



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



National Orthopaedic Surgery Report

July to September 2016

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
RAG	Red, amber, green
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 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 July to 30 September 2016. It also provides cumulative data from 1 March 2013 to 30 September 2016.

2.1 July to September 2016

During this surveillance period:

- district health boards (DHBs) performed 2537 hip and knee arthroplasty procedures, compared with 2733 in April to June 2016
- there were 30 surgical site infections (SSIs) in this quarter, a rate of 1.2 percent. Most of the SSIs, 21 (70 percent), were deep/organ space. Nine SSIs (30 percent) were superficial
- DHB performance against the prophylaxis timing quality and safety marker (QSM) for primary procedures was 98 percent. The target is 100 percent. Eight DHBs achieved 100 percent compliance and 18 DHBs recorded greater than 95 percent. Five DHBs had one or more procedures where timing was not recorded. Fewer than one percent of cases had antibiotic prophylaxis given either early or late
- DHB performance with the dose QSM was 96 percent. The target is 95 percent. Seventeen DHBs now comply with the dose QSM. The most common reason for missing the QSM is the use of 1 g doses of cefazolin, which were used most often at Taranaki DHB. Of the 33 patients who received 1 g of cefazolin, six (18 percent) were under-dosed as they weighed more than 80 kg
- prophylaxis was stopped within 24 hours in 99 percent of primary procedures. Twelve DHBs stopped prophylaxis within 24 hours for all primary procedures. Canterbury DHB and Waitemata DHB gave more than 43 patients 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
- Seven DHBs met both QSMs: Capital & Coast, Hawke's Bay, Lakes, Nelson Marlborough, South Canterbury, Wairarapa and Whanganui. Congratulations to these DHBs.

2.2 Cumulative findings

Between March 2013 and September 2016 the cumulative procedure total was 34,038 with 388 SSIs, 1.1 percent (95 percent confidence interval (CI) 1.0–1.3).

3 Change in reporting format

3.1 Cumulative SSI rates grouped by region

There is strong interest in regional data, therefore we continue to present data grouped by region, which includes cumulative SSI rates and 95 percent CIs, where appropriate. SSII Programme data helps regions to identify areas for future quality improvement activities.

3.2 QSM graphs

The bar graphs representing DHB performance against each QSM have been replaced with a RAG (red, amber, green) table using a ‘traffic light’ approach. A cell is coloured green if a DHB has met the QSM, amber if a DHB is within 5 percent of the QSM, and red if more than 5 percent from the QSM. This table is a more visual way of presenting areas where DHBs might want to consider focusing their quality improvement initiatives.

3.3 Run chart displaying the outcome marker by month

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 quarterly outcome marker over time. This approach allows us to identify when results have changed more quickly and precisely, and the apparent shifts revealed by this approach can be tested using traditional statistical approaches. Showing the data by month allows shifts in the median to be identified.

3.4 Future reporting format

We have been asked to examine hip and knee data separately. To provide enough detail for DHBs, we have added tables 5.2–5.5, which include hip and knee data by DHB. There is a slight variance in the numerator and denominator reported in these tables compared to cumulative data in this report. This is due to the way the new tables are produced e.g. running the complete data set which includes corrections made to the data versus adding to data from a previous report (one point in time).

We welcome your feedback and recommendations on this additional data – please email us at SSIIP@hqsc.govt.nz. Once we receive feedback from stakeholders, we will look at including superficial and deep/organ space SSI data by DHB along with any other details deemed useful.

4 Programme changes

Change	Date effective
<p>Compliance with the skin preparation QSM has been consistently high, with 99 percent or more procedures meeting the QSM every surveillance quarter since January 2015. 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. The results will no longer be included in this report.</p>	1 July 2016
<p>Revision procedures for infection are no longer included.</p> <p>This is because the pathogenesis of SSIs following revisions for infection involves complex factors not influenced by the standard interventions we recommend.</p> <p>If a deep or organ space infection occurs in a prosthetic joint, the SSI is recorded and all further procedures for that joint are excluded.</p> <p>This change has had no statistically significant effect on the SSI rate because there were only three 'revision due to infection' procedures where an SSI was recorded in the 12 months prior to the change (1 January 2015 to 31 December 2015).</p>	1 January 2016
<p>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.</p>	11 December 2015
<p>Deep and organ space SSIs were combined for reporting purposes.</p>	1 April 2015
<p>Cefuroxime 1.5 g is an accepted alternative prophylactic agent for compliance with the dose QSM.</p> <p>Cefazolin \geq 2 g remains the agent of choice for prophylaxis for the procedures included in this programme.</p>	1 January 2015
<p>Hemi-arthroplasty and partial arthroplasty procedures of the hip are no longer reported.</p>	1 March 2014

5 SSIs by DHB

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

DHB	Procedures Jul–Sep 2016	No of SSIs	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	Cumulative procedures from Mar 2013	Cumulative SSIs	%	Cumulative 95% CI
Auckland	113	0	0.0	0.0–3.3	616	6	1.0	2194	27	1.2	0.8–1.8
Bay of Plenty	197	2	1.0	0.3–3.6	798	7	0.9	2653	32	1.2	0.9–1.7
Canterbury	348	2	0.6	0.2–2.1	1373	8	0.6	4438	29	0.7	0.5–0.9
Capital & Coast	158	3	1.9	0.6–5.4	561	6	1.1	1626	24	1.5	1.0–2.2
Counties Manukau Health	181	3	1.7	0.6–4.8	696	13	1.9	2465	51	2.1	1.6–2.7
Hauora Tairāwhiti	33	0	0.0	0.0–10.4	131	0	0.0	405	4	1.0	0.4–2.5
Hawke's Bay	90	0	0.0	0.0–4.1	392	0	0.0	1289	15	1.2	0.7–1.9
Hutt Valley	77	2	2.6	0.7–9.0	271	4	1.5	1011	15	1.5	0.9–2.4
Lakes	83	2	2.4	0.7–8.4	329	4	1.2	1137	17	1.5	0.9–2.4
MidCentral	119	1	0.8	0.1–4.6	441	2	0.5	1493	8	0.5	0.3–1.1
Nelson Marlborough	139	2	1.4	0.4–5.1	588	5	0.9	1879	19	1.0	0.6–1.6
Northland	129	1	0.8	0.1–4.3	480	6	1.3	1596	19	1.2	0.8–1.9
South Canterbury	61	0	0.0	0.0–5.9	196	1	0.5	531	4	0.8	0.3–1.9
Southern	151	0	0.0	0.0–2.5	660	10	1.5	2065	17	0.8	0.5–1.3
Taranaki	79	1	1.3	0.2–6.8	308	1	0.3	885	7	0.8	0.4–1.6
Waikato	169	2	1.2	0.3–4.2	820	11	1.3	2884	37	1.3	0.9–1.8
Wairarapa	16	1	6.3	1.1–28.3	130	1	0.8	436	3	0.7	0.2–2.0
Waitemata	311	6	1.9	0.9–4.1	1200	10	0.8	3870	42	1.1	0.8–1.5
West Coast	19	0	0.0	0.0–16.8	83	0	0.0	281	5	1.8	0.8–4.1
Whanganui	64	2	3.1	0.9–10.7	288	4	1.4	900	13	1.4	0.8–2.5
Total	2537	30	1.2	0.8–1.7	10,361	99	1.0	34,038	388	1.1	1.0–1.3

5.2a Total and primary hip procedures and SSI rates by DHB, last 12 months, October 2015 to September 2016

