



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



National Cardiac Surgery Report

July to September 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 July to 30 September 2017. It also provides cumulative data from 1 October 2014 to 30 September 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 July to September 2017

During this surveillance period:

- DHBs performed 699 cardiac procedures
- there were 35 SSIs*, a rate of 5 percent (95 percent confidence interval (CI) 3.6–6.9). Six SSIs were from procedures performed by the paediatric and congenital cardiac service (17 percent) and the remaining 29 from adult procedures (83 percent)
- 17 SSIs (49 percent) were superficial, 12 deep and 6 organ space. Ten (29 percent) involved only the donor site. There were 25 (71 percent) SSIs involving only the chest site; nine were superficial, ten deep and six organ space. There were no procedures with both a chest and a donor site SSI this quarter
- 17 (49 percent) SSIs had staphylococci isolated. Nine had *Staphylococcus aureus* and the remaining eight had *Staphylococcus epidermidis*.

2.2 Cumulative findings

The cumulative procedure total was 5,665 with 276 SSIs, 4.9 percent (95 percent CI 4.3–5.5). This total consists of 5,099 adult procedures performed between October 2014 and September 2017, and 566 paediatric procedures between January 2016 and September 2017.

* Since production of this report, the number of cardiac SSIs at Southern DHB in this quarter has decreased from 8 to 7. This reduces the national rate to 4.9% for the July–September 2017 quarter. (The national cumulative rate is unchanged.)

3 Change in reporting format

There are no changes in format this quarter.

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).

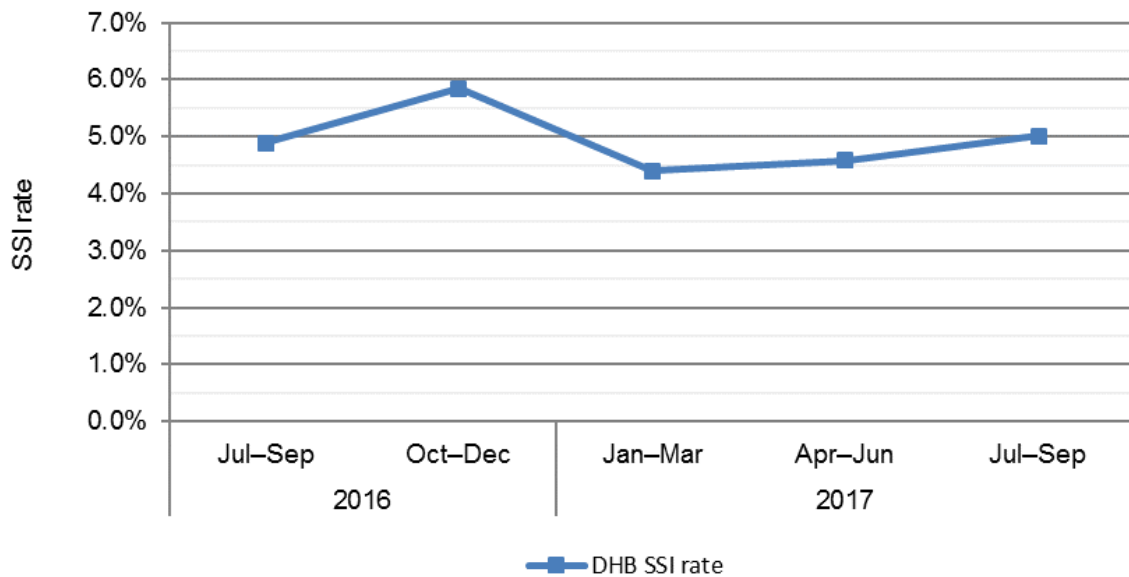
4.1 Cardiac SSIs by DHB, surveillance period and cumulative SSI rates

DHB	Procedures Jul–Sep 17	No of SSIs*	%	95% CI	Cumulative procedures Oct 14–Sep 17	No of cumulative SSIs*	%	Cumulative 95% CI
Auckland adult	243	9	3.7	2–6.9	2,652	111	4.2	3.5–5
Auckland paediatric	70	6	8.6	4–17.5	566	42	7.4	5.5–9.9
Canterbury	55	1	1.8	0.3–9.6	720	29	4.0	2.8–5.7
Capital & Coast	141	4	2.8	1.1–7.1	606	18	3.0	1.9–4.6
Southern**	50	8	16.0	8.3–28.5	472	41	8.7	6.5–11.6
Waikato	140	7	5.0	2.4–10	649	35	5.4	3.9–7.4
Total	699	35	5.0	3.6–6.9	5,665	276	4.9	4.3–5.5

