Health Quality & Safety Commission New Zealand
Kupu Taurangi Hauora o Aotearoa

ACC
PREVENTION. CARE. RECOVERY.
Te Kaporeihana Āwhina Hunga Whara

National Orthopaedic Surgery Report

April to June 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
Povl/Alc	Povidone iodine in alcohol
QSM	Quality and safety marker
SSI	Surgical site infection
SSII	Surgical Site Infection Improvement

Contents

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 April to 30 June 2017. It also provides cumulative data from 1 March 2013 to 30 June 2017.

2.1 April to June 2017

During this surveillance period:

- district health boards (DHBs) performed 2,965 hip and knee arthroplasty procedures, compared with 2,693 in April to June 2017
- there were 24 surgical site infections (SSIs) in this quarter, a rate of 0.8 percent compared with 1.1 percent in the last quarter. Eighteen SSIs (75 percent) were deep/organ space. Six SSIs (25 percent) were superficial
- national performance against the prophylaxis timing quality and safety marker (QSM) for primary procedures was 97 percent, down from 98 percent in the previous quarter. The target is 100 percent. Nine DHBs achieved 100 percent compliance (compared with six in the previous quarter) and 18 DHBs recorded 95 percent or greater. Eight DHBs had one or more procedures where timing was not recorded. In 2.6 percent of cases, antibiotic prophylaxis was given either early or late (compared with 1.7 percent in the last quarter)
- national performance against the dose QSM was 97 percent. The target is 95 percent. Eighteen DHBs now comply with the dose QSM, compared with 17 in the last quarter. Twenty-five patients received less than 2 g of cefazolin; six (24 percent) were under-dosed as they weighed more than 80 kg and received 1 g of cefazolin
- prophylaxis was stopped within 24 hours in 97 percent of all procedures. Eight DHBs stopped prophylaxis within 24 hours for all procedures, down from nine in the previous quarter and 10 in the October–December 2016 quarter. Seventy 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
- eight DHBs met both QSMs: Lakes, Taranaki, Capital & Coast, Hawke's Bay, Hutt Valley, Wairarapa, Whanganui and West Coast. Congratulations to these DHBs.

2.2 Cumulative findings

Between March 2013 and June 2017 the cumulative procedure total was 42,267 with 463 SSIs, 1.1 percent (95 percent confidence interval (CI) 1.0–1.2).

3 Change in reporting format

3.1 SSII Programme data cleaning and reconciliation

Over the last quarter there has been a significant focus on reconciling and reviewing the historic programme data. This has been a joint effort between the national programme team and DHBs. Changes have been made to the historic data as a result of this process and these changes are reflected in the run chart (page 10) and the cumulative tables in this report. Most changes relate to procedures that took place during 2013 and 2014. The national quarterly SSI rates are unchanged except for the October–December 2013 quarter, in which the SSI rate dropped from 1.3 percent to 1.1 percent.

In future, the cumulative data in the national reports will be taken directly from the reconciled national SSI monitor.

3.2 ACC treatment injury claim information

Since February 2016, ACC has supported the SSII Programme's work to reduce SSIs. Treatment injury claims for all infections following hip and knee surgery have increased substantially over the last five years. In the January–March 2017 report we introduced a new, permanent section (section 10, page 25), which gives an overview of accepted treatment injury claims and claim data for 2011–16. Understanding the total amount of patient harm due to SSIs requires further exploration and drawing on multiple sources of data.

3.2 Run chart displaying the outcome marker by month

Since the July–September 2016 quarter, a run chart showing the outcome marker (number of SSIs per 100 hip and knee procedures) over time by month has replaced the graph showing the outcome marker over time by quarter. The run chart format lets us identify when results have changed more quickly and precisely. Any shifts revealed can be tested using traditional statistical approaches.

3.4 Future reporting format

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

4 Programme changes

Change	Date effective
Due to the continual high compliance against the 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
Prophylaxis up to 24 hours after surgery is acceptable for the procedures in this 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 ≥ 2 g remains the agent of choice for prophylaxis for the procedures included in this 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 Apr–Jun 2017	No of SSIs	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	Cumulative procedures from Mar 2013	Cumulative SSIs	%	Cumulative 95% CI
Auckland	186	2	1.1	0.3–3.8	582	3	0.5	2,662	30	1.1	0.8–1.6
Bay of Plenty	177	1	0.6	0.1–3.1	756	6	0.8	3,230	36	1.1	0.8–1.5
Canterbury	382	1	0.3	0.0–1.5	1,470	8	0.5	5,613	35	0.6	0.4–0.9
Capital & Coast	132	1	0.8	0.1–4.2	586	7	1.2	2,054	28	1.4	0.9–2
Counties Manukau Health	160	4	2.5	1.0–6.3	681	10	1.5	2,971	60	2.0	1.6–2.6
Hauora Tairāwhiti	26	0	0.0	0.0–12.9	112	0	0.0	484	3	0.6	0.2–1.8
Hawke's Bay	127	2	1.6	0.4–5.6	426	5	1.2	1,620	20	1.2	0.8–1.9
Hutt Valley	62	0	0.0	0.0–5.8	264	3	1.1	1,195	16	1.3	0.8–2.2
Lakes	94	0	0.0	0.0–3.9	363	7	1.9	1,414	22	1.6	1–2.3
MidCentral	123	1	0.8	0.1–4.5	443	5	1.1	1,817	12	0.7	0.4–1.2
Nelson Marlborough	197	2	1.0	0.3–3.6	579	6	1.0	2,321	23	1.0	0.7–1.5
Northland	156	1	0.6	0.1–3.5	627	5	0.8	2,097	23	1.1	0.7–1.6
South Canterbury	42	0	0.0	0.0–8.4	201	1	0.5	675	4	0.6	0.2–1.5
Southern	194	2	1.0	0.3–3.7	711	2	0.3	2,616	19	0.7	0.5–1.1
Taranaki	94	0	0.0	0.0–3.9	329	4	1.2	1,130	10	0.9	0.5–1.6
Waikato	327	2	0.6	0.2–2.2	901	10	1.1	3,618	45	1.2	0.9–1.7
Wairarapa	36	0	0.0	0.0–9.6	128	1	0.8	547	3	0.5	0.2–1.6
Waitemata	346	4	1.2	0.5–2.9	1,190	20	1.7	4,753	53	1.1	0.9–1.5
West Coast	20	0	0.0	0.0–16.1	77	1	1.3	339	6	1.8	0.8–3.8
Whanganui	84	1	1.2	0.2–6.4	276	4	1.4	1,111	15	1.4	0.8–2.2
Total	2,965	24	0.8	0.5–1.2	10,702	108	1.0	42,267	463	1.1	1.0–1.2

