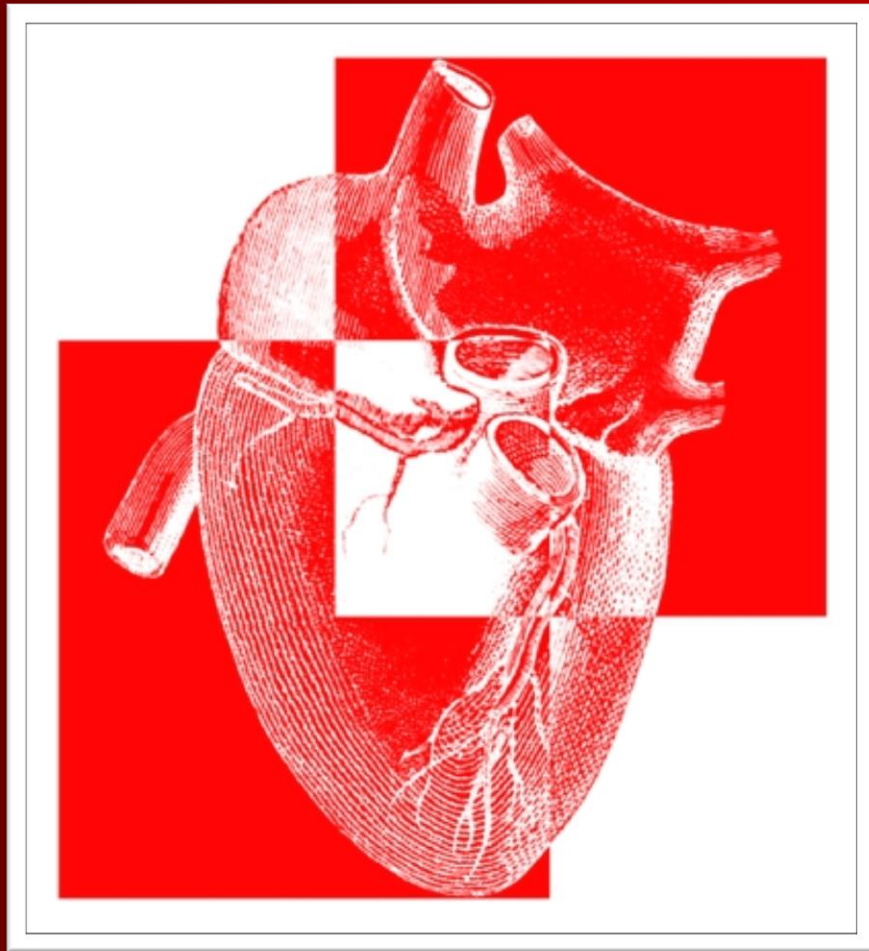


ANZSCTS Cardiac Surgery Database Program



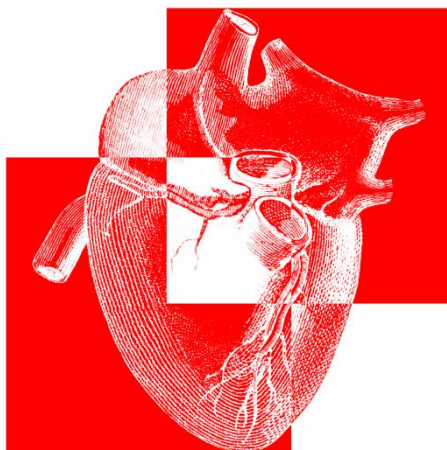
National Report 2011

**The Australian and New Zealand Society of Cardiac and
Thoracic Surgeons
(ANZSCTS)**

National Cardiac Surgery Database Program

Annual Report

2011



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Gilbert Shardey, Christopher Reid on behalf of the ANZSCTS National Database
Program Steering Committee

Foreword

Progress towards a National Cardiac Surgery Quality Assurance Program has been constantly developing over the past decade. Commencing in 2001 with the establishment of the Victorian Database Program, the program has continued to mature and develop towards truly National coverage.

This is the fifth National Report of the ANZSCTS Database Program. That is, the fifth year when information from meaningful numbers of patients who had cardiac surgery in States other than Victoria contributed to the database.

The format of data presentation in the report enables individual units to compare their performance to the other participants. Hospital and surgeon comparative data, where given, is coded. Each hospital will be informed of the codes relevant to it and only to it.

Statistical analysis of unit and surgeon performance for coronary artery surgery is given.

The data in the Web-based National Unit Report module may be used by each Unit to compare its outcomes- on a broad range of parameters with that of the entire group. Indeed, Units may use the web-based Report to do so for individual surgeons.

The Society will continue in its mission to ensure and maintain high quality and safety standards are being met in all Units across Australia undertaking cardiac surgical procedures.

Gil Shardey
Chairman
Steering Committee

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Data Presentation

This report analyses data collected from the ANZSCTS Cardiac Surgery Database in the 2011 calendar year.

Data from previous years (2007-10) includes all cases from participating units:

- Data for 2007 calendar year includes all cases from ten participating units; 6 Vic public, Mater Health Services, Cabrini Health,
- Data for 2008 calendar year includes all cases from sixteen participating units; 6 Vic public, Mater Health Services, Cabrini Health, Flinders Medical Centre, Lake Macquarie Private and 6 NSW public units.
- Data for 2009 calendar year includes all cases from 21 hospitals including: 6 Vic public, Cabrini Health, Jesse McPherson Private hospital, 8 NSW public, Lake Macquarie Private hospital, Canberra hospital, Flinders Medical Centre, Townsville hospital, Mater Health Services.
NB. Two hospitals only submitted 2 months and 6 months' worth of data.
- Data for 2010 calendar year includes all cases from 23 hospitals including: 6 Vic public, Cabrini Health, Jesse McPherson Private hospital, 8 NSW public, Canberra hospital, Flinders Medical Centre, Townsville hospital, Mater Health Services.
NB. One hospital submitted 6 months' worth of data, and another submitted 8 months of data.
- Data for 2011 calendar year includes all cases from 25 hospitals including: 6 VIC public, Cabrini Hospital, Jessie McPherson Private Hospital, Epworth Healthcare, 8 NSW Public Hospitals, Lake Macquarie Private Hospital, The Canberra Hospital, Flinders Medical Centre, Townsville Hospital, Mater Health Services, Royal Perth Hospital.
N.B. RNSH did not submit data for November and December 2011. In addition one hospital did not submit completed ICU/Intubation times and therefore their information is not included in ICU/Intubation analyses.

Final data related to this report was received by the ANZSCTS Data Management Centre in March 2012. In future, the three-monthly data lock will be rigorously enforced to ensure that the Report is prepared more expeditiously.

In this report, unless stated otherwise, mortality includes all deaths in hospital prior to discharge at any time plus all deaths post-discharge but within 30 days of the date of surgery.

Cases with missing data fields for operation status and procedure type were excluded from the analysis. In 2011 36 cases were excluded.

National Report 2011

This is the fifth report of the National Program. It describes the data from surgery performed in 2011.

At the time of this report, the following units had registered with the National database program and had contributed data in 2011. Importantly, 20 of the 24 Public Units in Australia have registered.



*Joined in 2012

Table 1 - Hospitals contributing to ANZSCTS Cardiac Surgery Registry

Hospital	Contributing	Total Number of procedures submitted 2001-11*
Austin Hospital, VIC	Yes	3689
Geelong Hospital, VIC	Yes	4188
Monash Medical Centre, VIC	Yes	4374
Royal Melbourne Hospital, VIC	Yes	6733
St Vincent's Hospital, VIC	Yes	4833
The Alfred Hospital, VIC	Yes	5635
Flinders Medical Centre, SA	Yes	2381
Mater Health Services, North Queensland	Yes	1336
Townsville Hospital, QLD	Yes	1170
Lake Macquarie Private Hospital, NSW	Yes	1617
John Hunter Hospital, NSW	Yes	979
Prince of Wales Hospital, NSW	Yes	1867
St George Hospital, NSW	Yes	1180
St Vincent's Hospital, NSW	Yes	1997
Royal North Shore Hospital, NSW	Yes	1132
Royal Prince Alfred Hospital, NSW	Yes	1734
Liverpool Hospital, NSW	Yes	1330
Westmead Hospital, NSW	Yes	927
The Canberra Hospital, ACT	Yes	667
Cabrini Medical Centre, VIC	Yes	3071
Jessie McPherson, VIC	Yes	542
Royal Perth Hospital, WA	Yes	507
Sir Charles Gairdner Hospital, WA	Yes	510
Holyspirit Northside Hospital, QLD	Yes	312
Epworth Private Hospital, VIC	Yes	588
Prince Charles Hospital, QLD	No	0
Princess Alexandra Hospital, QLD	No	0
Fremantle Hospital, WA	No	0
Royal Hobart Hospital, TAS	No	0
Melbourne Private Hospital, VIC	No	0
Knox Private Hospital, VIC	No	0
St Vincent's & Mercy Private Hospital, VIC	No	0
Warringal Private Hospital, VIC	No	0
North Shore Private Hospital, NSW	No	0
St George Private Hospital, NSW	No	0
Strathfield Private Hospital, NSW	No	0
Westmead Private Hospital, NSW	No	0
Prince of Wales Private Hospital, NSW	No	0
Sydney Adventist Private Hospital, NSW	No	0
Wakefield Private Hospital, SA	No	0
Mount Lawley Private Hospital, WA	No	0
Hollywood Private Hospital, WA	No	0
Ashford hospital Private Hospital, SA	No	0
Brisbane Waters Private Hospital, QLD	No	0
Greenslopes Private Hospital, QLD	No	0
Royal Adelaide Hospital, SA	No	0
John Flynn, QLD	No	0
Total contributing hospitals	25	

*Calendar year.

Comprehensive Surgeon's Report

	Number of patients	Number of procedures
2011	9158	9272

This section provides a detailed assessment of the data. It provides a facility to look for emerging trends and inter-relationships between variables.

The Surgeons' Report includes detailed information about:

Isolated CABG Surgery

Data is presented on:

- Mortality
- Grafts applied
- Patient characteristics
- Post-operative complications
- Post-operative clinical indicators

Valve Surgery

This section includes data on valve procedures, performed with and without Coronary Artery Bypass Grafts.

Data is presented on:

- Mortality
- Procedure type
- Prosthesis use
- Post-operative complications
- Post-operative clinical indicators

Other Cardiac Operations

This section provides outcome data for operations other than Valve and Coronary Artery Bypass Graft procedures, or where combinations of procedures, not covered in the previous section, were performed in the same surgical episode.

Contributing Factors to Population Outcomes

This section provides outcome data for all cardiac surgery procedures in relation to a number of risk factors.

Isolated CABG Surgery

Figure 1: Observed mortality rate for isolated CABG

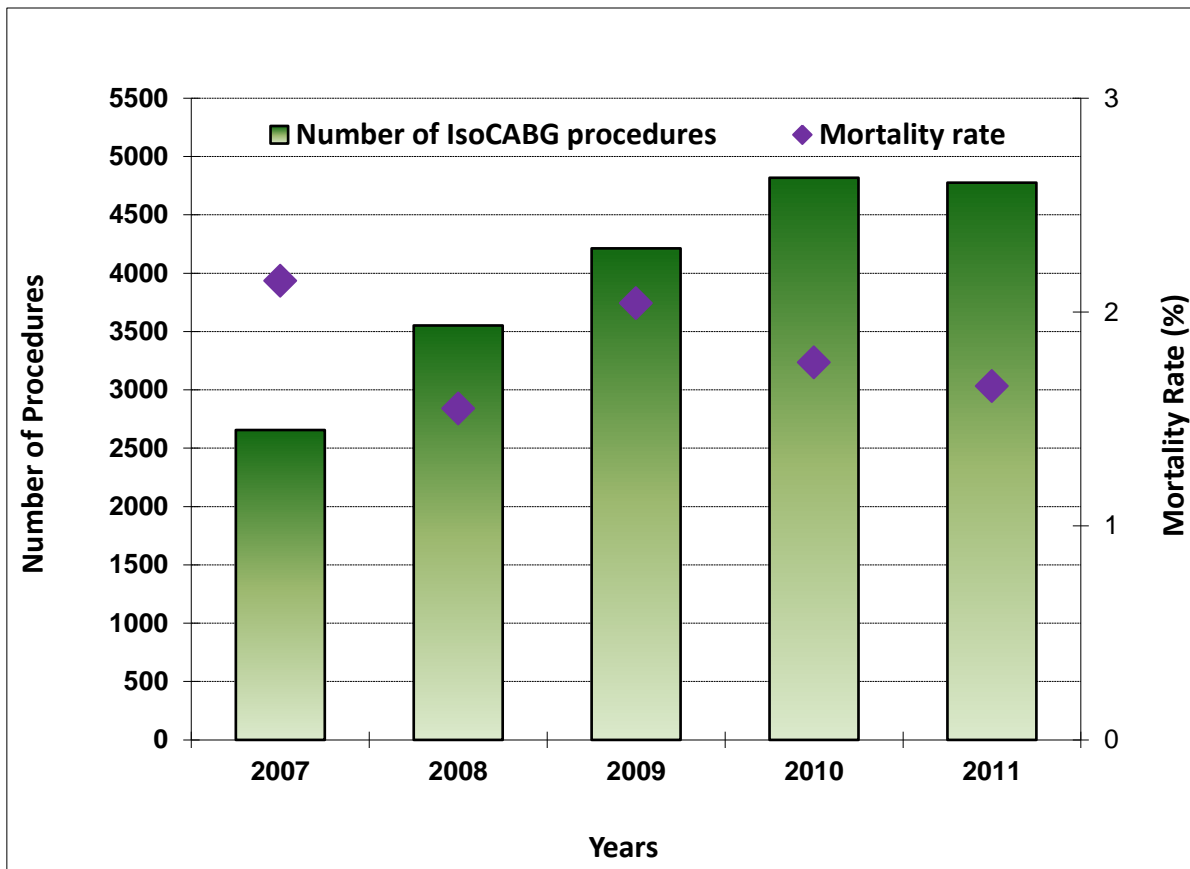


Figure 1: Despite an increase in the average age of the operated population and the associated perceived increase in co-morbid processes, observed mortality for isolated coronary surgery has remained between 1 and 2 per cent over the past three years.

Table 1a - Number of Procedures 2011

Procedure type	Total Number of procedures				Redo Surgery			
	Number		Mortality		Number		Mortality	
	Number of procedures	% of Isolated CABG	Number	% of Procedure type	Number of procedures	% of Redo	Number	% of Procedure type (redo)
Isolated CABG On Pump	4361	91.3%	74	1.7%	121	91.0%	5	4.1%
Isolated CABG Off Pump	415	8.7%	5	1.2%	12	9.0%	1	8.3%
TOTAL	4776	100.0%	79	1.7%	133	100.0%	6	4.5%

Isolated CABG Surgery

Table 1b – Number of Procedures 2008-2010

	Total Number of procedures				Redo Surgery			
	Number		Mortality		Number		Mortality	
Procedure type	Number of procedures	% of Isolated CABG	Number	% of Procedure type	Number of procedures	% of Redo	Number	% of Procedure type (redo)
Isolated CABG On Pump	11402	91.0%	207	1.8%	419	96.1%	13	3.1%
Isolated CABG Off Pump	1126	9.0%	17	1.5%	17	3.9%	0	0.0%
TOTAL	12528*	100.0%	224	1.8%	436†	100.0%	13	3.0%

*55 missing data, † 2 missing data

Figure 2: Mortality rates for initial and redo isolated CABG surgery

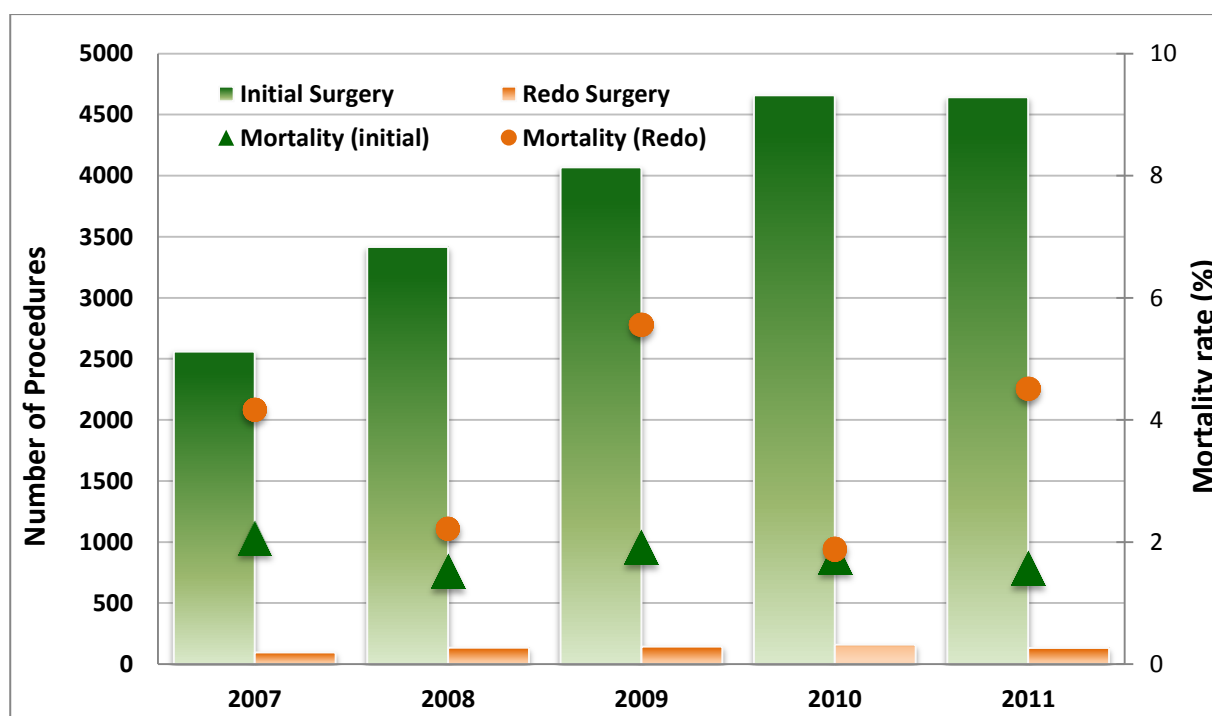


Figure 2: Approximately 3-4% of isolated CABG are redo procedures. The mortality for redo-CABG is variably greater than for the initial procedure.

Isolated CABG Surgery

Figure 3: Observed mortality rate for isolated CABG On-Pump

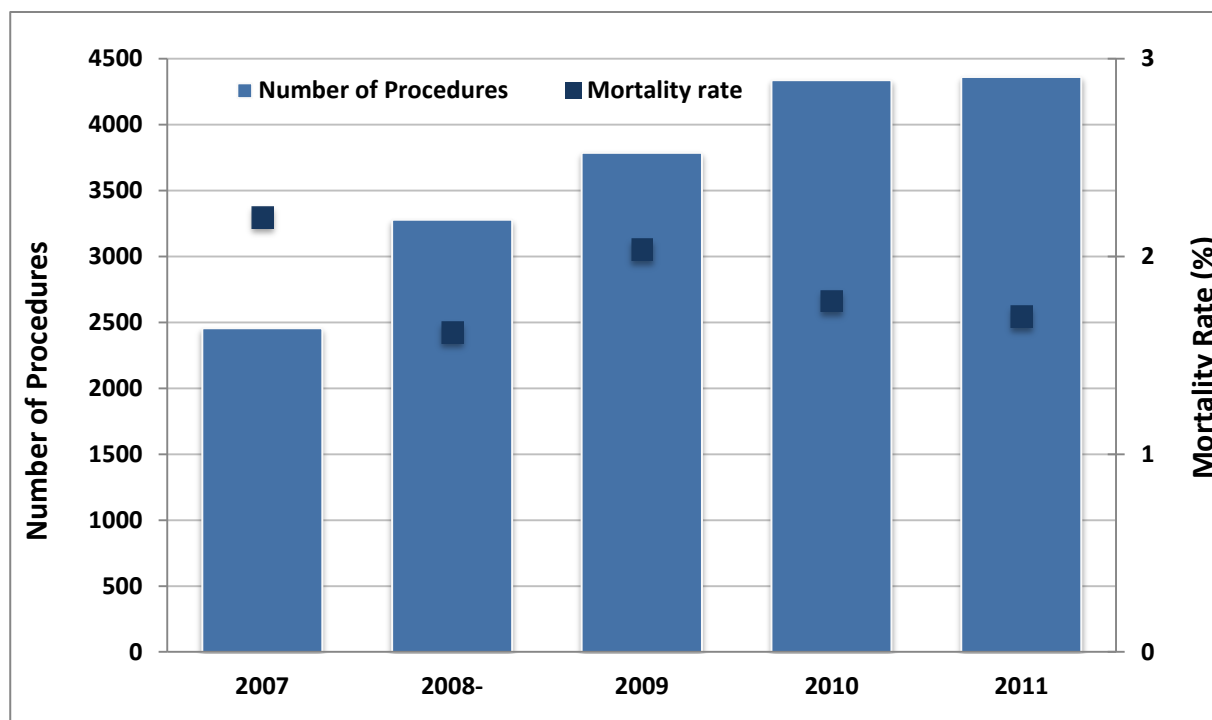
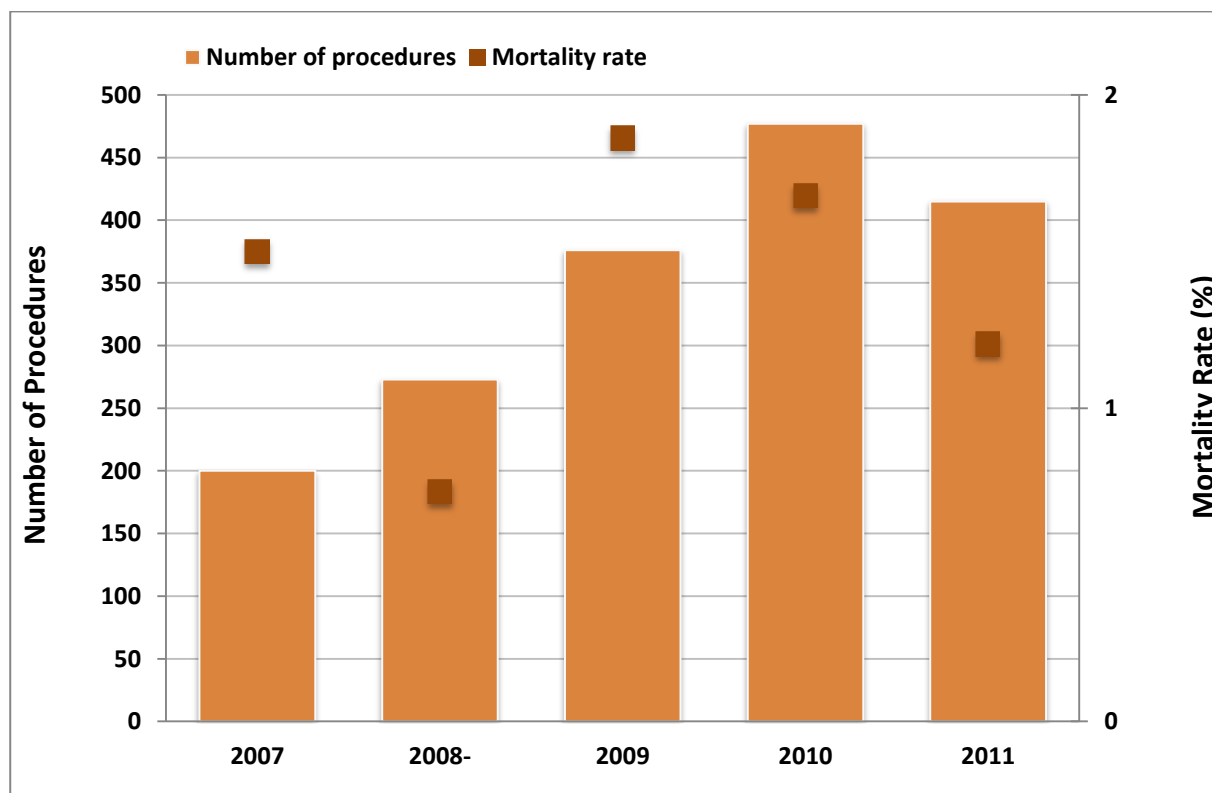


Figure 4: Observed mortality rate for isolated CABG Off-Pump



Isolated CABG Surgery

Table 2a - Number of distal anastomoses 2011

Procedure type	Total number of procedures	X 1	X 2	X 3	X 4	X 5	X 6	X 7	Mean no. grafts
Isolated CABG On Pump	4361	141	863	1719	1191	363	65	4	3.2
Isolated CABG Off Pump	415	111	138	103	44	16	1	0	2.3
TOTAL	4776	252	1001	1822	1235	379	66	4	3.1

Table 2b - Number of distal anastomoses 2008-2010

Procedure type	Total number of procedures	X 1	X 2	X 3	X 4	X 5	X 6	X 7	Mean no. grafts
Isolated CABG On Pump	11402	327	2110	4579	3166	990	166	36	3.3
Isolated CABG Off Pump	1126	279	344	277	173	43	3	0	2.4
TOTAL	12528*	606	2454	4856	3339	1033	169	36	3.2

*55 missing data

Table 2: Over the last 6 years of ANZSCTS data collection, the average number of grafts have been approximately 3.3 for on-pump procedures and around 2.3 – 2.5 for off-pump. Almost 60% of off-pump but only 23% of on-pump patients had one or two grafts.

