procedures in the SSII Programme. However, if prophylaxis is being continued until culture results are known, because of concerns about infection, this is not continuing 'prophylaxis'. It is more 'pre-emptive treatment'. If antibiotics are being continued for treatment reasons, this is no longer prophylaxis and the entry should be < 24 hours.	11 December 2015
Deep and organ space SSIs were combined for reporting purposes.	1 April 2015
Cefuroxime 1.5 g is an accepted alternative prophylactic agent for compliance with the dose QSM. Cefazolin \geq 2 g remains the agent of choice for prophylaxis for the procedures included in the SSII Programme.	1 January 2015
Hemi-arthroplasty and partial arthroplasty procedures of the hip are no longer reported.	1 March 2014

5 SSIs by DHB

5.1 Orthopaedic SSIs by DHB, surveillance period, last 12 months and cumulative SSI rates

DHB	Procedures Oct-Dec 2017	No of SSIs	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	Cumulative procedures from Jul 2013	Cumulative SSIs	%	Cumulative 95% CI
Auckland	139	1	0.7	0.1–4.0	601	4	0.7	2,735	26	1.0	0.6–1.4
Bay of Plenty	225	0	0.0	0.0–1.7	814	4	0.5	3,480	35	1.0	0.7–1.4
Canterbury	367	6	1.6	0.8–3.5	1,494	11	0.7	5,958	42	0.7	0.5–1.0
Capital & Coast	119	1	0.8	0.1–4.6	561	3	0.5	2,172	29	1.3	0.9–1.9
Counties Manukau Health	167	6	3.6	1.7–7.6	682	13	1.9	3,319	68	2.0	1.6–2.6
Hauora Tairāwhiti	42	1	2.4	0.4–12.3	138	1	0.7	570	4	0.7	0.3–1.8
Hawke's Bay	89	2	2.2	0.6–7.8	423	6	1.4	1,701	19	1.1	0.7–1.7
Hutt Valley	76	0	0.0	0.0–4.8	286	0	0.0	1,283	15	1.2	0.7–1.9
Lakes	111	3	2.7	0.9–7.6	403	8	2.0	1,622	26	1.6	1.1–2.3
MidCentral	83	1	1.2	0.2–6.5	412	3	0.7	2,012	13	0.6	0.4–1.1
Nelson Marlborough	149	3	2.0	0.7–5.8	560	8	1.4	2,490	29	1.2	0.8–1.7
Northland	140	3	2.1	0.7–6.1	608	8	1.3	2,363	28	1.2	0.8–1.7
South Canterbury	44	0	0.0	0.0–8.0	181	1	0.6	765	4	0.5	0.2–1.3
Southern	192	2	1.0	0.3–3.7	726	4	0.6	2,969	21	0.7	0.5–1.1
Taranaki	101	2	2.0	0.5–6.9	350	6	1.7	1,313	13	1.0	0.6–1.7
Waikato	219	2	0.9	0.3–3.3	1,108	10	0.9	4,120	48	1.2	0.9–1.5
Wairarapa	48	0	0.0	0.0–7.4	159	0	0.0	634	3	0.5	0.2–1.4
Waitemata	303	2	0.7	0.2–2.4	1,213	13	1.1	5,191	54	1.0	0.8–1.4
West Coast	29	0	0.0	0.0–11.7	92	1	1.1	397	6	1.5	0.7–3.3
Whanganui	74	0	0.0	0.0–4.9	323	1	0.3	1,268	15	1.2	0.7–1.9
Total	2,717	35	1.3	0.9–1.8	11,134	105	0.9	46,362	498	1.1	1.0–1.2

5.2 Orthopaedic SSIs by DHB, surveillance period, October to December 2017

DHB	Procedures Oct-Dec 2017	Total arthroplasty of hip, unilateral	Total arthroplasty of hip, bilateral	Revision total arthroplasty of hip	Total arthroplasty of knee, unilateral	Total arthroplasty of knee, bilateral	Revision total arthroplasty of knee	Hemi-arthroplasty of knee
Auckland	139	57	0	10	62	6	2	2
Bay of Plenty	225	100	0	10	103	4	5	3
Canterbury	367	162	2	21	98	4	11	69
Capital & Coast	119	50	1	7	52	3	6	0
Counties Manukau Health	167	64	0	16	66	14	4	3
Hauora Tairāwhiti	42	21	0	0	15	0	1	5
Hawke's Bay	89	44	2	5	27	0	3	8
Hutt Valley	76	41	2	1	27	4	1	0
Lakes	111	48	2	4	53	4	0	0
MidCentral	83	41	0	3	37	0	2	0
Nelson Marlborough	149	75	2	7	59	0	2	4
Northland	140	71	0	5	55	8	1	0
South Canterbury	44	24	0	2	17	0	1	0
Southern	192	106	0	10	58	8	4	6
Taranaki	101	45	2	5	38	2	1	8
Waikato	219	99	10	13	81	8	6	2
Wairarapa	48	20	0	4	20	0	4	0
Waitemata	303	128	0	3	155	4	2	11
West Coast	29	14	0	0	14	0	0	1
Whanganui	74	36	0	1	37	0	0	0
Total	2,717	1,246	23	127	1,074	69	56	122
No of SSIs	35	12	0	2	19	0	2	0
SSI rate	1.3	1.0	0.0	1.6	1.8	0.0	3.6	0.0
95% CI	0.9–1.8	0.6–1.7	0.0–14.3	0.4–5.6	1.1–2.7	0.0–5.3	1.0–12.1	0.0–3.1

5.3 Cumulative SSI rates by procedure, July 2013 to December 2017

	Total arthroplasty of hip, unilateral	Total arthroplasty of hip, bilateral	Revision total arthroplasty of hip	Total arthroplasty of knee, unilateral	Total arthroplasty of knee, bilateral	Revision total arthroplasty of knee	Hemi-arthroplasty of knee	Total
Procedure	21,954	557	2,652	17,968	887	1,040	1,304	46,362
No of SSIs	222	4	75	169	4	20	4	498
SSI rate	1.0	0.7	2.8	0.9	0.5	1.9	0.3	1.1
95% CI	0.9–1.2	0.3–1.8	2.3–3.5	0.8–1.1	0.2–1.2	1.2–3.0	0.1–0.8	1.0–1.2

5.4 Rates by SSI type

5.4.1 Rates by SSI type

Results are based on 2,717 procedures for October to December 2017.

SSI type	No of SSIs	%	95% CI
Superficial	13	0.5	0.3–0.8
Deep/organ space	22	0.8	0.5–1.2
Total	35	1.3	0.9–1.8

5.4.2 Cumulative SSI rates by SSI type

Results are based on 46,362 procedures from July 2013 to December 2017.

SSI type	No of SSIs	%	95% CI
Superficial	163	0.4	0.3–0.4
Deep/organ space	335	0.7	0.6–0.8
Total	498	1.1	1.0–1.2

SSI type description: For full SSI definitions please refer to the [SSII Programme orthopaedic implementation manual](#).