5.2 Orthopaedic SSIs by DHB surveillance period, April to June 2017

DHB	Procedures Apr–June 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	186	72	2	8	93	4	7	0
Bay of Plenty	177	79	0	10	77	2	5	4
Canterbury	382	182	10	19	91	2	11	67
Capital & Coast	132	52	0	14	63	0	3	0
Counties Manukau Health	160	62	8	15	69	2	4	0
Hauora Tairāwhiti	26	17	0	0	6	0	0	3
Hawke's Bay	127	75	0	3	48	0	1	0
Hutt Valley	62	29	2	0	28	2	0	1
Lakes	94	48	0	5	37	0	1	3
MidCentral	123	69	0	1	53	0	0	0
Nelson Marlborough	197	106	6	6	74	0	3	2
Northland	156	83	6	7	52	4	3	1
South Canterbury	42	26	2	0	14	0	0	0
Southern	194	103	6	20	51	10	3	1
Taranaki	94	36	4	7	40	0	3	4
Waikato	327	169	7	10	133	1	5	2
Wairarapa	36	19	0	6	11	0	0	0
Waitemata	346	137	0	7	193	2	2	5
West Coast	20	10	0	0	8	0	0	2
Whanganui	84	45	0	1	35	2	1	0
Total	2,965	1,419	53	139	1,176	31	52	95
No of SSIs	24	10	1	4	7	0	2	0
SSI rate	0.8	0.7	1.9	2.9	0.6	0.0	3.8	0.0
95% CI	0.5–1.2	0.4–1.3	0.3–9.9	1.1–7.2	0.3–1.2	0.0–11	1.1–13	0.0–3.9

5.3 Cumulative SSI rates by procedure, March 2013 to June 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	20,077	517	2,492	16,304	795	962	1,120	42,267
No of SSIs	212	4	73	148	4	19	3	463
SSI rate	1.1	0.8	2.9	0.9	0.5	2.0	0.3	1.1
95% CI	0.9–1.2	0.3–2.0	2.3–3.7	0.8–1.1	0.2–1.3	1.3–3.1	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 2,965 procedures for April to June 2017.

SSI type	No of SSIs	%	95% CI
Superficial	6	0.2	0.1–0.4
Deep/organ space	18	0.6	0.4–1.0
Total	**24**	**0.8**	**0.5–1.2**

5.4.2 Cumulative SSI rates by SSI type

Results are based on 42,267 procedures from March 2013 to June 2017.

SSI type	No of SSIs	%	95% CI
Superficial	149	0.4	0.3–0.4
Deep/organ space	314	0.7	0.7–0.8
Total	**463**	**1.1**	**1.0–1.2**

SSI type description: For full SSI definitions please refer to the SSII Programme orthopaedic 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.