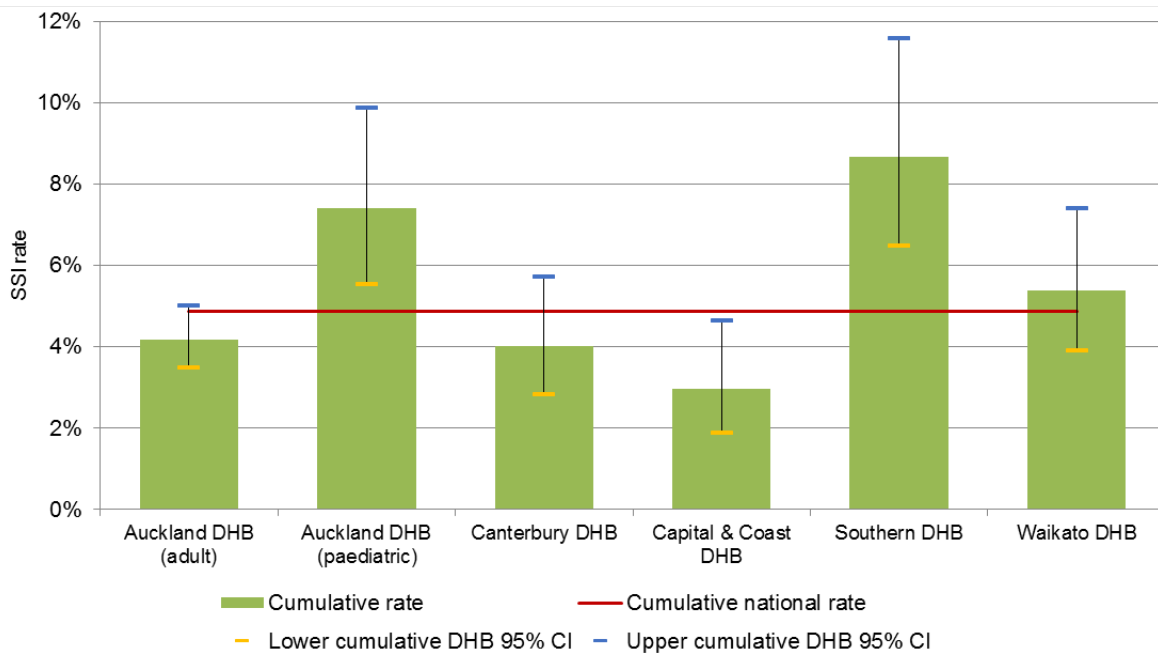
* SSI data collection for paediatric procedures started on 1 January 2016, therefore the number in the table represents paediatric procedures from that date. Data collection for Capital & Coast DHB and Waikato DHB started on 1 July 2016.

** Since production of this report, the number of cardiac SSIs at Southern DHB in this quarter has decreased from 8 to 7. This reduces the Southern DHB cardiac SSI rate to 14.0% and the national rate to 4.9% for the July–September 2017 quarter. The new cumulative cardiac SSI rate for Southern DHB is 8.5. The national cumulative rate is unchanged.

4.1.1 SSI rates over time, July 2016 to September 2017



4.1.2 Cumulative SSI rates by DHB, October 2014 to September 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, July to September 2017