DHB	Total hip				Total arthroplasty of hip, unilateral				Total arthroplasty of hip, bilateral			
	Procedures last 12 months	SSIs last 12 months	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	95% CI
Auckland	271	1	0.4	0.1–2.1	233	1	0.4	0.1–2.4	4	0	0.0	0–49.0
Bay of Plenty	428	7	1.6	0.8–3.3	379	6	1.6	0.7–3.4	1	0	0.0	0–79.3
Canterbury	779	7	0.9	0.4–1.8	644	2	0.3	0.1–1.1	50	0	0.0	0–7.1
Capital & Coast	324	5	1.5	0.7–3.6	272	2	0.7	0.2–2.6	10	0	0.0	0–27.8
Counties Manukau Health	351	9	2.6	1.4–4.8	286	8	2.8	1.4–5.4	14	0	0.0	0–21.5
Hauora Tairāwhiti	72	0	0.0	0–5.1	69	0	0.0	0–5.3	0	0	N/A	N/A
Hawke's Bay	242	0	0.0	0–1.6	223	0	0.0	0–1.7	1	0	0.0	0–79.3
Hutt Valley	163	2	1.2	0.3–4.4	150	2	1.3	0.4–4.7	10	0	0.0	0–27.8
Lakes	182	2	1.1	0.3–3.9	160	1	0.6	0.1–3.5	0	0	N/A	N/A
MidCentral	247	1	0.4	0.1–2.3	231	1	0.4	0.1–2.4	2	0	0.0	0–65.8
Nelson Marlborough	325	2	0.6	0.2–2.2	286	2	0.7	0.2–2.5	10	0	0.0	0–27.8
Northland	266	4	1.5	0.6–3.8	246	3	1.2	0.4–3.5	11	1	9.1	0–37.7
South Canterbury	132	1	0.8	0.1–4.2	122	1	0.8	0.1–4.5	0	0	N/A	N/A
Southern	440	9	2.0	1.1–3.8	380	7	1.8	0.9–3.8	24	0	0.0	0–13.8
Taranaki	181	0	0.0	0–2.1	163	0	0.0	0–2.3	3	0	0.0	0–56.1
Waikato	444	8	1.8	0.9–3.5	384	7	1.8	0.9–3.7	6	0	0.0	0–39.0
Wairarapa	79	1	1.3	0.2–6.8	63	1	1.6	0.3–8.5	2	0	0.0	0–65.8
Waitemata	552	6	1.1	0.5–2.4	489	5	1.0	0.4–2.4	1	0	0.0	0–79.3
West Coast	35	0	0.0	0–9.9	35	0	0.0	0–9.9	0	0	N/A	N/A
Whanganui	149	1	0.7	0.1–3.7	141	1	0.7	0.1–3.9	3	0	0.0	0–56.1
Total	5662	66	1.2	0.9–1.5	4956	50	1.0	0.8–1.3	152	1	0.7	0.1–3.6

5.2b Revision hip procedures and SSI rates by DHB, last 12 months, October 2015 to September 2016

DHB	Revision total arthroplasty of hip			
	Procedures last 12 months	SSIs last 12 months	%	95% CI
Auckland	34	0	0.0	0–10.2
Bay of Plenty	48	1	2.1	0.4–10.9
Canterbury	85	5	5.9	2.5–13.0
Capital & Coast	42	3	7.1	2.5–19.0
Counties Manukau Health	51	1	2.0	0.3–10.3
Hauora Tairāwhiti	3	0	0.0	0–56.1
Hawke's Bay	18	0	0.0	0–17.6
Hutt Valley	3	0	0.0	0–56.1
Lakes	22	1	4.5	0.8–21.8
MidCentral	14	0	0.0	0–21.5
Nelson Marlborough	29	0	0.0	0–11.7
Northland	9	0	0.0	0–29.9
South Canterbury	10	0	0.0	0–27.8
Southern	36	2	5.6	1.5–18.1
Taranaki	15	0	0.0	0–20.4
Waikato	54	1	1.9	0.3–9.8
Wairarapa	14	0	0.0	0–21.5
Waitemata	62	1	1.6	0.3–8.6
West Coast	0	0	N/A	N/A
Whanganui	5	0	0.0	0–43.4
Total	554	15	2.7	1.6–4.4

5.3a Total and primary hip procedures and SSI rates by DHB, cumulative data, March 2013 to September 2016

DHB	Total hip				Total arthroplasty of hip, unilateral				Total arthroplasty of hip, bilateral			
	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI
Auckland	1040	15	1.4	0.9–2.4	913	11	1.2	0.7–2.1	12	0	0.0	0–24.2
Bay of Plenty	1411	23	1.6	1.1–2.4	1220	18	1.5	0.9–2.3	10	1	10.0	1.8–40.4
Canterbury	2560	21	0.8	0.5–1.3	2150	13	0.6	0.4–1.0	115	0	0.0	0–3.2
Capital & Coast	982	18	1.8	1.2–2.9	773	7	0.9	0.4–1.9	38	0	0.0	0–9.2
Counties Manukau Health	1098	29	2.6	1.8–3.8	896	18	2.0	1.3–3.2	20	0	0.0	0–16.1
Hauora Tairāwhiti	224	1	0.4	0.1–2.5	208	1	0.5	0.1–2.7	1	0	0.0	0–79.3
Hawke's Bay	823	12	1.5	0.8–2.5	737	10	1.4	0.7–2.5	8	0	0.0	0–32.4
Hutt Valley	605	9	1.5	0.8–2.8	518	8	1.5	0.8–3.0	44	0	0.0	0–8.0
Lakes	581	13	2.2	1.3–3.8	503	8	1.6	0.8–3.1	0	0	N/A	N/A
MidCentral	810	5	0.6	0.3–1.4	735	4	0.5	0.2–1.4	5	0	0.0	0–43.4
Nelson Marlborough	1088	11	1.0	0.6–1.8	933	9	1.0	0.5–1.8	27	0	0.0	0–12.5
Northland	859	13	1.5	0.9–2.6	764	10	1.3	0.7–2.4	27	1	3.7	0.7–18.3
South Canterbury	371	3	0.8	0.3–2.4	339	2	0.6	0.2–2.1	2	1	50.0	9.5–90.5
Southern	1315	11	0.8	0.5–1.5	1134	8	0.7	0.4–1.4	44	0	0.0	0–8.0
Taranaki	549	2	0.4	0.1–1.3	479	2	0.4	0.1–1.5	13	0	0.0	0–22.8
Waikato	1592	23	1.4	1.0–2.2	1353	16	1.2	0.7–1.9	31	0	0.0	0–11.0
Wairarapa	288	2	0.7	0.2–2.5	244	2	0.8	0.2–2.9	2	0	0.0	0–65.8
Waitemata	1805	23	1.3	0.9–1.9	1632	21	1.3	0.8–2.0	4	0	0.0	0–49.0
West Coast	131	2	1.5	0.4–5.4	130	2	1.5	0.4–5.4	0	0	N/A	N/A
Whanganui	468	8	1.7	0.9–3.3	428	6	1.4	0.6–3.0	9	1	11.1	2.0–43.5
Total	18,600	244	1.3	1.2–1.5	16,089	176	1.1	0.9–1.3	412	4	1.0	0.4–2.5

5.3b Revision hip procedures and SSI rates by DHB, cumulative data, March 2013 to September 2016

DHB	Revision total arthroplasty of hip			
	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI
Auckland	115	4	3.5	1.4–8.6
Bay of Plenty	181	4	2.2	0.9–5.5
Canterbury	295	8	2.7	1.4–5.3
Capital & Coast	171	11	6.4	3.6–11.2
Counties Manukau Health	182	11	6.0	3.4–10.5
Hauora Tairāwhiti	15	0	0.0	0–20.4
Hawke's Bay	78	2	2.6	0.7–8.9
Hutt Valley	43	1	2.3	0.4–12.1
Lakes	78	5	6.4	2.8–14.1
MidCentral	70	1	1.4	0.3–7.7
Nelson Marlborough	128	2	1.6	0.4–5.5
Northland	68	2	2.9	0.8–10.1
South Canterbury	30	0	0.0	0–11.4
Southern	137	3	2.2	0.7–6.2
Taranaki	57	0	0.0	0–6.3
Waikato	208	7	3.4	1.6–6.8
Wairarapa	42	0	0.0	0–8.4
Waitemata	169	2	1.2	0.3–4.2
West Coast	1	0	0.0	0–79.3
Whanganui	31	1	3.2	0.6–16.2
Total	2099	64	3.0	2.4–3.9

5.4a Total and primary knee procedures and SSI rates by DHB, last 12 months, October 2015 to September 2016

There were no SSIs for knee hemi-arthroplasty procedures so DHB-specific data is not represented. The total knee data incorporates all knee procedures, including knee hemi-arthroplasty procedures.

DHB	Total knee				Total arthroplasty of knee, unilateral				Total arthroplasty of knee, bilateral			
	Procedures last 12 months	SSIs last 12 months	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	95% CI	Procedures last 12 months	SSIs last 12 months	%	95% CI
Auckland	349	5	1.4	0.6–3.3	301	5	1.7	0.7–3.8	23	0	0.0	0–14.3
Bay of Plenty	370	0	0.0	0–1.0	319	0	0.0	0–1.2	24	0	0.0	0–13.8
Canterbury	594	2	0.3	0.1–1.2	333	2	0.6	0.2–2.2	33	0	0.0	0–10.4
Capital & Coast	237	1	0.4	0.1–2.4	215	1	0.5	0.1–2.6	12	0	0.0	0–24.2
Counties Manukau Health	343	4	1.2	0.5–3.0	298	2	0.7	0.2–2.4	32	2	6.3	1.7–20.1
Hauora Tairāwhiti	59	0	0.0	0–6.1	43	0	0.0	0–8.2	0	0	N/A	N/A
Hawke's Bay	150	0	0.0	0–2.5	144	0	0.0	0–2.6	0	0	N/A	N/A
Hutt Valley	108	2	1.9	0.5–6.5	98	2	2.0	0.6–7.1	9	0	0.0	0–29.9
Lakes	147	2	1.4	0.4–4.8	128	2	1.6	0.4–5.5	4	0	0.0	0–49.0
MidCentral	194	1	0.5	0.1–2.9	182	1	0.5	0.1–3.0	8	0	0.0	0–32.4
Nelson Marlborough	263	3	1.1	0.4–3.3	242	3	1.2	0.4–3.6	5	0	0.0	0–43.4
Northland	214	2	0.9	0.3–3.3	179	2	1.1	0.3–4.0	23	0	0.0	0–14.3
South Canterbury	64	0	0.0	0–5.7	59	0	0.0	0–6.1	0	0	N/A	N/A
Southern	220	1	0.5	0.1–2.5	183	1	0.5	0.1–3.0	16	0	0.0	0–19.4
Taranaki	127	1	0.8	0.1–4.3	109	0	0.0	0–3.4	0	0	N/A	N/A
Waikato	376	3	0.8	0.3–2.3	345	3	0.9	0.3–2.5	14	0	0.0	0–21.5
Wairarapa	51	0	0.0	0–7.0	48	0	0.0	0–7.4	0	0	N/A	N/A
Waitemata	648	4	0.6	0.2–1.6	572	4	0.7	0.3–1.8	10	0	0.0	0–27.8
West Coast	48	0	0.0	0–7.4	45	0	0.0	0–7.9	0	0	N/A	N/A
Whanganui	139	3	2.2	0.7–6.2	133	3	2.3	0.8–6.4	5	0	0.0	0–43.4
Total	4701	34	0.7	0.5–1.0	3976	31	0.8	0.6–1.1	218	2	0.9	0.3–3.3