Superficial SSI: Infection occurs within 30 days of the operation and involves only skin and subcutaneous tissue of the incision.

Deep SSI: Infection occurs within 90 days of the operation and involves deep soft tissues of the incision, ie, fascia and muscle layers.

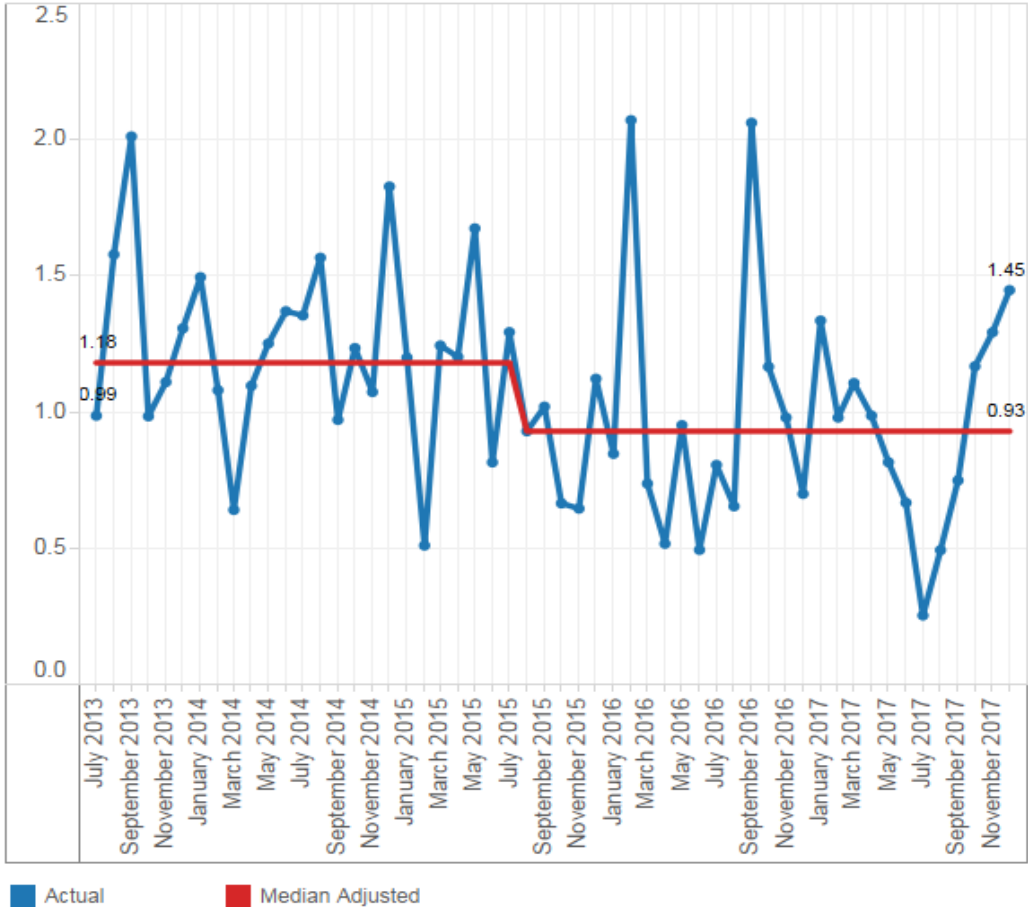
Organ space SSI: Infection occurs within 90 days of the operation and involves any part of the body that is opened or manipulated during the operative procedure, excluding the skin incision, fascia or muscle layers. For orthopaedic surgery this means osteomyelitis or joint infection.

5.5 SSI rates over time: national and by region

5.5.1 Run chart, national SSI rates over time, July 2013 to December 2017

The run chart is a commonly used quality improvement tool. Although simple in its construction, it has a rigorous basis in probability theory.¹ The ‘shift’ rule notes that six points one side or another of the median line represents a ‘shift’, where a sustained shift has taken place and results improved or worsened. At this point, a new median is drawn until another shift takes place.

The chart below shows there has been a significant shift in the median monthly SSI rate, from 1.18 percent in the baseline period to 0.93 percent since August 2015. During the reduction period, there are spikes in February and September 2016. Examination of the September DHB-level data shows the number of SSIs increased by one or two cases in seven DHBs compared with their baseline levels of zero or one case per month. Figures in both February and September are higher outliers. They indicate some one-time occurrences of special cause variation. Since July 2017 the percentage of SSIs has increased every month. It is of note that this occurred after the lowest-ever-recorded percentage of operations which had an SSI.



¹ Anhoj J and Olesen A. 2014. Run Charts Revisited: A Simulation Study of Run Chart Rules for Detection of Non-Random Variation in Health Care Processes. *PLOS ONE* 9(11).

The apparent shift point can be tested using traditional frequentist statistics by testing the difference in proportion of procedures that resulted in an infection before and after the apparent shift point in August 2015. The percentage of procedures that had an infection fell from 1.23 percent before the shift point to 0.95 percent after the shift point. This result is statistically significant ($p < 0.01$).

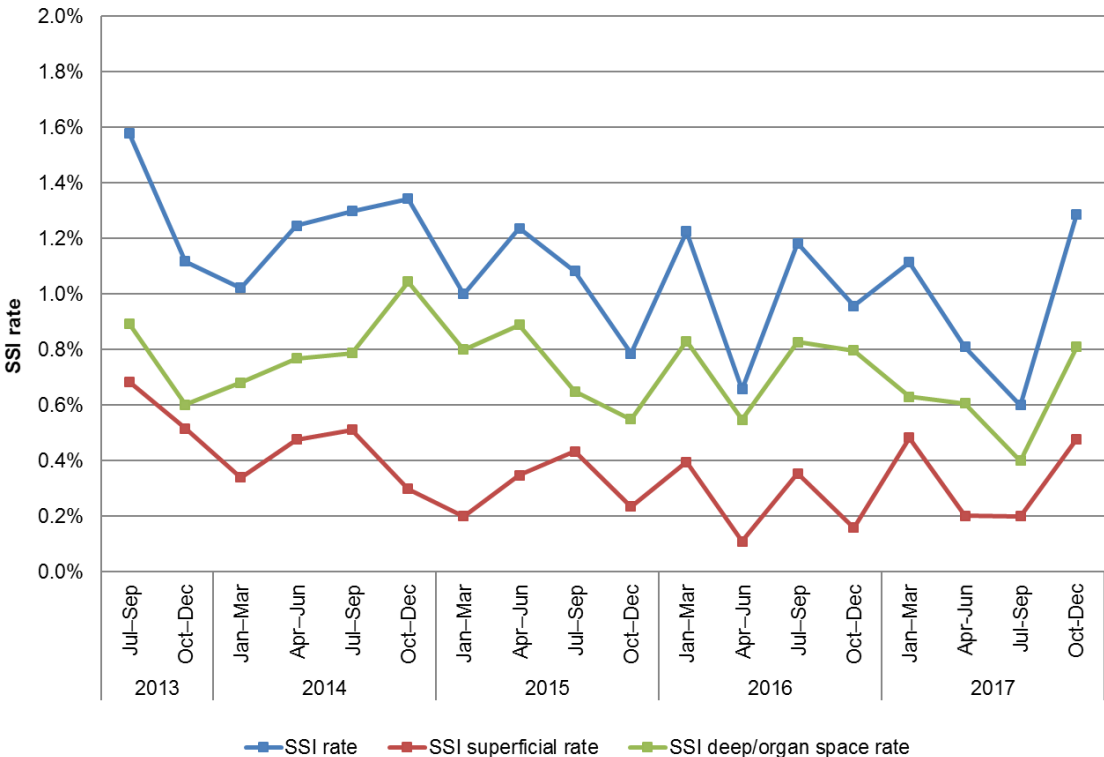
	Procedures	No of SSIs	Percentage infections
Before run shift	20,536	252	1.23%
After run shift	25,826	246	0.95%

