



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



National Cardiac Surgery Report

October to December 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

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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 October to 31 December 2017. It also provides cumulative data from 1 October 2014 to 31 December 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 October to December 2017

During this surveillance period:

- DHBs performed 641 cardiac procedures
- there were 25 SSIs, a rate of 3.9 percent (95 percent confidence interval (CI) 2.7–5.7) compared with 5 percent in the last quarter. Four SSIs were from procedures performed by the paediatric and congenital cardiac service (16 percent) and the remaining 21 from adult procedures (84 percent)
- eighteen SSIs (72 percent) were superficial, three deep and four organ space. Twelve (48 percent) SSIs involved only the donor site. There were 12 (48 percent) SSIs involving only the chest site; five were superficial, three deep and four organ space. Organ space SSIs could be identified as mediastinitis (3) and pericarditis (1). There was one procedure with both a superficial chest and a donor site SSI this quarter
- nine (36 percent) SSIs had staphylococci isolated of which all had *Staphylococcus aureus*
- national performance against the prophylaxis timing quality and safety marker (QSM) was 98 percent. The target is 100 percent. Three DHBs achieved the QSM
- national performance against the dose QSM was 98 percent for adult procedures and 97 percent for paediatric procedures. The target is 95 percent. All DHBs achieved the QSM
- national performance against the skin prep QSM was 99.7 percent. The target is 100 percent. Four DHBs fully achieved the QSM
- prophylaxis was stopped within 24 hours in 97 percent of all procedures. Two DHBs stopped prophylaxis within 24 hours for all procedures

- three DHBs met all three QSMs: Canterbury, Capital & Coast and Southern. Congratulations to these DHBs.

2.2 Cumulative findings

The cumulative procedure total was 6,306 with 300 SSIs, 4.8 percent (95 percent CI 4.3–5.3). This total consists of 5,671 adult procedures performed between October 2014 and December 2017, and 635 paediatric procedures performed between January 2016 and December 2017.

3 Change in reporting format

There are no changes in format this quarter but DHBs now supply details on the type of organ space SSI observed, ie, either myocarditis, pericarditis, mediastinitis, sternal osteomyelitis or endocarditis.

4 Procedures and SSI rates

Procedures are reported in three procedure groups:

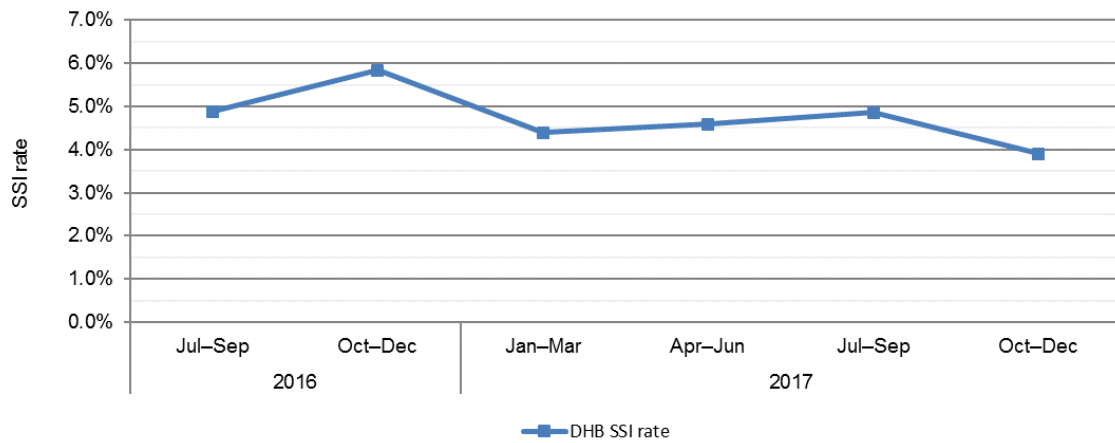
- cardiac surgery, ie, heart procedures including valves and septum, etc (CARD)
- coronary artery bypass graft with both chest and donor site (CBGB)
- coronary artery bypass graft chest site only (CBGC).