5.4b Revision knee procedures and SSI rates by DHB, last 12 months, October 2015 to September 2016

DHB	Revision total arthroplasty of knee			
	Procedures last 12 months	SSIs last 12 months	%	95% CI
Auckland	25	0	0.0	0–13.3
Bay of Plenty	22	0	0.0	0–14.9
Canterbury	51	0	0.0	0–7.0
Capital & Coast	10	0	0.0	0–27.8
Counties Manukau Health	10	0	0.0	0–27.8
Hauora Tairāwhiti	1	0	0.0	0–79.3
Hawke's Bay	6	0	0.0	0–39.0
Hutt Valley	1	0	0.0	0–79.3
Lakes	10	0	0.0	0–27.8
MidCentral	4	0	0.0	0–49.0
Nelson Marlborough	13	0	0.0	0–22.8
Northland	6	0	0.0	0–39.0
South Canterbury	4	0	0.0	0–49.0
Southern	11	0	0.0	0–25.9
Taranaki	6	1	16.7	3.0–56.4
Waikato	15	0	0.0	0–20.4
Wairarapa	2	0	0.0	0–65.8
Waitemata	32	0	0.0	0–10.7
West Coast	0	0	N/A	N/A
Whanganui	1	0	0.0	0–79.3
Total	230	1	0.4	0.1–2.4

5.5a Total and primary knee procedures and SSI rates by DHB, cumulative data, March 2013 to September 2016

DHB	Total knee				Total arthroplasty of knee, unilateral				Total arthroplasty of knee, bilateral			
	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI
Auckland	1158	12	1.0	0.6–1.8	1042	11	1.1	0.6–1.9	43	0	0.0	0–8.2
Bay of Plenty	1264	9	0.7	0.4–1.3	1083	8	0.7	0.4–1.5	66	0	0.0	0–5.5
Canterbury	1930	10	0.5	0.3–1.0	1156	7	0.6	0.3–1.2	87	1	1.1	0.2–6.2
Capital & Coast	645	6	0.9	0.4–2.0	557	5	0.9	0.4–2.1	42	0	0.0	0–8.4
Counties Manukau Health	1198	19	1.6	1.0–2.5	1066	14	1.3	0.8–2.2	69	2	2.9	0.8–10.0
Hauora Tairāwhiti	182	3	1.6	0.6–4.7	141	1	0.7	0.1–3.9	0	0	N/A	N/A
Hawke's Bay	466	5	1.1	0.5–2.5	441	4	0.9	0.4–2.3	2	0	0.0	0–65.8
Hutt Valley	413	6	1.5	0.7–3.1	342	6	1.8	0.8–3.8	49	0	0.0	0–7.3
Lakes	555	4	0.7	0.3–1.8	488	3	0.6	0.2–1.8	12	0	0.0	0–24.2
MidCentral	683	3	0.4	0.1–1.3	652	3	0.5	0.2–1.3	18	0	0.0	0–17.6
Nelson Marlborough	798	9	1.1	0.6–2.1	715	9	1.3	0.7–2.4	9	0	0.0	0–29.9
Northland	740	7	0.9	0.5–1.9	580	4	0.7	0.3–1.8	79	1	1.3	0.2–6.8
South Canterbury	165	1	0.6	0.1–3.4	153	1	0.7	0.1–3.6	1	0	0.0	0–79.3
Southern	753	6	0.8	0.4–1.7	619	6	1.0	0.4–2.1	59	0	0.0	0–6.1
Taranaki	337	5	1.5	0.6–3.4	257	4	1.6	0.6–3.9	7	0	0.0	0–35.4
Waikato	1293	14	1.1	0.6–1.8	1167	13	1.1	0.7–1.9	52	1	1.9	0.3–10.1
Wairarapa	147	1	0.7	0.1–3.8	139	1	0.7	0.1–4.0	1	0	0.0	0–79.3
Waitemata	2068	23	1.1	0.7–1.7	1905	20	1.0	0.7–1.6	29	0	0.0	0–11.7
West Coast	150	3	2.0	0.7–5.7	144	3	2.1	0.7–5.9	0	0	N/A	N/A
Whanganui	432	5	1.2	0.5–2.7	412	5	1.2	0.5–2.8	11	0	0.0	0–25.9
Total	15,377	151	1.0	0.8–1.2	13,059	128	1.0	0.8–1.2	636	5	0.8	0.3–1.8

5.5b Revision knee procedures and SSI rates by DHB, cumulative data, March 2013 to September 2016

DHB	Hemi-arthroplasty of knee				Revision total arthroplasty of knee			
	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI	Cumulative procedures from Mar 2013	Cumulative SSIs	%	95% CI
Auckland	1	0	0.0	0–79.3	72	1	1.4	0.2–7.5
Bay of Plenty	39	0	0.0	0–9.0	76	1	1.3	0.2–7.1
Canterbury	543	1	0.2	0–1.0	144	1	0.7	0.1–3.8
Capital & Coast	1	0	0.0	0–79.3	45	1	2.2	0.4–11.6
Counties Manukau Health	15	0	0.0	0–20.4	48	3	6.3	2.1–16.8
Hauora Tairāwhiti	38	2	5.3	1.5–17.3	3	0	0.0	0–56.1
Hawke's Bay	0	0	N/A	N/A	23	1	4.3	0.8–21.0
Hutt Valley	9	0	0.0	0–29.9	13	0	0.0	0–22.8
Lakes	21	0	0.0	0–15.5	34	1	2.9	0.5–14.9
MidCentral	0	0	N/A	N/A	13	0	0.0	0–22.8
Nelson Marlborough	22	0	0.0	0–14.9	52	0	0.0	0–6.9
Northland	28	0	0.0	0–12.1	53	2	3.8	1.0–12.8
South Canterbury	2	0	0.0	0–65.8	9	0	0.0	0–29.9
Southern	39	0	0.0	0–9.0	36	0	0.0	0–9.6
Taranaki	44	0	0.0	0–8.0	29	1	3.4	0.6–17.2
Waikato	6	0	0.0	0–39.0	68	0	0.0	0–5.3
Wairarapa	1	0	0.0	0–79.3	6	0	0.0	0–39.0
Waitemata	54	0	0.0	0–6.6	80	3	3.8	1.3–10.5
West Coast	4	0	0.0	0–49.0	2	0	0.0	0–65.8
Whanganui	0	0	N/A	N/A	9	0	0.0	0–29.9
Total	867	3	0.3	0.1–1.0	815	15	1.8	1.1–3.0

5.6 Cumulative SSI rates by procedure, March 2013 to September 2016

	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	16,134	409	2111	13,120	639	824	801	34,038
No of SSIs	174	3	64	124	5	15	3	388
SSI rate	1.1%	0.7%	3.0%	0.9%	0.8%	1.8%	0.4%	1.1%
95% CI	0.9–1.2	0.2–2.1	2.4–3.9	0.9–1.1	0.3–1.8	1.1–3.0	0.1–1.1	1.0–1.3

5.7 Rates by SSI type

5.7.1 Rates by SSI type

Results are based on 2537 procedures for July to September 2016.

SSI type	No of SSIs	%	95% CI
Superficial	9	0.4	0.2–0.7
Deep/organ space	21	0.8	0.5–1.3
Total	30	1.2	0.8–1.7

5.7.2 Cumulative SSI rates by SSI type

Results are based on 34,038 procedures from March 2013 to September 2016.