Isolated CABG Surgery

Figure 5: All arterial grafts in isolated CABG On Pump

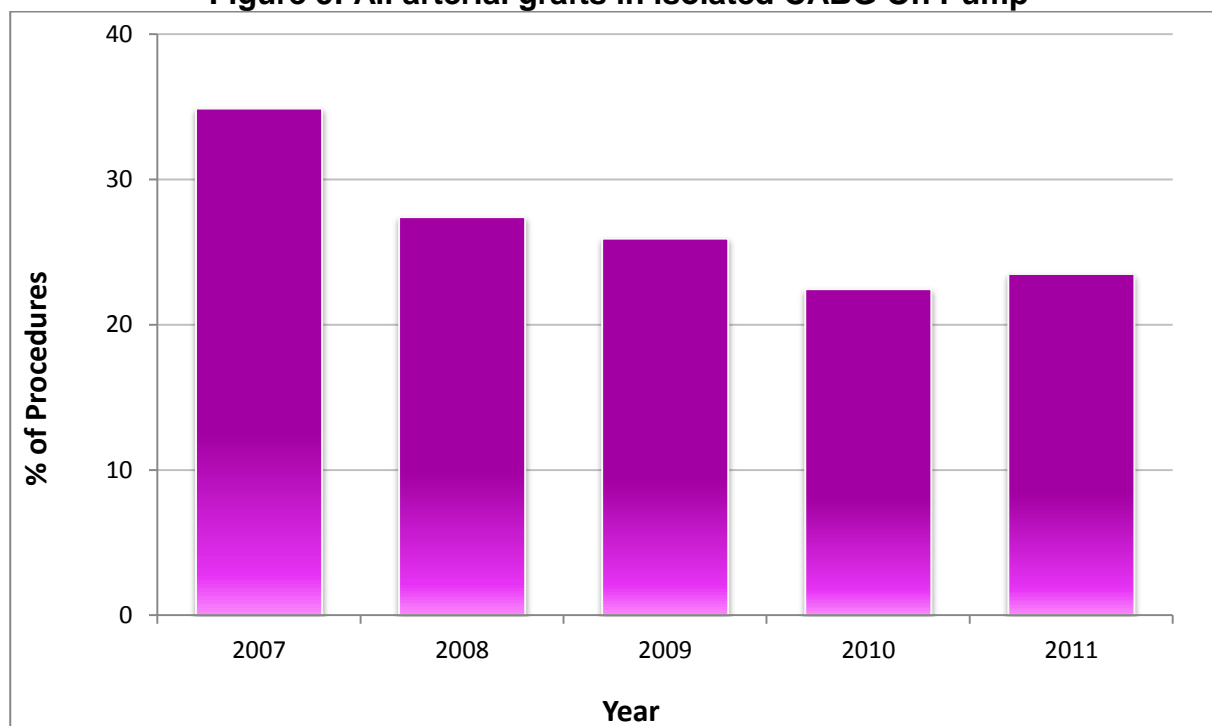


Figure 5: The general decrease in the proportion of patients having all arterial grafts reflects the practice of a large group of Units that joined after 2007.

Table 3: A greater proportion of off-pump CABG patients have all arterial grafts. T or Y grafts were performed in 33.3% off-pump CABG but only 6.8% of on-pump CABG's in 2011.

Table 3a - Arterial grafts 2011

Procedure type	Total number of procedures	All arterial		T or Y grafts	
		Number of procedures	% of procedure type	Number of procedures	% of procedure type
Isolated CABG On Pump	4361	1025	23.5	296	6.8
Isolated CABG Off Pump	415	290	69.9	138	33.3
TOTAL	4776	1315	27.5	434	9.1

Table 3b -Arterial grafts 2008-2010

Procedure type	Total number of procedures	All arterial		T or Y grafts	
		Number of procedures	% of procedure type	Number of procedures	% of procedure type
Isolated CABG On Pump	11402	2855	25.0	705	6.2
Isolated CABG Off Pump	1126	748	66.4	353	31.4
TOTAL	12528*	3603	28.8	1058	8.4

*55 missing data

Isolated CABG Surgery

Figure 6: Conduits used in isolated CABG On-Pump

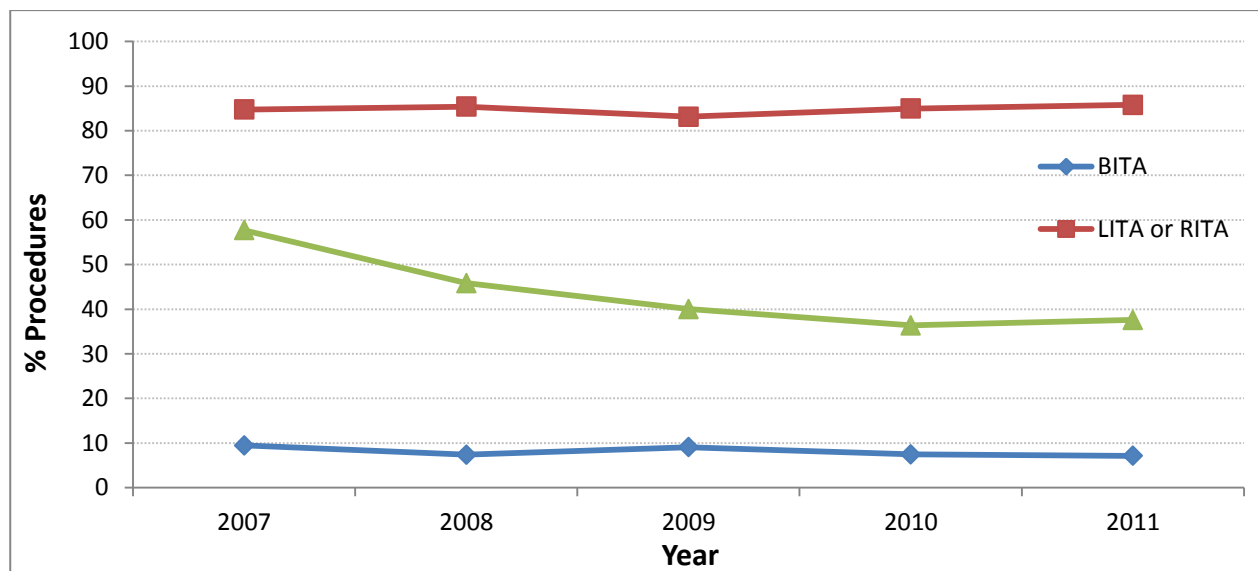
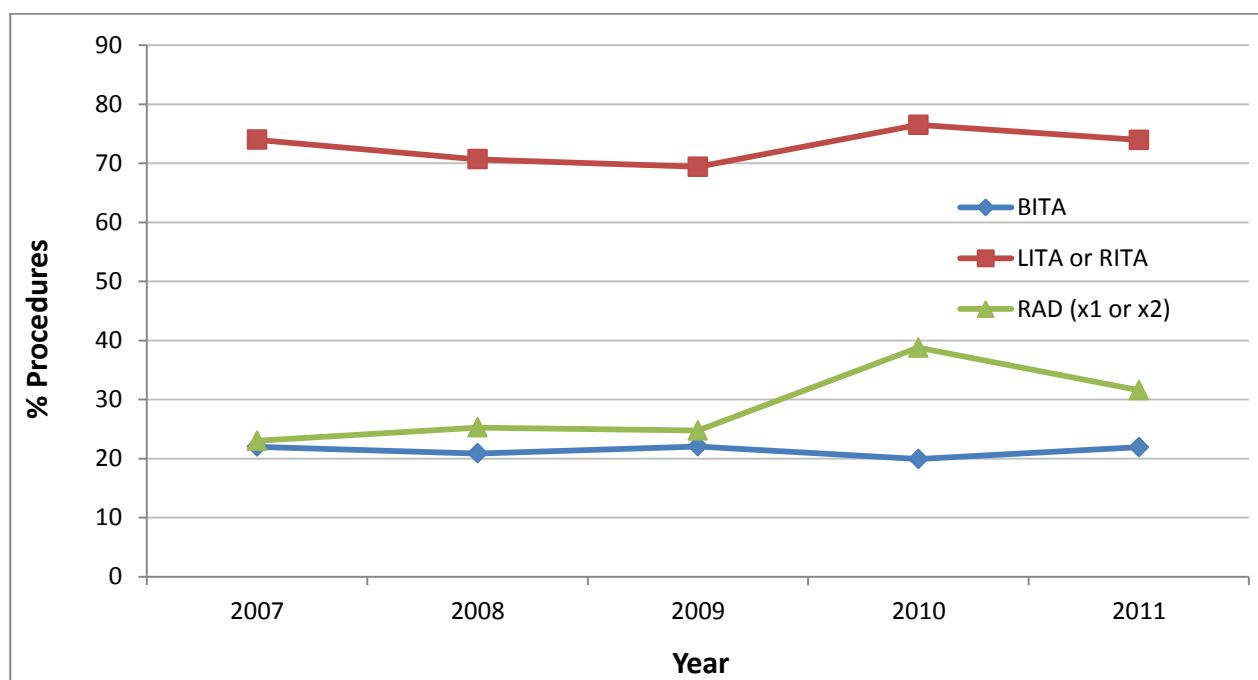


Figure 7: Conduits used in isolated CABG Off-Pump



Isolated CABG Surgery

Table 4a - Conduits used 2011

Procedure type	Total number of procedures	Number of IMA conduits (mutually exclusive)			Number of RAD (mutually exclusive)		Number of GEPA procedures	Number of SVG procedures
		LITA	RITA	BITA	RAD x 1	RAD x 2		
Isolated CABG On Pump	4361	3720	22	311	1303	336	13	3325
Isolated CABG Off Pump	415	295	12	91	125	6	0	122
TOTAL	4776	4015	34	402	1428	342	13	3447

Table 4b - Conduits used 2008-2010

Procedure type	Total number of procedures	Number of IMA conduits (mutually exclusive)			Number of RAD (mutually exclusive)		Number of GEPA procedures	Number of SVG procedures
		LITA	RITA	BITA	RAD x 1	RAD x 2		
Isolated CABG On Pump	11402	9553	79	909	3372	1225	21	8534
Isolated CABG Off Pump	1126	805	14	235	308	39	2	369
TOTAL	12528*	10358	93	1144	3680	1264	23	8903

*55 missing data

Isolated CABG Surgery

Patient Characteristics by Unit 2011

Figure 8A: Total number of isolated CABG by Unit 2011

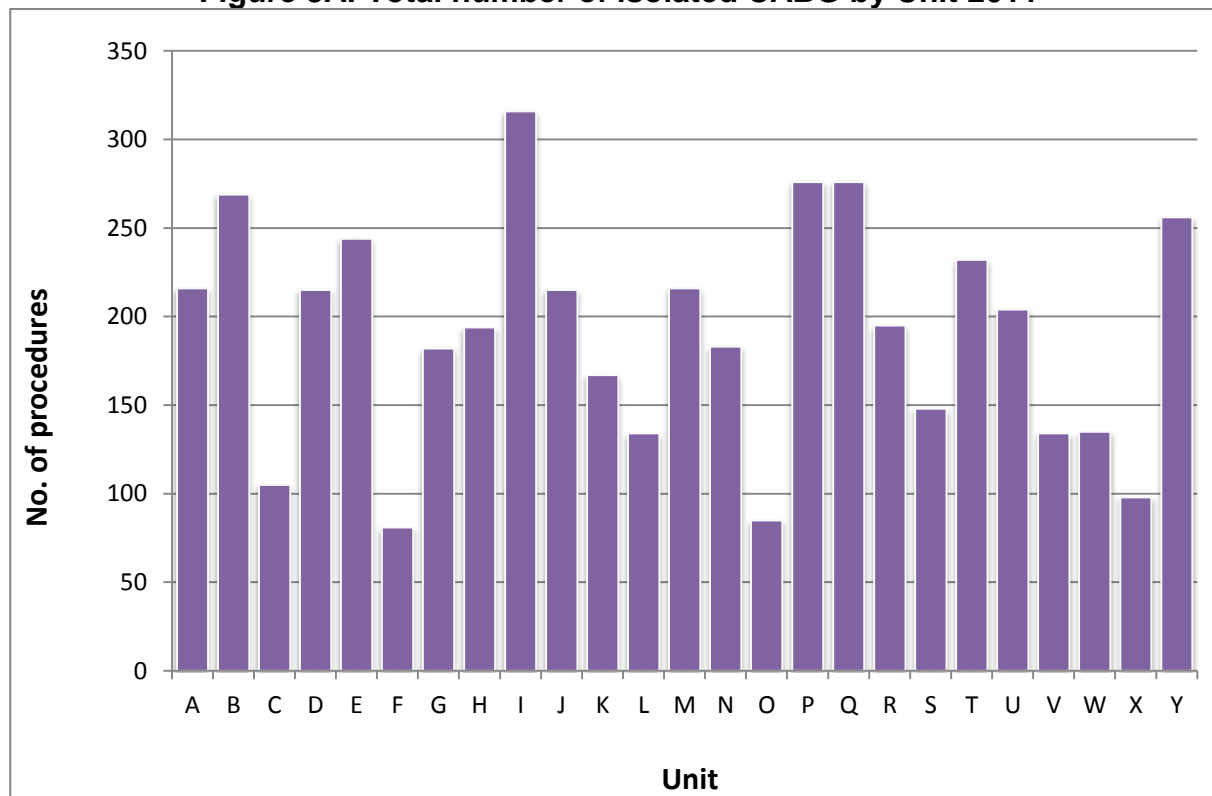
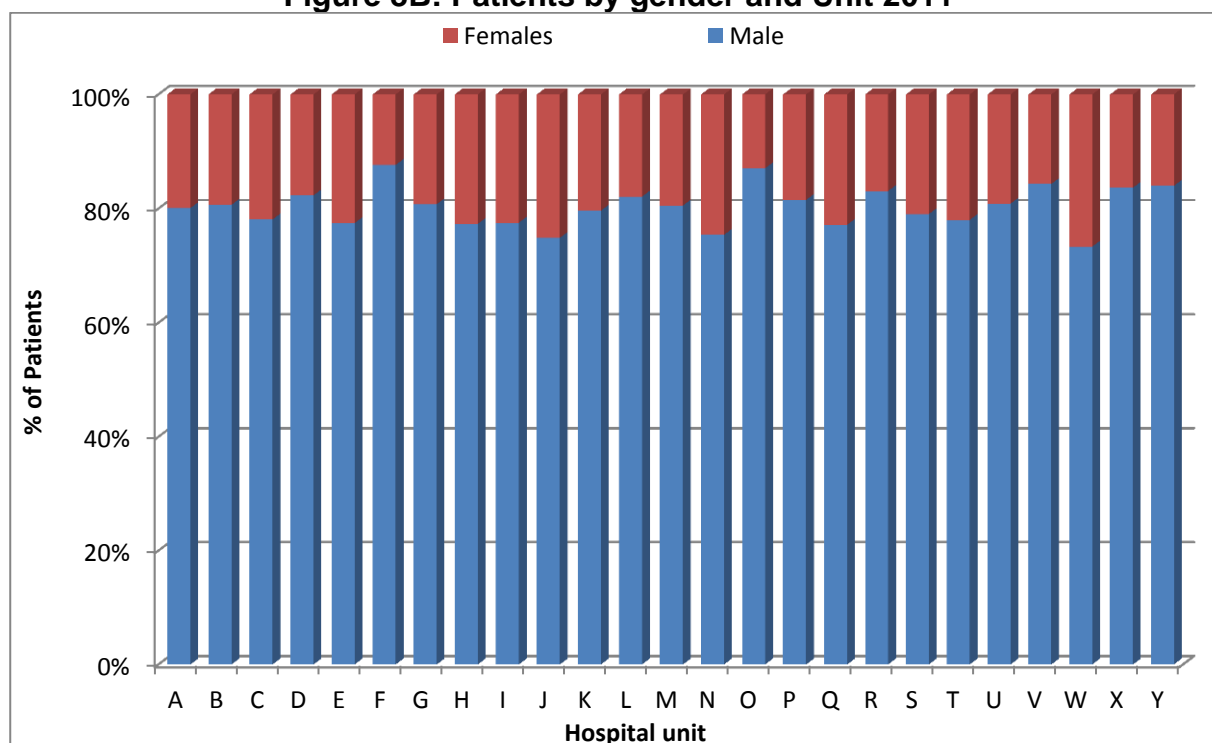


Figure 8B: Patients by gender and Unit 2011



Isolated CABG Surgery

Figure 8C: Percentage of patients >70yrs old by Unit 2011

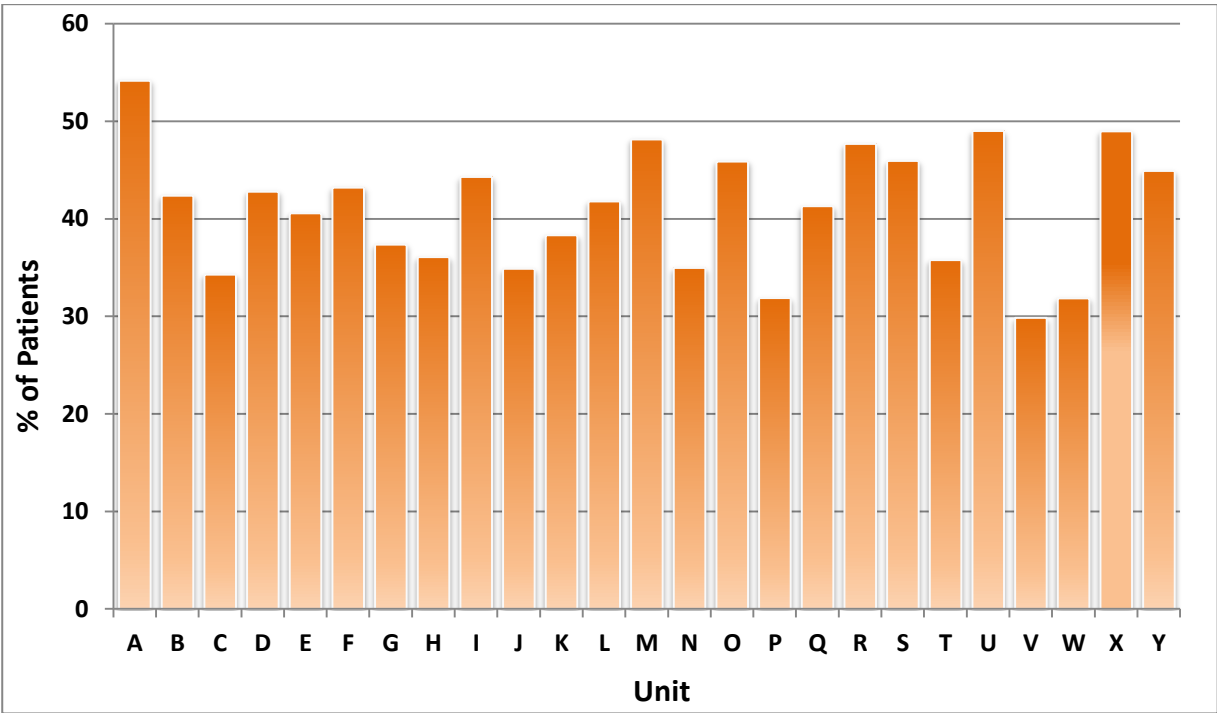
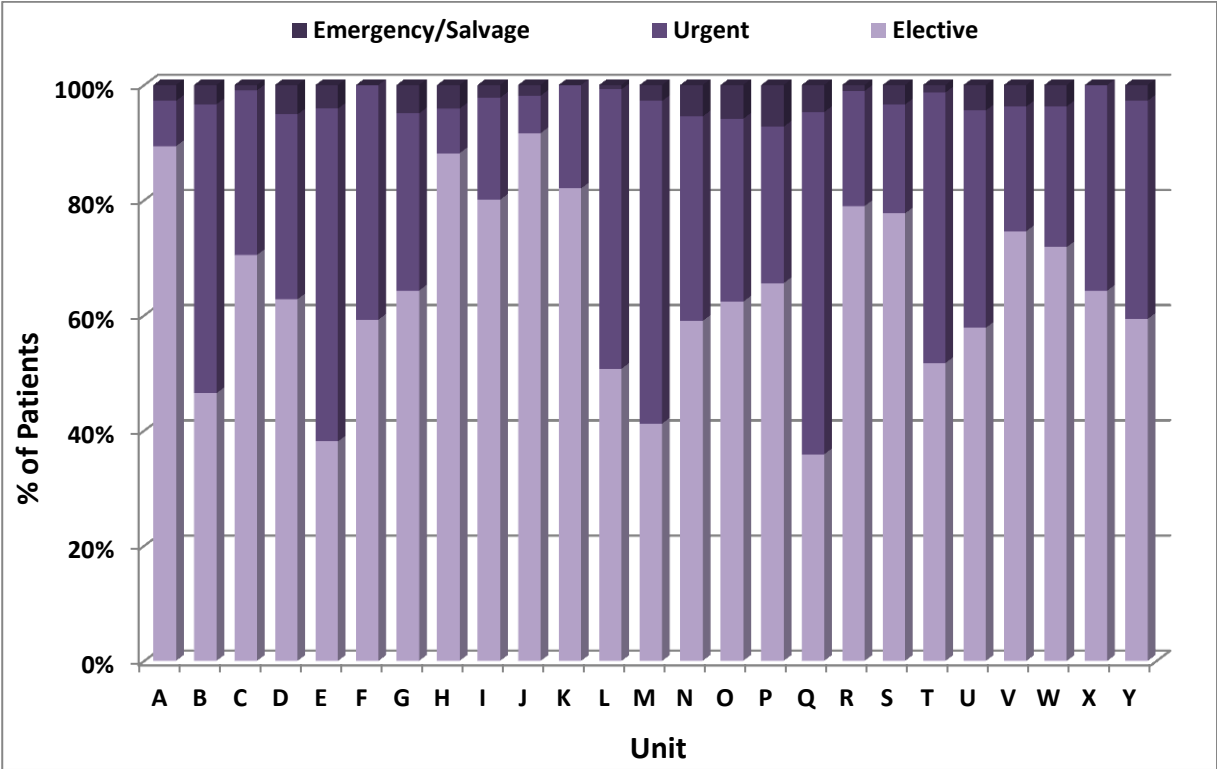
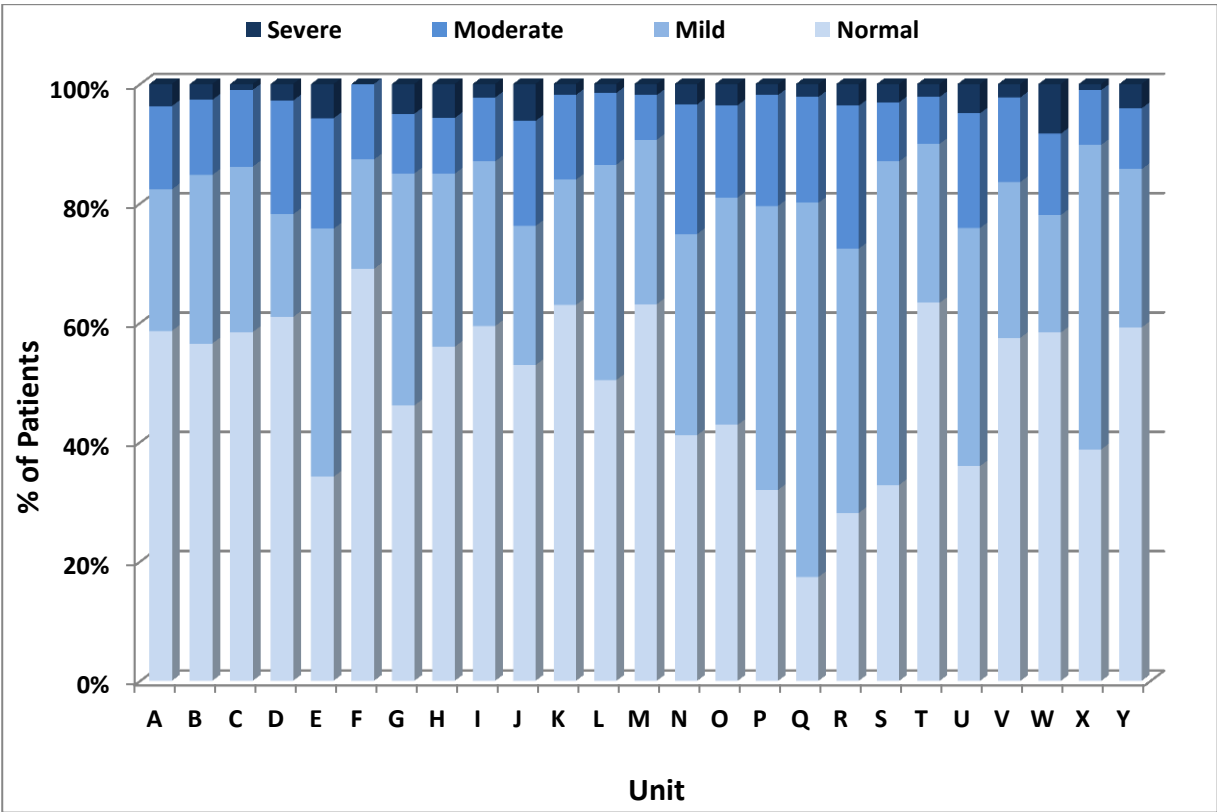


Figure 8D: Patients by clinical status and Unit 2011



Isolated CABG Surgery

Figure 8E: LV function by Unit 2011



Isolated CABG Surgery

Risk Adjusted Mortality

Figure 9A: Mortality after isolated CABG by unit 2011

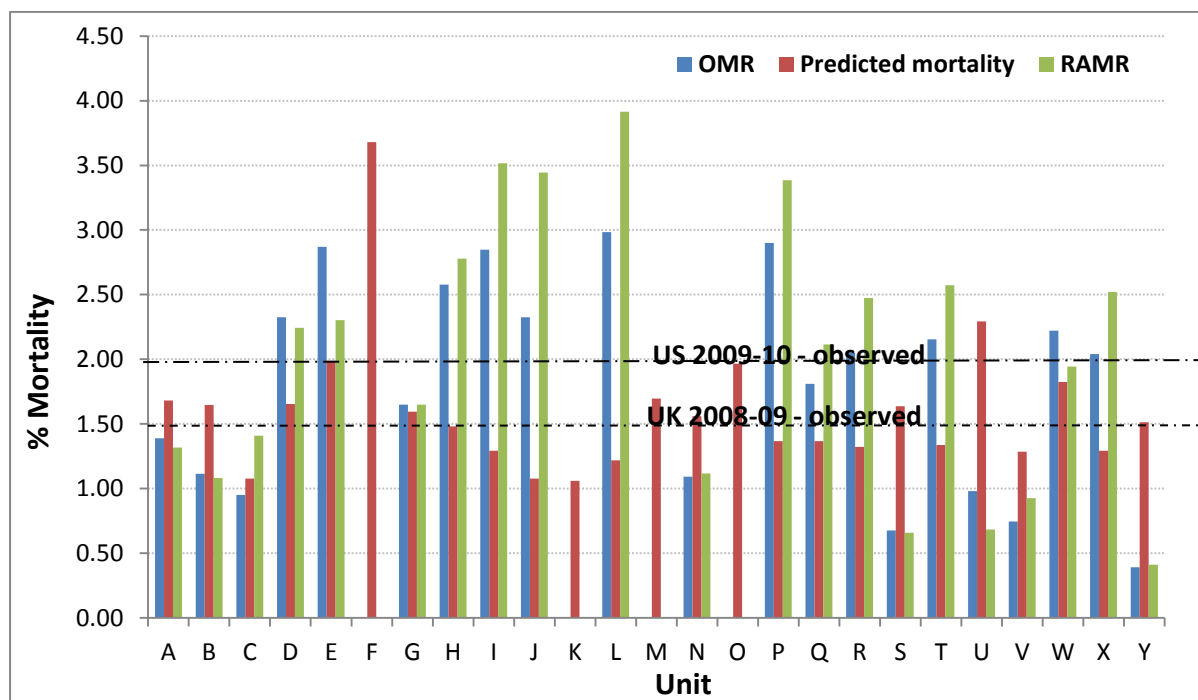


Figure 9A includes both “observed or actual” and “predicted” and “risk-adjusted” mortality. Since the degree of risk associated with the operation varies widely for different patients who undergo cardiac surgery and patient characteristics will differ between hospitals, Risk-Adjustment is necessary to allow comparison of mortality between hospitals.