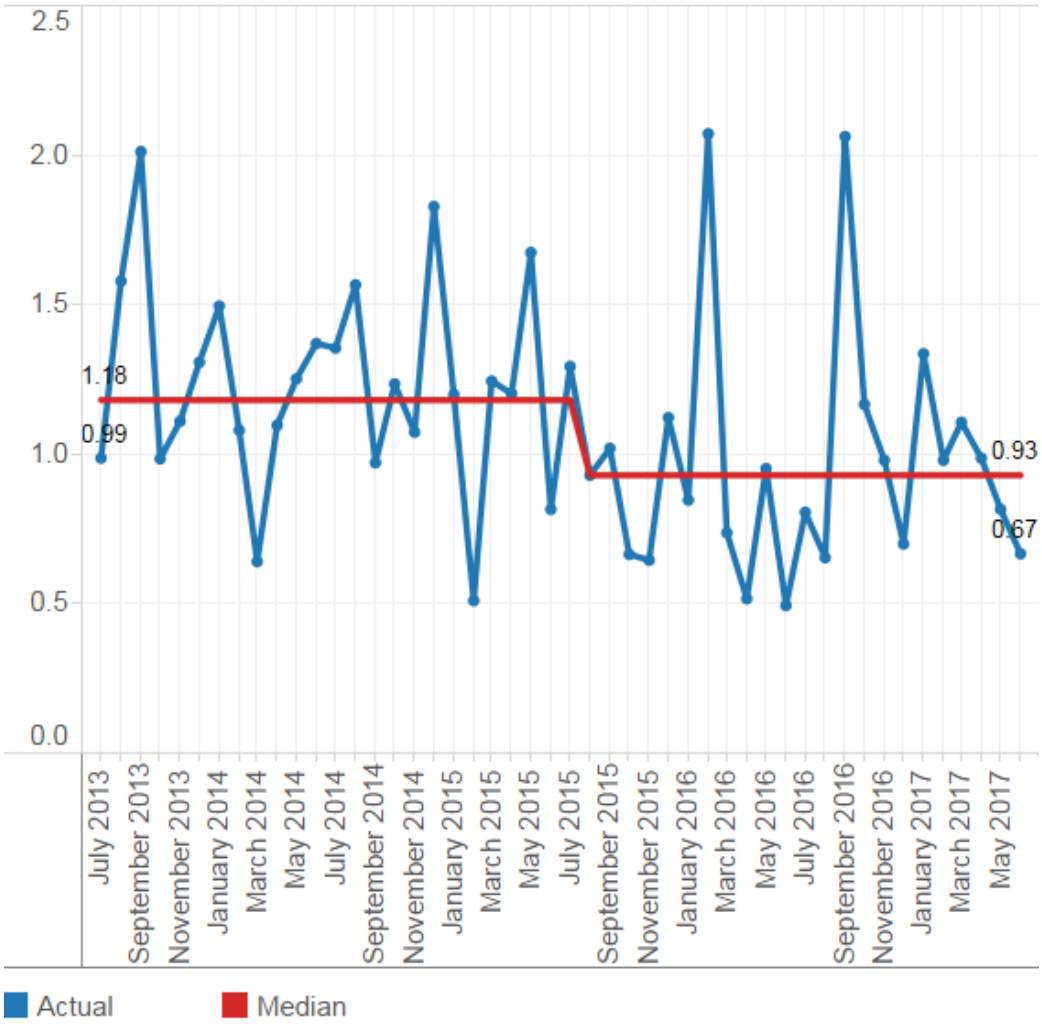
Organ space SSI: Infection occurs within 90 days of the operation and involves any part of the body that is opened or manipulated during the operative procedure, excluding the skin incision, fascia or muscle layers. For orthopaedic surgery this means osteomyelitis or joint infection.

5.5 SSI rates over time: national and by region

5.5.1 Run chart, national SSI rates over time, July 2013 to June 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 a couple of 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 a special cause.



[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 0.96 percent after the shift point. This result is statistically significant ($p < 0.01$).

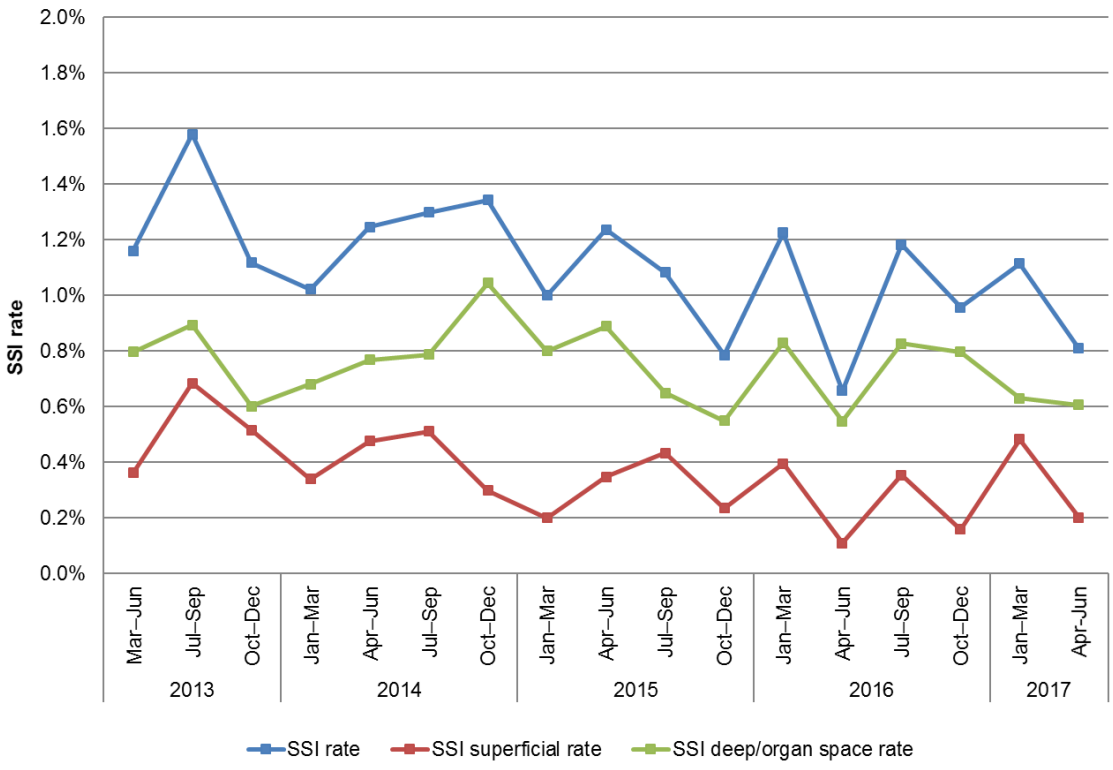
	Procedures	No of SSIs	Percentage infections
Before run shift	20,542	253	1.23%
After run shift	20,355	195	0.96%