4.1 Cardiac SSIs by DHB, surveillance period and cumulative SSI rates

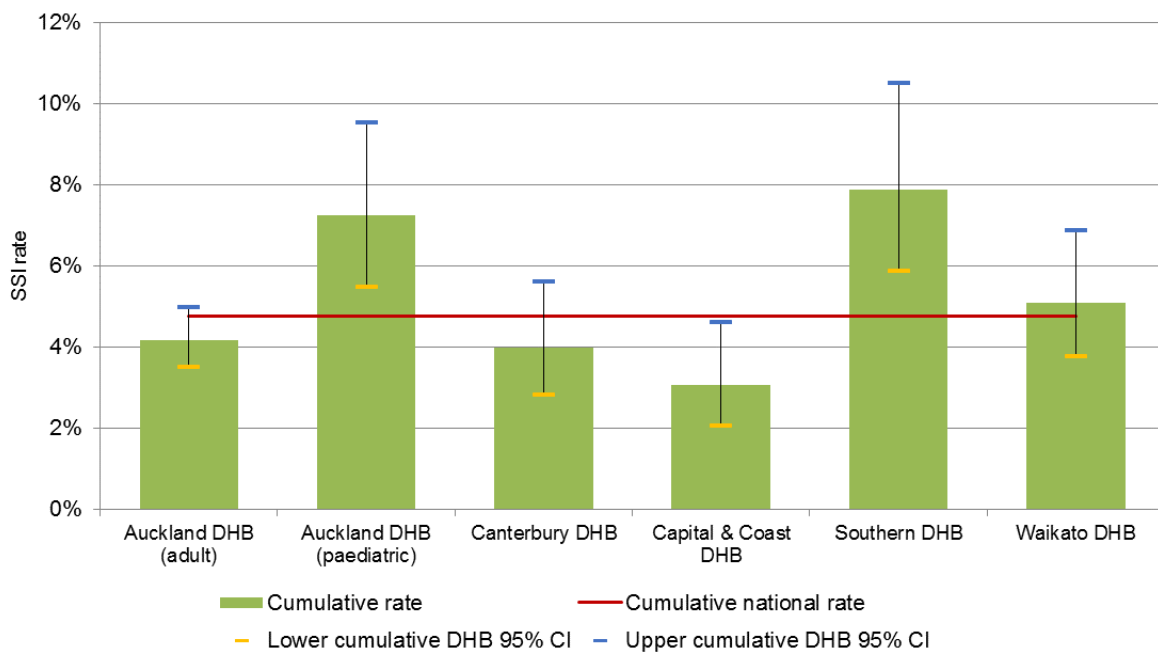
DHB	Procedures Oct–Dec 17	No of SSIs*	%	95% CI	Cumulative procedures Oct 14–Dec 17	No of cumulative SSIs*	%	Cumulative 95% CI
Auckland adult	221	9	4.1	2.2–7.6	2,873	120	4.2	3.5–5.0
Auckland paediatric	69	4	5.8	2.3–14	635	46	7.2	5.5–9.5
Canterbury	57	2	3.5	1.0–11.9	777	31	4.0	2.8–5.6
Capital & Coast	109	4	3.7	1.4–9.1	715	22	3.1	2.0–4.6
Southern	49	1	2.0	0.4–10.7	521	41	7.9	5.9–10.5
Waikato	136	5	3.7	1.6–8.3	785	40	5.1	3.8–6.9
Total	641	25	3.9	2.7–5.7	6,306	300	4.8	4.3–5.3

* 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.

4.1.1 SSI rates over time, July 2016 to December 2017



4.1.2 Cumulative SSI rates by DHB, October 2014 to December 2017*



* SSI data collection for paediatric procedures started on 1 January 2016, therefore this graph 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, October to December 2017