The Risk-Adjusted Mortality Rate compares the mortality rates for the units involved in this analysis. A RAMR lower than the average implies that the unit performs better and one higher than average implies that it performs worse than the average (see also appendix A).

In 2011, 14/25 hospitals had predicted mortality which was lower than the observed, suggesting that their observed mortality was higher than expected based on the risk-algorithm (All Procedures Model) used.

However Figure 9B indicates that statistically, based on a 95% CI, their performances are still within acceptable limits.

Isolated CABG Surgery

Figure 9B: Confidence intervals for RAMR following isolated CABG during 2011

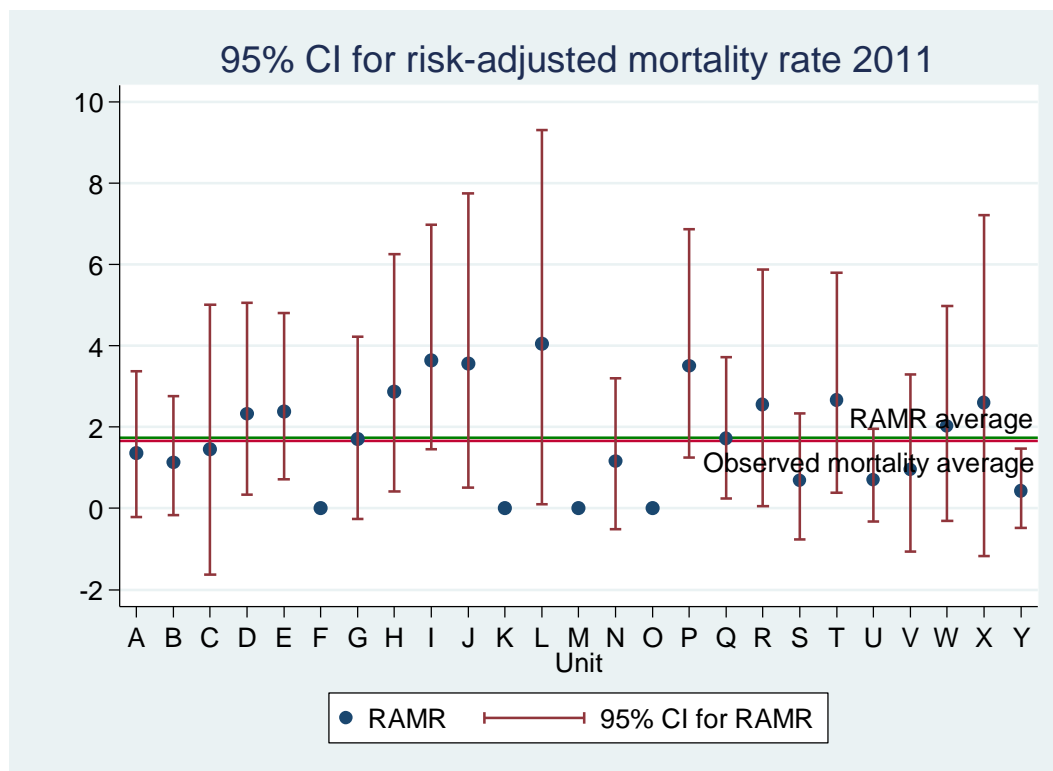
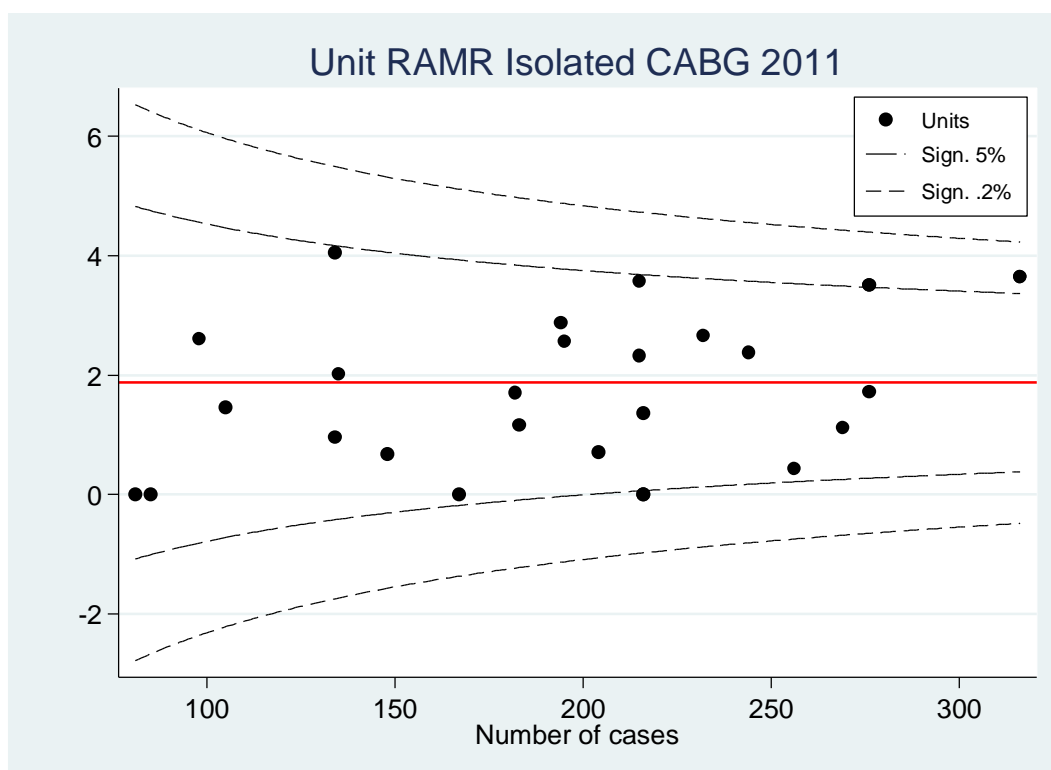
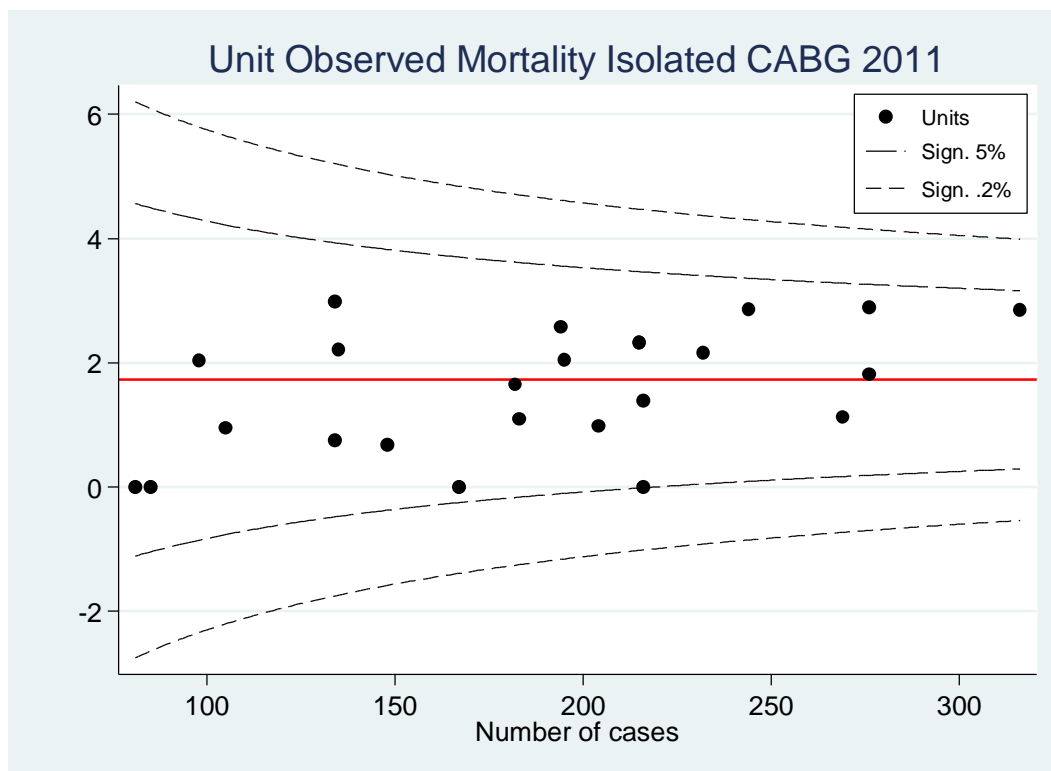


Figure 9B: The 95% CI for risk-adjusted mortality rate for each unit suggests all units are close to the group average. There is no statistically significant difference at that level between the mortality rates for the various units compared to the group (See Appendix B).

Isolated CABG Surgery

Funnel Plots 2011 by Unit



Isolated CABG Surgery

Figure 10: Mortality rate for isolated CABG in relation to age

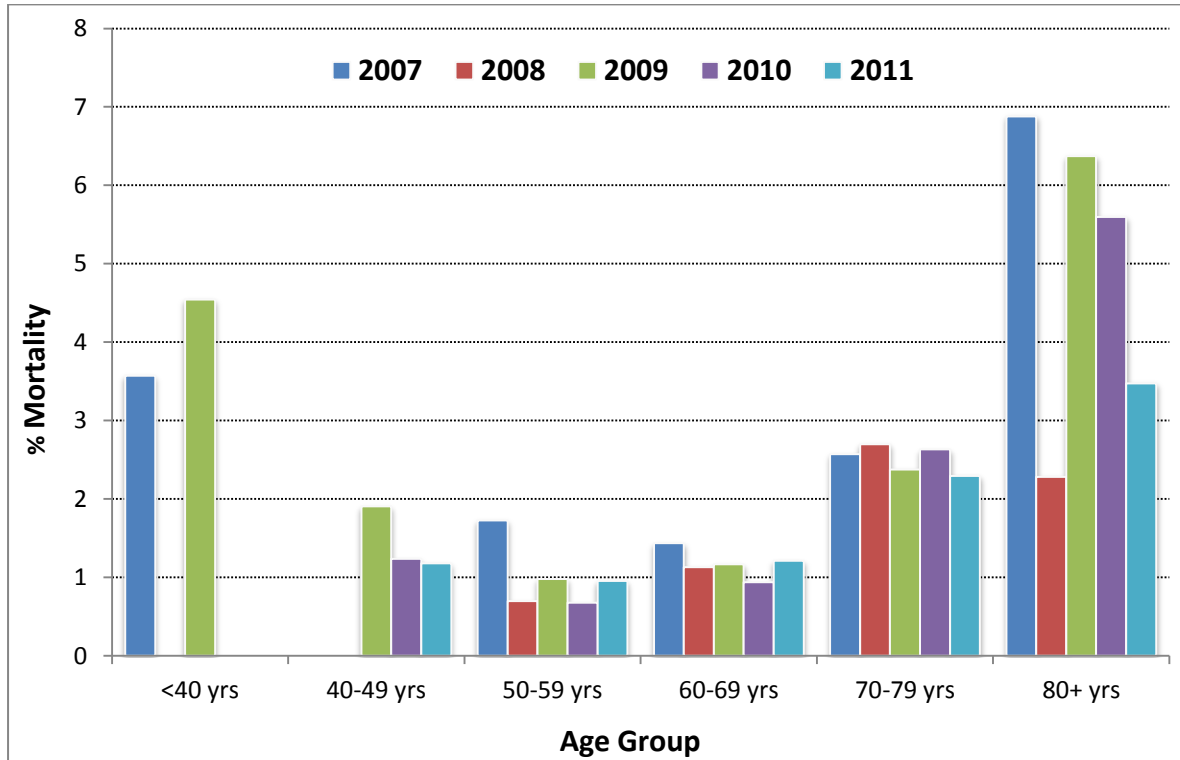


Figure 10 and Table 5: There is a progressive increase in operative mortality with advancing age. Mortality for the highest risk group, the 80+ yrs, is decreasing over the past three years.

Table 5 – Mortality by age

	Mortality (mortality/n,%)					
	<40yrs	40-49yrs	50-59yrs	60-69yrs	70-79yrs	80+yrs
2011	0/46, 0.0	4/339, 1.2	9/942, 1.0	20/1650, 1.2	32/1395, 2.3	14/403, 3.5
2010	0/60, 0.0	4/323, 1.2	7/1037, 0.7	15/1599, 0.9	37/1406, 2.6	22/393, 5.6
2009	2/44, 4.5	6/315, 1.9	8/816, 1.0	16/1373, 1.2	31/1304, 2.4	23/361, 6.4
2008	0/35, 0.0	0/238, 0.0	5/718, 0.7	13/1149, 1.1	31/1149, 2.7	6/263, 2.3
2007	1/28, 3.6	0/198, 0.0	9/521, 1.7	13/904, 1.4	21/816, 2.6	13/189, 6.9

Isolated CABG Surgery

Figure 11A: Mortality rate for isolated CABG in relation to clinical status

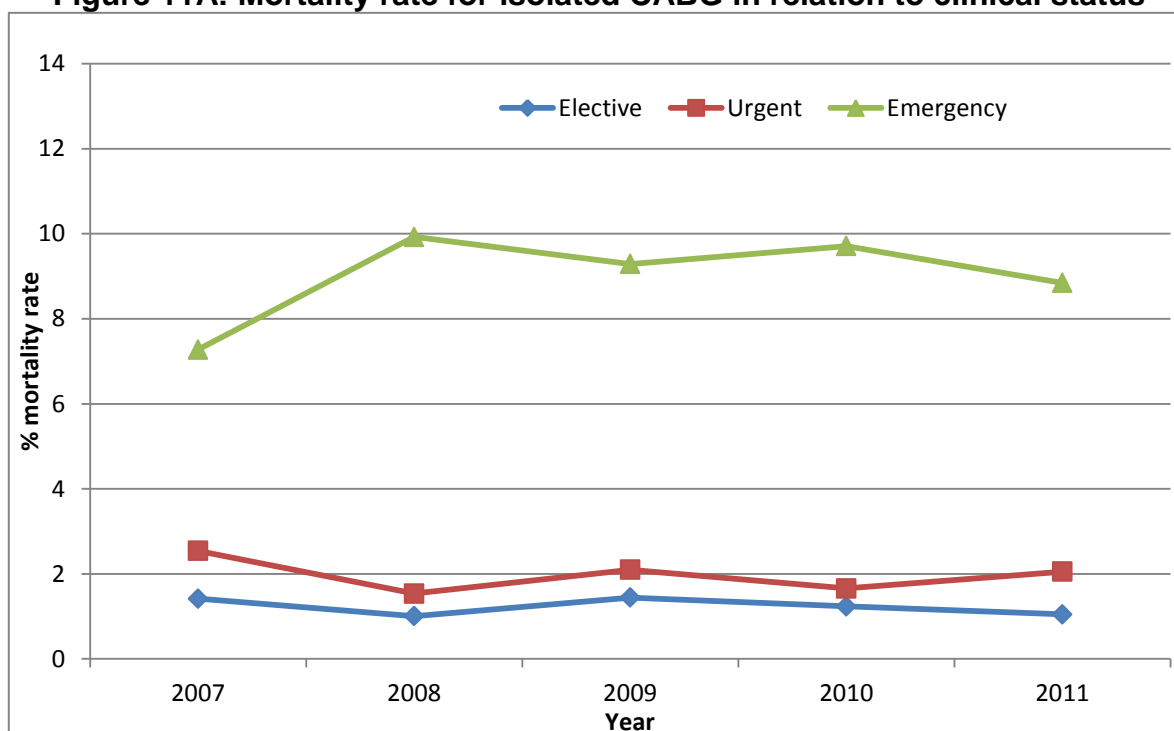
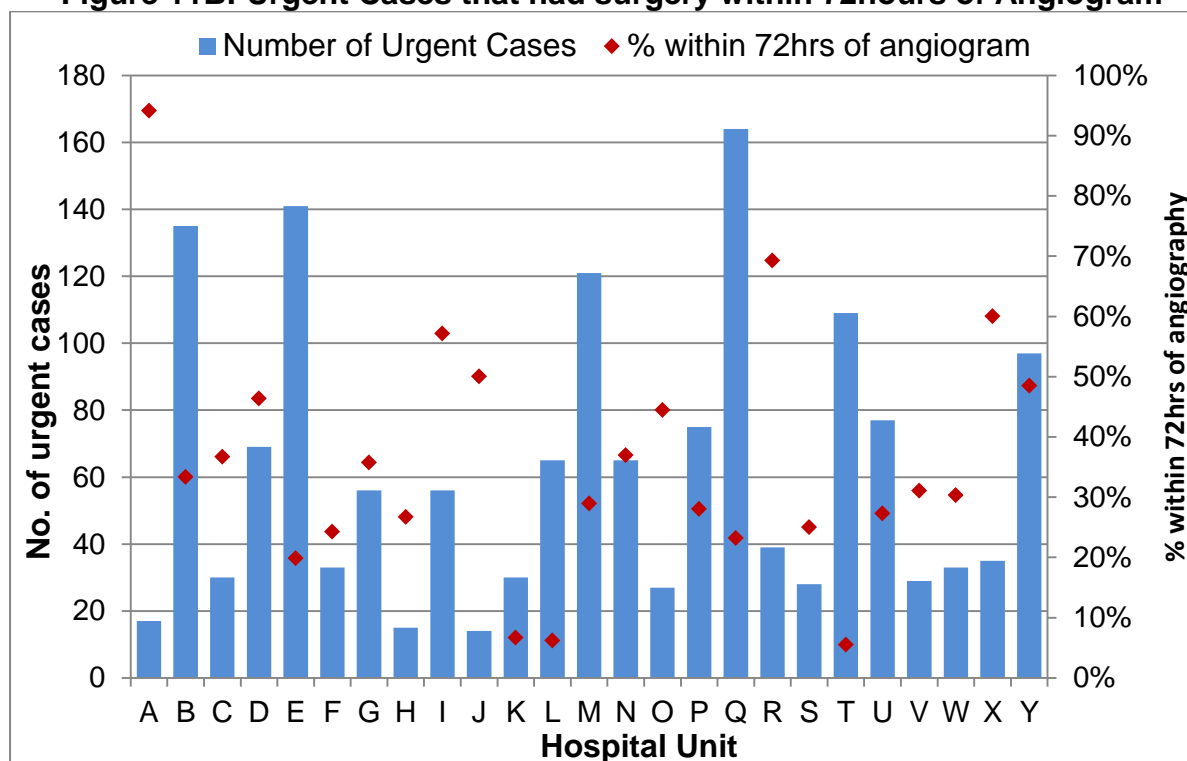


Figure 11a: Clinical urgency also significantly influences mortality at approximately around 1% for elective, 2% for urgent and 9% for emergency surgery in 2011.

Figure 11B: Urgent Cases that had surgery within 72hours of Angiogram



The ANZSCTS Database definition of 'Urgent' includes the requirement that the procedure is performed within 72 hours of angiography. It appears that a majority of patients are incorrectly classified as 'Urgent' by most Units.

Isolated CABG Surgery

Table 6 – Mortality by clinical status

	Mortality (mortality/n, %)			
	Elective	Urgent	Emergency	Salvage
2011	32/3060, 1.0	32/1560, 2.1	13/147, 8.8	2/9, 22.2
2010	39/3155, 1.2	24/1449, 1.7	20/206, 9.7	2/8, 25.0
2009	36/2498, 1.4	32/1525, 2.1	17/183, 9.3	1/7, 14.3
2008	20/1987, 1.0	22/1430, 1.5	13/131, 9.9	0/4, 0.0
2007	21/1481, 1.4	27/1062, 2.5	8/110, 7.3	1/3, 33.3

Figure 12A: Mortality rate for isolated CABG by pre-operative AMI 2007-2011

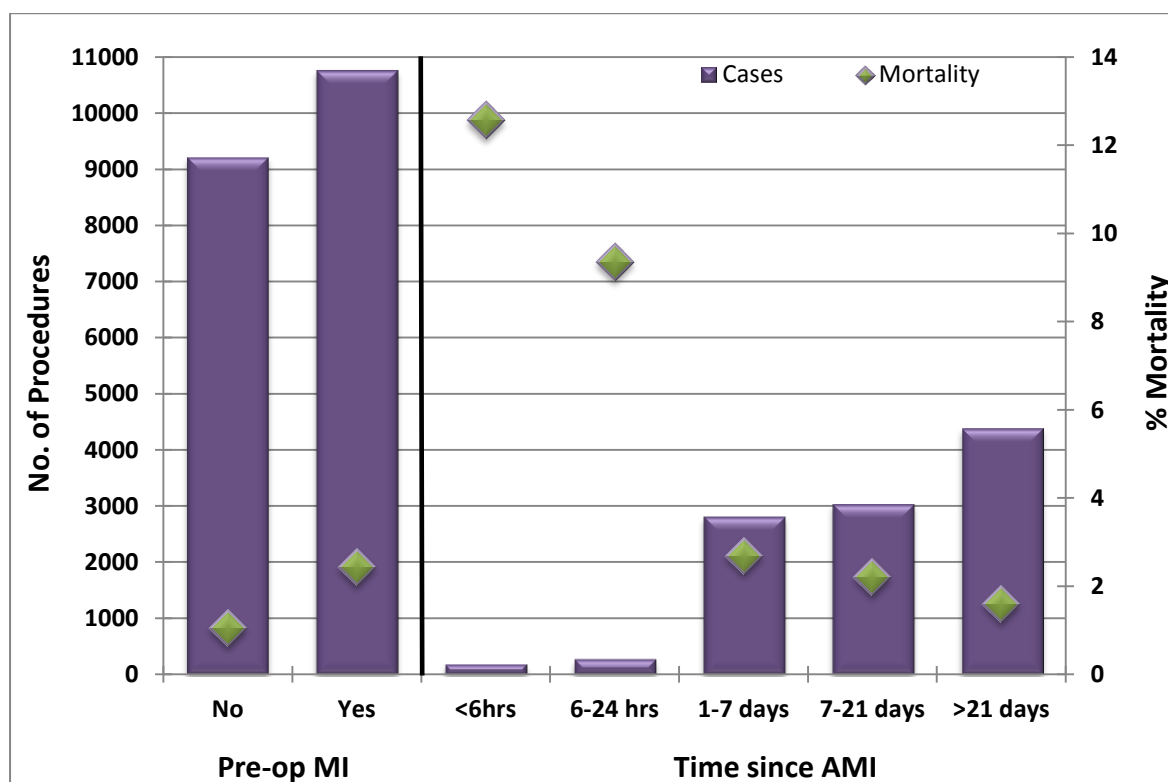


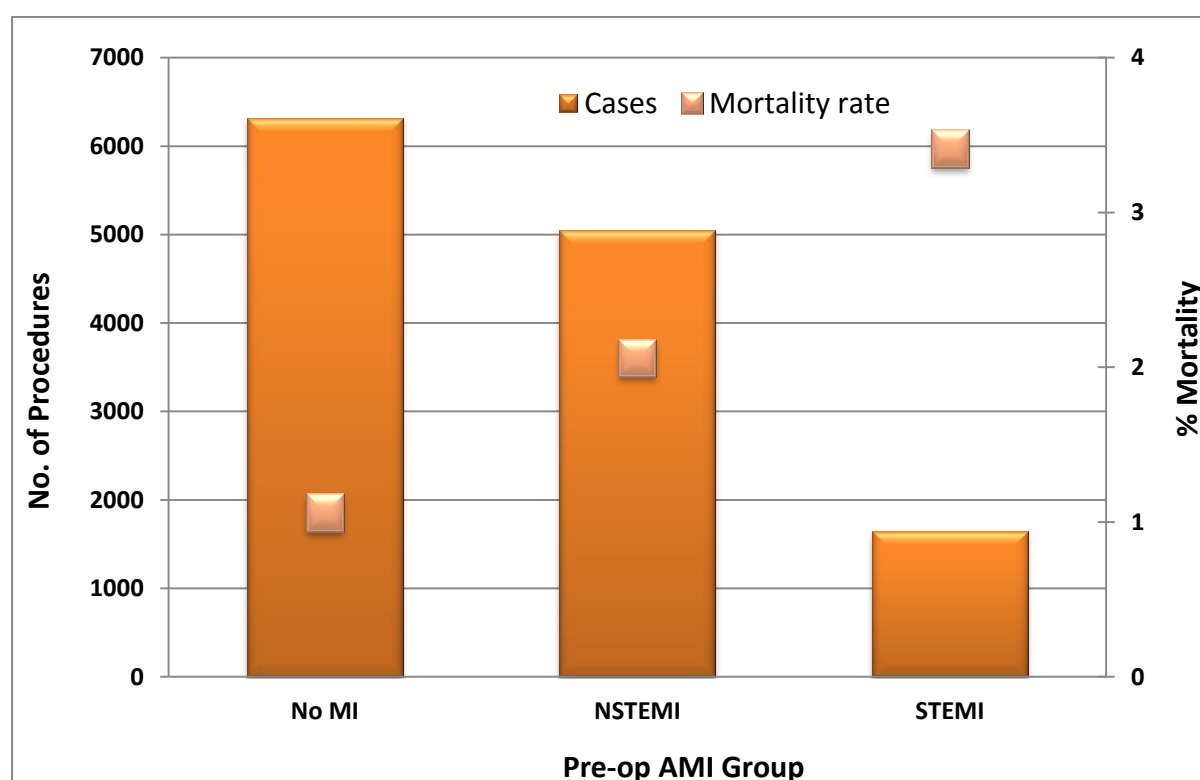
Figure 12a: Over the past five years, the surgical risk after AMI is approximately 2.5% or almost two and a half times that without AMI. The risk is high at intervals <24 hours after AMI, then falls rapidly to 2.6% in the 1-7 day group and to 1.5% in the >21 day group. Table 7 details the mortality related to pre-operative AMI this year.