SSI type	No of SSIs	%	95% CI
Superficial	130	0.4	0.3–0.5
Deep/organ space	258	0.8	0.7–0.9
Total	388	1.1	1.0–1.3

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.

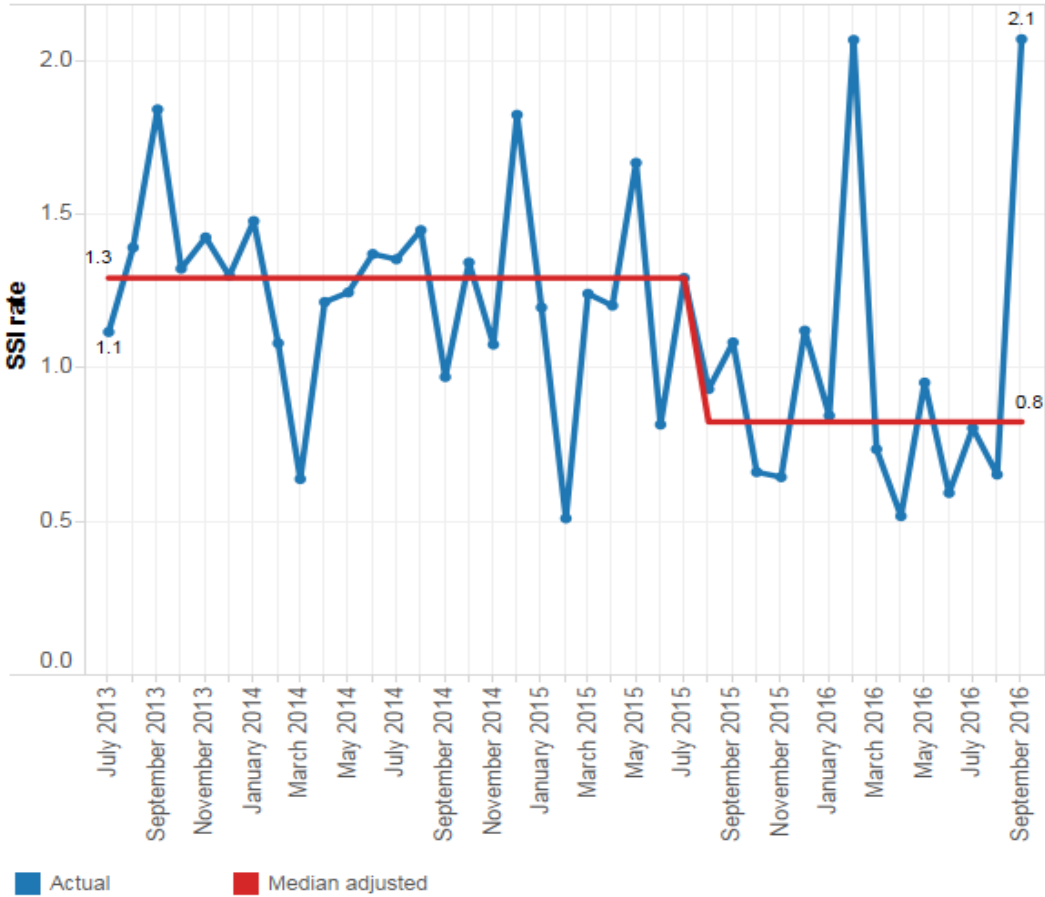
Deep SSI: Infection occurs within 90 days of the operation and involves deep soft tissues of the incision, ie, fascia and muscle layers.

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.

5.8 SSI rates over time: national and by region

5.8.1 Run chart, national SSI rates over time, March 2013 to September 2016

The run chart is a commonly used quality improvement tool which although simple in its construction has a rigorous basis in probability theory¹. 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 that there has been a significant shift in the median SSI rate from 1.3 up to August 2015, to 0.8 percent from August 2015.



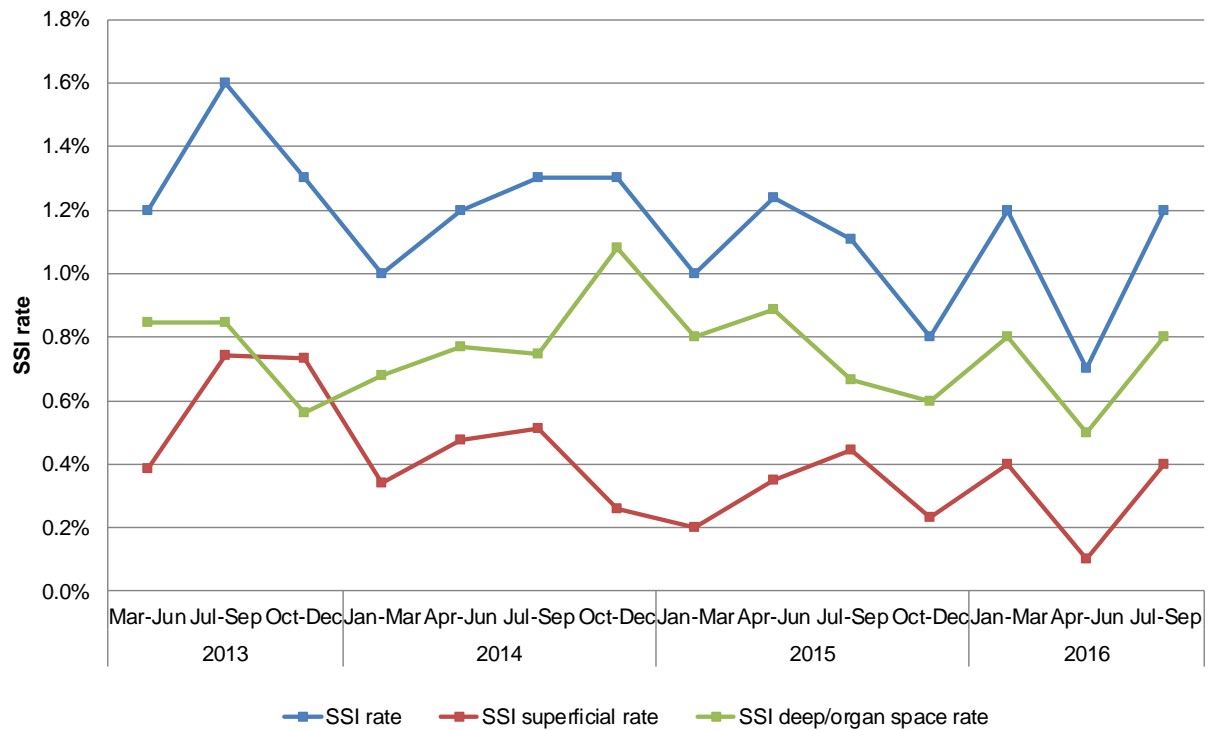
The apparent shift point can be tested using traditional frequentist statistics by testing the difference in proportion of procedures which resulted in an infection before and after the apparent shift point in August 2015. This shows that the percentage of procedures that had an infection fell from 1.25 percent to 0.96 percent. This result is statistically significant (p=.02).

	Procedures	No of SSIs	Percentage infections
Before run shift	23,680	296	1.25%
After run shift	10,361	99	0.96%