p value 0.005

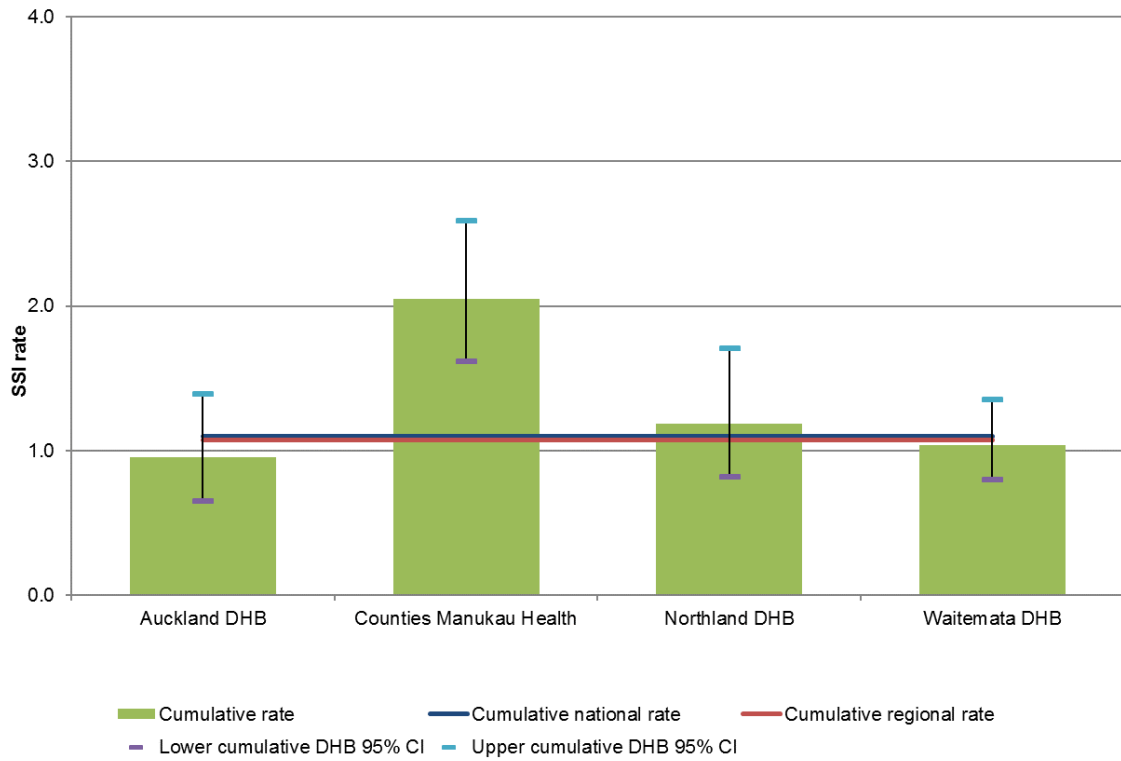
Run charts prior to the April–Jun 2017 quarter had a 12-month baseline period beginning in March 2013. The baseline now starts at July 2013. This is the point at which all 20 DHBs were participating in the programme.

During the SSII Programme data cleaning and reconciliation process, DHBs made changes to their historic data. While historic quarterly infection rates are largely unaffected, there are small changes to the monthly rates over time and these are reflected in the run chart.

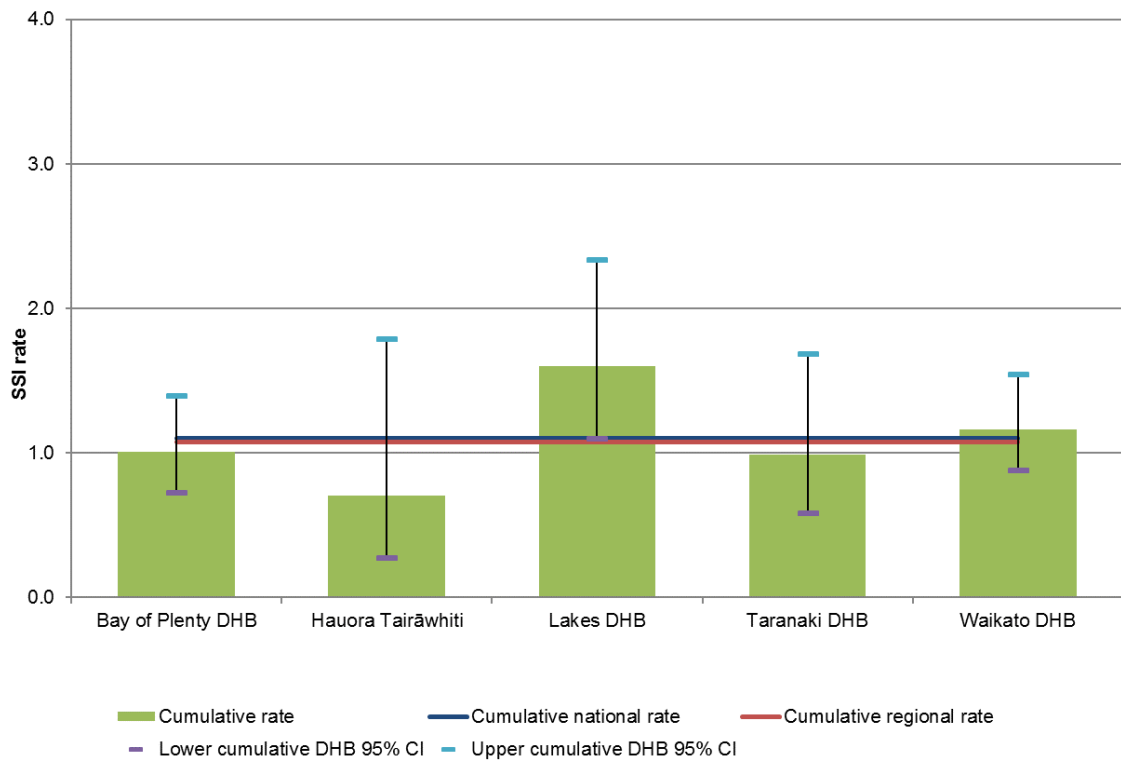
5.5.2 National orthopaedic SSI rates over time: superficial and deep/organ space, July 2013 to December 2017