Isolated CABG Surgery

Table 7 – Mortality by pre-operative AMI

	Mortality (mortality/n, %)						
	Pre-op AMI		Time since AMI				
	Yes	No	<=6 hrs	6-24 hrs	1-7 days	7-21 days	>= 21 days
2011	60/2598, 2.3	19/2177, 0.9	3/46, 6.5	9/62, 14.5	22/837, 2.6	12/746, 1.6	14/905, 1.5
2010	62/2618, 2.4	23/2192, 1.0	6/65, 9.2	7/82, 8.5	16/682, 2.3	18/768, 2.3	15/1014, 1.5
2009	59/2238, 2.6	25/1951, 1.3	6/30, 20.0	4/50, 8.0	13/551, 2.4	20/640, 3.1	16/950, 1.7
2008	40/1891, 2.1	15/1659, 0.9	6/29, 20.7	2/48, 4.2	14/443, 3.2	8/533, 1.5	10/827, 1.2
2007	42/1416, 3.0	15/1238, 1.2	3/21, 14.3	4/36, 11.1	11/307, 3.6	9/356, 2.5	15/696, 2.2

Figure 12B: Mortality rate for isolated CABG by type of AMI 2009-2011



The type of pre-operative AMI has been recorded for the past two years. The histogram indicates that overall, the presence of a STEMI increases mortality more than a Non-STEMI. There are insufficient numbers as yet, to further analyse the STEMI group.

Isolated CABG Surgery

Figure 13: Mortality rate for isolated CABG by LV function 2007-2011

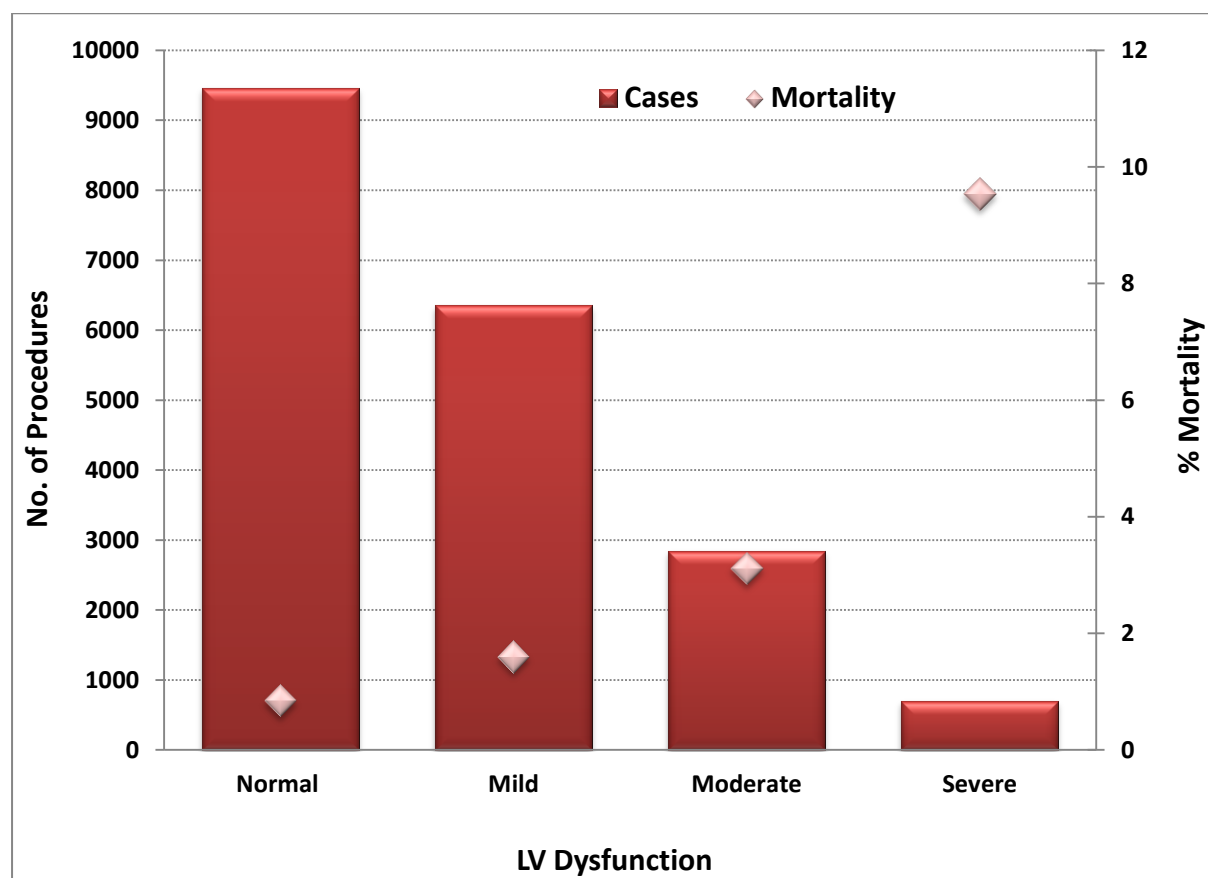


Figure 13: Reduced ventricular function remains a significant determinant of peri-operative mortality.

Table 8 – Mortality by LV function

	Mortality (mortality/n %)			
	LV Dysfunction			
	Normal	Mild	Moderate	Severe
2011	21/2279, 0.9	23/1571, 1.5	19/669, 2.8	13/156, 8.3
2010	21/2213, 0.9	21/1556, 1.3	20/704, 2.8	18/185, 9.7
2009	20/1969, 1.0	27/1366, 2.0	20/647, 3.1	13/131, 9.9
2008	10/1748, 0.6	8/1087, 0.7	16/466, 3.4	15/128, 11.7
2007	9/1253, 0.7	23/770, 3.0	14/362, 3.9	8/102, 7.8

Isolated CABG Surgery

Table 9 - Mortality - Gender

Mortality - Off pump

	Gender (n, %)		Procedure type (n, %)*	
	Male	Female	Off-Pump	On-Pump
2011	51/3813, 1.3	28/963, 2.9	5/415, 1.2	74/4361, 1.7
2010	53/3881, 1.4	32/937, 3.4	8/477, 1.7	77/4337, 1.8
2009	60/3287, 1.8	26/926, 2.8	7/376, 1.9	77/3786, 2.0
2008	39/2762, 1.4	16/790, 2.0	2/273, 0.7	53/3279, 1.6
2007	36/2136, 1.7	21/520, 4.0	3/200, 1.5	54/2456, 2.2
Total	239/15879, 1.5	123/4136, 3.0	25/1741, 1.4	335/18219, 1.8

*55 missing data

Table 10 - Mortality - Diabetes

Mortality - Renal function

	Diabetes (n, %)		Pre-op creatinine (n, %)		Pre-op eGFR (n, %)	
	Yes	Yes	<200ml	>=200ml	> 60 mL/min	≤ 60 mL/min
2011	34/1724, 2.0	34/1724, 2.0	69/4600, 1.5	10/176, 5.7	36/3682, 1.0	43/1094, 3.9
2010	33/1696, 1.9	33/1696, 1.9	81/4665, 1.7	4/153, 2.6	37/3660, 1.0	48/1158, 4.1
2009	42/1446, 2.9	42/1446, 2.9	82/4086, 2.0	4/127, 3.1	42/3243, 1.3	44/970, 4.5
2008	27/1166, 2.3	27/1166, 2.3	49/3383, 1.4	6/169, 3.6	32/2673, 1.2	23/879, 2.6
2007	22/831, 2.6	22/831, 2.6	47/2568, 1.8	10/88, 11.4	24/1947, 1.2	33/709, 4.7
Total	158/6863*, 2.3	158/6863*, 2.3	328/19302, 1.7	34/713, 4.8	171/15208, 1.1	188/4607, 4.1

*27 missing data

Table 9 and 10: The overall mortality rate for the 5 year period is significantly affected by female gender, diabetes and renal impairment.

Isolated CABG Surgery

Table 11 – Post-operative complications by age 2011 (% of cases)

	Age Group						
	<40yrs	40-49yrs	50-59yrs	60-69yrs	70-79yrs	80+yrs	Total
n	46	339	939	1645	1390	402	4762*
New Renal Failure	-	1.8	2.3	3.1	5.0	6.0	3.6
Cerebrovascular Complication	-	0.6	0.3	1.3	2.1	3.0	1.4
Permanent Stroke	-	0.6	0.2	0.7	1.4	2.2	0.9
Deep Sternal Infection (30 days post-op)	-	0.9	0.5	1.2	1.1	1.5	1.0
Septicaemia	2.2	0.3	0.5	1.2	0.6	0.5	0.8
Return to theatre (all cases)	-	4.4	3.8	4.8	6.5	6.5	5.2
Re-op for Bleeding	-	2.9	2.3	2.1	2.9	3.0	2.5
Peri-operative AMI	-	0.3	0.1	0.7	1.0	0.7	0.7
New Cardiac Arrhythmia	13.0	11.2	18.4	25.8	33.1	39.8	26.5
Pneumonia	4.3	3.8	3.2	2.7	3.7	2.7	3.2
GIT complication	-	0.3	0.5	0.7	1.4	2.0	0.9
Multi-system Failure	-	0.3	0.3	0.5	0.9	0.2	0.6
Anticoagulant complication	-	-	0.3	0.2	0.4	0.2	0.3
Red Blood Cells transfused	41.3	26.8	26.2	35.8	48.0	59.0	38.9
Non-RBC blood products	28.3	24.8	21.4	22.6	26.9	30.1	24.5

*14 missing data

Table 11: Advancing age is consistently associated with an increased likelihood of most post-operative complications. It also associated with an increased likelihood of transfusion requirements.

Isolated CABG Surgery

Table 12 – Post-operative complications by clinical status 2011 (% of cases)

	Operative Status				
	Elective	Urgent	Emergency	Salvage	Total
n	3053	1558	143	8	4762*
New Renal Failure	3.2	3.9	8.4	12.5	3.6
Cerebrovascular Complication	1.2	1.6	4.1	-	1.4
Permanent Stroke	0.7	1.2	2.8	-	0.9
Deep Sternal Infection (30 days post-op)	1.1	0.8	1.4	-	1.0
Return to theatre (all cases)	4.5	6.0	9.1	25.0	5.2
Septicaemia	0.8	0.4	4.2	-	0.8
Re-op for Bleeding	2.2	2.9	3.4	-	2.5
Peri-operative AMI	0.6	0.4	3.5	-	0.7
New Cardiac Arrhythmia	26.6	25.7	32.9	25.0	26.5
Pneumonia	3.1	3.2	4.9	-	3.2
GIT complication	0.8	1.2	2.8	-	0.9
Multi-system Failure	0.4	0.4	4.2	12.5	0.6
Anticoagulant complication	0.2	0.4	0.7	-	0.3
Red Blood Cells transfused	36.1	41.9	62.9	75.0	38.9
Non-RBC blood products	21.7	27.0	54.5	50.0	24.5

*14 missing data

Table 12: Increasingly acute clinical status is similarly associated with an increased likelihood of developing postoperative complications and need for transfusion.

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Table 13a - Complications by: redo, off pump, renal function 2011 (% of cases)

	Redo		Off-pump		Pre-op creatinine		Pre-op eGFR		Total
	1st proc	Redo	Off-pump	On-pump	≤ 0.2 mmol/L	> 0.2 mmol/L	> 60 mL/min	≤ 60 mL/min	Patients
n	4600	162	415	4347	4586	176	3675	1028	4762*
New Renal Failure	3.5	5.6	4.6	3.5	3.4	10.2	2.4	7.6	3.6
Cerebrovascular Complication	1.4	2.5	0.2	1.5	1.5	-	1.2	2.2	1.4
Permanent Stroke	0.9	0.6	0.2	1.0	1.0	-	0.8	1.3	0.9
Deep Sternal Infection (30 days post-op)	1.0	0.6	1.7	1.0	1.0	1.7	1.0	1.3	1.0
Septicaemia	0.7	1.2	0.5	0.8	0.7	2.8	0.7	1.1	0.8
Return to theatre (all cause)	4.9	11.7	5.1	5.2	5.1	6.2	4.6	7.1	5.2
Re-op for Bleeding	2.4	4.9	2.2	2.5	2.5	1.1	2.4	2.7	2.5
Peri-operative AMI	0.6	1.9	0.7	0.6	0.6	1.1	0.5	1.2	0.7
New Cardiac Arrhythmia	26.3	31.5	25.1	26.6	26.3	30.7	25.1	31.0	26.5
Pneumonia	3.1	5.6	1.9	3.3	3.0	6.8	3.0	3.6	3.2
GIT complication	1.0	0.6	0.5	1.0	0.9	1.7	0.6	2.1	0.9
Multi-system Failure	0.5	1.9	0.5	0.6	0.5	3.4	0.3	1.6	0.6
Anticoagulant complication	0.3	-	0.2	0.3	0.3	0.6	0.2	0.4	0.3
Red Blood Cells transfused	38.5	47.5	30.6	39.6	37.8	67.0	31.8	62.7	38.9
Non-RBC blood products	24.0	37.0	17.6	25.1	24.1	34.1	22.3	31.6	24.5

*14 missing data

Tables 13a and b indicate that in redo procedures, on-pump surgery and impaired renal function tend to be associated with greater incidence of most adverse outcomes and the use of blood products.

Isolated CABG Surgery

Table 13b - Complications by: redo, off pump, renal function 2008-2010(% of cases)

	Redo		Off-pump		Pre-op creatinine		Pre-op eGFR		Total
	1st proc	Redo	Off-pump	On-pump	≤ 0.2 mmol/L	> 0.2 mmol/L	> 60 mL/min	≤ 60 mL/min	Patients
n	11924	628	1126	11371	12105	447	9562	2990	12552*
New Renal Failure	3.3	4.1	2.7	3.5	3.3	4.7	2.4	6.5	3.4
Cerebrovascular Complication	1.2	2.1	1.2	1.3	1.3	1.6	0.9	2.3	1.3
Permanent Stroke	0.7	1.4	1.0	0.7	0.7	0.7	0.5	1.4	0.7
Deep Sternal Infection (30 days post-op)	1.3	0.8	1.1	1.3	1.2	3.1	1.1	1.7	1.3
Septicaemia	0.8	1.6	0.5	0.9	0.9	1.3	0.8	1.1	0.9
Return to theatre (all cause)	4.7	8.1	5.1	4.8	4.8	6.7	4.2	6.9	4.9
Re-op for Bleeding	2.2	2.4	2.6	2.1	2.2	2.4	1.9	3.2	2.2
Peri-operative AMI	0.7	1.0	1.3	0.7	0.8	0.2	0.7	0.7	0.7
New Cardiac Arrhythmia	27.8	31.1	20.0	28.8	28.0	27.5	26.4	33.0	28.0
Pneumonia	3.3	4.1	2.8	3.4	3.4	3.6	3.2	4.0	3.4
GIT complication	1.0	1.1	1.5	0.9	0.9	3.4	0.8	1.6	1.0
Multi-system Failure	0.8	0.8	0.8	0.8	0.8	1.3	0.6	1.6	0.8
Anticoagulant complication	0.4	0.8	0.3	0.5	0.4	1.8	0.3	0.9	0.5
Red Blood Cells transfused	38.6	49.4	31.4	39.9	38.5	54.5	32.7	59.6	39.1
Non-RBC blood products	22.3	29.1	20.4	22.9	22.4	29.5	20.5	29.6	22.7

*31 missing data

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Table 14 – Resource utilisation by age (median value)

		Age Group (years)					
		<40	40-49	50-59	60-69	70-79	80+
Intubation Time (hours)	2011	12.0	10.0	9.0	10.0	11.0	12.0
	2010	11.0	10.0	10.0	11.0	12.0	13.0
	2009	6.0	9.0	10.0	11.0	12.0	13.0
	2008	10.0	9.0	9.0	10.0	11.0	12.0
	2007	9.5	8.0	9.0	10.0	11.0	12.0
Intensive Care Stay (hours)	2011	41.5	41.0	42.0	44.0	46.0	48.0
	2010	40.0	29.0	40.0	42.0	45.0	47.0
	2009	25.0	26.0	29.0	33.0	41.0	45.0
	2008	25.0	28.5	26.0	33.0	38.0	44.0
	2007	23.5	24.0	26.0	26.0	32.0	43.0
Post-op Length of Stay (days)	2011	6.0	6.0	6.0	7.0	8.0	9.0
	2010	6.0	6.0	6.0	7.0	8.0	8.5
	2009	6.0	6.0	6.0	7.0	7.0	9.0
	2008	6.0	6.0	6.0	7.0	7.0	9.0
	2007	6.0	6.0	6.0	7.0	7.0	9.0

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Table 15 - Resource utilisation by clinical status (median value)

		Elective	Urgent	Emergency	Salvage
Intubation Time (hours)	2011	10.0	11.0	17.0	25.0
	2010	10.0	13.0	22.0	158.0
	2009	10.0	13.0	19.5	59.0
	2008	9.0	11.0	23.0	50.0
	2007	10.0	10.0	19.0	29.0
Intensive Care Stay (hours)	2011	42.0	47.0	64.0	80.0
	2010	32.0	47.0	72.0	234.0
	2009	26.0	45.0	65.0	220.0
	2008	27.0	39.0	67.5	188.0
	2007	26.0	26.0	54.0	49.5
Post-op Length of Stay (days)	2011	7.0	7.0	8.0	6.5
	2010	7.0	7.0	9.0	17.0
	2009	7.0	7.0	8.0	16.0
	2008	7.0	7.0	8.0	25.0
	2007	7.0	7.0	8.0	6.0

Table 15: Over this five year period, there does not appear to have been any significant change in the duration of intubation time, of stay in ICU or postoperative length of stay. Emergency and Salvage patient groups have increased resource utilisation requirements.

Isolated CABG Surgery

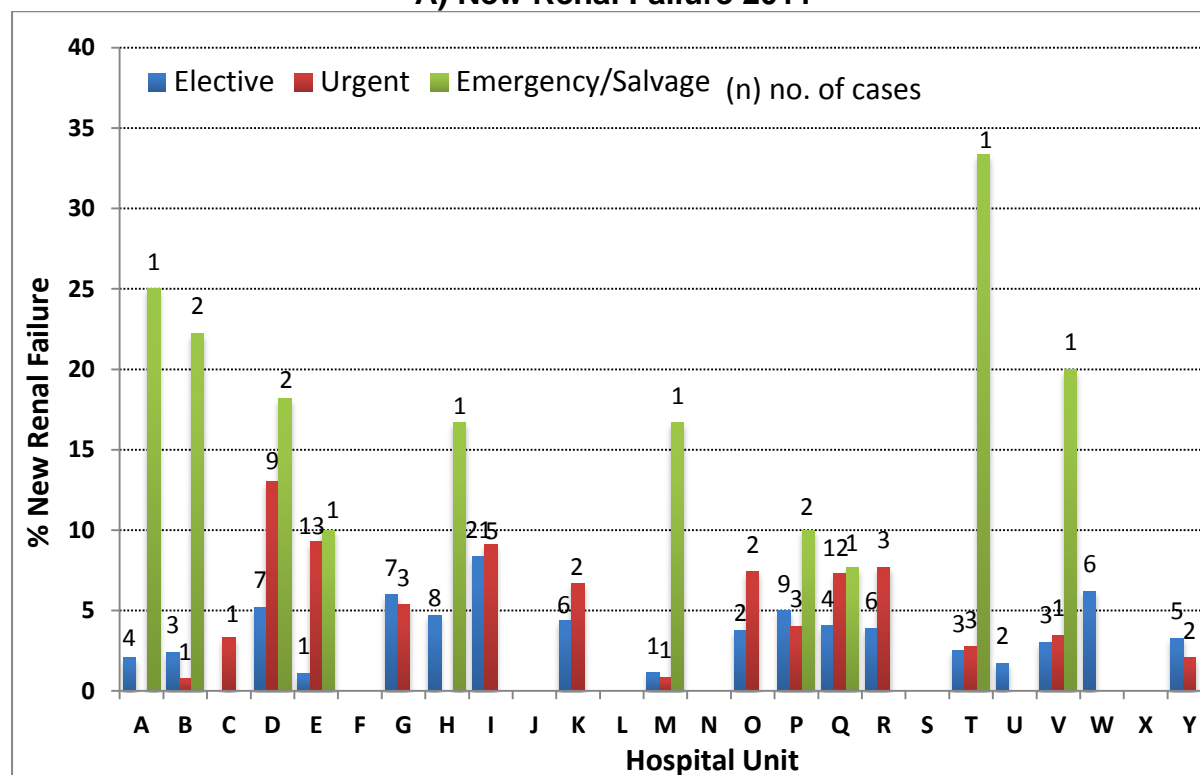
Table 16 - Resource utilisation by: gender, redo, off pump, renal function (median value)

		Gender		Redo		Off pump		Pre-op creatinine*	
		Male	Female	1st proc	Redo	Off pump	On pump	≤ 0.2 mmol/L	> 0.2 mmol/L
Intubation Time (hours)	2011	10.0	11.0	10.0	11.0	11.0	10.0	10.0	13.0
	2010	11.0	12.0	11.0	12.0	13.0	11.0	11.0	15.0
	2009	10.0	12.0	11.0	11.0	12.0	11.0	11.0	13.0
	2008	10.0	11.0	10.0	12.0	9.0	10.0	10.0	11.0
	2007	10.0	11.0	10.0	11.0	10.0	10.0	10.0	13.0
Intensive Care Stay (hours)	2011	43.0	47.0	44.0	46.0	48.0	44.0	44.0	54.0
	2010	42.0	46.0	36.0	47.0	48.0	42.0	43.0	67.0
	2009	33.0	41.5	36.0	45.0	45.0	33.0	37.0	45.5
	2008	29.0	40.0	29.0	45.0	40.0	31.0	30.0	47.0
	2007	26.0	29.0	27.0	38.5	43.0	26.0	27.0	44.0
Post-op Length of Stay (days)	2011	7.0	8.0	7.0	7.0	7.0	7.0	7.0	8.0
	2010	7.0	7.0	7.0	8.0	7.0	7.0	7.0	9.0
	2009	7.0	7.0	7.0	8.0	6.0	7.0	7.0	8.0
	2008	7.0	7.0	7.0	8.0	6.0	7.0	7.0	7.0
	2007	7.0	7.0	7.0	8.0	6.0	7.0	7.0	9.0

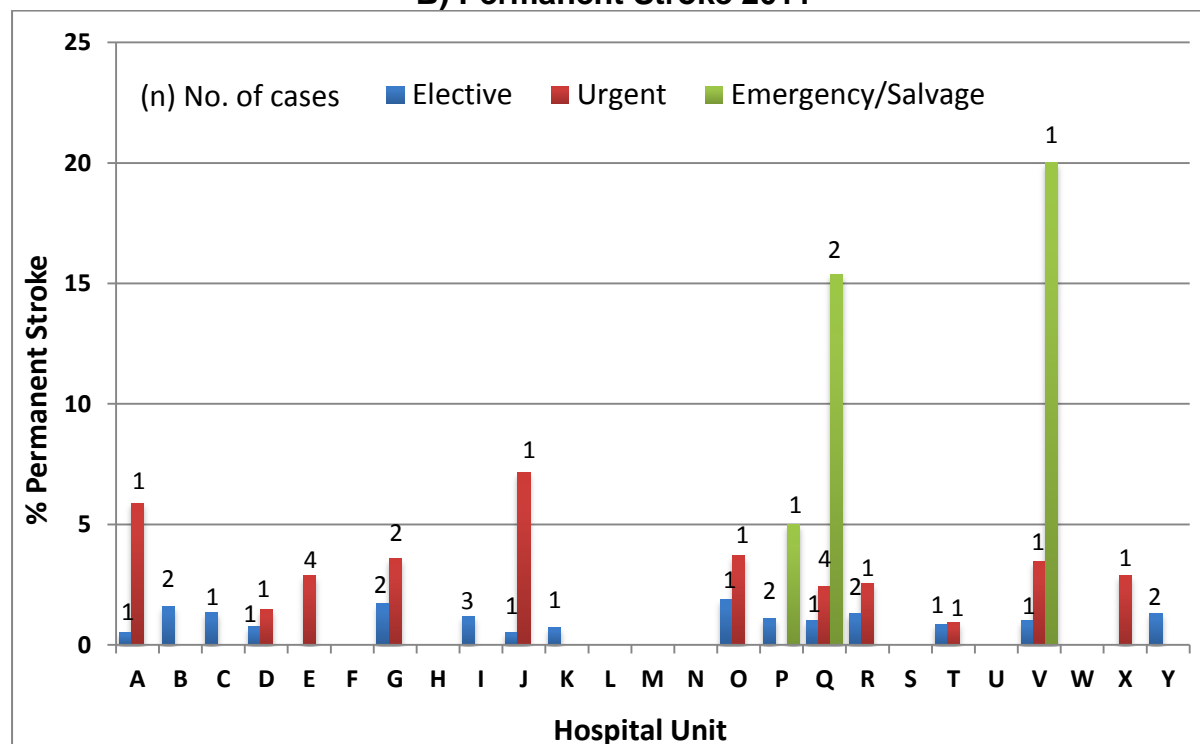
Isolated CABG Surgery

Figure 14: Morbidity by clinical status and unit 2011

A) New Renal Failure 2011



B) Permanent Stroke 2011



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C) Re-operation for Bleeding 2011

