



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



National Cardiac Surgery Report

April to June 2017

Cardiac surgery
Surgical Site Infection Improvement Programme

SSII Surgical Site Infection
Improvement Programme

Abbreviations

ASA	American Society of Anesthesiologists
CARD	Cardiac surgery, ie, heart procedures including valves and septum, etc
CABG	Coronary artery bypass graft (irrespective of donor site)
CBGB	Coronary artery bypass graft with both chest and donor sites
CBGC	Coronary artery bypass graft chest site only
CHX	Aqueous chlorhexidine
CHX/Alc	Chlorhexidine in alcohol
CI	Confidence interval
Commission	Health Quality & Safety Commission
DHB	District health board
ESBL	Extended-spectrum beta-lactamase
KTS	Knife to skin
MRSA	Methicillin-resistant <i>Staphylococcus aureus</i>
NA	Not applicable
Povi	Aqueous povidone iodine
Povi/Alc	Povidone iodine in alcohol
QSM	Quality and safety marker
SSI	Surgical site infection
SSII	Surgical Site Infection Improvement

Contents

Contents	3
1 Acknowledgements.....	4
2 Summary of findings.....	4
2.1 April to June 2017.....	4
2.2 Cumulative findings	4
3 Change in reporting format	5
3.1 ACC treatment injury claim information	5
4 Procedures and SSI rates.....	5
4.1 Cardiac SSIs by DHB surveillance period and cumulative SSI rates.....	5
4.2 Procedures by DHB and SSI rates, April to June 2017	6
4.3 Cumulative SSI rates by procedure, October 2014 to June 2017	6
4.4 Procedures: graft donor sites, April to June 2017	6
4.5 Rates by SSI type and wound site	7
5 Timing of antibiotic prophylaxis	9
5.1 Antibiotic prophylaxis timing rates, April to June 2017	9
6 Dosing of cefazolin prophylaxis	10
6.1 Cefazolin prophylaxis rates for adult patients, April to June 2017	10
6.2 Cefazolin prophylaxis rates for paediatric patients, April to June 2017	10
7 Duration of antibiotic prophylaxis after surgery	11
7.1 Antibiotic prophylaxis rates, April to June 2017.....	11
8 Skin preparation agents	12
8.1 Skin preparation rates, April to June 2017	12
9 Risk scores and SSI rates	13
9.1 ASA score and SSI rates, April to June 2017.....	13
9.2 Cumulative ASA score and SSI rates, October 2014 to June 2017.....	13
9.3 Total surgical risk score and SSI rates, April to June 2017.....	14
9.4 Cumulative total surgical risk score and SSI rates, October 2014 to June 2017	14
10 ACC treatment injury claims following coronary artery bypass graft (CABG).....	14
10.1 Accepted treatment injury claims	15
11 Timeline of future reports.....	16

1 Acknowledgements

Thank you to all those who have worked so diligently to get cardiac data collected and entered on time. This helps us greatly with reporting.

Since February 2016 the Accident Compensation Corporation (ACC) has supported the 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 procedures.

2 Summary of findings

This report presents the results of the cardiac SSII Programme for the period 1 April to 30 June 2017. It also provides cumulative data from 1 October 2014 to 30 June 2017.

All five district health boards (DHBs) performing cardiac surgery submitted all procedures for the reporting period.

Paediatric surgical site infection (SSI) data began to be collected in January 2016.

2.1 April to June 2017

During this surveillance period:

- DHBs performed 676 cardiac procedures
- there were 31 SSIs, a rate of 4.6 percent (95 percent confidence interval (CI) 3.2–6.4). One SSI was from procedures performed by the Paediatric and Congenital Cardiac Service (3 percent) and the remaining 30 from adult procedures (97 percent)
- most SSIs, 19 (61 percent), were superficial. Thirteen (42 percent) involved only the donor site. There were 18 (58 percent) SSIs involving only the chest site; eight were superficial, six deep and four organ space. There were no procedures with both a chest and a donor site SSI this quarter
- 15 (48 percent) SSIs had staphylococci isolated. All had *Staphylococcus aureus*; one patient also had *Staphylococcus lugdunensis*.

2.2 Cumulative findings

The cumulative procedure total was 4,966 with 241 SSIs, 4.9 percent (95 percent CI 4.3–5.5). This total consists of 4,470 adult procedures performed between October 2014 and June 2017, and 496 paediatric procedures between January 2016 and June 2017.