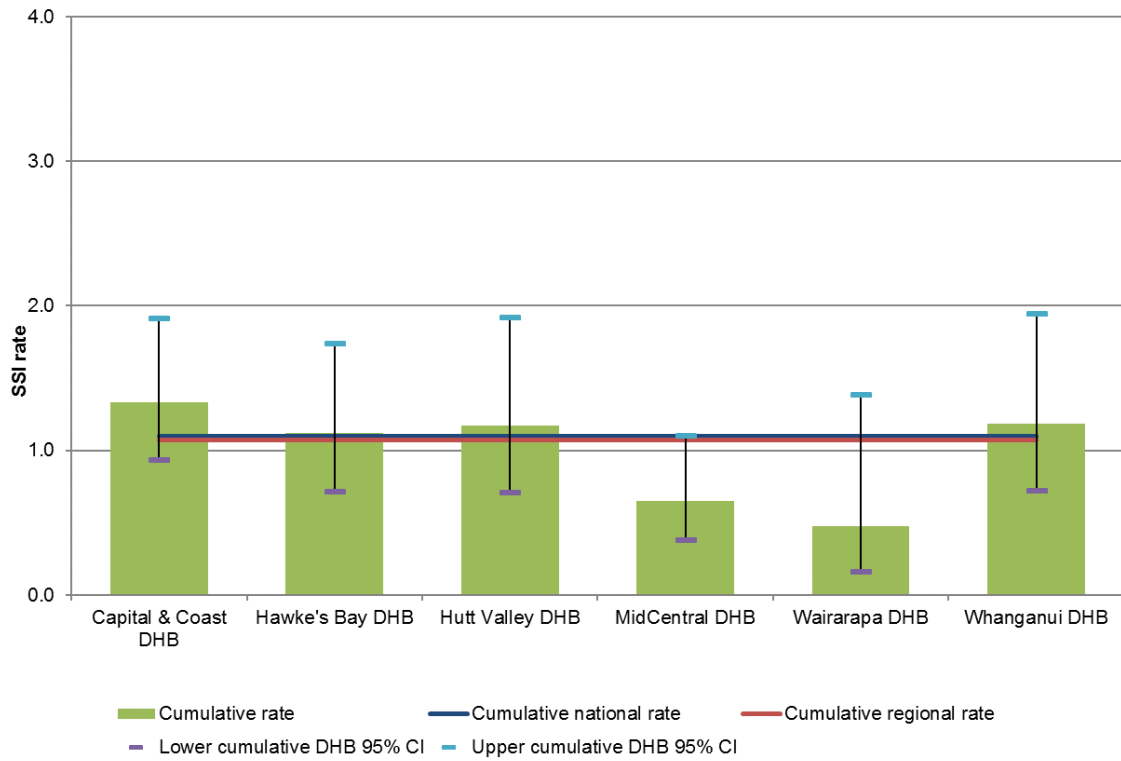
5.5.3 Northern region: SSI rates by DHB, July 2013 to December 2017



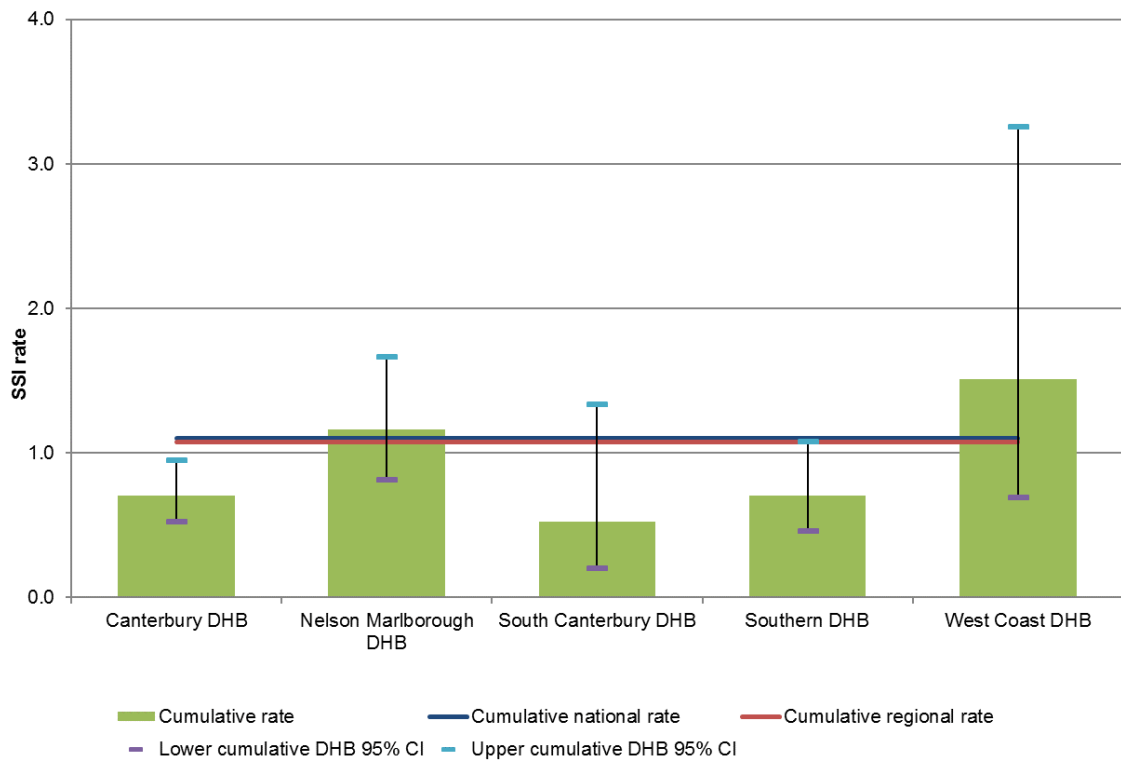
5.5.4 Midland region: SSI rates by DHB, July 2013 to December 2017



5.5.5 Central region: SSI rates by DHB, July 2013 to December 2017



5.5.6 South Island region: SSI rates by DHB, July 2013 to December 2017



6 Timing of antibiotic prophylaxis

The QSM for timing of antibiotic prophylaxis for primary procedures is 100 percent 'on time', 0–60 minutes before knife to skin (KTS).