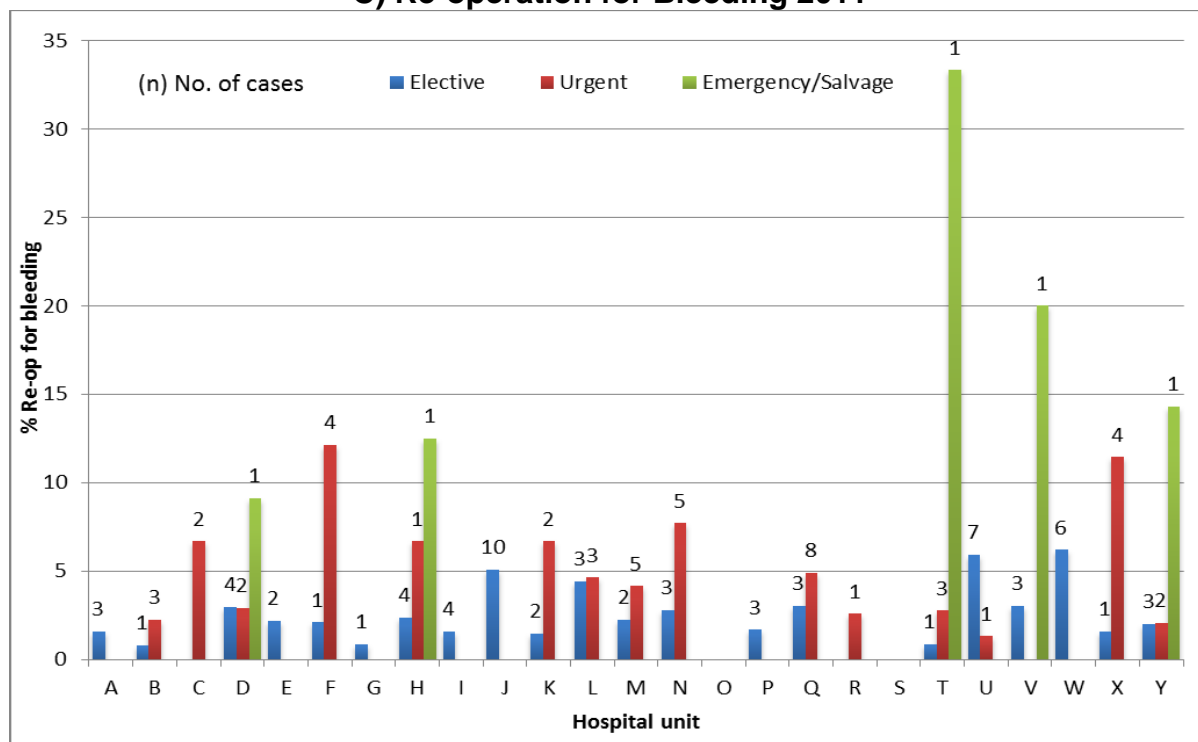
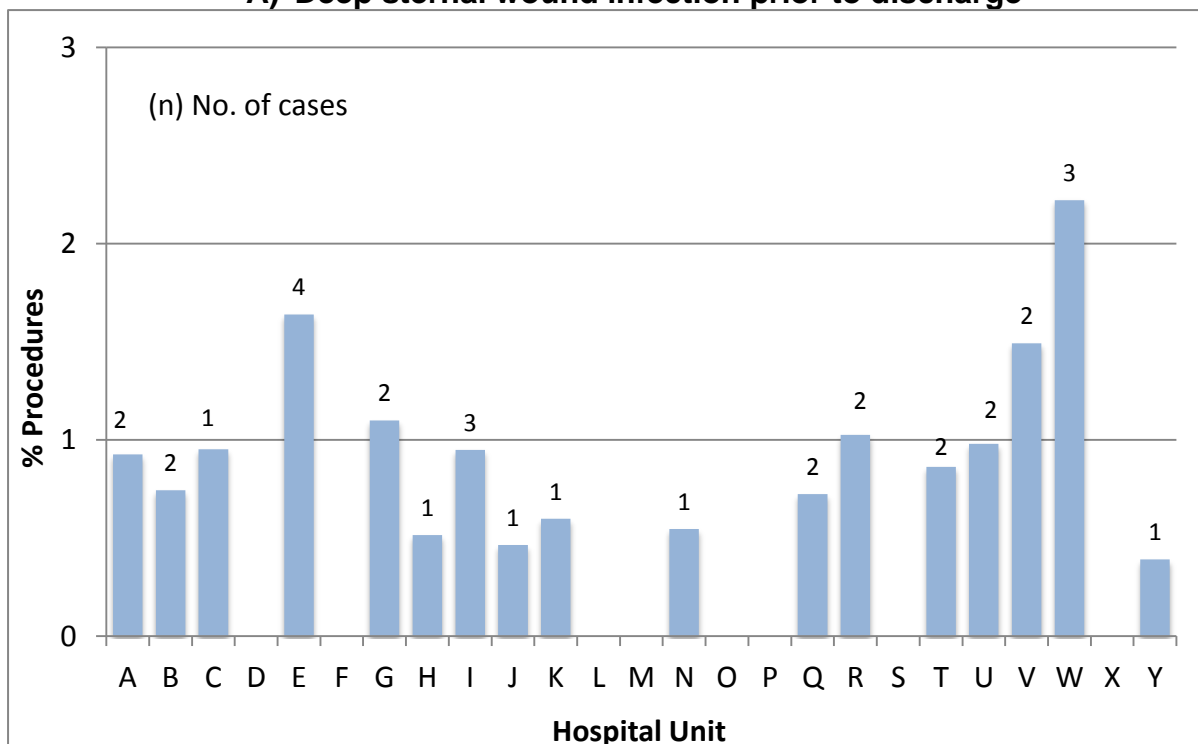
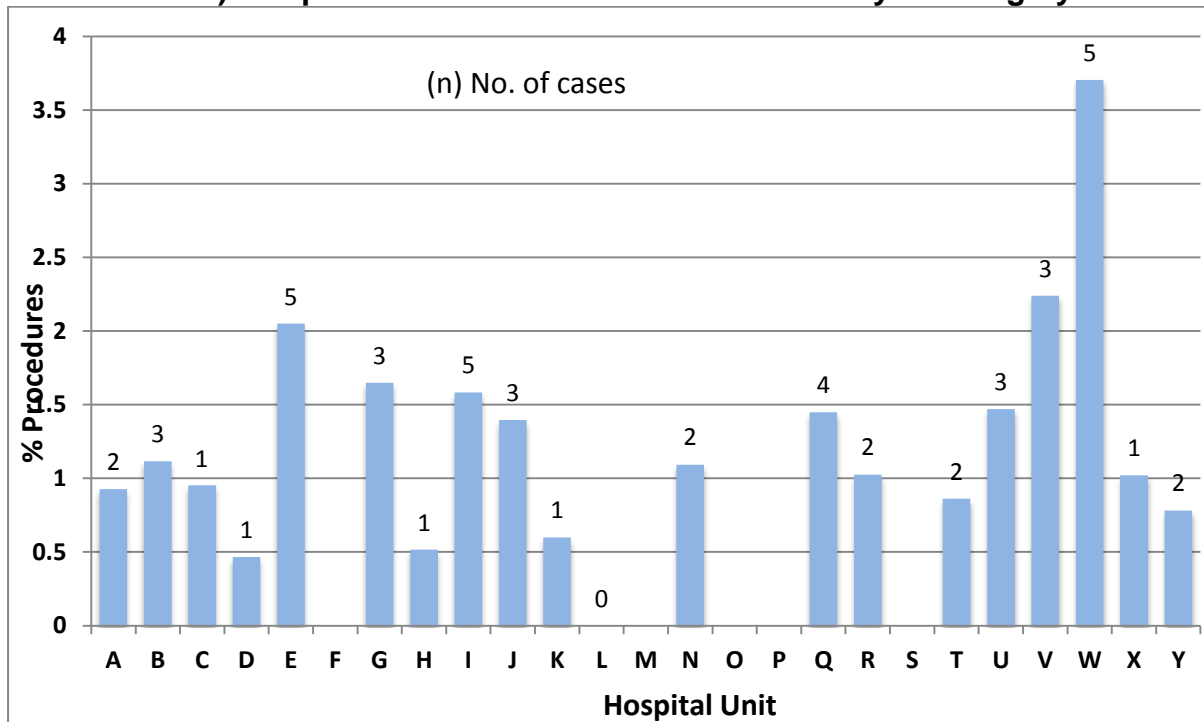


Figure 15: Post-operative complications by unit 2011

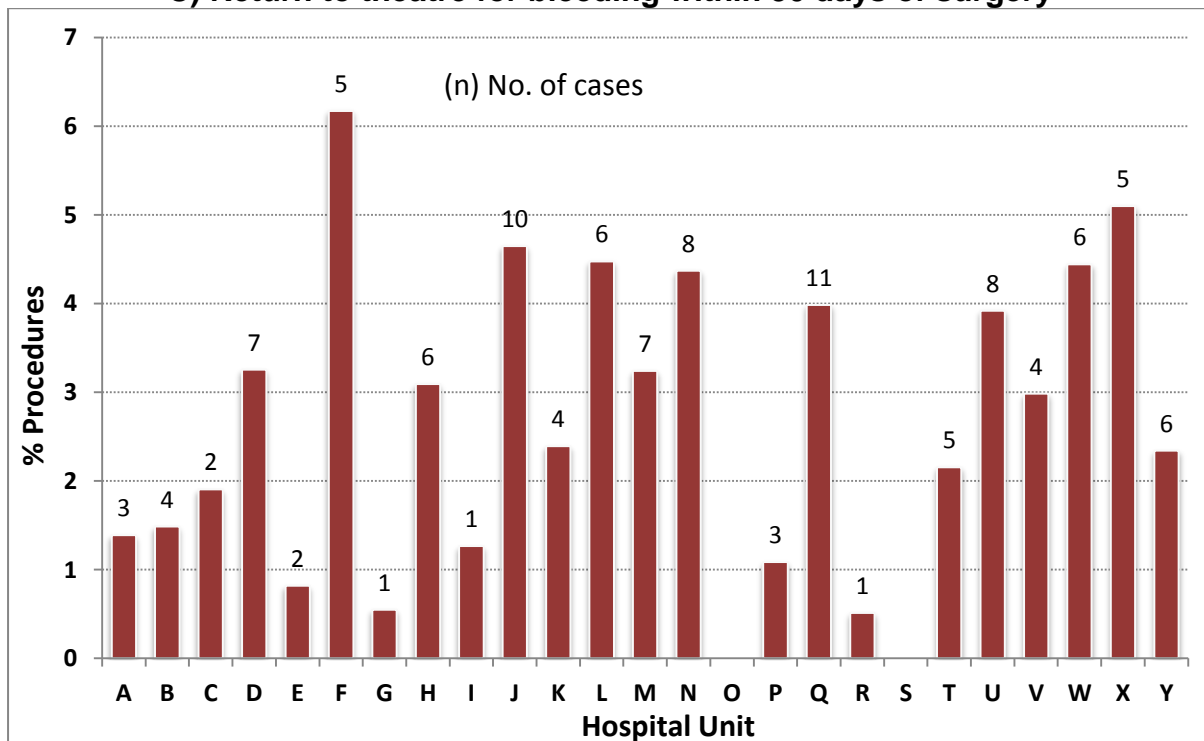
A) Deep sternal wound infection prior to discharge



B) Deep sternal wound infection within 30days of surgery



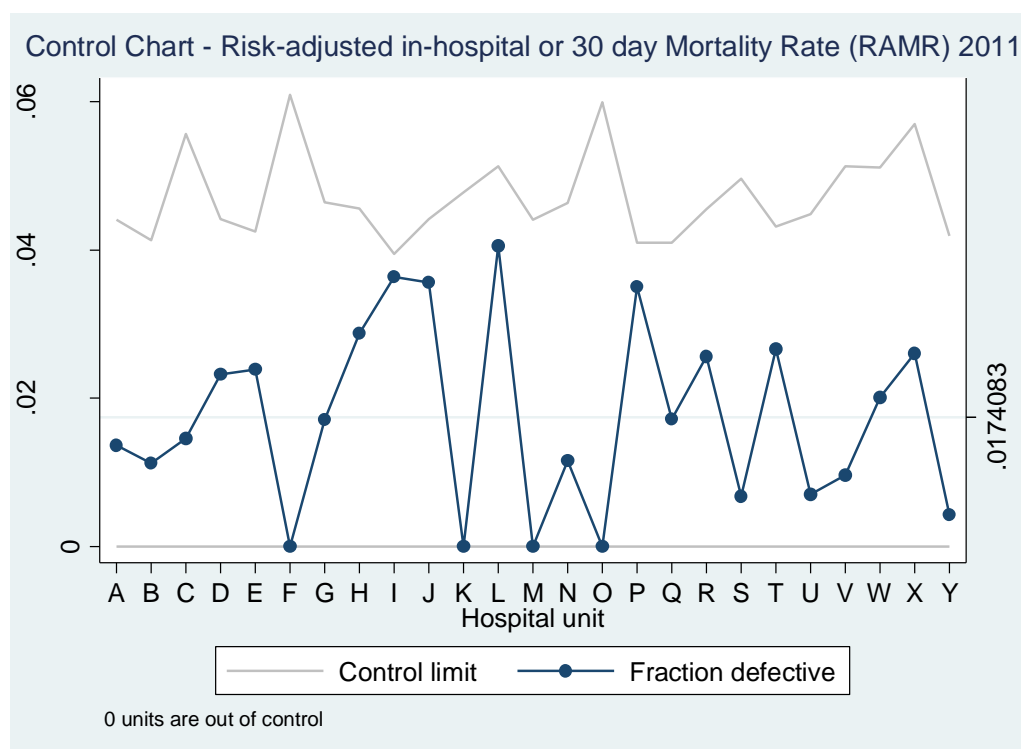
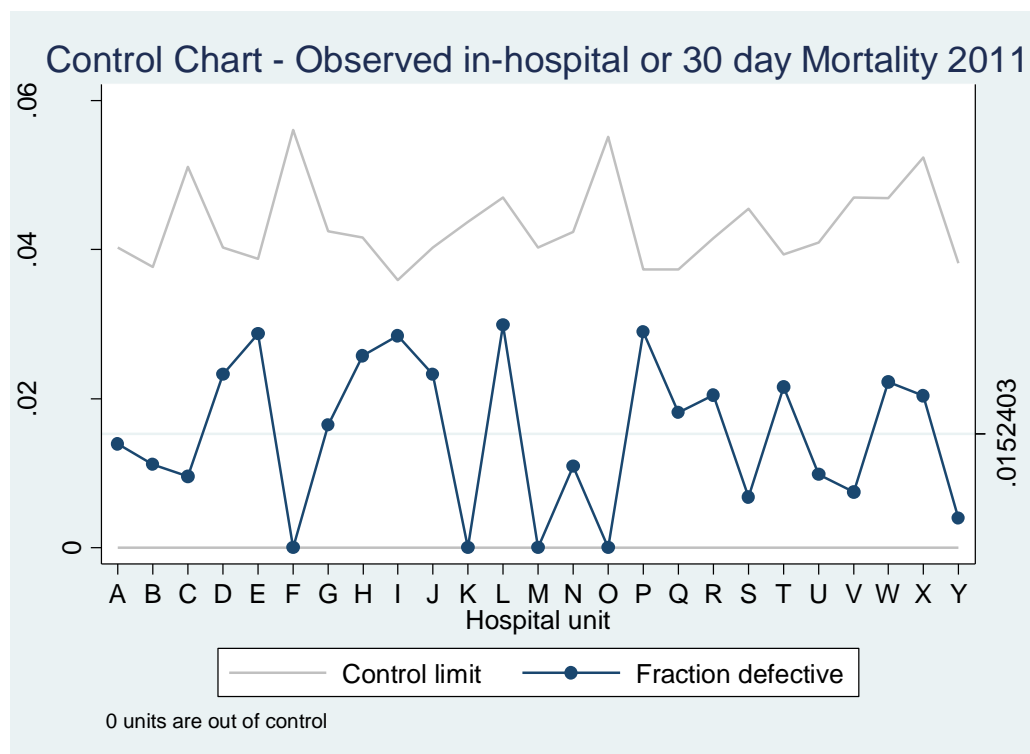
C) Return to theatre for bleeding within 30 days of surgery



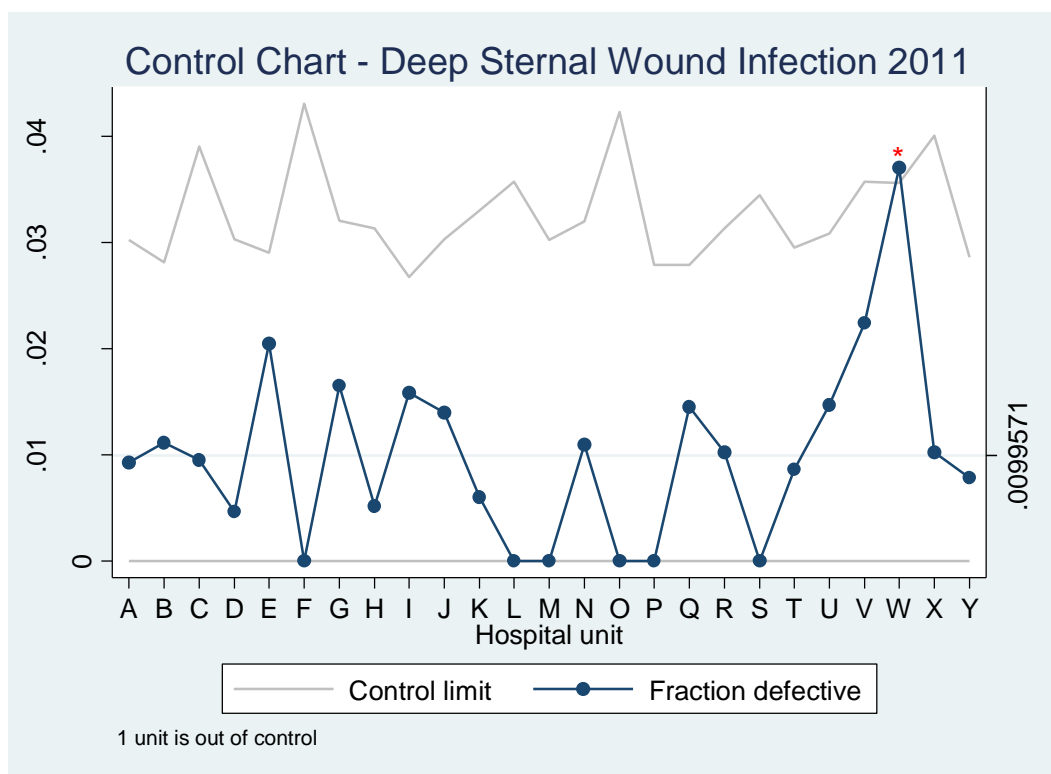
Control Charts for Isolated CABG 2011

Control charts for in-hospital or 30-day mortality, deep sternal infection, and haemorrhage represent variance from the control for each Unit. ICU time, intubation time, length of stay, and post-procedure length of stay represent variation from the mean. The boundaries represent 3 standard deviations from the mean.

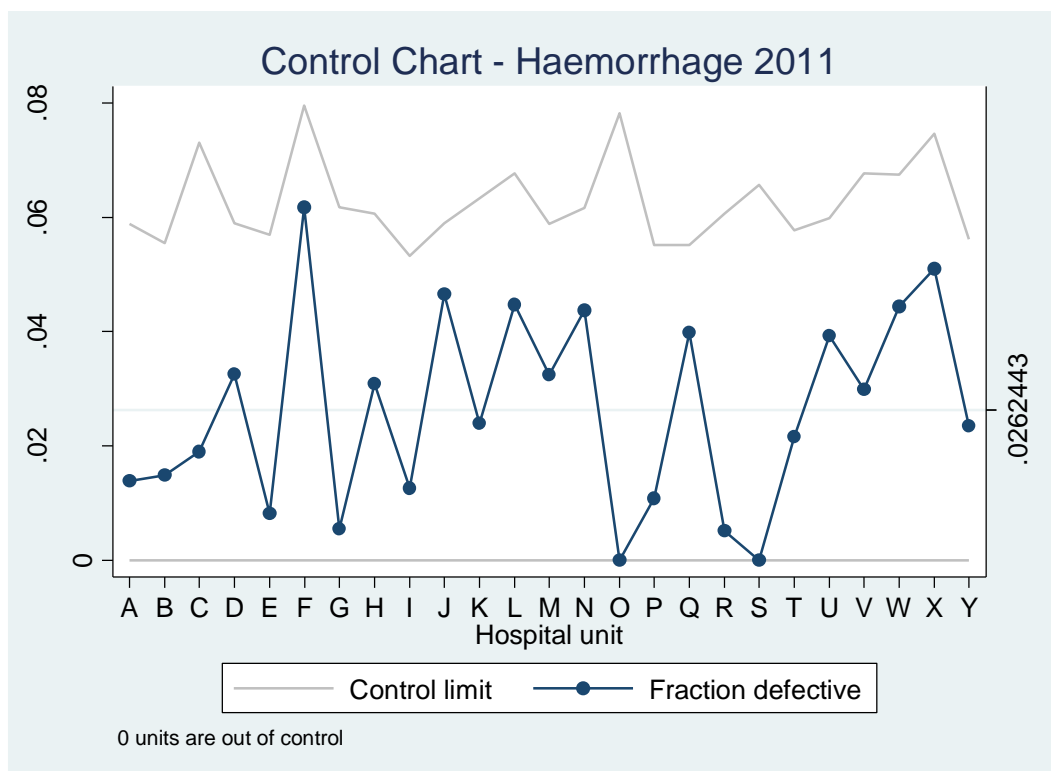
The control chart for mortality is the only chart that is risk-adjusted using the All Procedures Model.



Isolated CABG Surgery

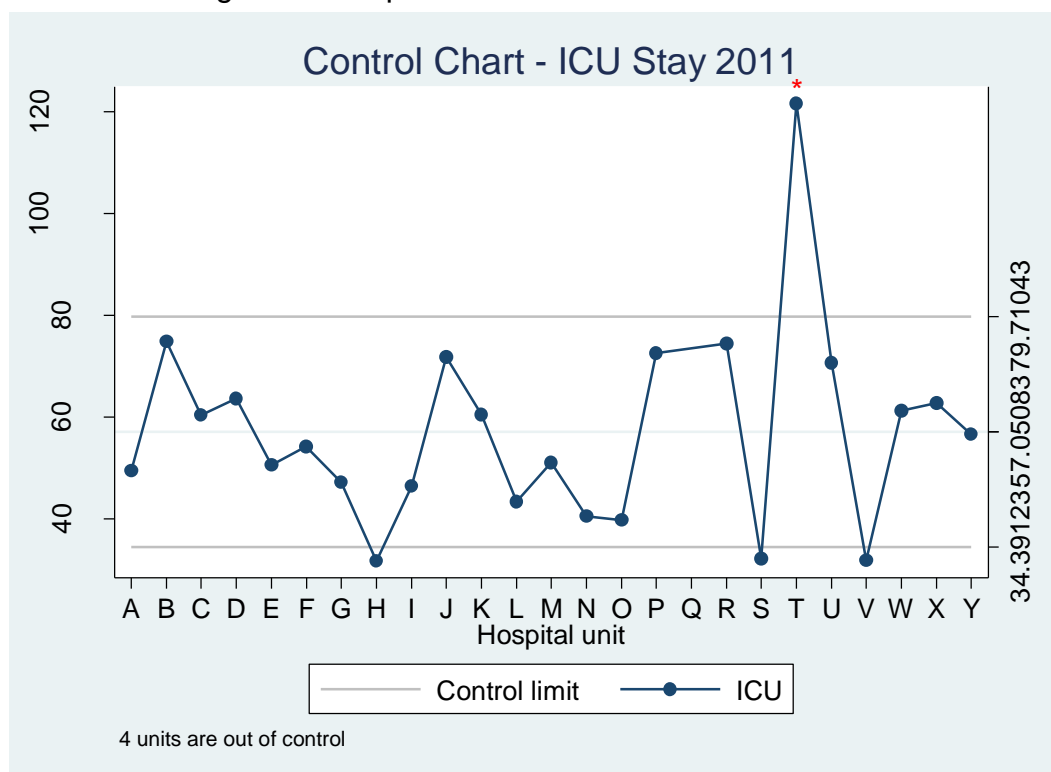


This is the second consecutive year that Unit W has been above the upper control limits.

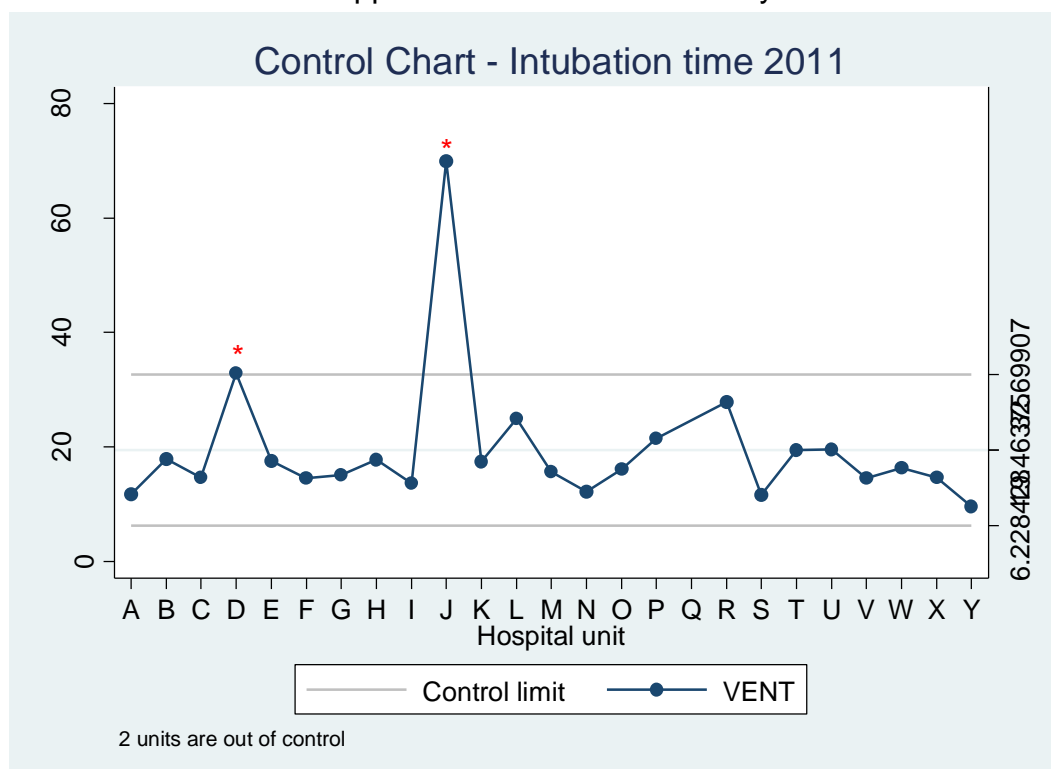


Isolated CABG Surgery

Note: the following control charts for ICU time, intubation time, length of stay, and post-procedure length of stay are representative of the Mean not the Median as they are presented throughout the report.