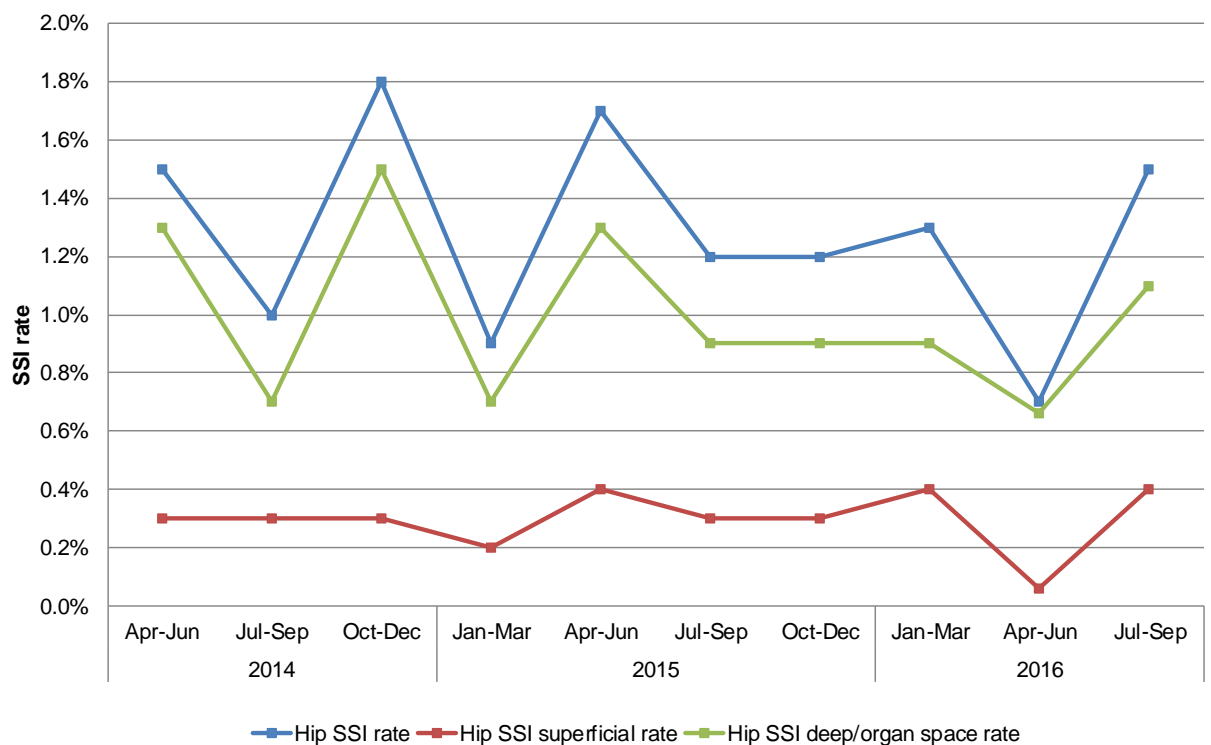
z score -2.3346, p value 0.0198

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

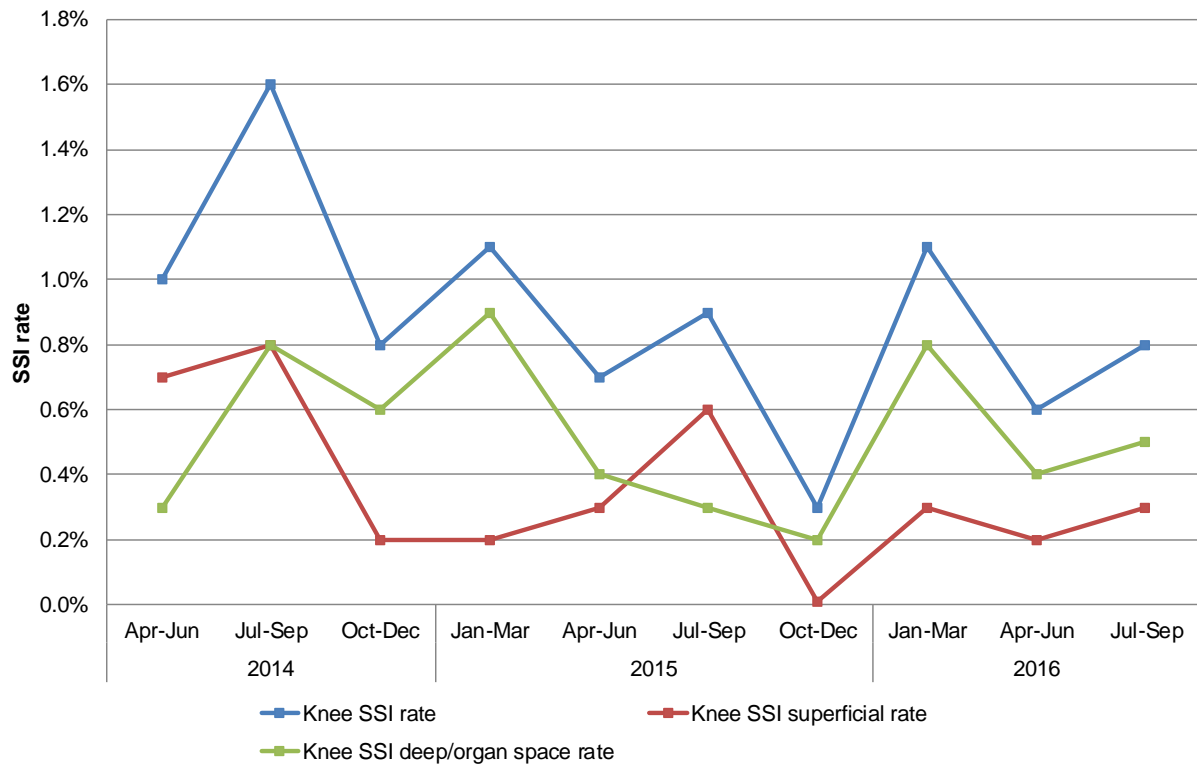
5.8.2 National orthopaedic SSI rates over time: superficial and deep/organ space, March 2013 to September 2016



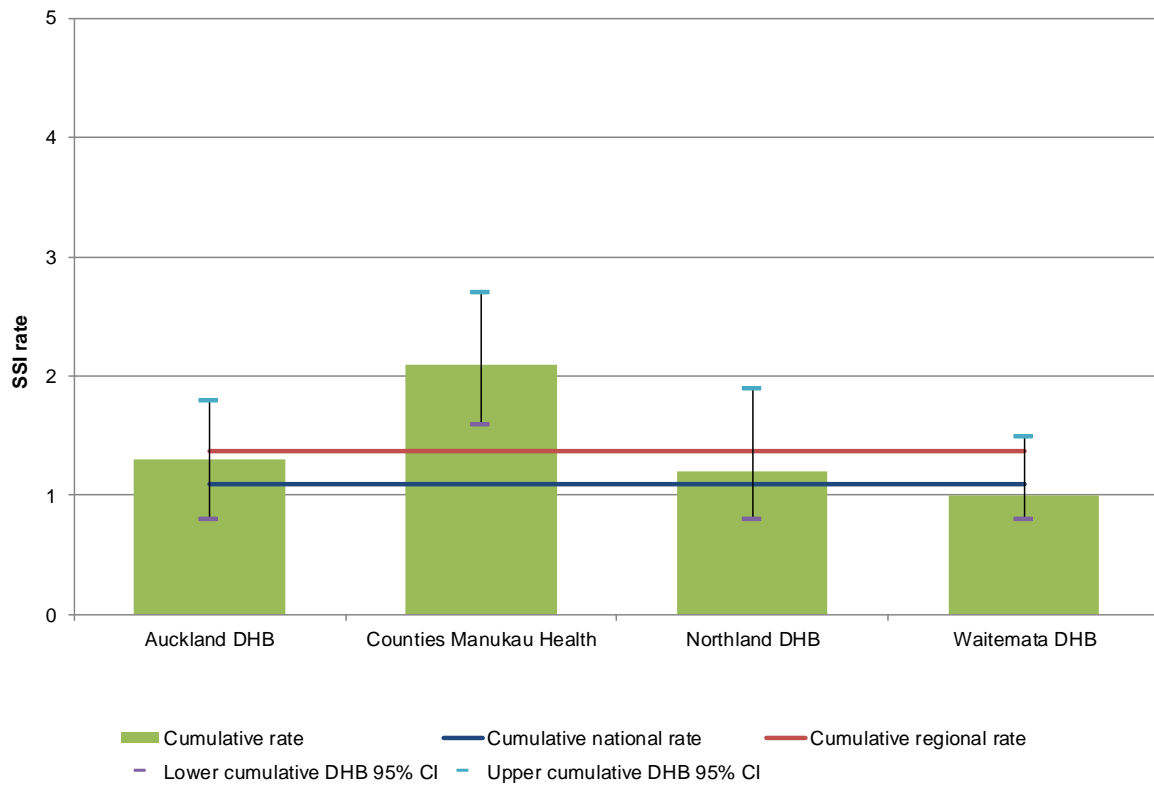
5.8.3 National hip SSI rates over time: superficial and deep/organ space, April 2014 to September 2016