6.1 Primary arthroplasties, October to December 2017

DHB	Total	Total 'on time'	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	127	120	94	3	3	1
Bay of Plenty	210	210	100	0	0	0
Canterbury	335	335	100	0	0	0
Capital & Coast	106	106	100	0	0	0
Counties Manukau Health	147	137	93	1	1	8
Hauora Tairāwhiti	41	38	93	1	1	1
Hawke's Bay	81	81	100	0	0	0
Hutt Valley	74	74	100	0	0	0
Lakes	107	105	98	1	1	0
MidCentral	78	78	100	0	0	0
Nelson Marlborough	140	140	100	0	0	0
Northland	134	128	96	0	6	0
South Canterbury	41	41	100	0	0	0
Southern	178	178	100	0	0	0
Taranaki	95	95	100	0	0	0
Waikato	200	197	99	2	1	0
Wairarapa	40	40	100	0	0	0
Waitemata	298	287	96	1	10	0
West Coast	29	29	100	0	0	0
Whanganui	73	73	100	0	0	0
Total	2,534	2,492	98	9	23	10
				0.4%	0.9%	0.4%

To calculate the percentage 'on time', those with timing not recorded are included in the denominator, ie, number of procedures performed.

6.2 Revision arthroplasties, October to December 2017

DHB	Total	Total 'on time'	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	12	11	92	0	0	1
Bay of Plenty	15	15	100	0	0	0
Canterbury	32	32	100	0	0	0
Capital & Coast	13	13	100	0	0	0
Counties Manukau Health	20	18	90	2	0	0
Hauora Tairāwhiti	1	1	100	0	0	0
Hawke's Bay	8	7	88	0	1	0
Hutt Valley	2	2	100	0	0	0
Lakes	4	4	100	0	0	0
MidCentral	5	5	100	0	0	0
Nelson Marlborough	9	9	100	0	0	0
Northland	6	5	83	0	1	0
South Canterbury	3	2	67	0	1	0
Southern	14	13	93	0	1	0
Taranaki	6	5	83	0	1	0
Waikato	19	18	95	0	1	0
Wairarapa	8	8	100	0	0	0
Waitemata	5	5	100	0	0	0
West Coast	0	0	NA	0	0	0
Whanganui	1	1	100	0	0	0
Total	183	174	95	2	6	1
				1.1%	3.3%	0.5%

In the uncommon situation when infection is strongly suspected as the reason for revision, it is recommended that prophylaxis is delayed until microbiology specimens have been obtained. This is the reason for reporting timing for revision procedures separately.

The [National periprosthetic joint infection sampling and culture guide](#) released March 2018 aims to improve the consistency of approach to diagnosing periprosthetic joint infections.

In most revision procedures, however, prophylaxis should be given 'on time', ie, 0–60 minutes before KTS, as observed above.

6.3 All procedures, October to December 2017

DHB	Total	Total 'on time'	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	139	131	94	3	3	2
Bay of Plenty	225	225	100	0	0	0
Canterbury	367	367	100	0	0	0
Capital & Coast	119	119	100	0	0	0
Counties Manukau Health	167	155	93	3	1	8
Hauora Tairāwhiti	42	39	93	1	1	1
Hawke's Bay	89	88	99	0	1	0
Hutt Valley	76	76	100	0	0	0
Lakes	111	109	98	1	1	0
MidCentral	83	83	100	0	0	0
Nelson Marlborough	149	149	100	0	0	0
Northland	140	133	95	0	7	0
South Canterbury	44	43	98	0	1	0
Southern	192	191	99	0	1	0
Taranaki	101	100	99	0	1	0
Waikato	219	215	98	2	2	0
Wairarapa	48	48	100	0	0	0
Waitemata	303	292	96	1	10	0
West Coast	29	29	100	0	0	0
Whanganui	74	74	100	0	0	0
Total	2,717	2,666	98	11	29	11
				0.4%	1.1%	0.4%

6.4 Compliance with prophylaxis timing QSM (primary procedures), July 2013 to December 2017

Decimal places are not included in the RAG charts but the cells are coloured according to the unrounded value.

Key

< 95%	95–99.9%	100% QSM achieved
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Region	DHB	2013		2014				2015				2016				2017			
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Northern	Auckland	97	98	98	96	96	96	96	95	97	95	94	97	96	98	98	95	98	94
	Counties Manukau Health	52	70	80	83	94	97	99	97	97	98	94	99	94	92	95	96	95	93
	Northland	98	89	98	97	95	96	93	91	92	98	98	99	98	99	95	93	90	96
	Waitemata	92	92	95	97	98	98	97	94	98	96	92	92	98	95	94	90	97	96
Midland	Bay of Plenty	95	92	95	97	95	97	98	99	99	96	99	98	99	99	98	98	97	100
	Hauora Tairāwhiti	91	91	88	48	88	95	97	95	100	91	97	87	94	100	92	100	93	93
	Lakes	100	98	99	98	100	99	99	98	97	100	97	97	100	99	98	100	100	98
	Taranaki	93	91	100	97	98	90	95	78	94	89	100	100	99	100	97	100	100	100
	Waikato	85	98	90	87	92	81	93	92	94	97	98	98	99	96	99	97	99	99
Central	Capital & Coast	93	96	93	99	95	98	96	100	100	100	100	100	100	100	100	100	99	100
	Hawke's Bay	93	88	95	93	100	98	100	100	100	98	100	100	100	100	97	100	99	100
	Hutt Valley	99	85	54	91	94	91	95	97	98	94	96	98	99	98	100	100	100	100
	MidCentral	91	94	96	99	97	96	90	100	99	98	98	98	99	98	100	98	100	100
	Wairarapa	97	100	100	97	100	96	100	100	100	95	100	100	94	100	100	100	100	100
	Whanganui	90	93	100	100	100	100	100	100	100	100	100	100	100	100	100	100	99	100
Southern	Canterbury	94	96	97	96	94	99	97	100	100	98	99	100	99	100	99	98	100	100
	Nelson Marlborough	92	87	97	99	100	98	97	99	96	99	100	98	100	99	97	96	97	100
	South Canterbury	93	84	95	100	100	100	100	100	96	100	100	95	100	100	95	98	95	100
	Southern	77	66	88	91	92	93	92	93	92	90	97	96	97	99	98	96	95	100
	West Coast	87	94	100	89	100	100	96	100	93	100	100	100	100	100	100	100	100	100

7 Dosing of cefazolin and cefuroxime prophylaxis

The SSII Programme antibiotic prophylaxis of choice is ≥ 2 g of cefazolin or ≥ 1.5 g of cefuroxime. The QSM requires either to be used in at least 95 percent of procedures.