z score -2.658, p value 0.008

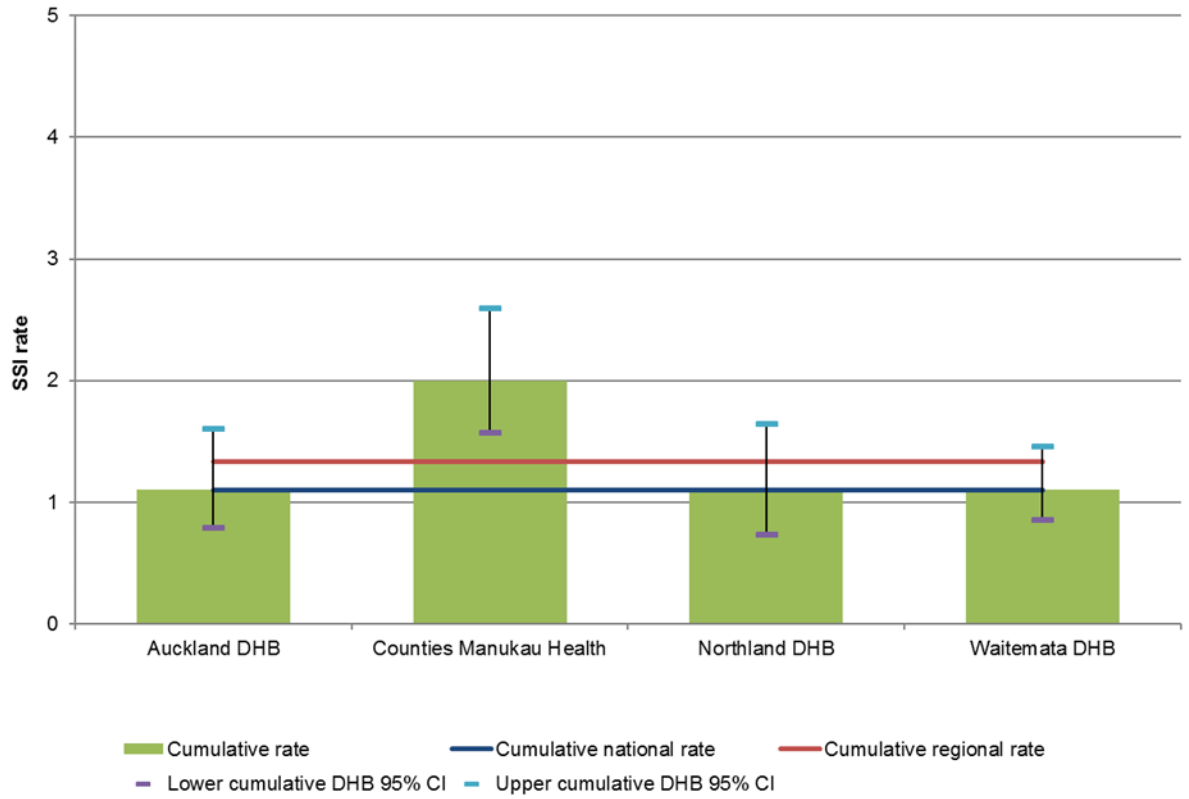
Previous run charts had a 12-month baseline period beginning in March 2013. The baseline now starts at July 2013. This is the point at which all 20 DHBs were participating in the programme.

During the SSII Programme data cleaning and reconciliation process, DHBs have 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.