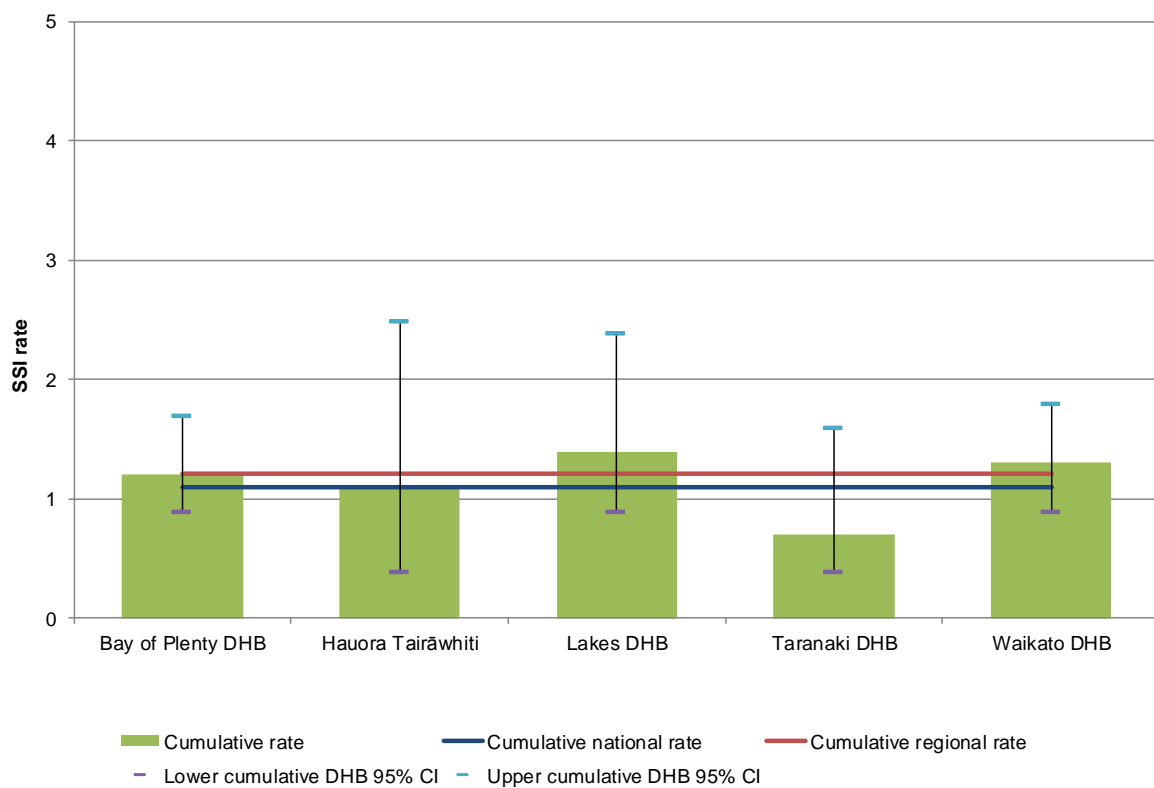
5.8.4 National knee SSI rates over time: superficial and deep/organ space, April 2014 to September 2016



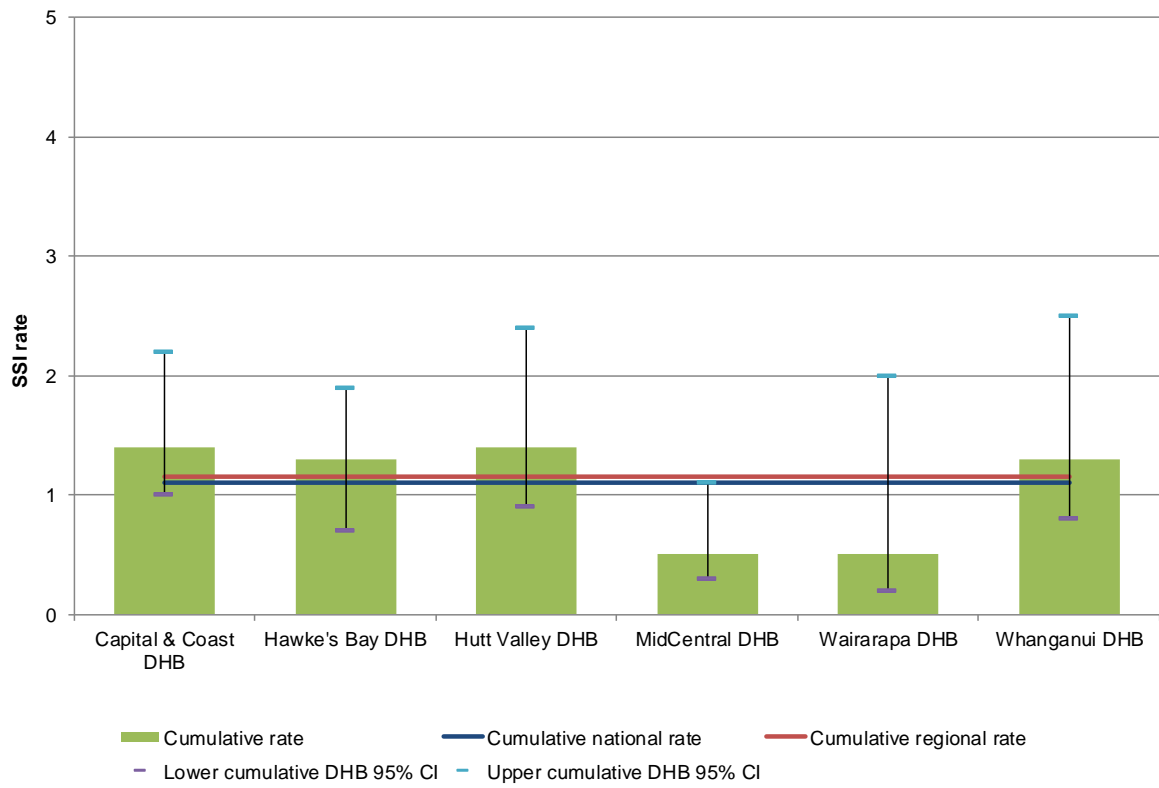
5.8.5 Northern region: SSI rates by DHB, March 2013 to September 2016



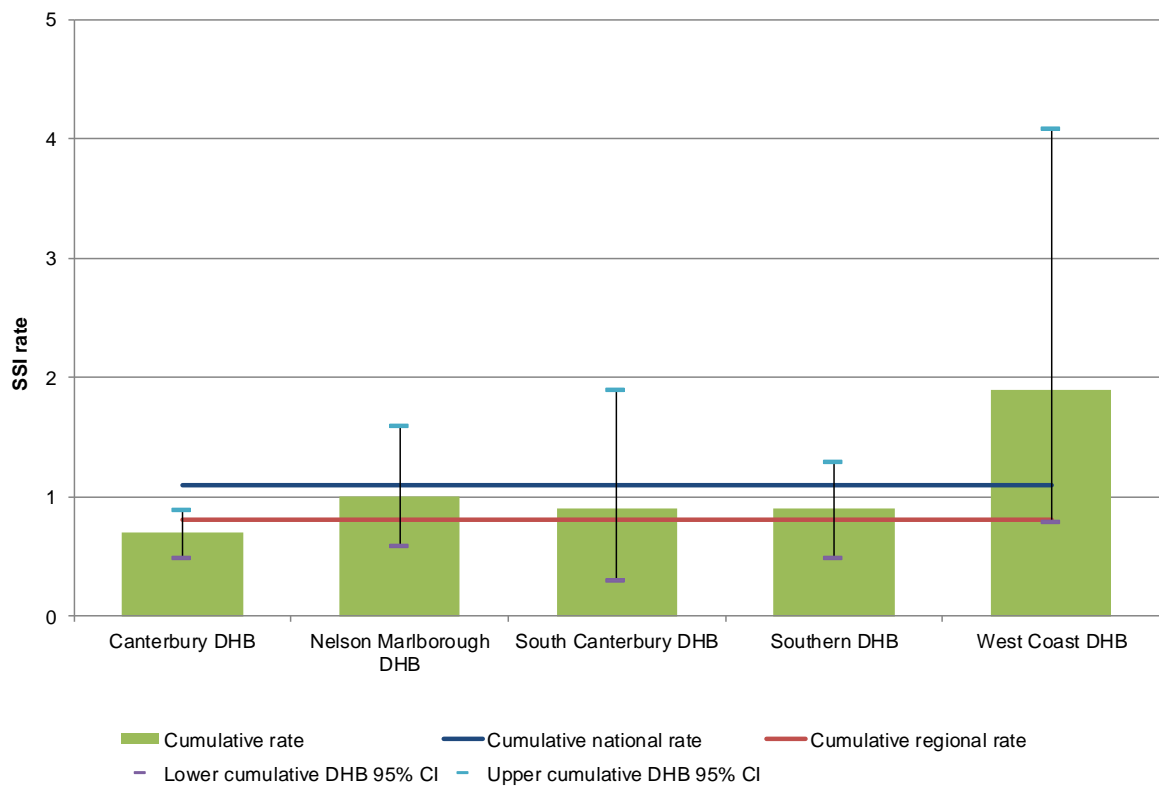
5.8.6 Midland region: SSI rates by DHB, March 2013 to September 2016



5.8.7 Central region: SSI rates by DHB, March 2013 to September 2016



5.8.8 South Island region: SSI rates by DHB, March 2013 to September 2016



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	108	103	95	3	2	0
Bay of Plenty	184	182	99	2	0	0
Canterbury	316	314	99	1	1	0
Capital & Coast	144	144	100	0	0	0
Counties Manukau Health	162	152	94	2	2	6
Hauora Tairāwhiti	33	31	94	2	0	0
Hawke's Bay	83	83	100	0	0	0
Hutt Valley	77	76	99	0	0	1
Lakes	75	75	100	0	0	0
MidCentral	115	114	99	1	0	0
Nelson Marlborough	131	131	100	0	0	0
Northland	125	122	98	1	1	1
South Canterbury	60	60	100	0	0	0
Southern	139	135	97	1	0	3
Taranaki	74	73	99	1	0	0
Waikato	154	152	99	1	0	1
Wairarapa	15	15	100	0	0	0
Waitemata	290	283	98	1	6	0
West Coast	19	19	100	0	0	0
Whanganui	64	64	100	0	0	0
Total	2368	2328	98	16	12	12
				0.7%	0.5%	0.5%