DHB	Total*	Cefazolin used as prophylaxis	Doses used				Cefuroxime ≥ 1.5 g	Not recorded	Cefazolin or cefuroxime used in acceptable dose %
			< 2 g	2 g	≥ 3 g	≥ 2 g%			
Auckland	139	135	2	130	3	96	0	2	96
Bay of Plenty	225	221	0	214	7	98	0	0	98
Canterbury	367	363	0	363	0	99	0	0	99
Capital & Coast	119	118	0	117	1	99	0	0	99
Counties Manukau Health	167	166	1	161	4	99	0	0	99
Hauora Tairāwhiti	42	38	0	35	3	90	0	1	90
Hawke's Bay	89	82	0	82	0	92	6	0	99
Hutt Valley	76	75	0	71	4	99	0	0	99
Lakes	111	107	0	75	32	96	0	0	96
MidCentral	83	7	0	7	0	8	75	0	99
Nelson Marlborough	149	144	3	140	1	95	3	0	97
Northland	140	135	1	134	0	96	0	0	96
South Canterbury	44	41	0	41	0	93	0	0	93
Southern	192	165	4	157	4	84	25	0	97
Taranaki	101	99	0	98	1	98	0	0	98
Waikato	219	212	7	181	24	94	0	0	94
Wairarapa	48	48	0	0	48	100	0	0	100
Waitemata	303	294	1	290	3	97	1	0	97
West Coast	29	29	0	28	1	100	0	0	100
Whanganui	74	74	0	74	0	100	0	0	100
Total	2,717	2,553	19	2,398	136	93	110	3	97
		94%	0.7%	88%	5%		4%		

* Includes procedures (51 of the 2,717) receiving other antibiotics for prophylaxis.

7.1 Compliance with dose QSM, July 2013 to December 2017

Key

< 90% 90–94.9% ≥ 95% QSM achieved

Region	DHB	2013		2014				2015				2016				2017			
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Northern	Auckland	85	92	96	95	95	98	100	98	96	94	96	96	98	95	98	95	97	96
	Counties Manukau Health	68	78	82	90	98	98	100	98	99	100	97	99	95	99	99	97	100	99
	Northland	56	90	95	98	94	93	96	95	93	98	100	98	96	96	96	98	93	96
	Waitemata	66	72	82	97	96	98	97	93	96	95	95	94	95	97	96	97	97	97
Midland	Bay of Plenty	72	93	93	95	95	99	99	96	99	97	99	97	98	99	97	97	97	98
	Hauora Tairāwhiti	96	92	87	96	92	98	97	98	100	97	97	94	100	100	100	92	91	90
	Lakes	96	94	96	95	95	99	97	96	96	98	97	96	99	99	98	99	98	96
	Taranaki	15	24	15	29	35	41	30	66	51	51	57	67	83	94	90	97	96	98
	Waikato	76	78	87	93	94	95	90	93	94	94	95	97	95	94	97	96	94	94
Central	Capital & Coast	100	98	97	96	99	98	98	98	100	99	99	99	98	98	99	98	99	99
	Hawke's Bay	11	36	61	71	85	89	93	97	99	94	97	99	97	98	98	98	98	99
	Hutt Valley		89	96	97	94	100	100	100	99	97	97	96	99	98	98	100	95	99
	MidCentral	2		3	4	8	10	95	98	98	95	96	98	97	99	99	97	98	99
	Wairarapa	90	88	81	94	100	94	100	100	100	95	100	97	100	100	100	97	100	100
	Whanganui	9	69	95	94	95	99	100	92	98	99	100	98	98	100	98	96	98	100
Southern	Canterbury	46	54	65	86	95	97	97	97	97	98	96	98	97	98	98	98	99	99
	Nelson Marlborough	26	69	93	99	99	97	100	99	99	100	97	98	98	99	94	99	100	97
	South Canterbury	76	51	97	91	93	95	95	94	93	92	97	94	95	90	92	98	85	93
	Southern	22	45	65	81	77	81	90	93	96	94	96	95	94	97	97	95	94	97
	West Coast	13	61	30	95	100	100	96	100	96	95	100	95	95	96	100	95	93	100

8 Duration of antibiotic prophylaxis after surgery

The SSII Programme encourages DHBs to focus on discontinuing surgical antimicrobial prophylaxis within 24 hours of surgery. Three doses of cefazolin or cefuroxime given every eight hours after surgery is accepted as discontinuing within 24 hours of surgery.

8.1 Primary arthroplasties, October to December 2017

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	127	127	100	0	0
Bay of Plenty	210	210	100	0	0
Canterbury	335	320	96	15	0
Capital & Coast	106	106	100	0	0
Counties Manukau Health	147	147	100	0	0
Hauora Tairāwhiti	41	39	95	2	0
Hawke's Bay	81	81	100	0	0
Hutt Valley	74	74	100	0	0
Lakes	107	106	99	1	0
MidCentral	78	78	100	0	0
Nelson Marlborough	140	139	99	1	0
Northland	134	130	97	4	0
South Canterbury	41	39	95	2	0
Southern	178	178	100	0	0
Taranaki	95	95	100	0	0
Waikato	200	197	99	3	0
Wairarapa	40	40	100	0	0
Waitemata	298	298	100	0	0
West Coast	29	29	100	0	0
Whanganui	73	73	100	0	0
Total	2,534	2,506	99	28	0
				1%	0.0%

* Includes procedures that did not receive any prophylaxis after surgery.

8.2 Revision arthroplasties, October to December 2017

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	12	12	100	0	0
Bay of Plenty	15	15	100	0	0
Canterbury	32	22	69	10	0
Capital & Coast	13	13	100	0	0
Counties Manukau Health	20	20	100	0	0
Hauora Tairāwhiti	1	0	0	1	0
Hawke's Bay	8	8	100	0	0
Hutt Valley	2	2	100	0	0
Lakes	4	4	100	0	0
MidCentral	5	5	100	0	0
Nelson Marlborough	9	9	100	0	0
Northland	6	6	100	0	0
South Canterbury	3	2	67	1	0
Southern	14	13	93	1	0
Taranaki	6	5	83	1	0
Waikato	19	17	89	2	0
Wairarapa	8	8	100	0	0
Waitemata	5	5	100	0	0
West Coast	0	0	NA	0	0
Whanganui	1	1	100	0	0
Total	183	167	91	16	0
				9%	0%

* Includes procedures where the patient did not receive any prophylaxis after surgery.

In the uncommon situation when infection is suspected as the reason for revision, some choose to continue prophylaxis until the microbiology results are reported. This is the reason for reporting the duration of prophylaxis following revision procedures separately.

8.3 All procedures, October to December 2017

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	139	139	100	0	0
Bay of Plenty	225	225	100	0	0
Canterbury	367	342	93	25	0
Capital & Coast	119	119	100	0	0
Counties Manukau Health	167	167	100	0	0
Hauora Tairāwhiti	42	39	93	3	0
Hawke's Bay	89	89	100	0	0
Hutt Valley	76	76	100	0	0
Lakes	111	110	99	1	0
MidCentral	83	83	100	0	0
Nelson Marlborough	149	148	99	1	0
Northland	140	136	97	4	0
South Canterbury	44	41	93	3	0
Southern	192	191	99	1	0
Taranaki	101	100	99	1	0
Waikato	219	214	98	5	0
Wairarapa	48	48	100	0	0
Waitemata	303	303	100	0	0
West Coast	29	29	100	0	0
Whanganui	74	74	100	0	0
Total	2,717	2,673	98	44	0
				2%	0%

* Includes procedures where the patient did not receive any prophylaxis after surgery.