3 Change in reporting format

3.1 ACC treatment injury claim information

Since February 2016, ACC has supported the SSII Programme's work to reduce SSIs. Accepted treatment injury claims following coronary artery bypass graft (CABG) surgery have increased over the last five years. In this report we introduce a new, permanent section (section 10, page 15), 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.

4 Procedures and SSI rates

Procedures are reported in three procedure groups:

- cardiac surgery, ie, heart procedures including valves and septum, etc (CARD)
- coronary artery bypass graft with both chest and donor site (CBGB)
- coronary artery bypass graft chest site only (CBGC).

4.1 Cardiac SSIs by DHB surveillance period and cumulative SSI rates

DHB	Procedures Apr–Jun 17	No of SSIs*	%	95% CI	Cumulative procedures Oct 14– Jun 17	No of cumulative SSIs*	%	Cumulative 95% CI
Auckland adult	234	10	4.3	2.3–7.7	2,409	102	4.2	3.5–5.1
Auckland paediatric	89	1	1.1	0.2–6.1	496	36	7.3	5.3–9.9
Canterbury	53	3	5.7	1.9–15.4	665	28	4.2	2.9–6
Capital & Coast	131	5	3.8	1.6–8.6	465	14	3.0	1.8–5
Southern	38	2	5.3	1.5–17.3	422	33	7.8	5.6–10.8
Waikato	131	10	7.6	4.2–13.5	509	28	5.5	3.8–7.8
Total	676	31	4.6	3.2–6.4	4,966	241	4.9	4.3–5.5

* SSI data collection for paediatric procedures started on 1 January 2016, therefore the number in the table represents paediatric procedures from that date. Data collection for Capital & Coast DHB and Waikato DHB started on 1 July 2016.

4.2 Procedures by DHB and SSI rates, April to June 2017

DHB	Procedures			
	Total	CARD	CBGB	CBGC
Auckland adult	234	89	135	10
Auckland paediatric	89	89	0	0
Canterbury	53	12	41	0
Capital & Coast	131	45	79	7
Southern	38	8	27	3
Waikato	131	39	84	8
Total	676	282	366	28
No of SSIs	31	6	24	1
SSI rate	4.6	2.1	6.6	3.6
95% CI	3.2–6.4	1.0–4.6	4.4–9.6	0.6–17.7

4.3 Cumulative SSI rates by procedure, October 2014 to June 2017

Results are based on adult procedures between October 2014 and June 2017, and paediatric procedures between January 2016 and June 2017.

	Procedures			
	Total	CARD	CBGB	CBGC
Procedures	4,966	1,996	2,780	190
No of SSIs	241	62	173	6
SSI rate	4.9	3.1	6.2	3.2
95% CI	4.3–5.5	2.4–4	5.4–7.2	1.5–6.7

4.4 Procedures: graft donor sites, April to June 2017

Procedure	Graft donor site					Total
	Internal mammary	Arm	Leg	Other	Not applicable	
CARD	0	0	0	0	282	282
CBGB	0	30	316	20	0	366
CBGC	28	0	0	0	0	28
Total	28	30	316	20	282	676

4.5 Rates by SSI type and wound site

For the reporting period, most SSIs, 19 (61 percent), were superficial. Thirteen (42 percent) involved only the donor site. There were 18 (58 percent) SSIs involving only the chest site; eight were superficial, six deep and four organ space. There were no procedures with both a chest and a donor site SSI.

4.5.1 Rates by SSI type, April to June 2017

Results are based on 676 adult and paediatric procedures for April to June 2017.

SSI type	No of SSIs	%	95% CI
Superficial	19	2.8	1.8–4.3
Deep	8	1.2	0.6–2.3
Organ space	4	0.6	0.2–1.5
Total	31	4.6	3.2–6.4

4.5.2 Cumulative SSI rates by SSI type, October 2014 to June 2017

Results are based on 4,470 adult procedures between October 2014 and June 2017, and 496 paediatric procedures between January 2016 and June 2017 (total procedures 4,966).

SSI type	No of SSIs	%	95% CI
Superficial	159	3.2	2.7–3.7
Deep	57	1.1	0.9–1.5
Organ space	25	0.5	0.3–0.7
Total	241	4.9	4.3–5.5

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

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

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

Organ space SSI: Infection occurs within 90 days of an 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 cardiac surgery this includes myocarditis, pericarditis, mediastinitis, sternal osteomyelitis and endocarditis.