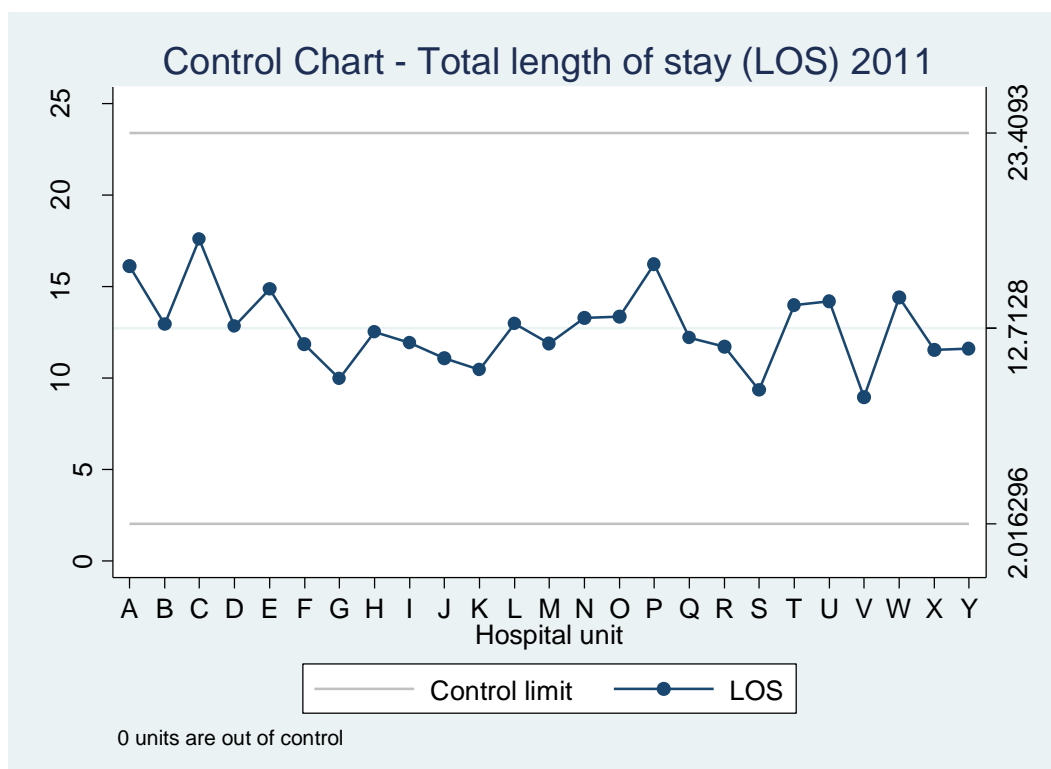
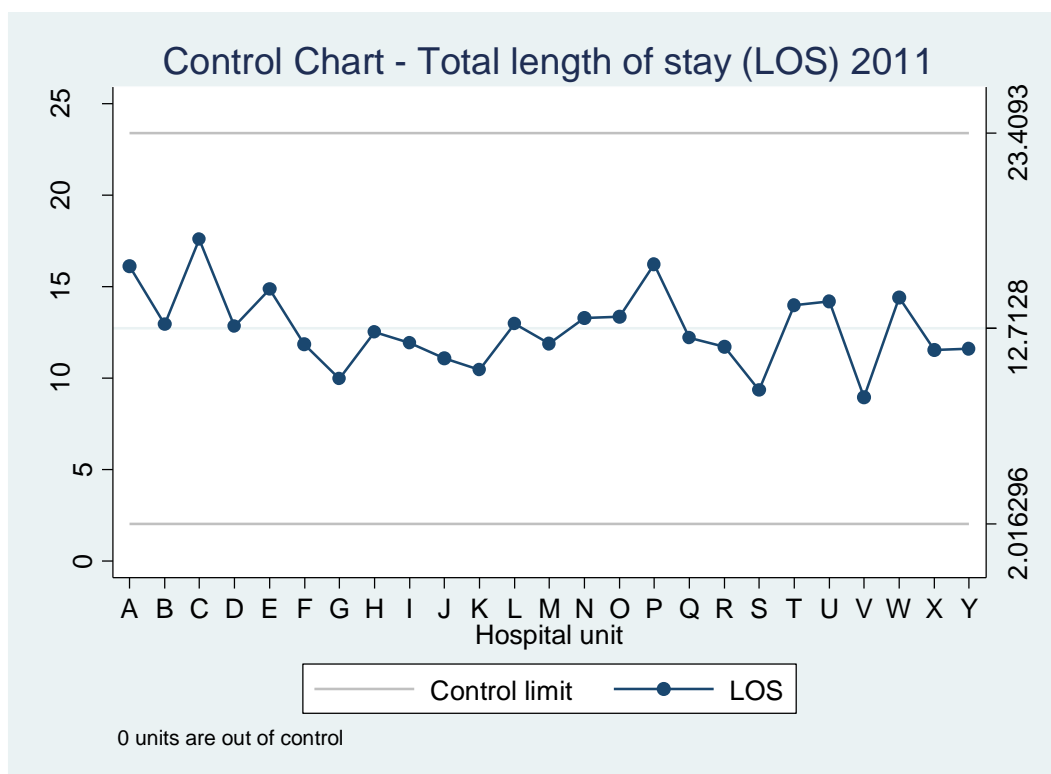


Unit T has been outside the upper limits for 3 consecutive years.



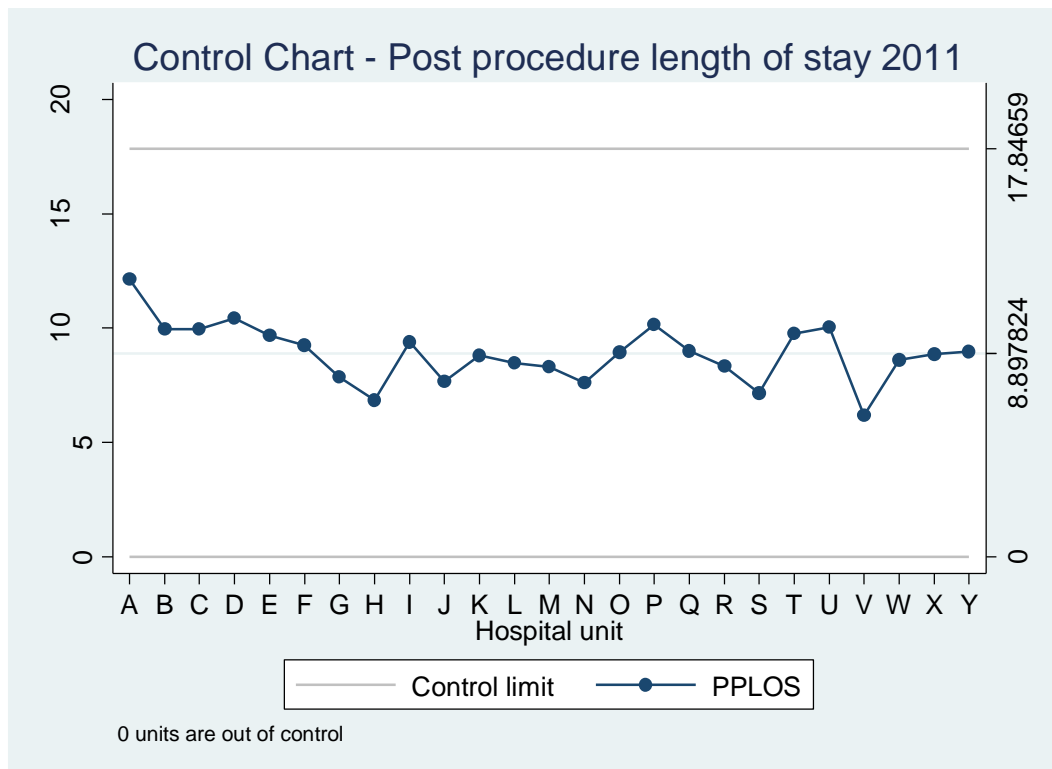
Units D and J are outside upper limits. This is the first year both units are outside the upper limits.

Isolated CABG Surgery



All Units were within control limits for total length of stay in 2011

Isolated CABG Surgery

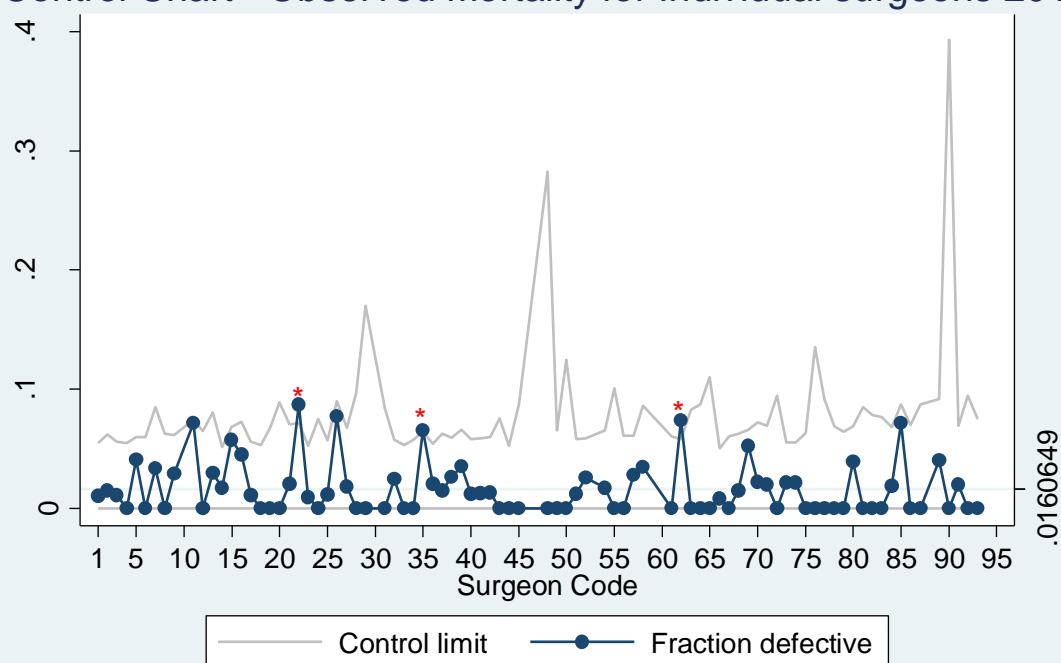


The difference between total and post-procedure length of stay represents surgical delay times.

Isolated CABG Surgery

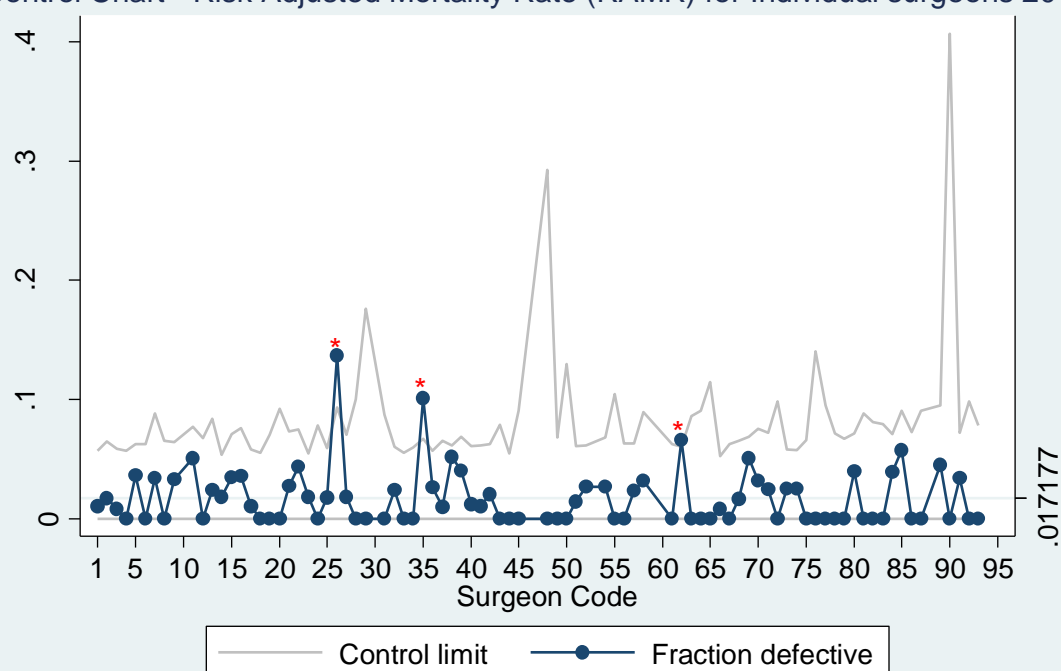
Surgeons Control Charts

Control Chart - Observed Mortality for Individual surgeons 2011



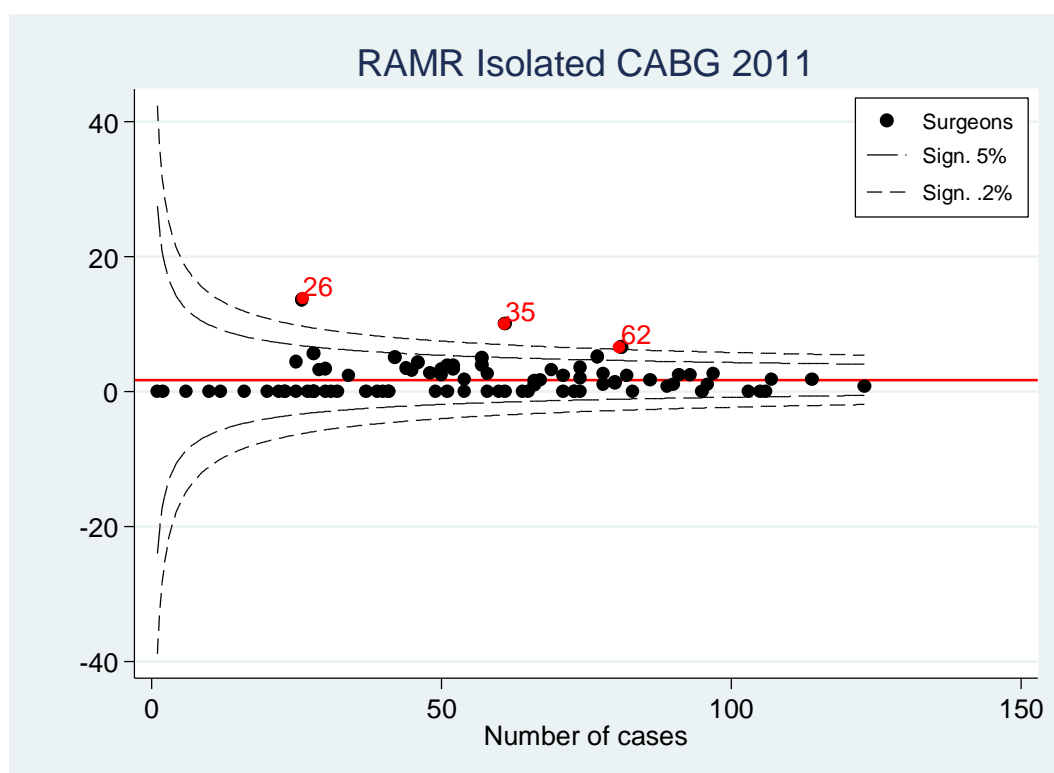
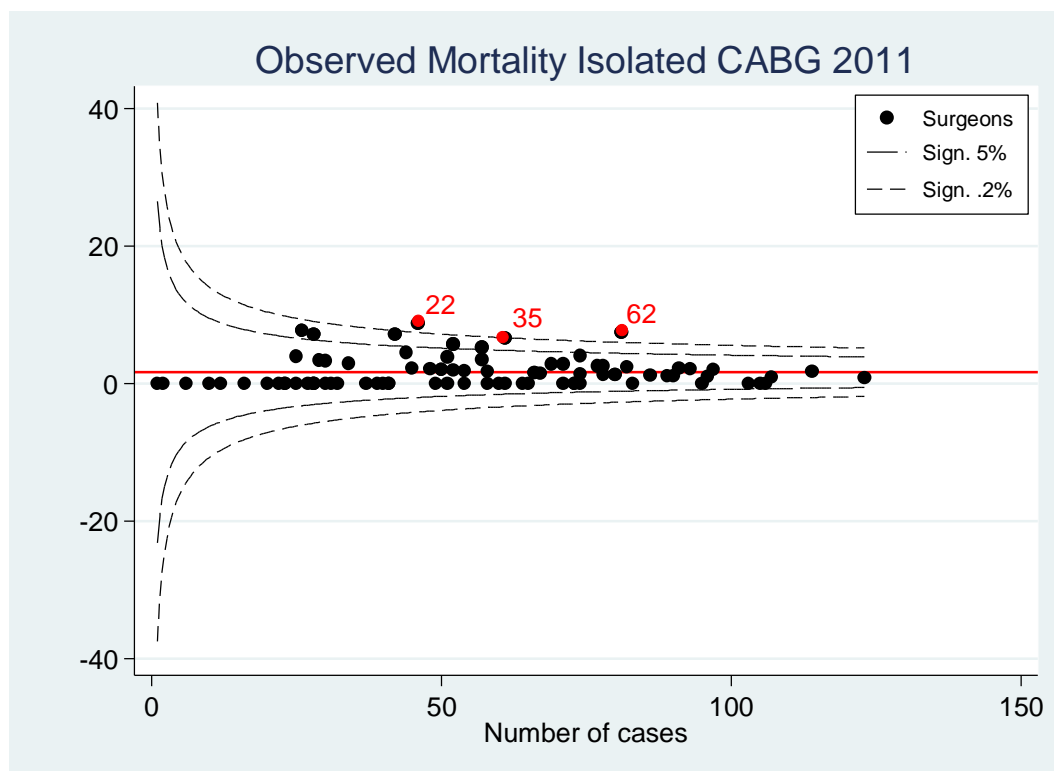
3 units are out of control

Control Chart - Risk Adjusted Mortality Rate (RAMR) for Individual surgeons 2011



3 units are out of control

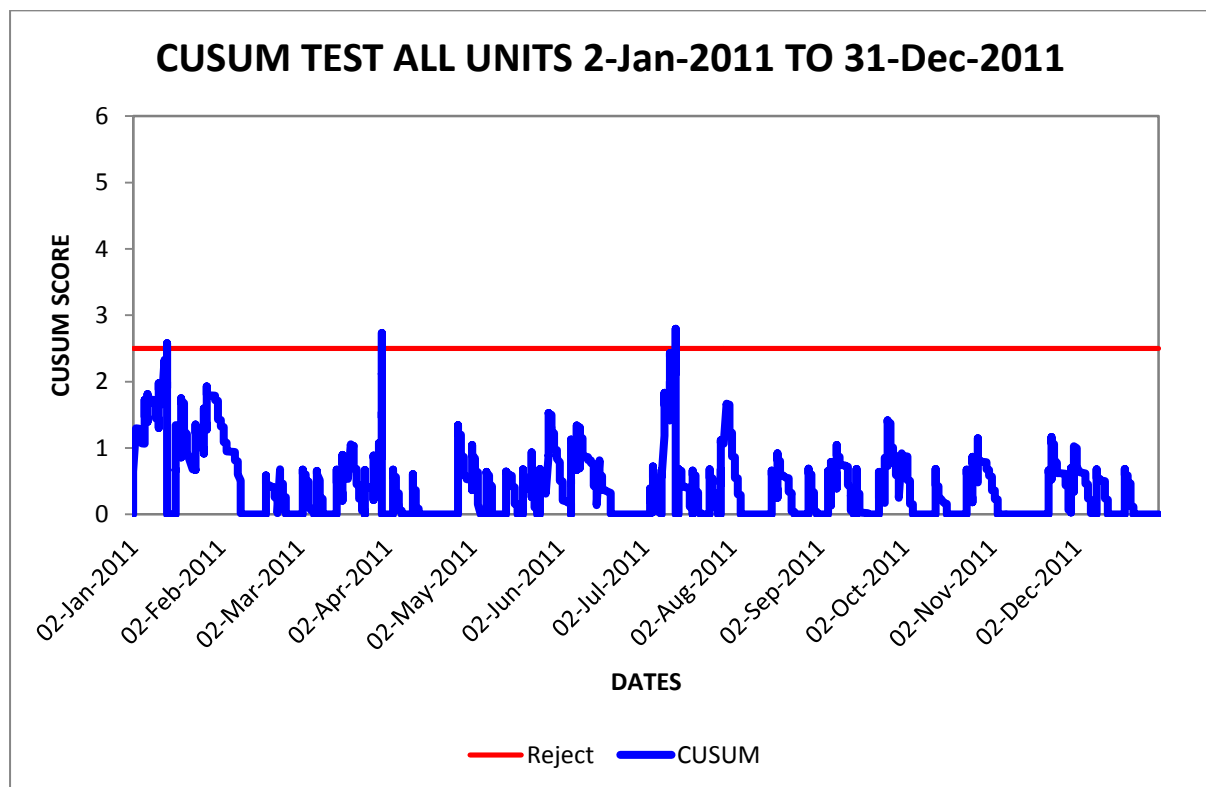
Isolated CABG Surgery



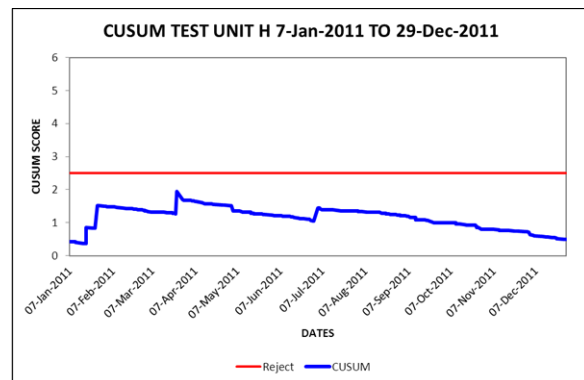
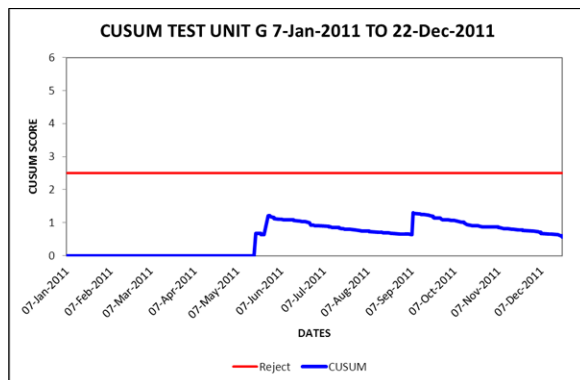
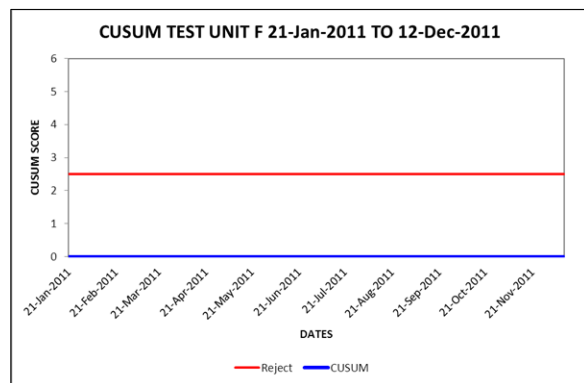
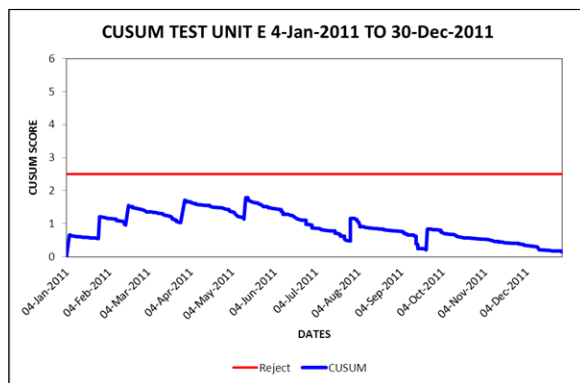
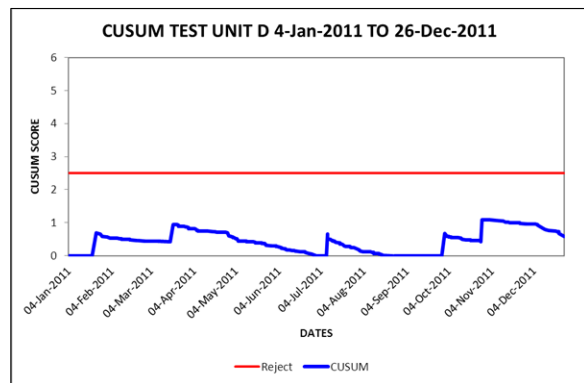
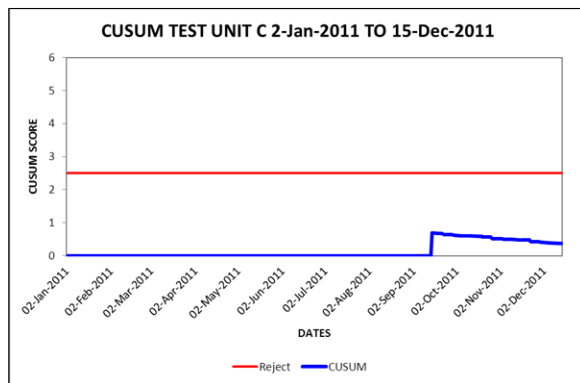
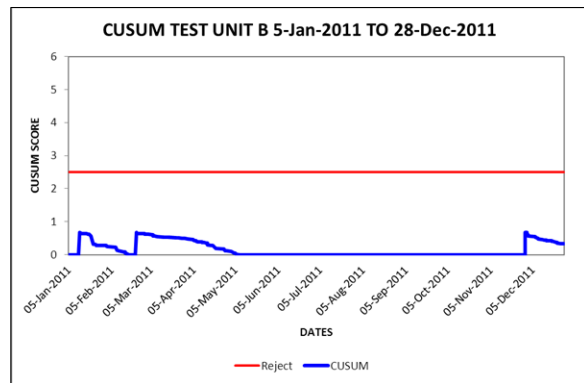
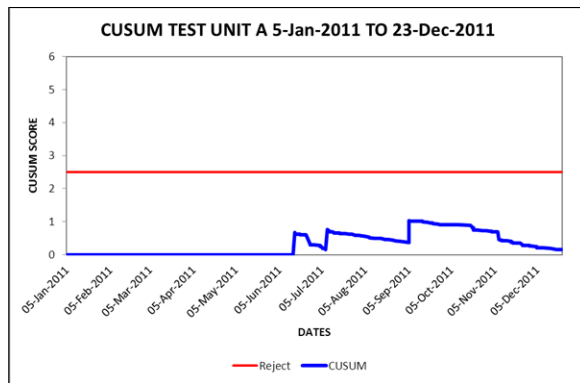
One surgeon was excluded from the analysis, as only one CABG surgery was performed in 2011 which resulted in mortality.