8.4 Postoperative prophylaxis stopped within 24 hours (all procedures), July 2013 to December 2017

Key

< 95%	95–99%	100%
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Region	DHB	2013		2014				2015				2016				2017				
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
Northern	Auckland	43	82	92	99	99	99	99	99	100	100	100	100	100	100	100	100	100	100	100
	Counties Manukau Health	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Northland	98	87	95	95	97	95	98	99	99	100	100	100	100	99	99	98	90	97	
	Waitemata	63	84	89	96	94	97	89	91	91	91	93	94	94	93	94	94	96	100	
Midland	Bay of Plenty	81	93	90	92	92	94	94	94	95	95	100	100	99	99	99	99	98	100	
	Hauora Tairāwhiti	87	92	80	91	84	98	97	95	100	100	100	100	100	100	96	88	100	93	
	Lakes	90	87	96	91	93	95	90	94	96	100	97	99	99	95	100	100	97	99	
	Taranaki	9	2	2	4	94	87	93	95	97	100	91	99	97	98	68	100	100	99	
	Waikato	53	78	83	84	88	80	88	93	96	92	91	99	95	93	94	90	93	98	
Central	Capital & Coast	31	98	100	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
	Hawke's Bay	98	98	93	97	100	100	100	100	100	100	100	100	100	100	100	99	100	100	
	Hutt Valley	82	95	100	100	95	100	100	99	100	100	99	100	100	100	98	97	98	100	
	MidCentral	41	0	10	1	4	46	87	93	95	95	96	98	100	98	100	97	100	100	
	Wairarapa	6	0	6	18	57	63	76	91	91	95	95	100	100	100	100	100	97	100	
	Whanganui	100	95	52	93	96	97	74	97	97	80	69	100	98	100	76	98	100	100	
Southern	Canterbury	6	36	35	17	21	37	78	91	87	88	90	91	93	97	98	97	95	93	
	Nelson Marlborough	79	84	95	97	96	98	99	98	99	100	100	100	98	99	100	97	100	99	
	South Canterbury	91	86	97	94	93	95	97	94	93	92	97	94	93	88	92	95	93	93	
	Southern	83	77	90	90	94	99	98	96	98	96	96	99	99	99	99	95	99	99	
	West Coast	25	94	85	100	96	95	96	100	96	95	100	100	100	100	100	100	100	100	

9 Risk scores and SSI rates

The American Society of Anesthesiologists (ASA) score is a global score to assess the physical status of patients before surgery. It has five classes, from 1 (a normal healthy patient) up to 5 (a moribund patient not expected to survive).

(See *ANZ Journal of Surgery*, www.anzjsurg.com/view/0/ASA_score.html.)

The SSI risk index is a score used to predict a surgical patient's risk of acquiring an SSI.

Total surgical risk score = ASA risk score (ASA > 2, score 1)

+ surgical wound score (contaminated or dirty wounds, score 1)

+ operation duration score (procedure taking more than 2 hours, score 1).

9.1 ASA scores and SSI rates, October to December 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	202	1,558	869	36	1	51	2,717
No of SSIs	1	14	19	0	0	1	35
SSI rate (%)	0.5	0.9	2.2	0.0	0.0	2.0	1.3
95% CI	0.1–2.8	0.5–1.5	1.4–3.4	0.0–9.6	0.0–79.3	0.3–10.3	0.9–1.8

9.2 Cumulative ASA scores and SSI rates, July 2013 to December 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	3,871	27,080	14,103	566	32	710	46,362
No of SSIs	20	220	231	13	1	13	498
SSI rate (%)	0.5	0.8	1.6	2.3	3.1	1.8	1.1
95% CI	0.3–0.8	0.7–0.9	1.4–1.9	1.3–3.9	0.6–15.7	1.1–3.1	1.0–1.2

9.3 Total surgical risk scores and SSI rates, October to December 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	1,598	914	154	0	51	2,717
SSI	13	18	3	0	1	35
SSI rate (%)	0.8	2.0	1.9	NA	2.0	1.3
95% CI	0.5–1.4	1.2–3.1	0.7–5.6	NA	0.3–10.3	0.9–1.8

9.4 Cumulative total surgical risk scores and SSI rates, July 2013 to December 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	27,488	15,587	2,540	22	725	46,362
SSI	191	234	60	0	13	498
SSI rate (%)	0.7	1.5	2.4	0.0	1.8	1.1
95% CI	0.6–0.8	1.3–1.7	1.8–3.0	0.0–14.9	1.1–3	1.0–1.2

10 ACC treatment injury claims following hip and knee surgery

ACC accepts claims for treatment injury in accord with the Accident Compensation Act (2001, amended 2005).

A treatment injury is a personal injury suffered during treatment from a registered health professional – but exclusions do apply. The definition of treatment is broad and includes diagnosis and treatment decisions, as well as omission or failure to provide treatment. SSIs may be accepted as a treatment injury. Infections of all types are the most frequent treatment injury claim accepted by ACC.

The number of treatment injury claims for infections following hip and knee surgery has increased substantially over the last five years. The average cost of these claims has also risen significantly. While cost is not a direct measure of severity, it is a useful proxy.

The reason for differences between accepted treatment injury claims and the SSIs reported through the SSII Programme (and summarised in this report) are not yet clear. The treatment injury claims due to hip and knee surgery include the same procedures within the scope of the SSII Programme and a small number of hip and knee procedures delivered by orthopaedic surgeons and their surgical teams (for example, procedures following trauma, including fractured neck of femur). Infections include both SSIs and other infections following surgery (for example, line infections).

Treatment injury claims can be lodged by any health professional. This means a proportion of infections following surgical procedures, detected by primary care facilities, are unlikely to be entered into the National Minimum Dataset or detected by the SSII Programme. Further exploration is required to understand the total amount of patient harm due to SSIs. This will require drawing on multiple sources of data.

The main purpose of tracking the number of treatment injuries over time is to encourage improvement in treatment safety within each DHB and hospital. The observed increase in frequency and average cost of accepted claims raises some important questions, given that each represents a person harmed by the treatment they received.

Comprehensive information about treatment injury is available at: www.acc.co.nz/treatmentsafety.

10.1 Accepted treatment injury claims

Professor Alan Merry, board chair of the Health Quality & Safety Commission, stated in his foreword to ACC's publication *Treatment Injury Information: Supporting Patient Safety* (April 2017): 'While there is no one single measure of safety in health, different sources of data can be used together to build a more complete picture of how safe our health care services are, and identify where improvement is needed' and 'the publication is quite right in emphasising that each accepted injury claim represents a person harmed. There is no room here for complacency.'