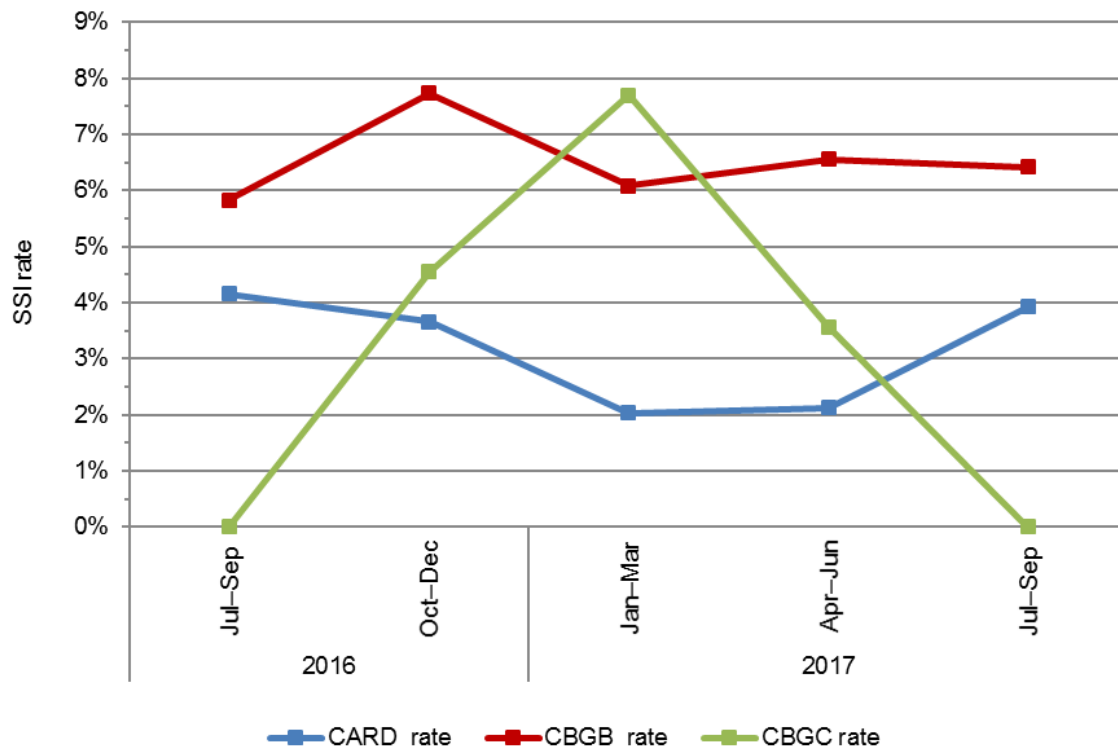
DHB	Procedures			
	Total	CARD	CBGB	CBGC
Auckland adult	243	82	150	11
Auckland paediatric	70	70	0	0
Canterbury	55	12	42	1
Capital & Coast	141	61	58	22
Southern	50	21	29	0
Waikato	140	34	95	11
Total	699	280	374	45
No of SSIs	35	11	24	0
SSI rate	5.0	3.9	6.4	0.0
95% CI	3.6–6.9	2.2–6.9	4.3–9.4	0.0–7.9

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

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

	Procedures			
	Total	CARD	CBGB	CBGC
Procedures	5,665	2,276	3,154	235
No of SSIs	276	73	197	6
SSI rate	4.9	3.2	6.2	2.6
95% CI	4.3–5.5	2.6–4	5.5–7.1	1.2–5.5

4.4 SSI rates by procedure, July 2016 to September 2017



4.5 Procedures: graft donor sites, July to September 2017

Procedure	Graft donor site					Total
	Internal mammary	Arm	Leg	Other	Not applicable	
CARD	0	0	0	0	280	280
CBGB	0	43	320	11	0	374
CBGC	45	0	0	0	0	45
Total	45	43	320	11	280	699

4.6 Rates by SSI type and wound site

For the reporting period, 17 SSIs (49 percent) were superficial, 12 were deep and six were organ space. Ten (29 percent) involved only the donor site. There were 25 (71 percent) SSIs involving only the chest site; nine were superficial, ten deep and six organ space. There were no procedures with both a chest and a donor site SSI.

4.6.1 Rates by SSI type, July to September 2017

Results are based on 699 adult and paediatric procedures for July to September 2017.

SSI type	No of SSIs	%	95% CI
Superficial	17	2.4	1.5–3.9
Deep	12	1.7	1.0–3.0
Organ space	6	0.9	0.4–1.9
Total	35	5.0	3.6–6.9

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

Results are based on 5,099 adult procedures between October 2014 and September 2017, and 566 paediatric procedures between January 2016 and September 2017 (total procedures 5,665).

SSI type	No of SSIs	%	95% CI
Superficial	176	3.1	2.7–3.6
Deep	69	1.2	1.0–1.5
Organ space	31	0.5	0.4–0.8
Total	276	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.

4.6.3 SSI rates by wound site, July to September 2017

During this surveillance period there were 35 SSIs; no procedures had an SSI at both donor and chest sites.