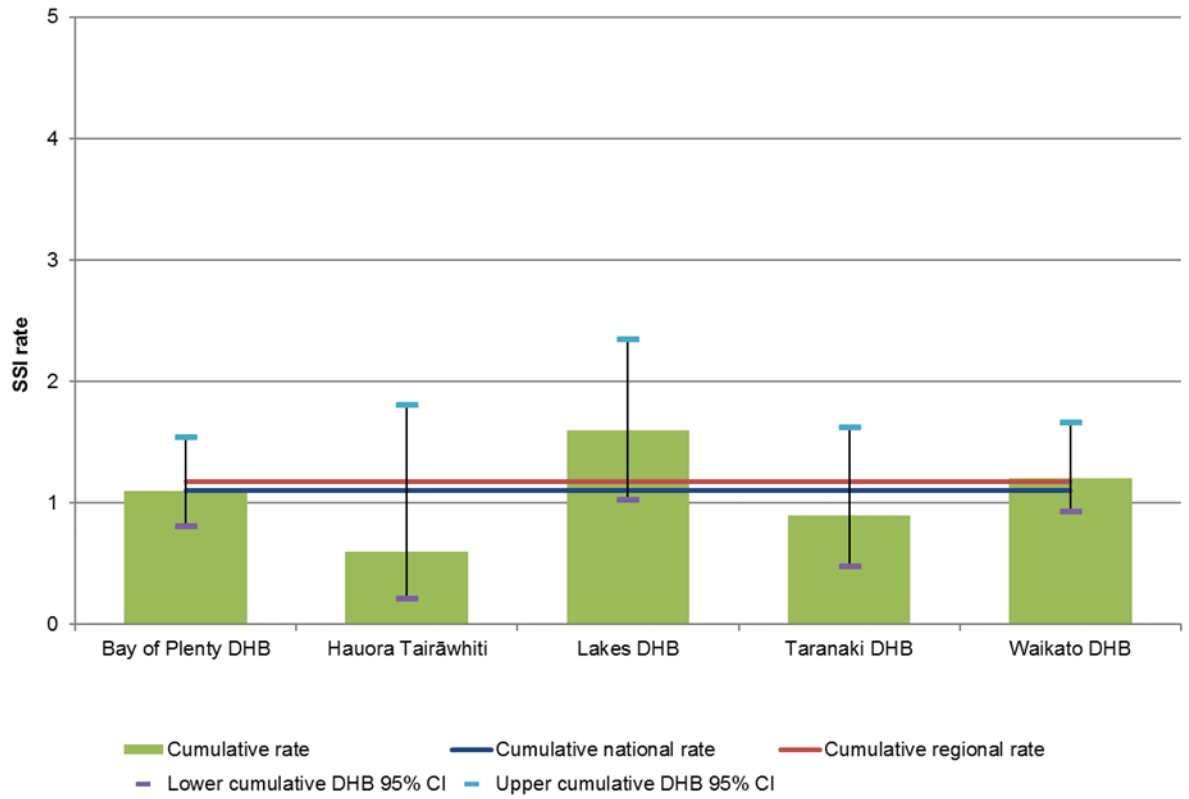
5.5.2 National orthopaedic SSI rates over time: superficial and deep/organ space, March 2013 to June 2017



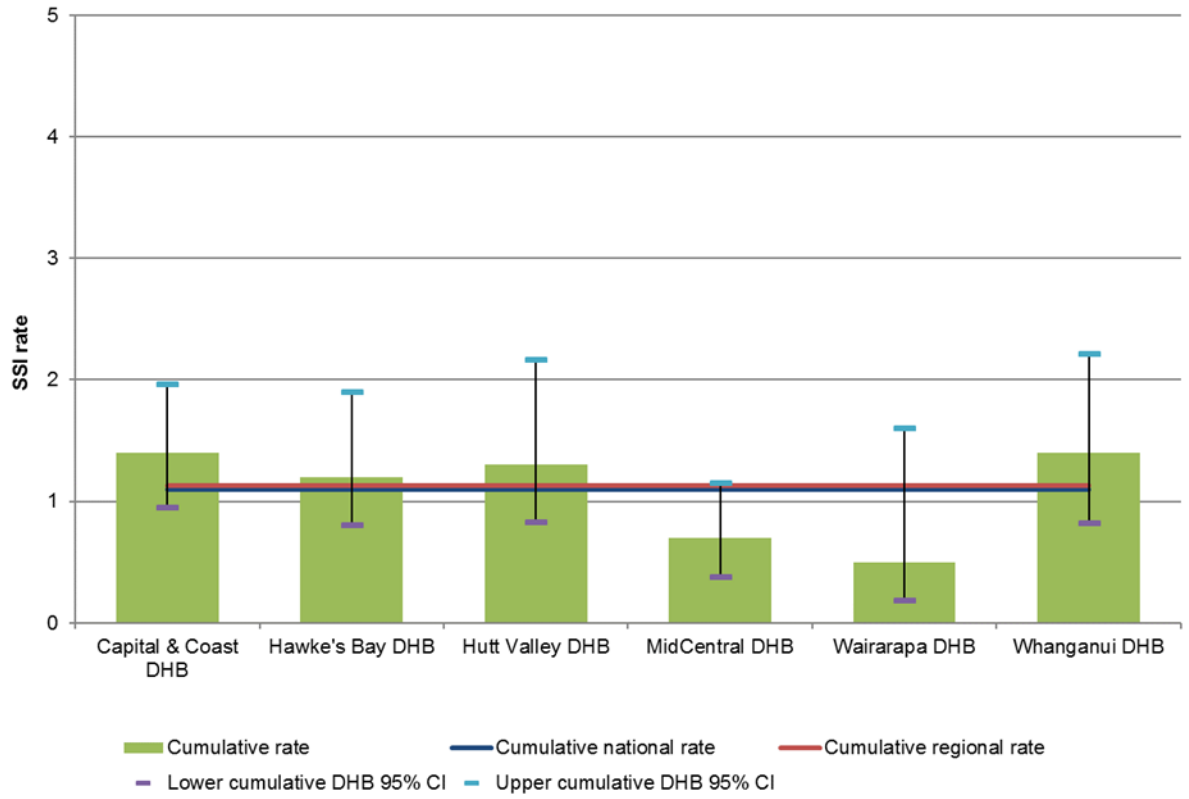
5.5.3 Northern region: SSI rates by DHB, March 2013 to June 2017