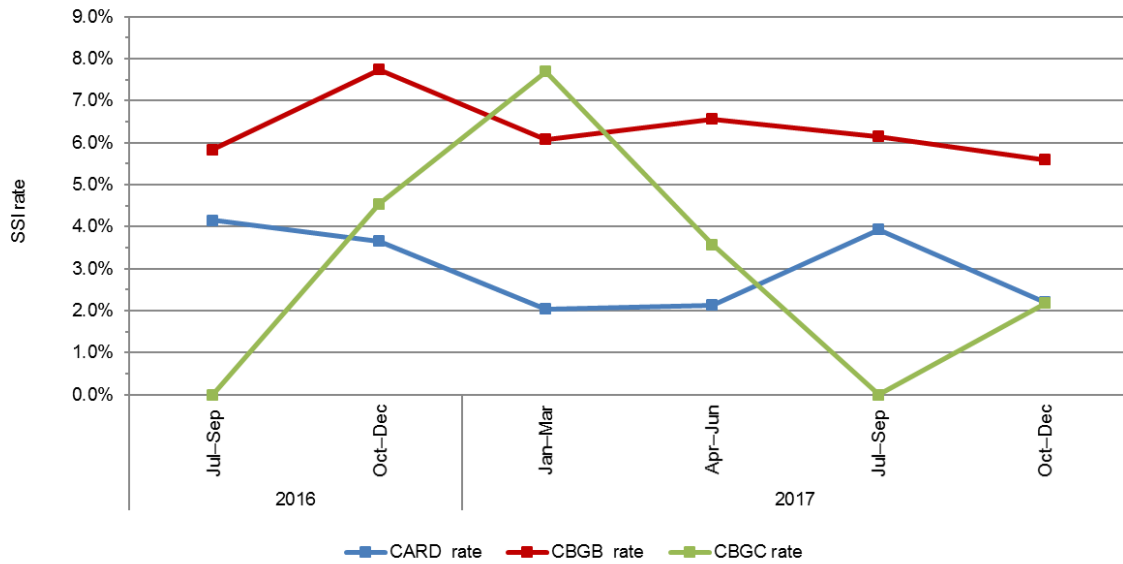
DHB	Procedures			
	Total	CARD	CBGB	CBGC
Auckland adult	221	73	138	10
Auckland paediatric	69	69	0	0
Canterbury	57	19	36	2
Capital & Coast	109	45	39	25
Southern	49	20	27	2
Waikato	136	47	82	7
Total	641	273	322	46
No of SSIs	25	6	18	1
SSI rate	3.9	2.2	5.6	2.2
95% CI	2.7–5.7	1.0–4.7	3.6–8.7	0.4–11.3

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

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

	Procedures			
	Total	CARD	CBGB	CBGC
Procedures	6,306	2,549	3,476	281
No of SSIs	300	79	214	7
SSI rate	4.8	3.1	6.2	2.5
95% CI	4.3–5.3	2.5–3.8	5.4–7	1.2–5.1

4.4 SSI rates by procedure, July 2016 to December 2017



4.5 Procedures: graft donor sites, October to December 2017

Procedure	Graft donor site					Total
	Internal mammary	Arm	Leg	Other	Not applicable	
CARD	0	0	0	0	273	273
CBGB	0	38	278	6	0	322
CBGC	46	0	0	0	0	46
Total	46	38	278	6	273	641

4.6 Rates by SSI type and wound site

For the reporting period, 18 SSIs (72 percent) were superficial, three were deep and four were organ space. Twelve (48 percent) involved only the donor site. There were 12 (48 percent) SSIs involving only the chest site; five were superficial, three deep and four organ space. There was one procedure with both a chest and a donor site SSI.

4.6.1 Rates by SSI type, October to December 2017

Results are based on 641 adult and paediatric procedures for October to December 2017.

SSI type	No of SSIs	%	95% CI
Superficial	18	2.8	1.8–4.4
Deep	3	0.5	0.2–1.4
Organ space	4	0.6	0.2–1.6
Total	25	3.9	2.7–5.7

4.6.2 Cumulative SSI rates by SSI type, October 2014 to December 2017

Results are based on 5,671 adult procedures between October 2014 and December 2017, and 635 paediatric procedures between January 2016 and December 2017 (total procedures 6,306).

SSI type	No of SSIs	%	95% CI
Superficial	193	3.1	2.7–3.5
Deep	71	1.1	0.9–1.4
Organ space	36	0.6	0.4–0.8
Total	300	4.8	4.3–5.3

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.

4.6.3 SSI rates by wound site, October to December 2017

During this surveillance period there were 25 SSIs; one procedure had an SSI at both donor and chest sites.

Site	Procedures	No of SSIs	%	95% CI
Leg*	278	11	4.0	2.2-6.9
Arm	38	2	5.3	1.5-17.3
Other	6	0	0.0	0-39
Chest**	641	13	2.0	1.2-3.4