4.5.3 SSI rates by wound site, April to June 2017

During this surveillance period there were 31 SSIs; no procedures had an SSI at both donor and chest sites.

Site	Procedures	No of SSIs	%	95% CI
Leg*	316	10	3.2	1.7–5.7
Arm	30	1	3.3	0.6–16.7
Other	20	2	10.0	2.8–30.1
Chest**	676	18	2.7	1.7–4.2

* Assumes only a unilateral leg incision for saphenous vein grafts.

** One internal mammary graft procedure had an organ space SSI.

4.5.4 Cumulative SSI rates by wound site, October 2014 to June 2017

Results are based on adult procedures between October 2014 and June 2017, and paediatric procedures between January 2016 and June 2017. During this period there were 241 SSIs. Five procedures had an SSI at both donor and chest site.

Site	Procedures	No of SSIs	%	95% CI
Leg*	2442	100	4.1	3.4–5
Arm	229	3	1.3	0.4–3.8
Other	109	5	4.6	2–10.3
Chest**	4966	138	2.8	2.4–3.3

* Assumes only a unilateral leg incision for saphenous vein grafts.

** Six internal mammary graft procedures had an SSI.

5 Timing of antibiotic prophylaxis

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

Over the reporting period, 97 percent of procedures had prophylaxis given on time. One percent received prophylaxis early.

Southern DHB achieved the QSM.

5.1 Antibiotic prophylaxis timing rates, April to June 2017

DHB	Total	Total 'on time'	%*	More than 1 hour before KTS	After KTS	Not recorded
Auckland adult	234	224	96	3	7	0
Auckland paediatric	89	85	96	2	2	0
Canterbury	53	52	98	1	0	0
Capital & Coast	131	130	99	0	1	0
Southern	38	38	100	0	0	0
Waikato	131	124	95	2	2	3
Total	676	653	97	8	12	3
				1%	1.8%	0.4%

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

6 Dosing of cefazolin prophylaxis

The SSII Programme antibiotic prophylaxis of choice is ≥ 2 g or more of cefazolin for adults and ≥ 30 mg/kg of cefazolin for paediatric patients, not to exceed the adult dose. The QSM target is that either dose is used in at least 95 percent of procedures.

Over the reporting period, 98 percent of adult procedures and 92 percent of paediatric procedures used the recommended dose. Auckland (adult procedures), Capital & Coast, Southern and Waikato DHBs met the QSM.

6.1 Cefazolin prophylaxis rates for adult patients, April to June 2017

DHB	Total	Cefazolin used as prophylaxis	Doses used				% ≥ 2 g
			1 g	2 g	≥ 3 g	Not recorded	
Auckland adult	234	227	2	212	13	0	96
Canterbury	53	51	1	50	0	0	94
Capital & Coast	131	131	0	126	5	0	100
Southern	38	38	0	34	4	0	100
Waikato	131	130	0	122	8	0	99
Total	587	577	3	544	30	0	98
		98%	0.5%	93%	5%	0.0%	

6.2 Cefazolin prophylaxis rates for paediatric patients, April to June 2017

DHB	Total	Cefazolin used as prophylaxis	< 30 mg/kg	≥ 30 mg/kg	Not recorded	% ≥ 30 mg/kg
Auckland paediatric	89	88	6	82	0	92
		99%	7%	92%	0.0%	

7 Duration of antibiotic prophylaxis after surgery

Surgical antimicrobial prophylaxis should be stopped within 48 hours of cardiac surgery. Six doses of cefazolin, given every eight hours after surgery, is accepted as stopping within 48 hours of surgery.

All Auckland DHB procedures had prophylaxis stopped within 48 hours. Canterbury DHB did not submit data on prophylaxis after surgery.

7.1 Antibiotic prophylaxis rates, April to June 2017

DHB	Total	≤ 48 hr	% ≤ 48 hr	> 48 hr	Unknown or not recorded
Auckland adult	234	234	100	0	0
Auckland paediatric	89	89	100	0	0
Canterbury	53	0	0	0	53
Capital & Coast	131	129	98	2	0
Southern	38	37	97	1	0
Waikato	131	116	89	15	0
Total	676	605	89	18	53
				3%	7.8%

8 Skin preparation agents

The SSII Programme QSM for skin antisepsis is use of an alcohol-based preparation in 100 percent of procedures.