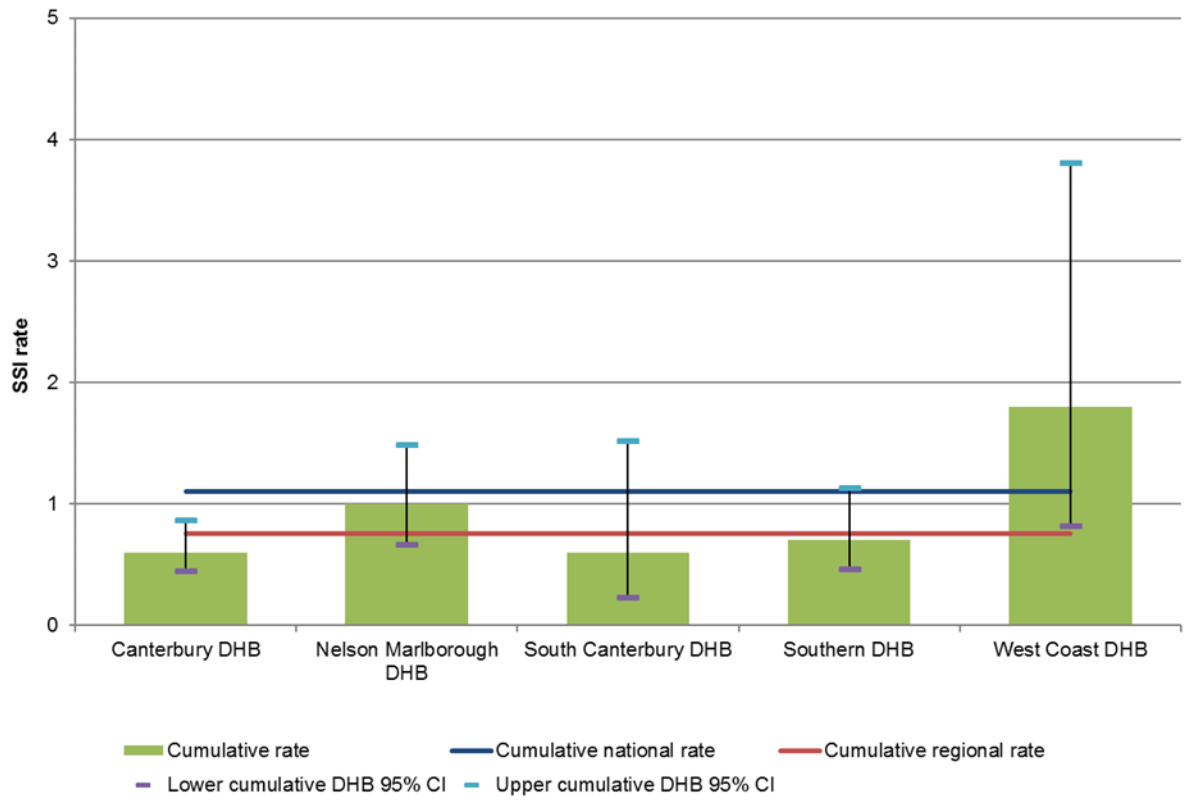
5.5.4 Midland region: SSI rates by DHB, March 2013 to June 2017



5.5.5 Central region: SSI rates by DHB, March 2013 to June 2017



5.5.6 South Island region: SSI rates by DHB, March 2013 to June 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

DHB	Total	Total ‘on time’	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	171	163	95	4	1	3
Bay of Plenty	162	159	98	2	0	1
Canterbury	352	344	98	6	0	2
Capital & Coast	115	115	100	0	0	0
Counties Manukau Health	141	136	96	2	0	3
Hauora Tairāwhiti	26	26	100	0	0	0
Hawke’s Bay	123	123	100	0	0	0
Hutt Valley	62	62	100	0	0	0
Lakes	88	88	100	0	0	0
MidCentral	122	119	98	2	1	0
Nelson Marlborough	188	181	96	3	4	0
Northland	146	136	93	4	4	2
South Canterbury	42	41	98	1	0	0
Southern	171	165	96	3	1	2
Taranaki	84	84	100	0	0	0
Waikato	312	304	97	2	3	3
Wairarapa	30	30	100	0	0	0
Waitemata	337	304	90	0	31	2
West Coast	20	20	100	0	0	0
Whanganui	82	82	100	0	0	0
Total	2,774	2,682	97	29	45	18
				1.0%	1.6%	0.6%

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

DHB	Total	Total 'on time'	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	15	15	100	0	0	0
Bay of Plenty	15	15	100	0	0	0
Canterbury	30	28	93	2	0	0
Capital & Coast	17	17	100	0	0	0
Counties Manukau Health	19	15	79	2	0	2
Hauora Tairāwhiti	0	0	NA	0	0	0
Hawke's Bay	4	4	100	0	0	0
Hutt Valley	0	0	NA	0	0	0
Lakes	6	6	100	0	0	0
MidCentral	1	0	0	0	1	0
Nelson Marlborough	9	8	89	0	1	0
Northland	10	10	100	0	0	0
South Canterbury	0	0	NA	0	0	0
Southern	23	14	61	0	8	1
Taranaki	10	10	100	0	0	0
Waikato	15	14	93	0	1	0
Wairarapa	6	6	100	0	0	0
Waitemata	9	9	100	0	0	0
West Coast	0	0	NA	0	0	0
Whanganui	2	2	100	0	0	0
Total	191	173	91	4	11	3
				2.1%	5.8%	1.6%

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.