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

** No internal mammary graft procedures had an organ space SSI.

4.6.4 Cumulative SSI rates by wound site, October 2014 to December 2017

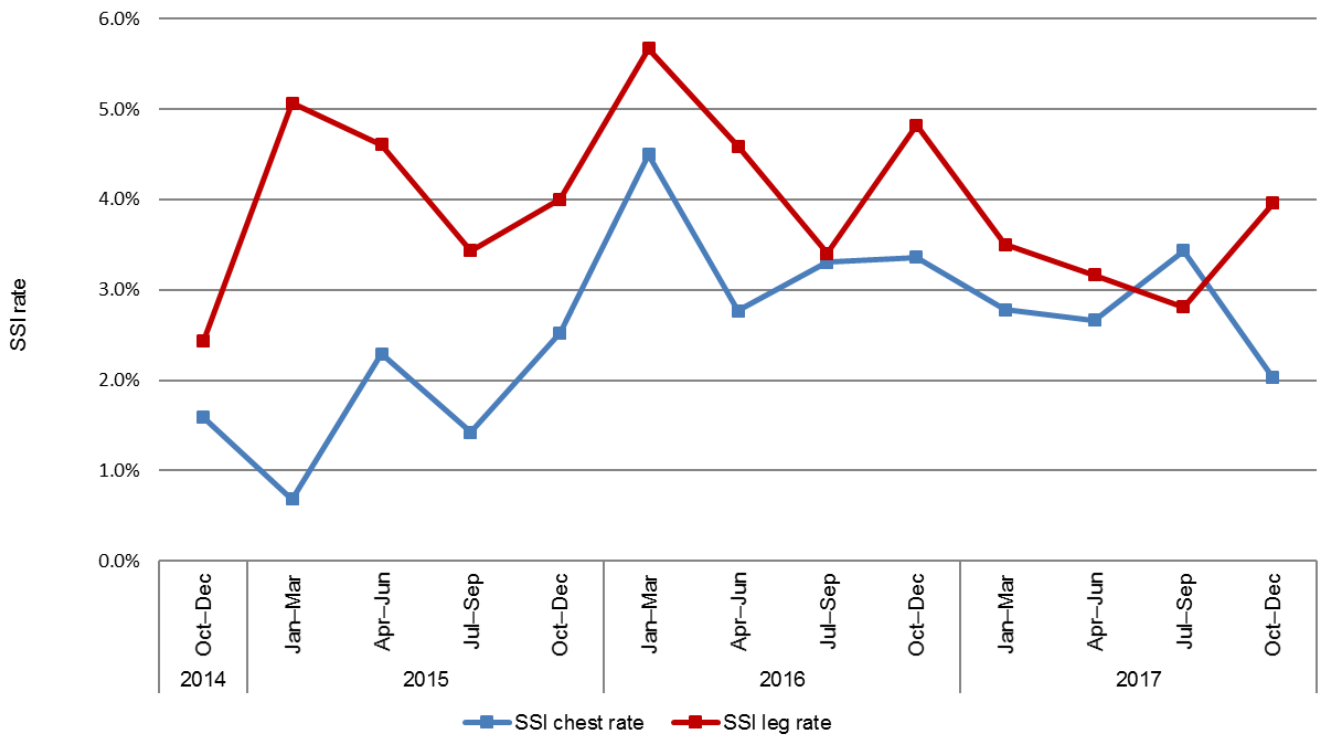
Results are based on adult procedures between October 2014 and December 2017, and paediatric procedures between January 2016 and December 2017. During this period there were 300 SSIs. Six procedures had an SSI at both donor and chest sites.

Site	Procedures	No of SSIs	%	95% CI
Leg*	3,040	120	3.9	3.3-4.7
Arm	310	5	1.6	0.7-3.7
Other	126	6	4.8	2.2-10.0
Chest**	6,306	175	2.8	2.4-3.2

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

** Seven internal mammary graft procedures had an SSI.

4.6.5 SSI rates at chest and leg sites* October 2014 to December 2017**



* Includes six dual-site infections present in both chest and leg.

** All DHBs began submitting data in July 2016.

5 Timing of antibiotic prophylaxis

The SSII Programme quality and safety marker (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, 98 percent of procedures had prophylaxis given on time. One percent received prophylaxis early.

Canterbury, Capital & Coast and Southern DHBs achieved the QSM.

5.1 Antibiotic prophylaxis timing rates, October to December 2017

DHB	Total	Total 'on time'	%*	More than 1 hour before KTS	After KTS	Not recorded
Auckland adult	221	213	96	5	3	0
Auckland paediatric	69	68	99	0	1	0
Canterbury	57	57	100	0	0	0
Capital & Coast	109	109	100	0	0	0
Southern	49	49	100	0	0	0
Waikato	136	131	96	3	1	1
Total	641	627	98	8	5	1
				1%	0.8%	0.2%

* 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 97 percent of paediatric procedures used the recommended dose. All DHBs met the QSM. Congratulations to all DHBs for this achievement.