Site	Procedures	No of SSIs	%	95% CI
Leg*	320	9	2.8	1.5–5.3
Arm	43	0	0.0	0.0–8.2
Other	11	1	9.1	1.6–37.7
Chest**	699	25	3.6	2.4–5.2

* 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 September 2017

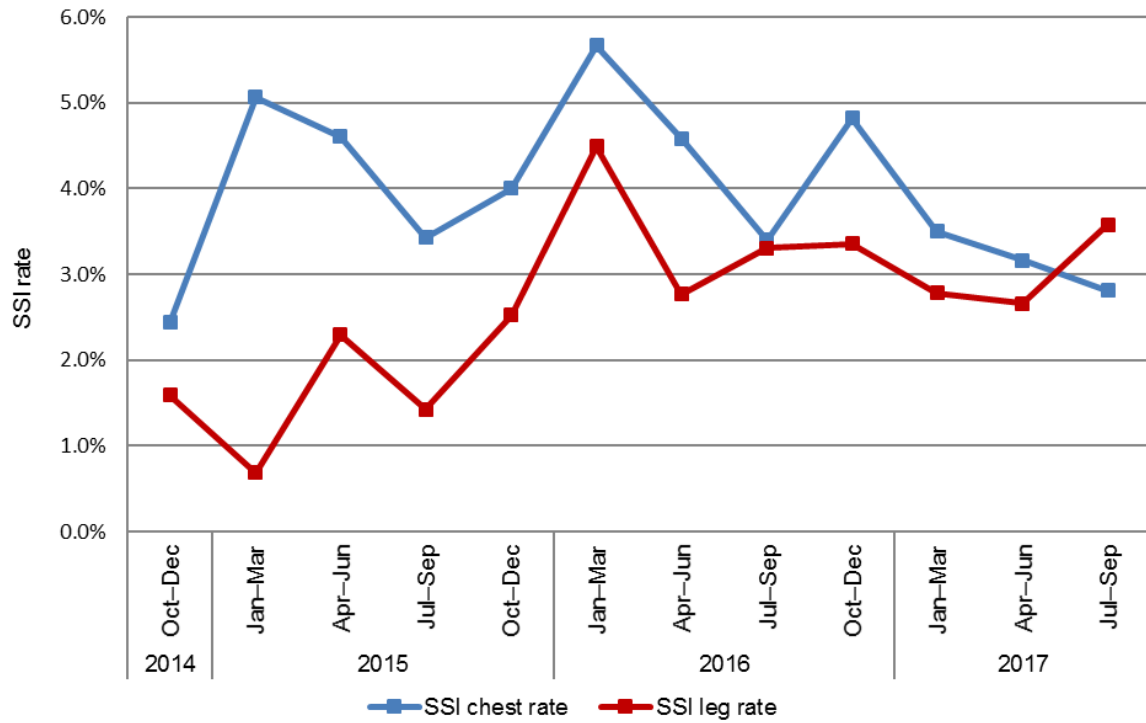
Results are based on adult procedures between October 2014 and September 2017, and paediatric procedures between January 2016 and September 2017. During this period there were 276 SSIs. Five procedures had an SSI at both donor and chest sites.

Site	Procedures	No of SSIs	%	95% CI
Leg*	2,762	109	3.9	3.3–4.7
Arm	272	3	1.1	0.4–3.2
Other	120	6	5.0	2.3–10.5
Chest**	5,665	163	2.9	2.5–3.3

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

** Six internal mammary graft procedures had an SSI.

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



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

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, July to September 2017

DHB	Total	Total 'on time'	%*	More than 1 hour before KTS	After KTS	Not recorded
Auckland adult	243	236	97	6	1	0
Auckland paediatric	70	69	99	1	0	0
Canterbury	55	55	100	0	0	0
Capital & Coast	141	141	100	0	0	0
Southern	50	50	100	0	0	0
Waikato	140	133	95	0	5	2
Total	699	684	98	7	6	2
				1%	0.9%	0.3%

* 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 for the first time in the cardiac SSII Programme. Congratulations to all DHBs for this achievement.