CUSUM curves for Risk-adjusted 30-day Mortality - Isolated CABG 2011

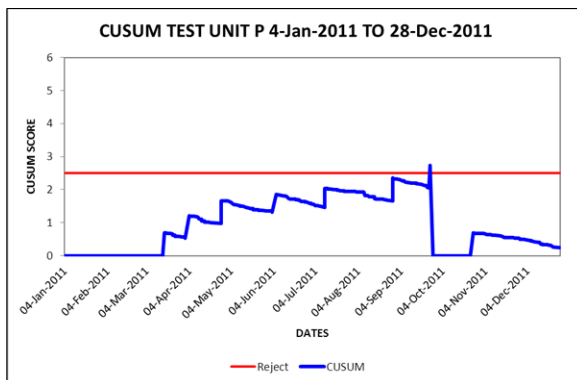
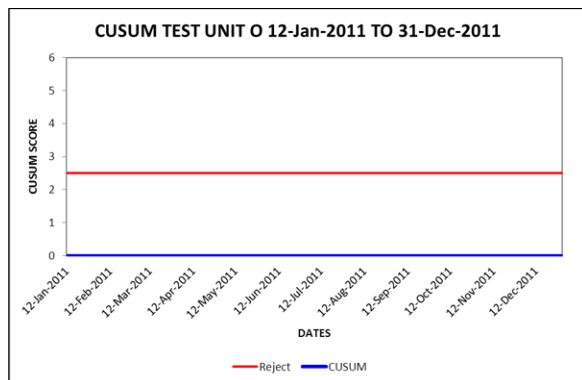
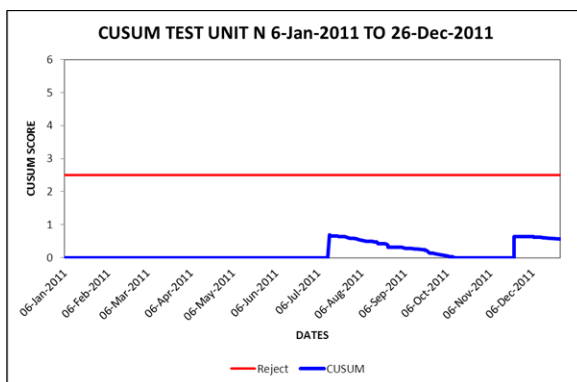
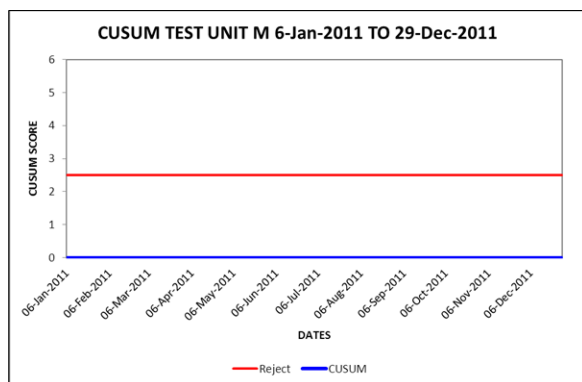
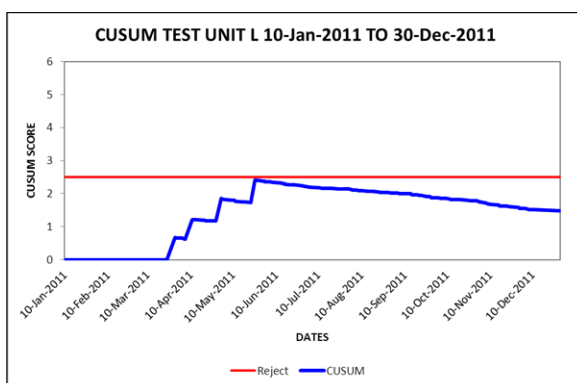
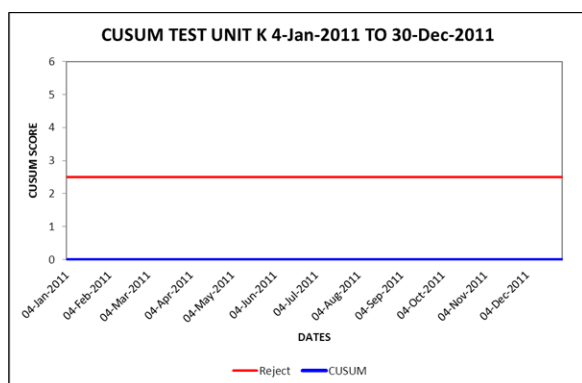
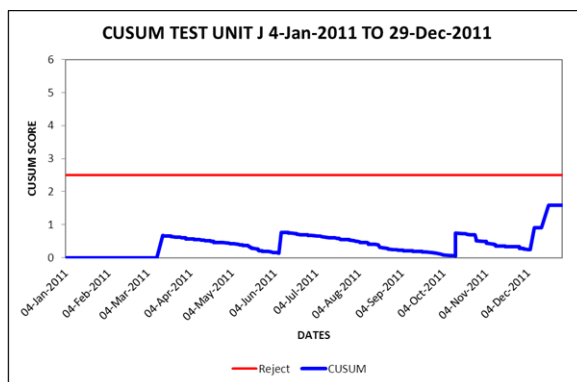
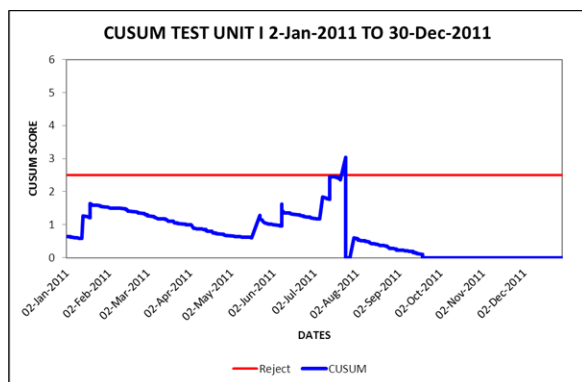
The CUSUM scores for each case in the combined units and then for separate units fall within the rejection (red) line, the performance of all hospitals is at a satisfactory level (See Appendix C).



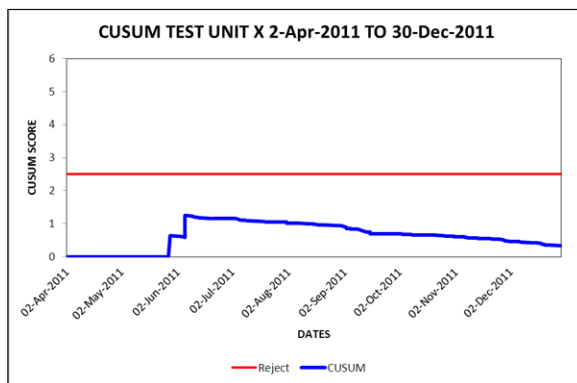
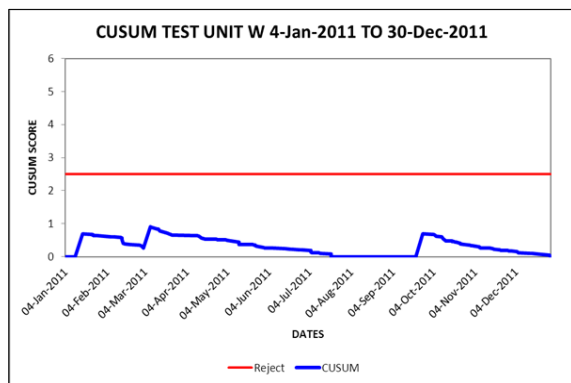
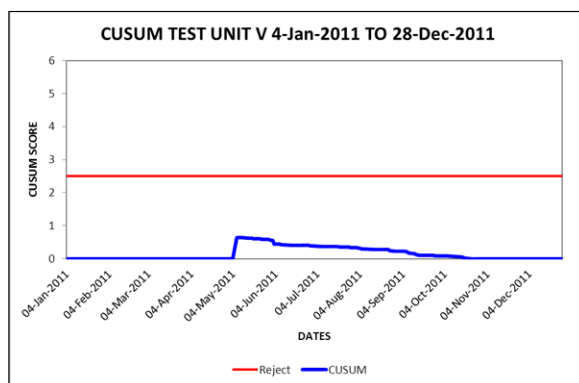
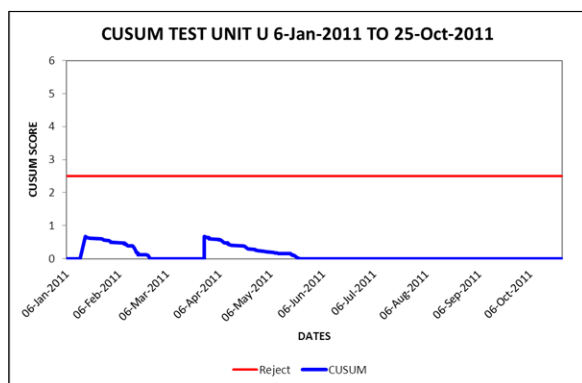
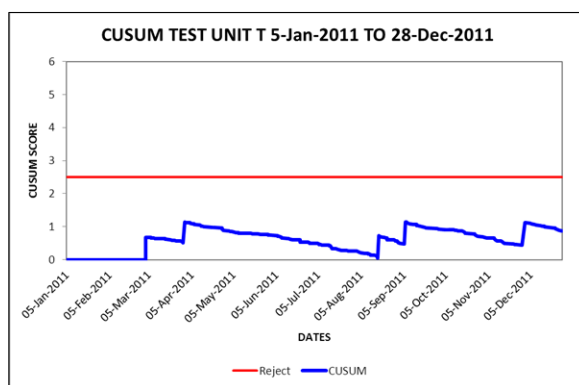
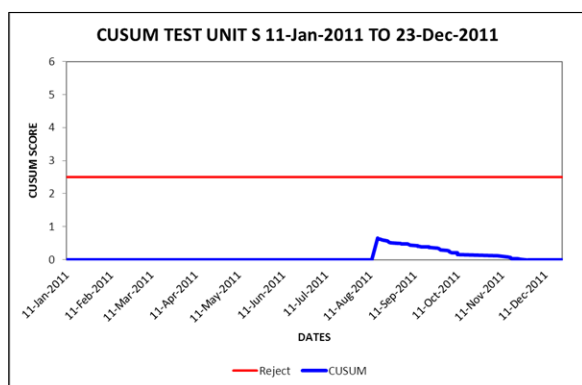
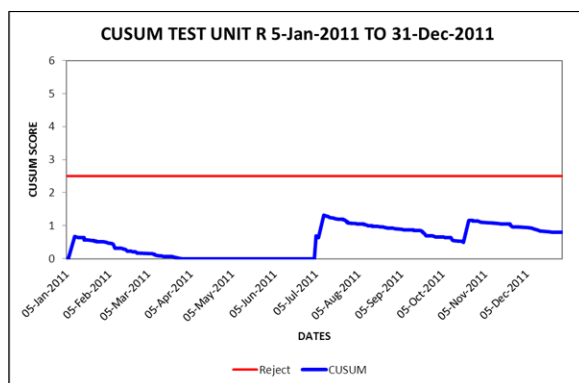
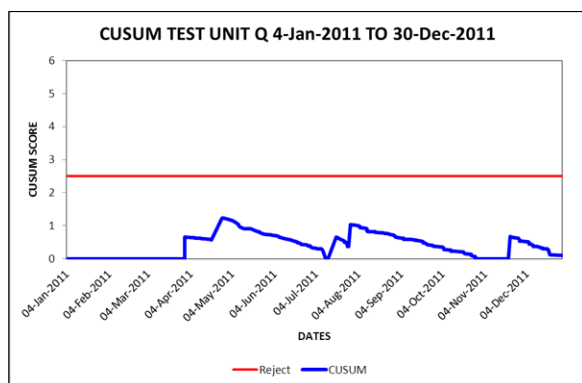
Isolated CABG Surgery



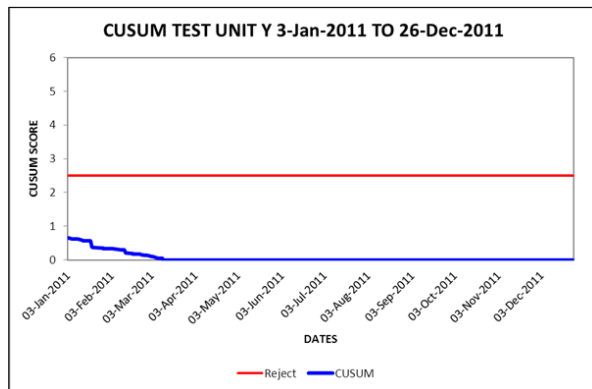
Isolated CABG Surgery



Isolated CABG Surgery



Isolated CABG Surgery



The CUSUM test illustrates that some Units, indeed the entire group, approach the upper limit on isolated occasions during the year, but when that happens, the mortality outcome rapidly corrects.

Valve Surgery

Table 17a - Single valve operations 2011

	Without CABG									WITH CABG		
	Initial			Redo			Total			Total		
Aortic	No	Died	%	No	Died	%	No	Died	%	No	Died	%
Replacement	943	16	1.7	47	2	4.3	990	18	1.8	686	31	4.5
Repair/Reconstruction without Annuloplasty	5	1	20.0	1	-	-	6	1	16.7	1	-	-
Bentall Procedure	15	1	6.7	13	-	-	28	1	3.6	7	1	14.6
David Procedure	2	-	-	-	-	-	2	-	-	-	-	-
Valvotomy	28			-	-	-	28	-	-	-	-	-
Ross Procedure	19			2	-	-	21	-	-	-	-	-
Other Valve Proc	1	-	-	1	-	-	2	-	-	2	-	-
Aortic Total	1013	18	1.8	64	2	3.1	1077	20	1.9	696	32	4.6
Mitral	No	Died	%	No	Died	%	No	Died	%	No	Died	%
Replacement	180	8	4.4	48	4	8.3	228	12	5.3	70	2	2.9
Annuloplasty	15	-	-	1	-	-	16	-	-	40	4	10.0
Repair/Reconstruction with Annuloplasty	274	3	1.1	2	-	-	276	3	1.1	87	3	3.4
Repair/Reconstruction without Annuloplasty	8	-	-	5	-	-	13	-	-	5	-	-
Other Valve Proc	-	-	-	3	1	33.3	4	1	25.	1	-	-
Mitral Total	477	11	2.3	59	5	8.5	536	16	3.0	203	9	4.4
Tricuspid	No	Died	%	No	Died	%	No	Died	%	No	Died	%
Replacement	12	2	16.7	8	2	25.0	20	4	20	2	-	-
Annuloplasty	1	-	-	2	-	-	3	-	-	-	-	-
Repair/reconstruction with Annuloplasty	5	-	-	1	-	-	6	-	-	4	1	25.0
Tricuspid Total	18	2	11.1	11	2	18.2	29	4	13.8	6	1	16.7
Pulmonary	No	Died	%	No	Died	%	No	Died	%	No	Died	%
Replacement	17	-	-	6	-	-	23	-	-	-	-	-
Other Valve Proc	1	-	-	-	-	-	1	-	-	-	-	-
Pulmonary Total	18	-	-	6	-	-	24	-	-	-	-	-
Total Single Valve	1526	31	2.0	141	9	6.4	1667	40	2.4	905	42	4.6

Table 17b - Multiple valve operations 2011

Double Valves	No	Died	%	No	Died	%	No	Died	%	No	Died	%
Mitral & Aortic	76	5	6.6	12	-	-	88	5	5.7	50	1	2.0
Mitral & Tricuspid	67	3	4.5	12	-	-	79	3	3.8	22	3	13.6
Aortic & Tricuspid	11	-	-	5	1	20	16	1	6.3	3	-	-
Other double valves	3	-	-	-	-	-	3	-	-	-	-	-
Double total	157	8	5.1	29	1	3.4	186	9	4.8	75	4	5.3
Triple total	16	2	12.5	4	1	25	20	3	15.0	7	1	14.3
Total Multiple	173	10	5.8	33	2	6.1	206	12	6.3	82	5	6.1
Total Single	1526	31	2.0	141	9	6.4	1667	40	2.4	905	42	4.6
Total Valve	1699	41	2.4	174	6	3.4	1873*	52	2.8	987[†]	47	4.8

*13 incomplete/inaccurate data, †4 incomplete/inaccurate data

Valve Surgery

Table 18a - Type of valve prosthesis - Single Valve with or without CABG 2011

	Valve Position							
	Aortic		Mitral		Tricuspid		Pulmonary	
n	1774	%	721*	%	32 [†]	%	23**	%
Mechanical	283	16.0	142	47.7 [#]	5	14.3	-	-
Xenograft	1394	78.6	150	50.3 [#]	15	1.1	23	100.0
Allograft	10	0.6	-	-	-	-	-	-
Autograft	18	1.0	-	-	-	-	-	-
Annuloplasty Ring/Band	0	-	420 [†]	96.8 ^{##}	12	42.9	-	-
Not specified	69	3.9	6	0.8	-	-	-	-

*18 repair reconstruction without annuloplasty not included, 3 miscoded cases not included.

**1 repair/reconstruction without annuloplasty not included.

of replacements

of repairs

† 3 miscoded cases not included

Valve Surgery

Table 19b – Aortic Root Reconstruction Procedures 2011

	WITHOUT CABG			WITH CABG		
	No.	Died	%	No.	Died	%
Pulmonary autografts (Ross)	17	1	5.9	9	-	-
Root reconstruction with valve conduit (Bentall)	4	-	-	-	-	-
Root reconstruction with valve sparing (David)	-	-	-	-	-	-

NB – Bentall procedures listed in Tables 17a include only those cases in which Data Managers coded the cases as either “Coronary Artery Bypass” or “Valve” Surgery and selected “Aortic Valve Procedure=6, Root Reconstruction with Valve Conduit (Bentall procedure)”.

Bentall procedures listed in 19b includes all cases above PLUS cases where Data Managers coded “Other cardiac” and said yes to “Aortic procedure” with yes to any one of the following: “Aortic aneurysm type – ascending”, “Aortic aneurysm type – Arch”, and/or “Aortic dissection”.

Valve Surgery

**Table 20 - Valve aetiology by age – Single Aortic Valve with or without CABG
(% of cases)**

Age Group	<40 yrs	40-49 yrs	50-59 yrs	60-69 yrs	70-79 yrs	80+ yrs	Total
n	62	66	147	361	627	494	1742*
Rheumatic	6.5	10.6	2.7	2.8	1.8	0.4	2.2
Congenital	43.5	30.3	32.7	14.7	4.5	2.5	10.8
Idiopathic	1.6	13.6	35.4	64.5	74.2	77.9	65.0
Calcific	-	6.1	2.7	1.7	4.1	4.6	3.6
Myxomatous degeneration	-	1.5	0.7	-	0.3	0.4	0.3
Failed prior repair	6.5	4.5	2.0	1.4	1.0	2.1	1.8
Prosthetic valve failure	-	-	0.7	-	-	-	0.1
Peri-prosthetic leak	1.6	-	-	0.3	-	0.2	0.2
Prosthetic valve thrombosis	17.1	10.6	8.2	2.2	2.1	0.4	3.0
Active infection	6.5	6.1	2.7	-	0.3	-	0.8
Previous infection	1.6	-	-	-	-	-	0.1
Marfans	-	1.5	1.4	0.8	1.1	0.4	0.9
Annuloaortic ectasia	1.6	6.1	4.1	3.6	4.0	1.7	3.3
Other degenerative disease	-	-	-	-	-	0.2	0.1
Dissection	-	-	-	0.3	-	-	0.1
Tumour	-	-	-	-	-	-	-
Trauma	-	-	-	-	-	-	-
Iatrogenic	-	-	-	-	-	-	-
Functional Mitral	-	-	-	-	-	-	-
Functional tricuspid	-	-	-	-	0.2	-	0.1
Other	3.2	4.5	4.1	2.5	2.1	1.9	2.4

*32 missing data

Valve Surgery

**Table 21 - Valve aetiology by age - Mitral Valve with or without CABG
(% of cases)**

Age Group	<40 yrs	40-49 yrs	50-59 yrs	60-69 yrs	70-79 yrs	80+ yrs	Total
n	55	62	108	194	185	83	687*
Rheumatic	27.3	19.4	10.2	11.9	5.4	6.0	11.1
Congenital	5.5	3.2	0.9	-	1.1	-	1.2
Ischaemic	3.6	12.9	15.7	12.9	10.3	10.8	11.6
Idiopathic Calcific	1.8	3.2	2.8	3.6	8.6	8.4	5.2
Myxomatous degeneration	27.3	37.1	54.6	54.1	51.4	59.0	50.4
Failed prior repair	-	1.6	0.9	1.5	2.7	2.4	1.7
Prosthetic valve failure	3.6	-	0.9	-	1.1	1.2	0.9
Peri-prosthetic leak	3.6	-	1.9	1.0	0.5	1.2	1.2
Prosthetic valve thrombosis	-	-	-	-	0.5	-	0.1
Active infection	21.8	11.3	5.6	5.2	5.4	1.2	6.7
Previous infection	1.8	3.2	1.9	1.5	2.2	-	1.7
Marfans	-	1.6	-	-	-	-	0.1
Other degenerative disease	3.6	-	1.9	2.6	3.8	4.8	2.9
Dissection	-	-	-	-	-	-	-
Tumour	-	-	-	-	-	-	-
Trauma	-	-	-	-	-	-	-
Iatrogenic	-	-	-	-	-	-	-
Functional mitral	-	-	-	-	-	-	-
Functional tricuspid	-	-	-	1.5	3.87	2.4	1.7
Other	-	-	-	-	0.5	-	0.1

*52 missing data

Valve Surgery

Table 22 – Summary of procedures

Valves Only	Number of Operations	Mortality (n)	Mortality (%)
Aortic Valve Surgery	1078	20	1.9
Aortic Valve Replacement	990	18	1.8
Mitral Valve Surgery	536	16	3.0
Mitral Valve Replacement	228	12	5.3
Mitral Valve Repair	305	3	1.0
Tricuspid Valve Surgery	29	4	13.8
Pulmonary Valve Surgery	24	-	-
Mitral & Aortic Valve Surgery	88	5	5.7
Mitral & Tricuspid Valve Surgery	79	3	3.8
Aortic & Tricuspid Valve Surgery	16	1	6.3
Other Double Valve Surgery	3	-	-
Triple Valve Surgery	20	3	15.0
Total Valves Only	1873	52	2.8
Valves & CABG Only			
Aortic Valve Surgery & CABG	696	32	4.6
Aortic Valve Replacement & CABG	686	31	4.5
Mitral Valve Surgery & CABG	203	9	4.4
Mitral Valve Replacement & CABG	70	2	2.9
Mitral Valve Repair & CABG	132	7	5.3
Tricuspid Valve Surgery & CABG	6	1	16.7
Pulmonary Valve Surgery & CABG	-	-	-
Mitral & Aortic Valve Surgery & CABG	50	1	2.0
Mitral & Tricuspid Valve Surgery & CABG	22	3	13.6
Aortic & Tricuspid Valve Surgery	3	-	-
Other Double Valve Surgery & CABG	-	-	-
Triple Valve Surgery & CABG	7	1	14.3
Total Valves & CABG Only	987	47	4.8
TOTAL Valve (with or without CABG) Only	2860	99	3.5

Valve Surgery

Figure 16: Mortality rate for isolated Valve(s) procedures

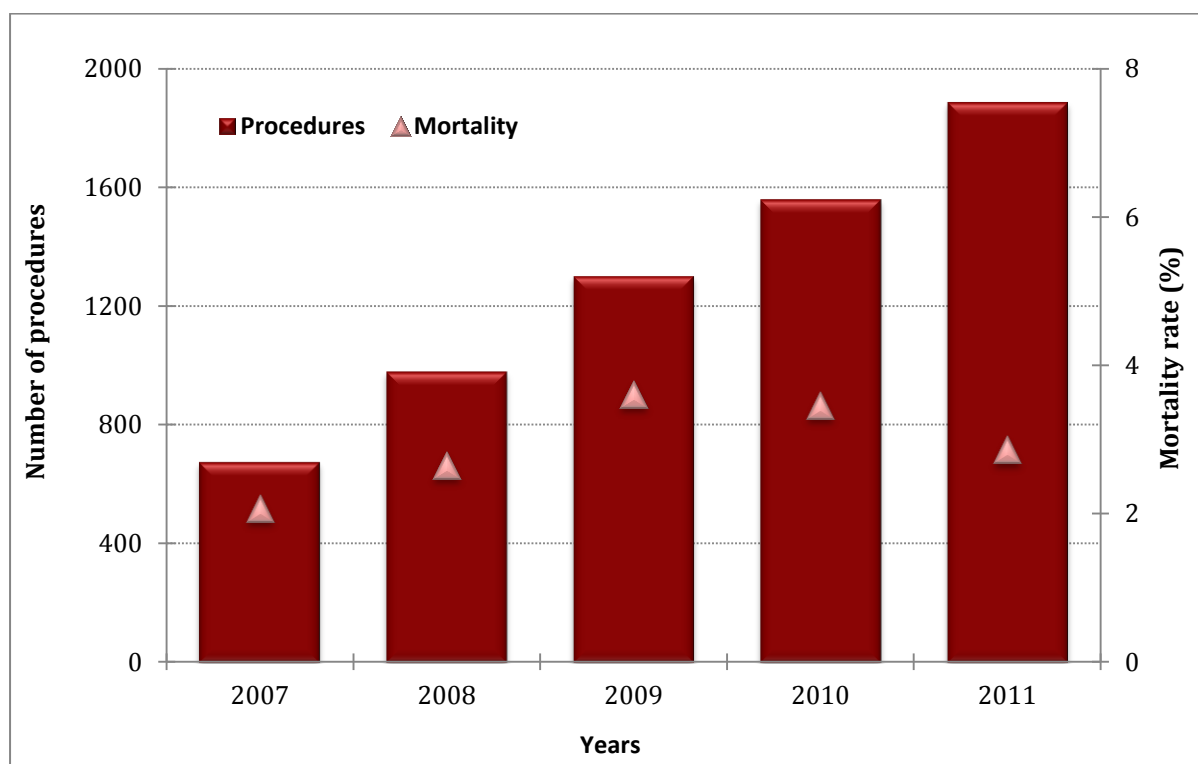
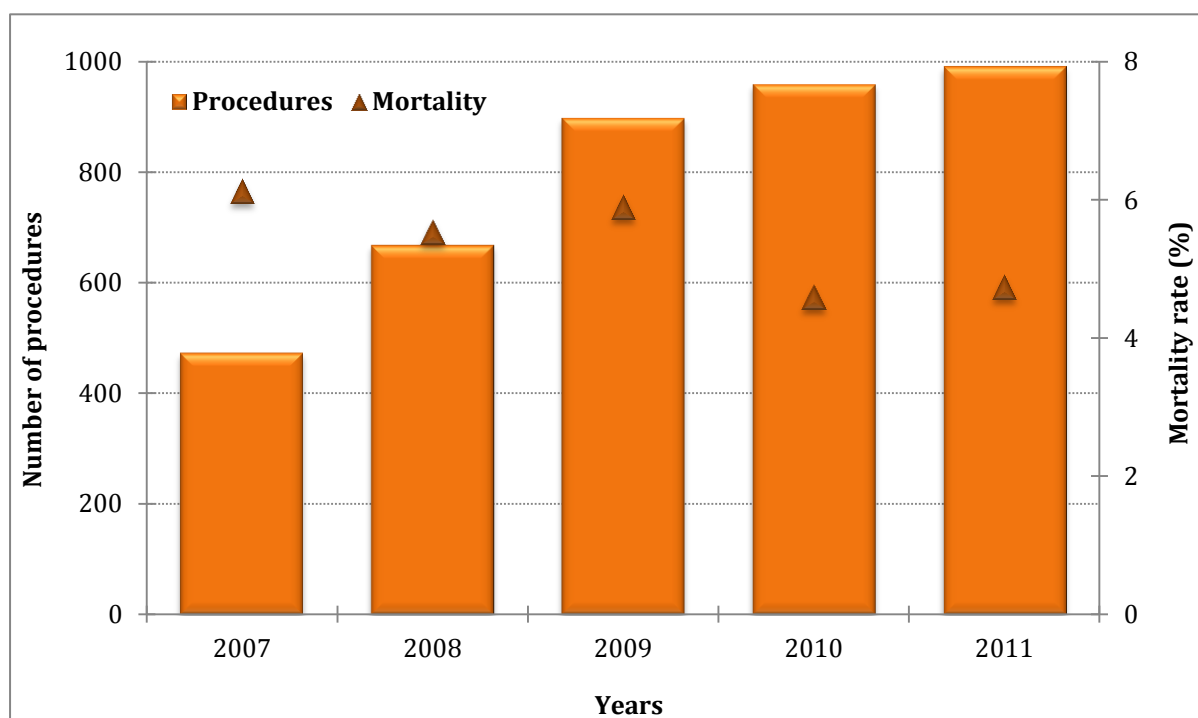


Figure 17: Mortality rate for all Valves with CABG procedures



Figures 16 and 17 demonstrate the addition of CABG to Valve surgery increases the mortality rate.