Accepted treatment injury claims must meet the criteria in the Act. Criteria have not changed since 2005. The key criteria are that the patient has suffered a physical injury caused by treatment from a registered health professional that is not an ordinary consequence. Claims include infections (superficial or deep) that follow surgical procedures.

10.1.1 Treatment injury claims for infection following hip surgery for all DHB facilities by calendar year, 2013–17

	Calendar year				
	2013	2014	2015	2016	2017
Accepted DHB claims	53	77	76	82	69
Active DHB claims	94	136	150	186	163
Cost of active claims	\$935,239	\$1,203,810	\$1,606,286	\$1,820,998	\$1,257,184
Cost per active claim	\$9,949	\$8,852	\$10,709	\$9,790	\$7,713

10.1.2 Treatment injury claims for infection following knee surgery for all DHB facilities by calendar year, 2013–17

	Calendar year				
	2013	2014	2015	2016	2017
Accepted DHB claims	48	66	82	100	53
Active DHB claims	85	118	133	171	129
Cost of active claims	\$728,629	\$649,059	\$1,169,682	\$1,999,359	\$830,637
Cost per active claim	\$8,572	\$5,501	\$8,795	\$11,692	\$6,439

Accepted DHB claims = number of accepted treatment injury claims for infection following hip/knee surgery performed in all DHB facilities over the last five calendar years.

Active DHB claims = number of active claims for infection following hip/knee surgery performed in all DHB facilities over the last five calendar years. 'Active' means the claim is open and has received a payment in that calendar year.

Cost of active claims = total cost of active claims for infection following hip/knee surgery performed in all DHB facilities over the last five calendar years.

Cost per active claim = average cost per active claim for infection following hip/knee surgery performed in all DHB facilities over the last five calendar years.

11 Progress against the QSMs, skin preparation and postoperative duration of prophylaxis

		Timing* (100%)	Dose** (95%)	Skin preparation (100%)	Postoperative duration < 24 hrs	SSI rate (%)
2013	Mar–Jun (baseline***) (A)	91.3	50.6	70.9	67.1	1.2
		1,151/1,260	698/1,379	978/1,379	925/1,379	16/1,379
	Jul–Sep (B)	89.5	55.3	74.9	59.8	1.6
		1,519/1,697	1,050/1,900	1,424/1,900	1,136/1,900	30/1,900
2013	Oct–Dec (C)	89.6	67.9	79.8	73.8	1.1
		1,860/2,077	1,580/2,326	1,856/2,326	1,717/2,326	26/2,326
2014	Jan–Mar (D)	93.2	77.9	93.8	76.7	1.0
		2,000/2,146	1,828/2,347	2,202/2,347	1,801/2,347	24/2,347
	Apr–Jun (E)	93.9	84.5	98.9	74.9	1.2
		2,368/2,521	2,307/2,729	2,699/2,729	2,043/2,729	34/2,729
2014	Jul–Sep (F)	95.8	88.1	99.5	80.0	1.3
		2,217/2,313	2,239/2,540	2,528/2,540	2,031/2,540	33/2,540
2014	Oct–Dec (G)	94.9	90.0	99.5	84.6	1.3
		2,307/2,432	2,413/2,682	2,669/2,682	2,268/2,682	36/2,682
2015	Jan–Mar (H)	96.2	94.7	99.9	92.3	1.0
		2,183/2,269	2,364/2,497	2,494/2,497	2,304/2,497	25/2,497
	Apr–Jun (I)	96.2	95.3	99.8	95.5	1.2
		2,267/2,356	2,465/2,587	2,582/2,587	2,471/2,587	32/2,587
2015	Jul–Sep (J)	97.2	95.7	99.6	95.7	1.1
		2,466/2,538	2,650/2,770	2,759/2,770	2,651/2,770	30/2,770
2015	Oct–Dec (K)	96.7	95.5	99.8	95.4	0.8
		2,246/2,323	2,431/2,546	2,541/2,546	2,429/2,546	20/2,546
2016	Jan–Mar (L)	97.3	95.8	99.8	95.4	1.2
		2,275/2,339	2,421/2,528	2,524/2,528	2,411/2,528	31/2,528
	Apr–Jun (M)	97.6	95.9	99.7	97.4	0.7
		2,484/2,544	2,622/2,734	2,726/2,734	2,664/2,734	18/2,734
2016	Jul–Sep (N)	98.3	96.3	99.5	97.5	1.2
		2,324/2,364	2,442/2,536	2,523/2,536	2,472/2,536	30/2,536
2016	Oct–Dec (O)	98.2	97.5	99.1	97.8	1.0
		2,287/2,329	2,445/2,508	2,486/2,508	2,453/2,508	24/2,508
2017	Jan–Mar (P)	97.6	97.2	99.0	96.5	1.1
		2,470/2,531	2,617/2,693	2,667/2,693	2,599/2,693	30/2,693
	Apr–Jun (Q)	96.7	97.0	98.3	96.8	0.8
		2,682/2,774	2,876/2,965	2,915/2,965	2,870/2,965	24/2,965
2017	Jul–Sep (R)	97.8	96.7	99.4	97.1	0.6
		2,530/2,587	2,672/2,761	2,718/2,735	2,682/2,761	16/2,761
2017	Oct–Dec (S)	98.3	97.3	99.5	98.9	1.3
		2,534/2,492	2,644/2,717	2,643/2,657	2,506/2,717	35/2,717

* For March to June 2013 the percentage is for all procedures. Primary procedures are only from July 2013 onwards. Statistical analysis therefore only compares (B) to (Q) time periods.

** Since 1 January 2015, ≥ 1.5 g cefuroxime is approved as an acceptable alternative.

*** Not all 20 DHBs submitted data.

Statistical analysis of process marker

- Timing: b vs. s, $p < 0.0001$.
- Dose: a vs. b, $p = 0.01$; b vs. c, $p < 0.0001$; c vs. d, $p < 0.0001$; d vs. e, $p < 0.0001$; e vs. f, $p < 0.0002$; f vs. g, $p = 0.04$; g vs. h, $p < 0.0001$; a vs. s, $p < 0.0001$.
- Alcohol-based skin preparation: a vs. s, $p < 0.0001$.
- Postoperative duration: a vs. s, $p < 0.0001$.

12 Timeline of future reports

Surveillance period	90-day follow-up ends	All data entered by	Draft report circulated for feedback	Final report circulated	Commission QSM publication
Jan–Mar 2018	30 Jun 2018	31 Jul 2018	Early Aug 2018	Sep 2018	30 Sep 2018
Apr–Jun 2018	30 Sep 2018	31 Oct 2018	Early Nov 2018	Dec 2018	15 Dec 2018
Jul–Sep 2018	31 Dec 2018	31 Jan 2019	Early Feb 2019	Mar 2019	31 Mar 2019

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