6.1 Cefazolin prophylaxis rates for adult patients, October to December 2017

DHB	Total	Cefazolin used as prophylaxis	Doses used				% ≥ 2 g
			1 g	2 g	≥ 3 g	Not recorded	
Auckland adult	221	212	2	206	4	0	95
Canterbury	57	57	0	57	0	0	100
Capital & Coast	109	109	0	106	3	0	100
Southern	49	49	1	47	1	0	98
Waikato	136	136	0	125	11	0	100
Total	572	563	3	541	19	0	98
		98%	0.5%	95%	3%	0%	

6.2 Cefazolin prophylaxis rates for paediatric patients, October to December 2017

DHB	Total	Cefazolin used as prophylaxis	< 30 mg/kg	≥ 30 mg/kg	Not recorded	% ≥ 30 mg/kg
Auckland paediatric	69	68	1	67	0	97
		99%	1%	97%	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 and Capital & Coast DHB procedures had prophylaxis stopped within 48 hours.

7.1 Antibiotic prophylaxis rates, October to December 2017

DHB	Total	≤ 48 hr	% ≤ 48 hr	> 48 hr	Unknown or not recorded
Auckland adult	221	221	100	0	0
Auckland paediatric	69	69	100	0	0
Canterbury	57	52	91	2	3
Capital & Coast	109	109	100	0	0
Southern	49	48	98	1	0
Waikato	136	127	93	9	0
Total	641	626	98	12	3
				2%	0.5%

8 Skin preparation agents

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

Almost all DHBs met this target. The use of aqueous povidone iodine has prevented Auckland DHB (adult procedures) DHBs from meeting this QSM.

8.1 Skin preparation rates, October to December 2017

DHB	Total	Skin preparation						
		CHX/ Alc	Povl/ Alc	Alcohol- based	%	Povl	Other	Not recorded
Auckland adult	221	206	13	219	99	2	0	0
Auckland paediatric	69	69	0	69	100	0	0	0
Canterbury	57	57	0	57	100	0	0	0
Capital & Coast	109	0	109	109	100	0	0	0
Southern	49	7	42	49	100	0	0	0
Waikato	136	111	25	136	100	0	0	0
Total	641	450	189	639	99.7	2	0	0
						0.3%	0%	0%

CHX/Alc = chlorhexidine in alcohol

Povl/Alc = povidone iodine in alcohol

Povl = aqueous povidone iodine

9 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.

9.1 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.

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

	Calendar year				
	2013	2014	2015	2016	2017
Accepted DHB claims	21	38	40	46	63
Active DHB claims	31	50	53	57	69
Cost of active claims	\$56,352	\$124,635	\$161,017	\$279,670	\$310,322
Cost per active claim	\$1,818	\$2,493	\$3,038	\$4,906	\$4,497

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

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

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

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

10 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).

10.1 ASA score and SSI rates, October to December 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	0	9	233	391	4	4	641
No of SSIs	0	0	9	16	0	0	25
SSI rate	NA	0.0	3.9	4.1	0.0	0.0	3.9
95% CI	NA	0.0–29.9	2.0–7.2	2.5–6.5	0.0–49.0	0.0–49.0	2.7–5.7

10.2 Cumulative ASA score and SSI rates, October 2014 to December 2017

Results are based on adult procedures between October 2014 and December 2017 (n=5,671) and paediatric procedures between January 2016 and December 2017 (n=635), total procedures 6,306.

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	5	105	2,514	3,639	28	15	6,306
No of SSIs	0	0	120	180	0	0	300
SSI rate	0.0	0.0	4.8	4.9	0.0	0.0	4.8
95% CI	0.0–43.4	0.0–3.5	4.0–5.7	4.3–5.7	0.0–12.1	0.0–20.4	4.3–5.3

10.3 Total surgical risk score and SSI rates, October to December 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	8	492	137	0	4	641
No of SSIs	0	21	4	0	0	25
SSI rate	0.0	4.3	2.9	NA	0.0	3.9
95% CI	0.0–32.4	2.8–6.4	1.1–7.3	NA	0.0–49.0	2.7–5.7

10.4 Cumulative total surgical risk score and SSI rates, October 2014 to December 2017

Results are based on adult procedures between October 2014 and December 2017 (n=5,671) and paediatric procedures between January 2016 and December 2017 (n=635), total procedures 6,306.

Total risk score	0	1	2	3	Not recorded	Total
Procedures	105	5,177	1,009	0	15	6,306
No of SSIs	0	246	54	0	0	300
SSI rate	0.0	4.8	5.4	NA	0.0	4.8
95% CI	0.0–3.5	4.2–5.4	4.1–6.9	NA	0.0–20.4	4.3–5.3

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
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
Jul–Sep 2018	31 Dec 2018	31 Jan 2019	Early Feb 2019	Mar 2019	31 Mar 2019

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