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	5	5	100	0	0	0
Bay of Plenty	13	12	92	1	0	0
Canterbury	32	32	100	0	0	0
Capital & Coast	14	14	100	0	0	0
Counties Manukau Health	19	15	79	3	0	1
Hauora Tairāwhiti	0	0	NA	0	0	0
Hawke's Bay	7	7	100	0	0	0
Hutt Valley	0	0	NA	0	0	0
Lakes	8	8	100	0	0	0
MidCentral	4	3	75	0	1	0
Nelson Marlborough	8	8	100	0	0	0
Northland	4	2	50	1	1	0
South Canterbury	1	0	0	0	0	1
Southern	12	11	92	1	0	0
Taranaki	5	5	100	0	0	0
Waikato	15	15	100	0	0	0
Wairarapa	1	1	100	0	0	0
Waitemata	21	19	90	0	1	1
West Coast	0	0	NA	0	0	0
Whanganui	0	0	NA	0	0	0
Total	169	157	93	6	3	3
				4%	2%	2%

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	113	108	96	3	2	0
Bay of Plenty	197	194	98	3	0	0
Canterbury	348	346	99	1	1	0
Capital & Coast	158	158	100	0	0	0
Counties Manukau Health	181	167	92	5	2	7
Hauora Tairāwhiti	33	31	94	2	0	0
Hawke's Bay	90	90	100	0	0	0
Hutt Valley	77	76	99	0	0	1
Lakes	83	83	100	0	0	0
MidCentral	119	117	98	1	1	0
Nelson Marlborough	139	139	100	0	0	0
Northland	129	124	96	2	2	1
South Canterbury	61	60	98	0	0	1
Southern	151	146	97	2	0	3
Taranaki	79	78	99	1	0	0
Waikato	169	167	99	1	0	1
Wairarapa	16	16	100	0	0	0
Waitemata	311	302	97	1	7	1
West Coast	19	19	100	0	0	0
Whanganui	64	64	100	0	0	0
Total	2537	2485	98	22	15	15
				0.9%	0.6%	0.6%

6.4 Compliance with prophylaxis timing QSM, July 2013 to September 2016

Key

< 95%	95–99%	100% QSM achieved
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Region	DHB	Jul-Sep 13	Oct-Dec 13	Jan-Mar 14	Apr-Jun 14	Jul-Sep 14	Oct-Dec 14	Jan-Mar 15	Apr-Jun 15	Jul-Sep 15	Oct-Dec 15	Jan-Mar 16	Apr-Jun 16	Jul-Sep 16
Northern	Auckland	97	98	98	96	96	97	96	95	96	95	94	97	95
	Counties Manukau Health		70	80	83	94	97	99	97	97	98	94	99	94
	Northland	98	89	98	97	96	96	93	91	92	98	98	99	98
	Waitemata	93	92	95	96	98	97	97	94	98	96	92	92	98
Midland	Bay of Plenty	95	92	95	97	95	97	98	99	99	96	99	98	99
	Hauora Tairāwhiti	91	91	88	48	88	95	95	95	100	91	97	87	94
	Lakes	98	98	99	98	100	99	99	98	97	100	97	97	100
	Taranaki	93	91	100	97	98	90	95	77	94	89	100	100	99
	Waikato	85	98	89	87	92	81	93	92	94	97	98	98	99
Central	Capital & Coast	93	96	93	99	95	98	96	100	100	100	100	100	100
	Hawke's Bay	94	87	95	93	100	98	100	100	100	98	100	100	100
	Hutt Valley	99	87	53	87	94	92	95	97	98	94	96	98	99
	MidCentral	91	94	96	99	97	96	90	100	99	98	98	98	99
	Wairarapa	97	100	100	97	100	96	100	100	100	95	100	100	100
	Whanganui	89	94	98	100	100	100	100	100	100	100	100	100	100
Southern	Canterbury	94	96	97	96	94	99	97	100	100	98	99	99.7	99
	Nelson Marlborough	92	87	97	99	100	98	97	99	96	99	100	98	100
	South Canterbury	93	84	95	100	100	100	100	100	96	100	100	95	100
	Southern	76	65	88	91	92	93	92	93	92	90	97	96	97
	West Coast	87	94	100	89	100	100	96	100	93	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 %
			1 g	2 g	≥ 3 g	≥ 2 g%			
Auckland	113	112	1	106	5	98	0	0	98
Bay of Plenty	197	194	0	184	10	98	0	0	98
Canterbury	348	341	3	338	0	97	0	0	97
Capital & Coast	158	155	0	141	14	98	0	0	98
Counties Manukau Health	181	177	5	170	2	95	0	2	95
Hauora Tairāwhiti	33	33	0	32	1	100	0	0	100
Hawke's Bay	90	85	2	83	0	92	4	0	97
Hutt Valley	77	74	0	56	18	96	2	1	99
Lakes	83	82	0	68	14	99	0	0	99
MidCentral	119	11	1	10	0	8	105	0	97
Nelson Marlborough	139	139	3	132	4	98	0	0	98
Northland	129	125	1	123	1	96	0	1	96
South Canterbury	61	59	1	58	0	95	0	1	95
Southern	151	134	4	129	1	86	11	0	93
Taranaki	79	75	10	58	7	82	1	0	84
Waikato	169	166	5	153	8	95	0	1	95
Wairarapa	16	16	0	1	15	100	0	0	100
Waitemata	311	299	3	289	7	95	0	1	95
West Coast	19	18	0	18	0	94.7	0	0	94.7
Whanganui	64	61	0	61	0	95	2	0	98
Total	2537	2356	39	2210	107	91	125	7	96
		93%	2%	87%	4%		5%		

* Includes procedures (49 of the 2537) receiving other antibiotics for prophylaxis.

7.1 Compliance with dose QSM, July 2013 to September 2016

Key

< 90%	90–94%	≥95% QSM achieved
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Region	DHB	Jul-Sep 13	Oct-Dec 13	Jan-Mar 14	Apr-Jun 14	Jul-Sep 14	Oct-Dec 14	Jan-Mar 15	Apr-Jun 15	Jul-Sep 15	Oct-Dec 15	Jan-Mar 16	Apr-Jun 16	Jul-Sep 16
Northern	Auckland	85	93	96	95	95	97	100	98	95	94	94	95	98
	Counties Manukau Health		97	93	98	99	99	100	100	100	100	97	99	95
	Northland	56	90	95	98	94	93	96	95	93	98	100	98	96
	Waitemata	66	72	82	97	96	98	97	94	97	95	94	94	95
Midland	Bay of Plenty	73	93	93	96	95	99	99	96	99	97	98	97	98
	Hauora Tairāwhiti	96	92	90	96	92	98	97	98	100	97	97	94	100
	Lakes	93	95	96	95	95	99	97	96	96	98	97	96	99
	Taranaki	15	27	17	29	39	41	31	66	51	53	58	67	84
	Waikato	74	78	88	93	94	95	90	93	94	94	95	97	95
Central	Capital & Coast	100	99	97	98	99	98	98	98	100	99	99	99	98
	Hawke's Bay	10	36	60	72	85	89	93	97	99	94	97	99	97
	Hutt Valley	0	90	96	99	94	100	100	100	99	97	97	96	99
	MidCentral	2	0	3	4	8	10	96	100	99	95	96	98	97
	Wairarapa	97	100	94	97	100	94	100	100	100	95	100	97	100
	Whanganui	9	67	95	94	95	99	100	92	98	99	100	98	98
Southern	Canterbury	52	56	70	91	96	97	97	98	96	98	96	97	97
	Nelson Marlborough	26	70	93	99	99	97	100	99	99	100	97	98	98
	South Canterbury	76	51	97	94	93	95	95	94	96	92	97	94	95
	Southern	23	45	65	81	77	81	89	93	96	94	96	95	93
	West Coast	13	61	30	100	100	100	96	100	96	95	100	95	94.7

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	108	108	100	0	0
Bay of Plenty	184	183	99	1	0
Canterbury	316	304	96	12	0
Capital & Coast	144	144	100	0	0
Counties Manukau Health	162	162	100	0	0
Hauora Tairāwhiti	33	33	100	0	0
Hawke's Bay	83	83	100	0	0
Hutt Valley	77	77	100	0	0
Lakes	75	75	100	0	0
MidCentral	115	115	100	0	0
Nelson Marlborough	131	128	98	3	0
Northland	125	125	100	0	0
South Canterbury	60	57	95	3	0
Southern	139	138	99	1	0
Taranaki	74	74	100	0	0
Waikato	154	149	97	5	0
Wairarapa	15	15	100	0	0
Waitemata	290	283	98	7	0
West Coast	19	19	100	0	0
Whanganui	64	63	98	1	0
Total	2368	2335	99	33	0
				1%	0%