6.1 Cefazolin prophylaxis rates for adult patients, July to September 2017

DHB	Total	Cefazolin used as prophylaxis	Doses used				% ≥ 2 g
			1 g	2 g	≥ 3 g	Not recorded	
Auckland adult	243	236	0	222	12	0	96
Canterbury	55	55	0	55	0	0	100
Capital & Coast	141	140	0	135	5	0	99
Southern	50	50	1	40	9	0	98
Waikato	140	137	1	128	8	1	97
Total	629	618	2	580	34	1	98
		98%	0.3%	92%	5%	0.2%	

6.2 Cefazolin prophylaxis rates for paediatric patients, July to September 2017

DHB	Total	Cefazolin used as prophylaxis	< 30 mg/kg	≥ 30 mg/kg	Not recorded	% ≥ 30 mg/kg
Auckland paediatric	70	70	2	68	0	99
		100%	3%	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 procedures had prophylaxis stopped within 48 hours. Canterbury DHB did not submit data on prophylaxis after surgery.

7.1 Antibiotic prophylaxis rates, July to September 2017

DHB	Total	≤ 48 hr	% ≤ 48 hr	> 48 hr	Unknown or not recorded
Auckland adult	243	243	100	0	0
Auckland paediatric	70	70	100	0	0
Canterbury	55	0	0	0	54
Capital & Coast	141	139	99	1	1
Southern	50	48	96	2	0
Waikato	140	124	89	14	2
Total	699	624	89	17	57
				2%	8.2%

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

8.1 Skin preparation rates, July to September 2017

DHB	Total	Skin preparation						
		CHX/ Alc	Povl/ Alc	Alcohol- based	%	Povl	Other	Not recorded
Auckland adult	243	233	7	240	99	3	0	0
Auckland paediatric	70	70	0	70	100	0	0	0
Canterbury	55	55	0	55	100	0	0	0
Capital & Coast	141	0	140	140	99	1	0	0
Southern	50	6	43	49	98	1	0	0
Waikato	140	97	43	140	100	0	0	0
Total	699	461	233	694	99	5	0	0
						0.7%	0.0%	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 September year

	September year				
	2013	2014	2015	2016	2017
Accepted DHB claims	23	34	40	42	59
Active DHB claims	31	43	49	55	82
Cost of active claims	\$46,947	\$63,930	\$175,174	\$277,687	\$369,257
Cost per active claim	\$1,514	\$1,487	\$3,575	\$5,049	\$4,503

Accepted DHB claims = number of accepted treatment injury claims for infection following CABG surgery performed in all DHB facilities over the last five September years (1 October to 30 September).

Active DHB claims = number of active claims for infection following CABG surgery performed in all DHB facilities over the last five September years (1 October to 30 September). 'Active' means the claim is open and has received a payment in that September year (1 October to 30 September).

Cost of active claims = total cost of active claims for infection following CABG surgery performed in all DHB facilities over the last five September years (1 October to 30 September).

Cost per active claim = average cost per active claim for infection following CABG surgery performed in all DHB facilities over the last five September years (1 October to 30 September).

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, July to September 2017

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	0	10	327	355	6	1	699
No of SSIs	0	0	19	16	0	0	35
SSI rate	NA	0.0	5.8	4.5	0.0	0.0	5.0
95% CI	NA	0–27.8	3.8–8.9	2.8–7.2	0–39	0–79.3	3.6–6.9

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

Results are based on adult procedures between October 2014 and September 2017 (n=5,099) and paediatric procedures between January 2016 and September 2017 (n=566), total procedures 5,665.

ASA score	1	2	3	4	5	Not recorded	Total
Procedures	5	96	2,281	3,248	24	11	5,665
No of SSIs	0	0	112	164	0	0	276
SSI rate	0.0	0.0	4.9	5.0	0.0	0.0	4.9
95% CI	0–43.4	0–3.8	4.1–5.9	4.3–5.9	0–13.8	0–25.9	4.3–5.5

10.3 Total surgical risk score and SSI rates, July to September 2017

Total risk score	0	1	2	3	Not recorded	Total
Procedures	8	568	122	0	1	699
No of SSIs	0	29	6	0	0	35
SSI rate	0	5.1	4.9	0	0.0	5.0
95% CI	0–32.4	3.6–7.2	2.3–10.3	0	0–79.3	3.6–6.9

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

Results are based on adult procedures between October 2014 and September 2017 (n=5,099) and paediatric procedures between January 2016 and September 2017 (n=566), total procedures 5,665.

Total risk score	0	1	2	3	Not recorded	Total
Procedures	97	4,685	872	0	11	5,665
No of SSIs	0	226	50	0	0	276
SSI rate	0	4.8	5.7	NA	0	4.9
95% CI	0–3.8	4.2–5.5	4.4–7.5	NA	0–25.9	4.3–5.5

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

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