Auckland (paediatric procedures), Canterbury, Capital & Coast and Waikato DHBs met this target. The use of aqueous povidone iodine has prevented Auckland DHB (adult procedures) from meeting this QSM.

8.1 Skin preparation rates, April to June 2017

DHB	Total	Skin preparation						
		CHX/ Alc	Povl/ Alc	Alcohol- based	%	Povl	Other	Not recorded
Auckland adult	234	223	9	232	99	2	0	0
Auckland paediatric	89	89	0	89	100	0	0	0
Canterbury	53	53	0	53	100	0	0	0
Capital & Coast	131	2	129	131	100	0	0	0
Southern	38	1	36	37	97	0	0	1
Waikato	131	105	26	131	100	0	0	0
Total	676	473	200	673	99.6	2	0	1
						0.3%	0.0%	0.1%

CHX/Alc = chlorhexidine in alcohol

Povl/Alc = povidone iodine in alcohol

Povl = aqueous povidone iodine

9 Risk scores and SSI rates

The American Society of Anesthesiologists (ASA) score is a global score that assesses 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 score (ASA > 2, score 1)

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

+ operation duration score (CBGC procedure > 4 hours, score 1; CBGB and CARD > 5 hours, score 1).

9.1 ASA score and SSI rates, April to June 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	1	15	258	393	5	4	676
No of SSIs	0	0	11	20	0	0	31
SSI rate	0.0	0.0	4.3	5.1	0.0	0.0	4.6
95% CI	0.0–79.3	0.0–20.4	2.4–7.5	3.3–7.7	0.0–43.4	0.0–49	3.2–6.4

9.2 Cumulative ASA score and SSI rates, October 2014 to June 2017

Results are based on adult procedures between October 2014 and June 2017 (n=4,470) and paediatric procedures between January 2016 and June 2017 (n=496), total procedures 4,966.

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	6	86	1,954	2,892	18	10	4,966
No of SSIs	0	0	93	148	0	0	241
SSI rate	0.0	0.0	4.8	5.1	0.0	0.0	4.9
95% CI	0.0–39	0.0–4.3	3.9–5.8	4.4–6	0.0–17.6	0.0–27.8	4.3–5.5

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

Total risk score	0	1	2	3	Not recorded	Total
Procedures	14	515	143	0	4	676
No of SSIs	0	22	9	0	0	31
SSI rate	0.0	4.3	6.3	NA	0.0	4.6
95% CI	0.0–21.5	2.8–6.4	3.3–11.5	NA	0.0–49	3.2–6.4

9.4 Cumulative total surgical risk score and SSI rates, October 2014 to June 2017

Results are based on adult procedures between October 2014 and June 2017 (n=4,470) and paediatric procedures between January 2016 and June 2017 (n=496), total procedures 4,966.

Total risk score	0	1	2	3	Not recorded	Total
Procedures	90	4,116	750	0	10	4,966
No of SSIs	0	197	44	0	0	241
SSI rate	0	4.8	5.9	NA	0	4.9
95% CI	0.0–4.1	4.2–5.5	4.4–7.8	NA	0.0–27.8	4.3–5.5

10 ACC treatment injury claims following coronary artery bypass graft (CABG)

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 claims accepted by ACC.

Treatment injury claims can be lodged by any health professional. This means a proportion of infections following surgical procedures, detected and treated 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 improvements 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/organ space) that follow surgical procedures.

10.1.1 Treatment injury claims related to infection following CABG surgery for all DHB facilities – by calendar year

	2011	2012	2013	2014	2015	2016
Accepted DHB claims	19	21	21	38	40	46
Active DHB claims	27	23	31	50	53	57
Cost of active claims	\$51,570	\$8,388	\$56,352	\$124,635	\$161,017	\$279,670
Cost per active claim	\$1,910	\$365	\$1,818	\$2,493	\$3,038	\$4,906

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

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

Cost per active claim = average cost per active claim for infection following CABG surgery performed in all DHB facilities over the last six calendar years.

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
Apr–Jun 2017	30 Sep 2017	31 Oct 2017	Early Nov 2017	Dec 2017	15 Dec 2017
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 2017

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