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

6.3 All procedures

DHB	Total	Total 'on time'	%	More than 1 hour before KTS	After KTS	Not recorded
Auckland	186	178	96	4	1	3
Bay of Plenty	177	174	98	2	0	1
Canterbury	382	372	97	8	0	2
Capital & Coast	132	132	100	0	0	0
Counties Manukau Health	160	151	94	4	0	5
Hauora Tairāwhiti	26	26	100	0	0	0
Hawke's Bay	127	127	100	0	0	0
Hutt Valley	62	62	100	0	0	0
Lakes	94	94	100	0	0	0
MidCentral	123	119	97	2	2	0
Nelson Marlborough	197	189	96	3	5	0
Northland	156	146	94	4	4	2
South Canterbury	42	41	98	1	0	0
Southern	194	179	92	3	9	3
Taranaki	94	94	100	0	0	0
Waikato	327	318	97	2	4	3
Wairarapa	36	36	100	0	0	0
Waitemata	346	313	90	0	31	2
West Coast	20	20	100	0	0	0
Whanganui	84	84	100	0	0	0
Total	2,965	2,855	96	33	56	21
				1.1%	1.9%	0.7%

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

Key

< 95%	95–99.9%	100% QSM achieved

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

			Doses used						
DHB	Total*	Cefazolin used as prophylaxis	< 2 g	2 g	≥ 3 g	≥ 2 g%	Cefuroxime ≥ 1.5 g	Not recorded	Cefazolin or cefuroxime used in acceptable dose %
Auckland	186	178	2	168	8	95	0	3	94.6
Bay of Plenty	177	174	3	160	11	97	0	1	97
Canterbury	382	375	2	373	0	98	0	1	98
Capital & Coast	132	128	0	111	17	97	1	0	98
Counties Manukau Health	160	160	5	152	3	97	0	0	97
Hauora Tairāwhiti	26	23	0	20	3	88	1	0	92
Hawke's Bay	127	122	1	121	0	95	3	0	98
Hutt Valley	62	62	0	56	6	100	0	0	100
Lakes	94	93	0	70	23	99	0	0	99
MidCentral	123	9	0	9	0	7	110	0	97
Nelson Marlborough	197	195	1	186	8	98	1	0	99
Northland	156	153	0	153	0	98	0	2	98
South Canterbury	42	41	0	41	0	98	0	0	98
Southern	194	178	5	168	4	89	13	1	95
Taranaki	94	93	2	86	5	97	0	0	97
Waikato	327	317	2	290	25	96	0	1	96
Wairarapa	36	35	0	0	35	97	0	0	97
Waitemata	346	334	1	329	4	96	2	2	97
West Coast	20	19	0	19	0	95	0	0	95
Whanganui	84	81	1	80	0	95	1	0	96
Total	2,965	2,770	25	2,592	152	93	132	11	97
		93%	0.8%	87%	5%		4%		

* Includes procedures (50 of the 2,965) receiving other antibiotics for prophylaxis.

7.1 Compliance with dose QSM, July 2013 to June 2017

Key

< 90%	90–94.9%	≥ 95% QSM achieved

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

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

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	171	171	100	0	0
Bay of Plenty	162	161	99	1	0
Canterbury	352	343	97	9	0
Capital & Coast	115	115	100	0	0
Counties Manukau Health	141	141	100	0	0
Hauora Tairāwhiti	26	23	88	3	0
Hawke's Bay	123	123	100	0	0
Hutt Valley	62	60	97	2	0
Lakes	88	88	100	0	0
MidCentral	122	119	98	3	0
Nelson Marlborough	188	183	97	1	4
Northland	146	144	99	2	0
South Canterbury	42	40	95	2	0
Southern	171	166	97	5	0
Taranaki	84	84	100	0	0
Waikato	312	288	92	12	12
Wairarapa	30	30	100	0	0
Waitemata	337	321	95	16	0
West Coast	20	20	100	0	0
Whanganui	82	80	98	2	0
Total	2,774	2,700	97	58	16
				2%	0.6%

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

8.2 Revision arthroplasties

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	15	15	100	0	0
Bay of Plenty	15	15	100	0	0
Canterbury	30	29	97	1	0
Capital & Coast	17	17	100	0	0
Counties Manukau Health	19	19	100	0	0
Hauora Tairāwhiti	0	0	NA	0	0
Hawke's Bay	4	4	100	0	0
Hutt Valley	0	0	NA	0	0
Lakes	6	6	100	0	0
MidCentral	1	1	100	0	0
Nelson Marlborough	9	9	100	0	0
Northland	10	9	90	1	0
South Canterbury	0	0	NA	0	0
Southern	23	19	83	4	0
Taranaki	10	10	100	0	0
Waikato	15	13	87	2	0
Wairarapa	6	6	100	0	0
Waitemata	9	5	56	4	0
West Coast	0	0	NA	0	0
Whanganui	2	2	100	0	0
Total	191	179	94	12	0
				6%	0.0%

* 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

DHB	Total	≤ 24 hr*	% ≤ 24 hr*	> 24 hr	Unknown or not recorded
Auckland	186	186	100	0	0
Bay of Plenty	177	176	99	1	0
Canterbury	382	372	97	10	0
Capital & Coast	132	132	100	0	0
Counties Manukau Health	160	160	100	0	0
Hauora Tairāwhiti	26	23	88	3	0
Hawke's Bay	127	127	100	0	0
Hutt Valley	62	60	97	2	0
Lakes	94	94	100	0	0
MidCentral	123	120	98	3	0
Nelson Marlborough	197	192	97	1	4
Northland	156	153	98	3	0
South Canterbury	42	40	95	2	0
Southern	194	185	95	9	0
Taranaki	94	94	100	0	0
Waikato	327	301	92	14	12
Wairarapa	36	36	100	0	0
Waitemata	346	326	94	20	0
West Coast	20	20	100	0	0
Whanganui	84	82	98	2	0
Total	2,965	2,879	97	70	16
				2%	1%