* 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	5	5	100	0	0
Bay of Plenty	13	13	100	0	0
Canterbury	32	20	63	12	0
Capital & Coast	14	14	100	0	0
Counties Manukau Health	19	19	100	0	0
Hauora Tairāwhiti	0	0	NA	0	0
Hawke's Bay	7	7	100	0	0
Hutt Valley	0	0	NA	0	0
Lakes	8	7	88	1	0
MidCentral	4	4	100	0	0
Nelson Marlborough	8	8	100	0	0
Northland	4	4	100	0	0
South Canterbury	1	0	0	1	0
Southern	12	12	100	0	0
Taranaki	5	3	60	2	0
Waikato	15	13	87	2	0
Wairarapa	1	1	100	0	0
Waitemata	21	9	43	12	0
West Coast	0	0	NA	0	0
Whanganui	0	0	NA	0	0
Total	169	139	82	30	0
				18%	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	113	113	100	0	0
Bay of Plenty	197	196	99	1	0
Canterbury	348	324	93	24	0
Capital & Coast	158	158	100	0	0
Counties Manukau Health	181	181	100	0	0
Hauora Tairāwhiti	33	33	100	0	0
Hawke's Bay	90	90	100	0	0
Hutt Valley	77	77	100	0	0
Lakes	83	82	99	1	0
MidCentral	119	119	100	0	0
Nelson Marlborough	139	136	98	3	0
Northland	129	129	100	0	0
South Canterbury	61	57	93	4	0
Southern	151	150	99	1	0
Taranaki	79	77	97	2	0
Waikato	169	162	96	7	0
Wairarapa	16	16	100	0	0
Waitemata	311	292	94	19	0
West Coast	19	19	100	0	0
Whanganui	64	63	98	1	0
Total	2537	2474	98	63	0
				2%	0%

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

8.4 Postoperative prophylaxis stopped within 24 hours, July 2013 to September 2016

Key

< 95%	95–99%	100%
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Region	DHB	Jul-Sep 13	Oct-Dec 13	Jan-Mar 14	Apr-Jun 14	Jul-Sep 14	Oct-Dec 14	Jan-Mar 15	Apr-Jun 15	Jul-Sep 15	Oct-Dec 15	Jan-Mar 16	Apr-Jun 16	Jul-Sep 16
Northern	Auckland	43	82	92	99	99	99	99	99	100	100	100	100	100
	Counties Manukau Health	0	100	100	100	100	100	100	100	100	100	100	100	100
	Northland	98	87	94.5	87	94.5	94.9	98	99	99	100	100	100	100
	Waitemata	63	84	90	84	90	97	89	90	91	91	92	94	94
Midland	Bay of Plenty	80	93	90	93	90	94	94	94	95	95	99	99	99
	Hauora Tairāwhiti	87	92	80	92	80	98	94.9	95	100	100	100	100	100
	Lakes	89	88	96	88	96	95	90	94	96	98	97	100	99
	Taranaki	9	2	2	2	2	87	93	95	97	100	93	99	97
	Waikato	53	77	83	77	83	80	88	93	96	86	96	99	96
Central	Capital & Coast	26	98	100	98	100	100	100	100	100	100	100	100	100
	Hawke's Bay	98	98	93	98	93	100	100	100	100	100	100	100	100
	Hutt Valley	82	95	100	95	100	100	100	99	100	100	99	100	100
	MidCentral	41	0	10	0	10	46	87	93	94.96	94.5	96	98	100
	Wairarapa	6	0	6	0	6	63	76	91	91	95	95	100	100
	Whanganui	100	95	52	95	52	97	74	97	97	80	69	100	98
Southern	Canterbury	6	36	35	36	35	37	78	91	87	81	91	91	93
	Nelson Marlborough	79	85	94.9	85	94.9	98	99	98	99	100	100	100	98
	South Canterbury	91	86	97	86	97	94.6	97	94	93	89	97	94	93
	Southern	83	76	90	76	90	99	98	96	98	96	96	99	99
	West Coast	25	94	85	94	85	94.7	96	100	96	95	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).

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).

ANZ Journal of Surgery, http://www.anzjsurg.com/view/0/ASA_score.html).

9.1 ASA scores and SSI rates, July to September 2016

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	190	1453	844	31	4	15	2537
No of SSIs	2	16	10	2	0	0	30
SSI rate (%)	1.1	1.1	1.2	6.5	0.0	0.0	1.2
95% CI	0.3–3.8	0.7–1.8	0.6–2.2	1.8–20.7	0.0–49.0	0.0–20.4	0.8–1.7

9.2 Cumulative ASA scores and SSI rates, March 2013 to September 2016

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	2878	19,880	10,255	414	30	581	34,038
No of SSIs	16	177	172	10	1	12	388
SSI rate (%)	0.6	0.9	1.7	2.4	3.3	2.1	1.1
95% CI	0.3–0.9	0.8–1.0	1.4–1.9	1.3–4.4	0.6–16.7	1.2–3.6	1.0–1.3

9.3 Total surgical risk scores and SSI rates, July to September 2016

Total risk score	0	1	2	3	Not recorded	Total
Procedures	1497	892	133	0	15	2537
SSI	18	11	1	0	0	30
SSI rate (%)	1.2	1.2	0.8	NA	0.0	1.2
95% CI	0.8–1.9	0.7–2.2	0.1–4.1	NA	0.0–20.4	0.8–1.7

9.4 Cumulative total surgical risk scores and SSI rates, March 2013 to September 2016

Total risk score	0	1	2	3	Not recorded	Total
Procedures	20,036	11,435	1964	22	581	34,038
SSI	157	168	51	0	12	388
SSI rate (%)	0.8	1.5	2.6	0.0	2.1	1.1
95% CI	0.7–0.9	1.3–1.7	2.0–3.4	0.0–14.9	1.2–3.6	1.0–1.3

10 QSM performance over time

10.1 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% 1187/1298	51% 662/1298	94% 1218/1298	61% 790/1298	1.2 16/1298
	Jul–Sep (B)	89% 1475/1660	63% 1042/1887	97% 1827/1887	56% 1058/1887	1.6 30/1887
	Oct–Dec (C)	90% 1859/2078	68% 1579/2323	96% 2234/2323	84% 1597/2323	1.3 30/2323
2014	Jan–Mar (D)	92% 1974/2148	78% 1832/2350	98% 2295/2350	76% 1779/2350	1.0 24/2350
	Apr–Jun (E)	94% 2373/2528	85% 2322/2738	97% 2664/2738	71% 1949/2738	1.2 34/2738
	Jul–Sep (F)	96% 2217/2314	88% 2243/2540	98% 2485/2540	80% 2033/2540	1.3 32/2540
	Oct–Dec (G)	95% 2305/2434	90% 2413/2685	98% 2624/2685	83% 2226/2685	1.3 36/2685
2015	Jan–Mar (H)	96% 2186/2274	95% 2368/2502	99% 2477/2502	90% 2258/2502	1.0 25/2500
	Apr–Jun (I)	96% 2266/2357	95% 2469/2588	99% 2568/2588	93% 2395/2588	1.2 32/2588
	Jul–Sep (J)	97% 2413/2485	96% 2597/2713	99% 2699/2713	96% 2595/2713	1.1 30/2713
	Oct–Dec (K)	97% 2250/2327	96% 2441/2555	99% 2548/2555	95% 2437/2555	0.8 20/2555
2016	Jan–Mar (L)	97% 2275/2339	96% 2424/2535	99% 2522/2535	96% 2429/2535	1.2 31/2535
	Apr–Jun (M)	98% 2484/2543	96% 2618/2733	99% 2715/2733	98% 2665/2733	0.7 18/2733
	Jul–Sep (N)	98% 2328/2388	96% 2442/2537	99% 2516/2537	98% 2474/2537	1.2 30/2537

* 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 (N) time periods.

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

*** Not all 20 DHBs submitted data.

Statistical analysis of process marker

- Timing: b vs. n, $p < 0.0001$.
- Dose: a vs. b, $p = 0.02$; b vs. c, $p < 0.0001$; c vs. d, $p < 0.0001$; d vs. e, $p < 0.0001$; e vs. f, $p < 0.0001$; f vs. g, $p = 0.19$; g vs. h, $p < 0.0001$; a vs. n, $p < 0.0001$.
- Alcohol-based skin preparation: a vs. n, $p < 0.0001$.
- Postoperative duration: a vs. n, $p < 0.0001$.

11 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
Oct–Dec 2016	30 Mar 2017	30 Apr 2017	Early May 2017	Jun 2017	30 Jun 2017
Jan–Mar 2016	30 Jun 2017	31 Jul 2017	Early Aug 2017	Sep 2017	30 Sep 2017
Apr–Jun 2017	30 Sep 2017	31 Oct 2017	Early Nov 2017	Dec 2017	15 Dec 2017

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