* 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 June 2017

Key

< 95%	95–99%	100%

		2013		2014				2015				2016				2017	
Region	**DHB**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**
Northern	Auckland	43	82	92	99	99	99	99	99	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
	Northland	98	87	94.5	95	96.5	94.9	98	99	99	100	100	100	100	99	99	98
	Waitemata	63	84	89	96	94	97	89	91	91	91	93	94	94	93	94	94
Midland	Bay of Plenty	81	93	90	92	92	94	94	94	95	95	100	100	99	99	99	99
	Hauora Tairāwhiti	87	92	80	91	84	98	97.4	95	100	100	100	100	100	100	96	88
	Lakes	90	87	96	91	93	95	90	94	96	100	97	99	99	95	100	100
	Taranaki	9	2	2	4	94	87	93	95	97	100	91	99	97	98	68	100
	Waikato	53	78	83	84	88	80	88	93	96	92	91	99	95	93	94	90
Central	Capital & Coast	31	98	100	99	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
	Hutt Valley	82	95	100	100	95	100	100	99	100	100	99	100	100	100	98	97
	MidCentral	41	0	10	1	4	46	87	93	94.96	95.5	96	98	100	98	100	97
	Wairarapa	6	0	6	18	57	63	76	91	91	95	95	100	100	100	100	100
	Whanganui	100	95	52	93	96	97	74	97	97	80	69	100	98	100	76	98
Southern	Canterbury	6	36	35	17	21	37	78	91	87	88	90	91	93	97	98	97
	Nelson Marlborough	79	84	94.9	97	95.6	98	99	98	99	100	100	100	98	99	100	97
	South Canterbury	91	86	97	94	93	94.6	97	94	93	92	97	94	93	88	92	95
	Southern	83	77	90	90	94	99	98	96	98	96	96	99	99	99	99	95
	West Coast	25	94	85	100	96	94.7	96	100	96	95	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/ASAscore.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, April to June 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	265	1713	935	26	0	26	2,965
No of SSIs	2	8	13	1	0	0	24
SSI rate (%)	0.8	0.5	1.4	3.8	NA	0.0	0.8
95% CI	0.2–2.7	0.2–0.9	0.8–2.4	0.7–18.9	NA	0.0–12.9	0.5–1.2

9.2 Cumulative ASA scores and SSI rates, March 2013 to June 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	3,570	24,709	12,783	514	32	659	42,267
No of SSIs	19	208	210	12	1	13	463
SSI rate (%)	0.5	0.8	1.6	2.3	3.1	2.0	1.1
95% CI	0.3–0.8	0.7–1.0	1.4–1.9	1.3–4.0	0.6–15.7	1.2–3.3	1.0–1.2

9.3 Total surgical risk scores and SSI rates, April to June 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	1,797	999	143	0	26	2,965
SSI	7	14	3	0	0	24
SSI rate (%)	0.4	1.4	2.1	NA	0.0	0.8
95% CI	0.2–0.8	0.8–2.3	0.7–6.0	NA	0.0–12.9	0.5–1.2

9.4 Cumulative total surgical risk scores and SSI rates, March 2013 to June 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	25,024	14,196	2,350	23	674	42,267
SSI	181	211	58	0	13	463
SSI rate (%)	0.7	1.5	2.5	0.0	1.9	1.1
95% CI	0.6–0.8	1.3–1.7	1.9–3.2	0.0–14.3	1.1–3.3	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: 54 percent for hip surgery, and 46 percent for knee surgery. 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, 2011–16

	2011	2012	2013	2014	2015	2016
Accepted DHB claims	45	45	53	77	76	82
Active DHB claims	76	78	94	136	150	183
Cost of active claims	$490,840	$517,946	$935,239	$1,203,810	$1,606,286	$1,820,522
Cost per active claim	$6,458	$6,640	$9,949	$8,852	$10,709	$9,948

10.1.2 Treatment injury claims for infection following knee surgery for all DHB facilities by calendar year, 2011–16

	2011	2012	2013	2014	2015	2016
Accepted DHB claims	31	46	48	66	82	100
Active DHB claims	60	73	85	118	133	171
Cost of active claims	$480,533	$394,482	$728,629	$649,059	$1,169,682	$1,999,359
Cost per active claim	$8,009	$5,404	$8,572	$5,501	$8,795	$11,692

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

Active DHB claims = number of active claims for infection following hip/knee surgery performed in all DHB facilities over the last six 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 six 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 six calendar years.

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

		Timing* (100%)	Dose** (95%)	Skin preparation (100%)	Post-operative 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
	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
	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
	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
	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
	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
	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
	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

* 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. q, 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.q, p<0.0001.
- Alcohol–based skin preparation: a vs. q, p<0.0001.
- Postoperative duration: a vs. q, 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
Jul–Sep 2017	31 Dec 2017	31 Jan 2018	Early Feb 2018	Mar 2018	31 Mar 2018
Oct–Dec 2017	30 Mar 2018	30 Apr 2018	Early May 2018	Jun 2018	30 Jun 2018
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

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