Valve Surgery

Figure 18: Mortality rate for Aortic Valve Replacement as an isolated procedure

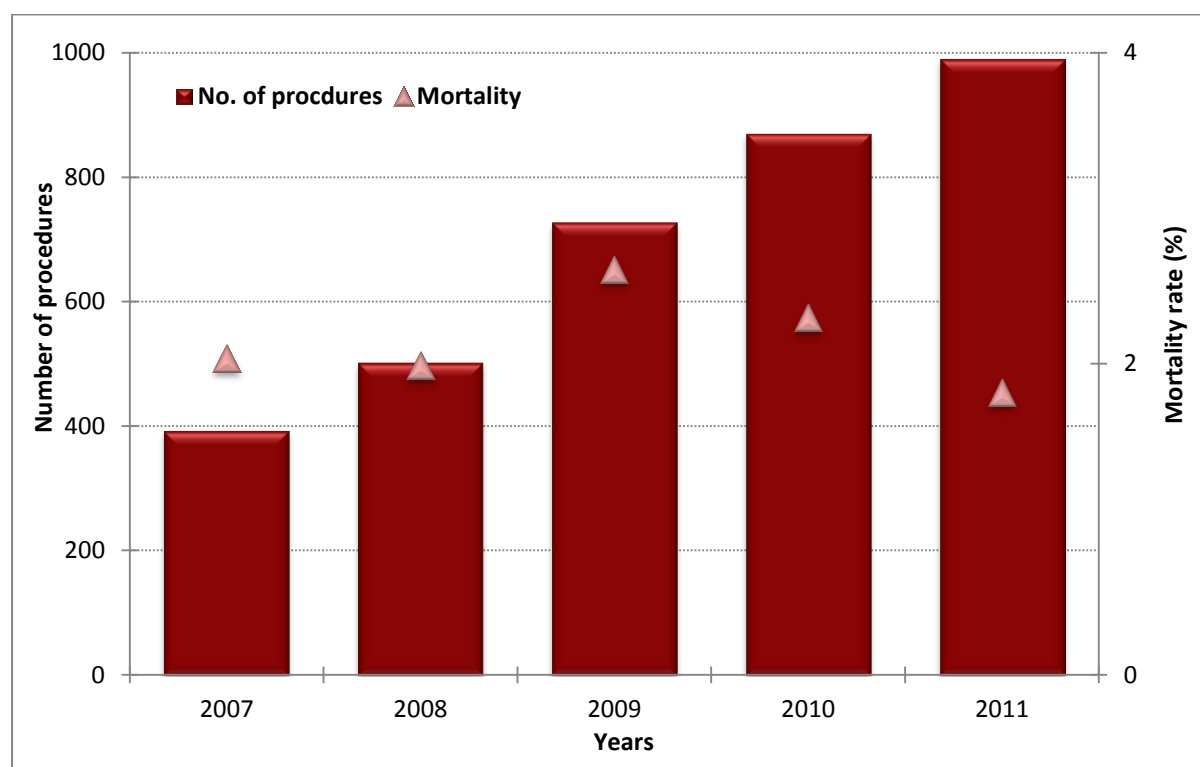
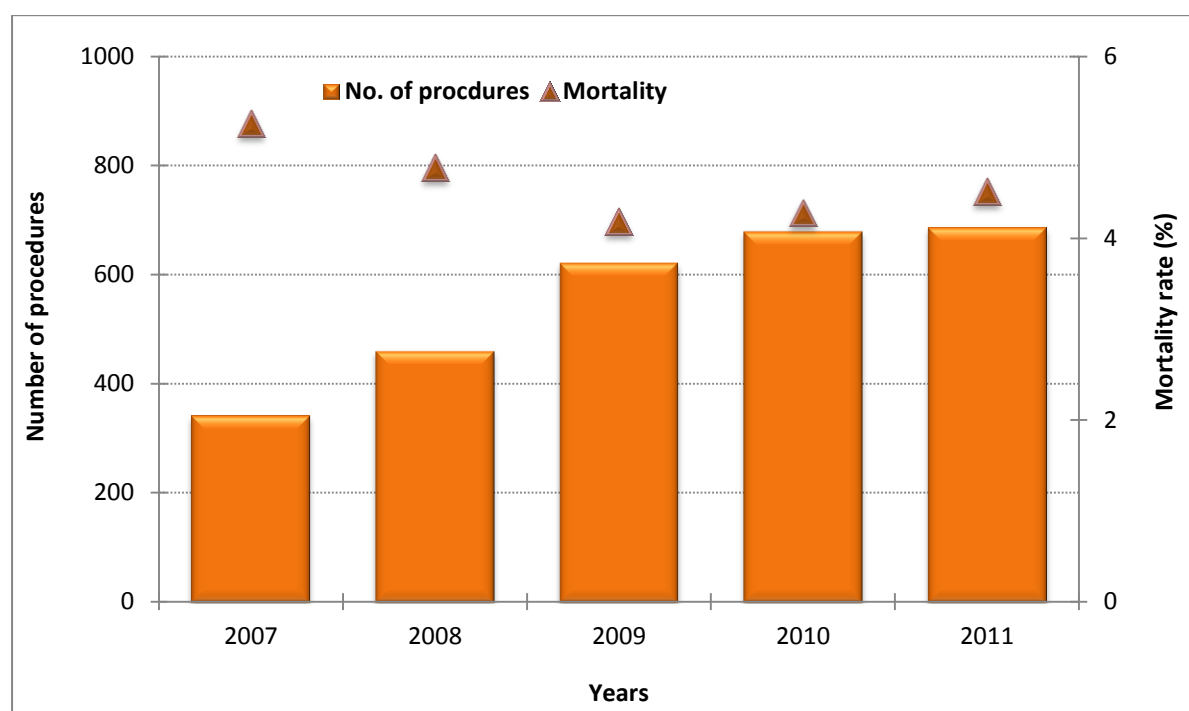


Figure 19: Mortality rate for Aortic Valve Replacement with CABG procedures



Valve Surgery

Figure 20: Mortality rate for Mitral Valve as an isolated procedure

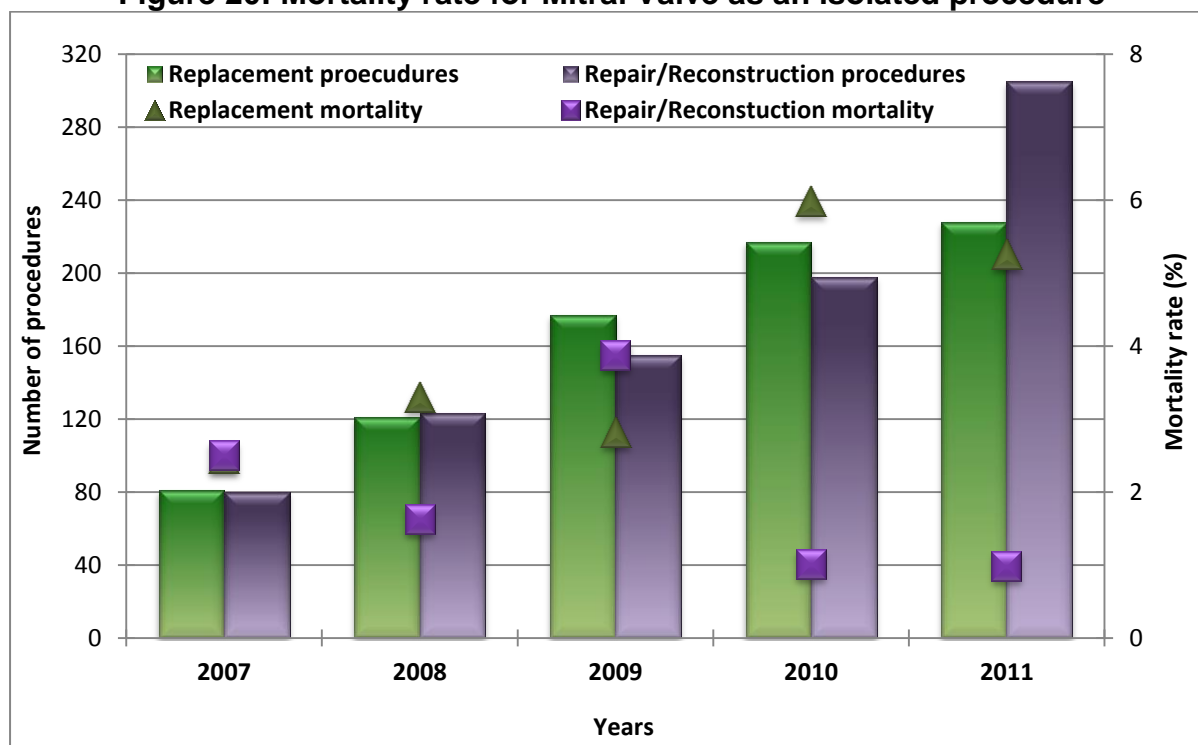


Figure 21: Mortality rate for Mitral Valve with CABG procedures

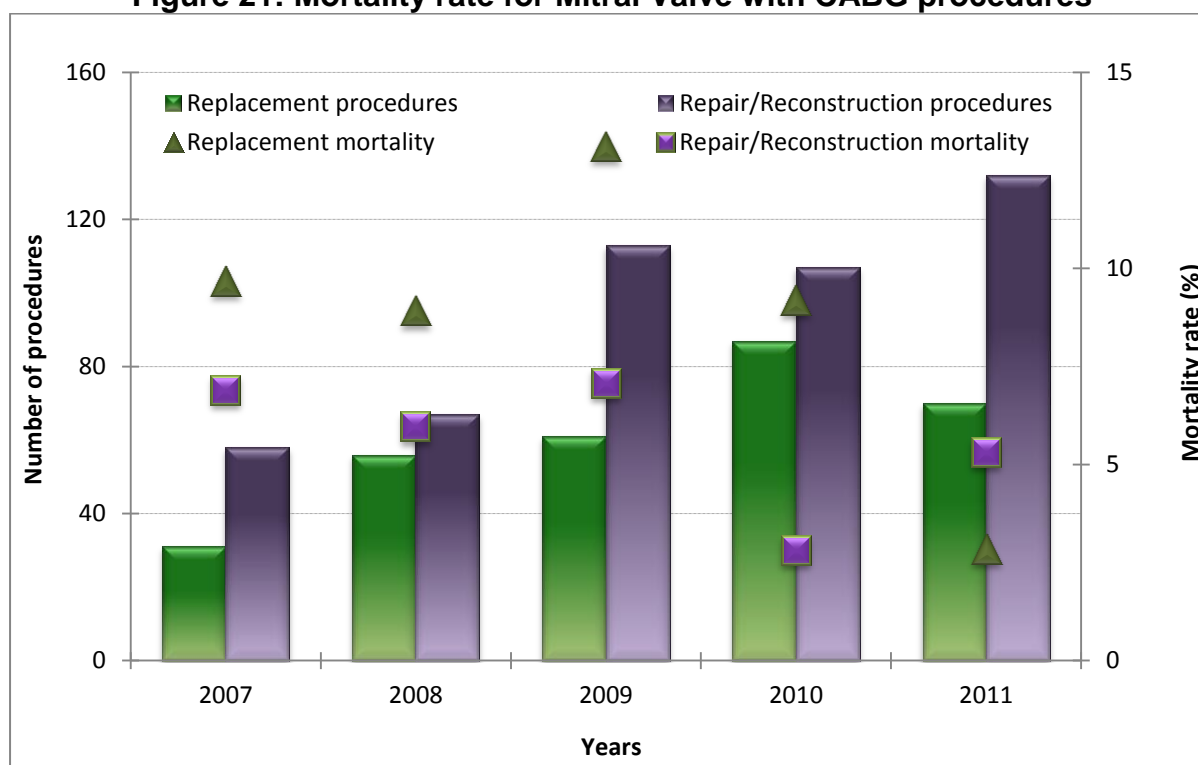


Table 22 and Figures 18-21 demonstrate that the addition of CABG with Valve surgery increases mortality for Aortic Valve Replacement and for Mitral Valve procedures.

Valve Surgery

Figure 22: Mortality for Aortic Valve Replacement by unit - single valve 2011 (initial operation)

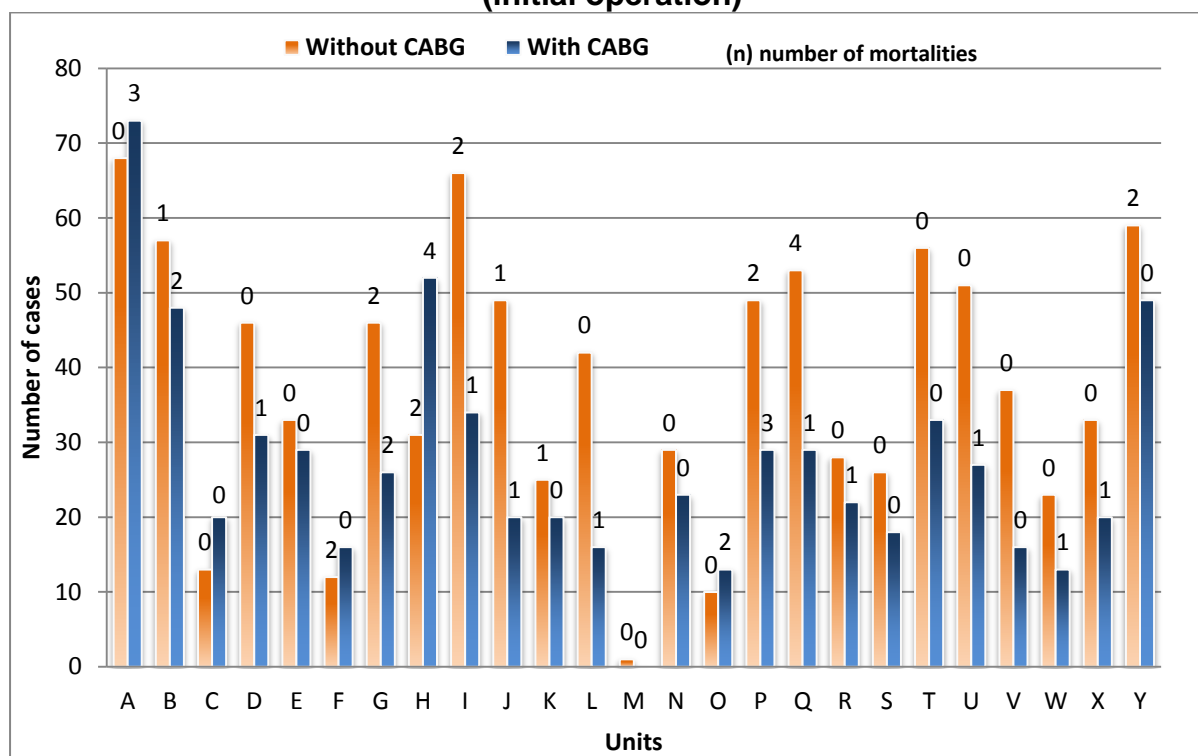
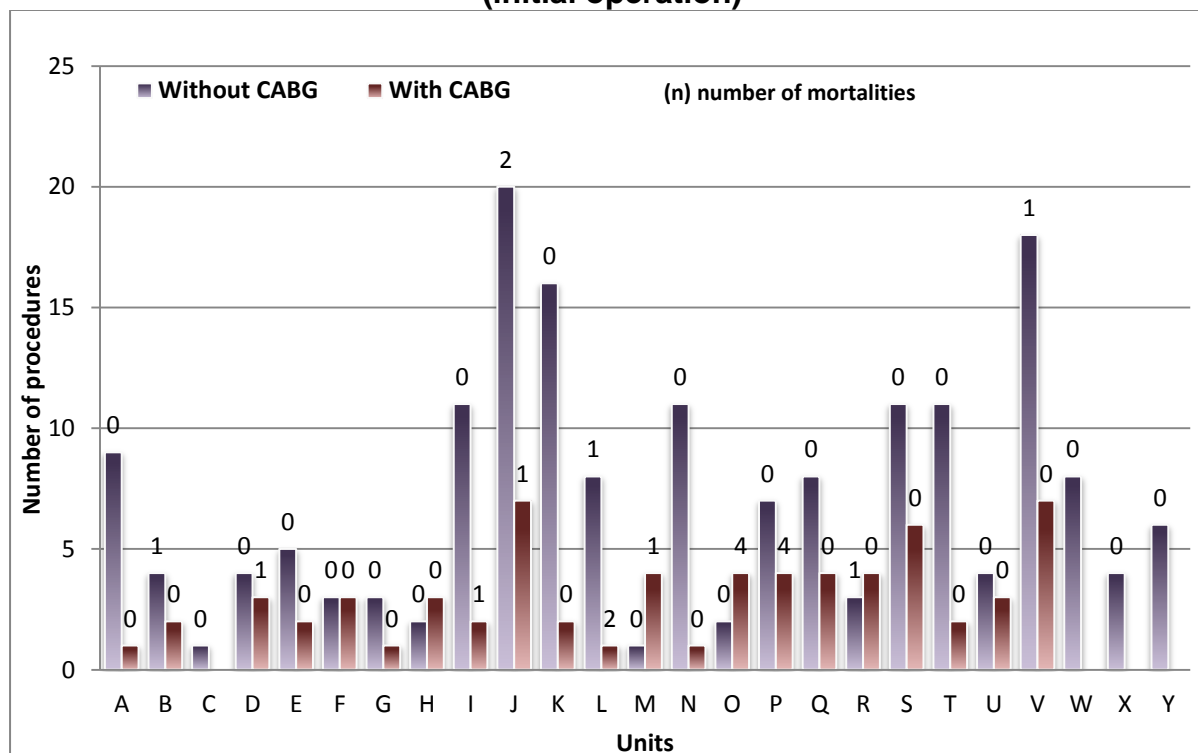


Figure 23: Mortality for Mitral Valve Replacement by unit - single valve 2011 (initial operation)



Valve Surgery

Table 23 – Mortality by age for single valve without CABG 2011

	Mortality (mortality/n, %)											
	Age Group											
	<40 years		40-49 yrs		50-59 yrs		60-69 yrs		70-79 yrs		80+ yrs	
Aortic	0/63	-	0/63	-	1/119	0.8	5/217	2.3	9/346	2.6	5/270	1.9
Mitral	1/59	1.7	2/54	3.7	3/97	3.1	1/146	0.7	5/124	4.0	4/56	7.1
Tricuspid	1/10	10.0	0/2	-	0/4	-	1/4	25.0	0/6	-	2/3	66.7
Pulmonary	0/18	-	0/5	-	0/1	-	-	-	-	-	-	-
Total	2/150	1.3	2/124	1.6	4/221	1.8	7/367	1.9	14/476	2.9	11/329	3.3

Figure 24: Mortality rate for single AVR with CABG procedures

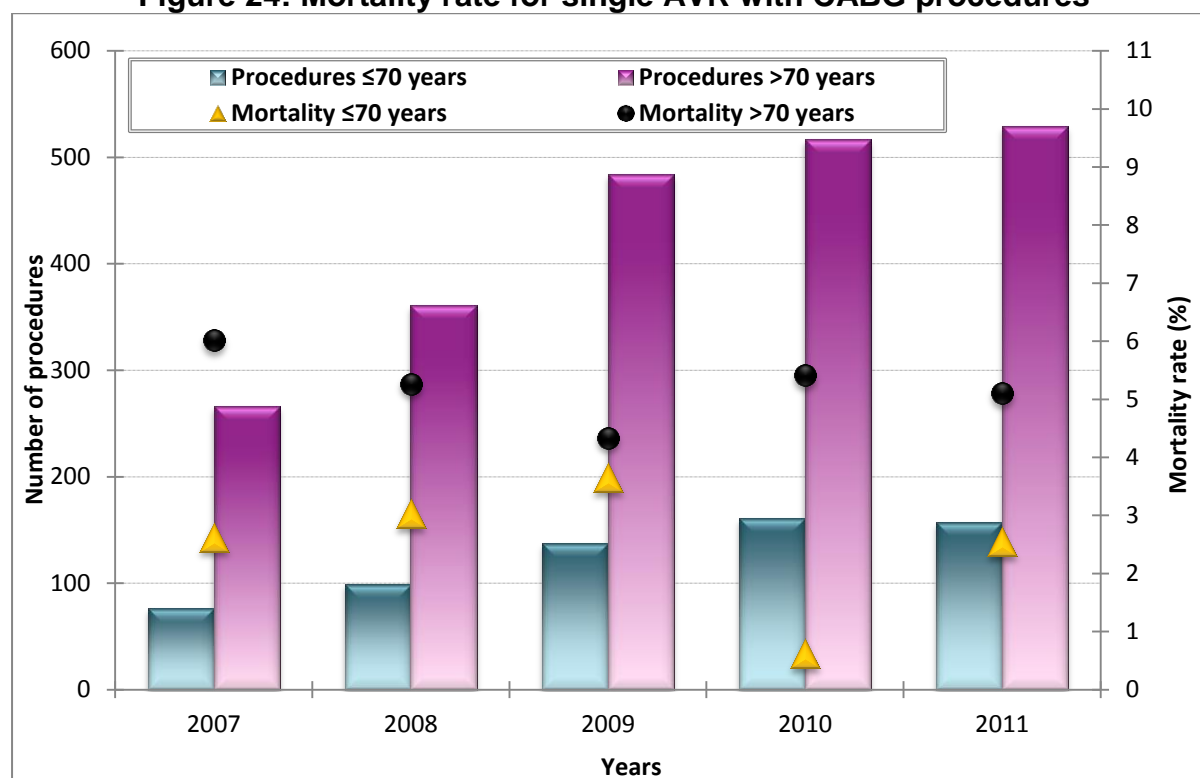


Table 24 – Mortality by age for single AVR + CABG 2007-2011

	Mortality (mortality/n, %)											
	Age Group											
	<40 years		40-49 yrs		50-59 yrs		60-69 yrs		70-79 yrs		80+ yrs	
2011	0/1	-	0/5	-	1/29	3.4	3/149	2.0	10/287	3.5	17/215	7.9
2010	0/4	-	0/7	-	0/29	-	2/144	1.4	15/289	5.2	12/205	5.9
2009	-	-	0/4	-	1/35	2.9	5/115	4.3	7/305	2.3	13/162	8.0
2008	-	-	0/2	-	1/20	5.0	2/94	2.1	13/215	6.0	6/129	4.7
2007	-	-	0/4	-	0/20	-	3/61	4.9	9/159	5.7	6/98	6.1

Valve Surgery

Figure 25: Mortality rate for Aortic Valve Replacement with CABG procedures, in relation to the urgency of surgery

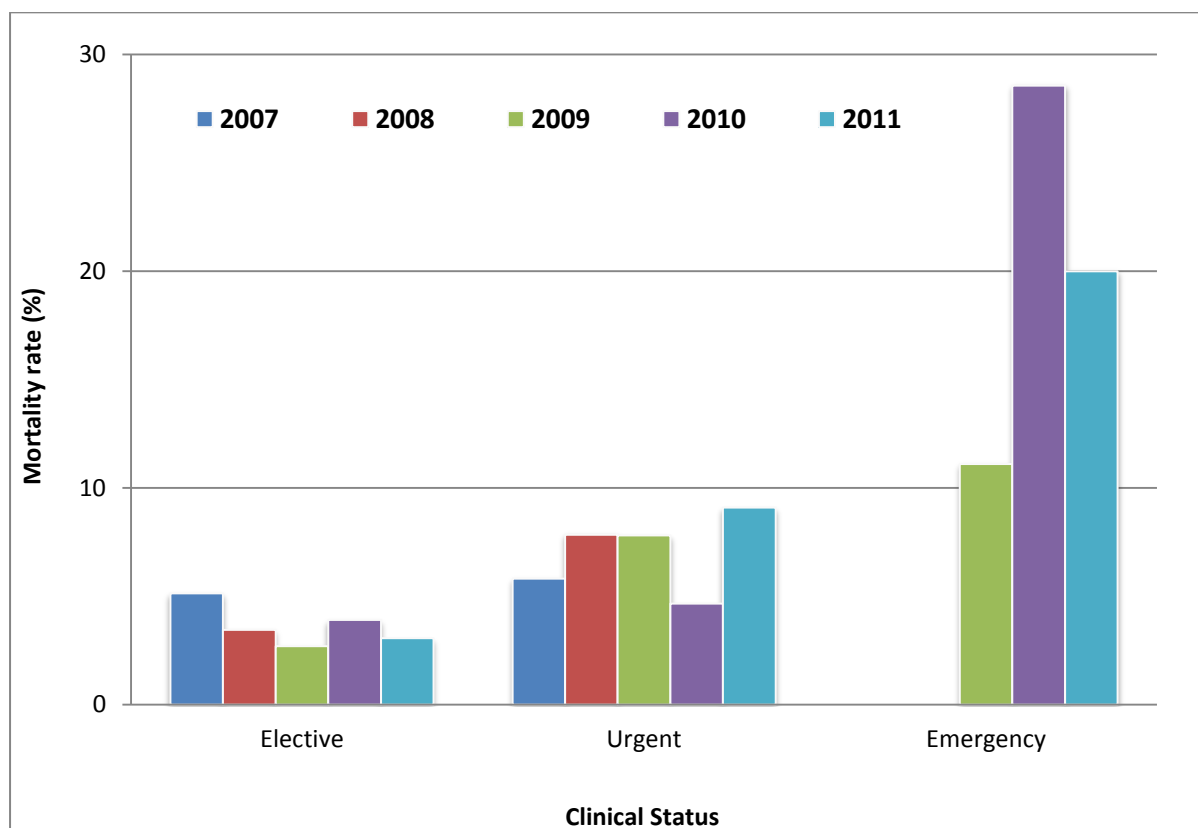


Table 25 – Mortality by clinical status for AVR + CABG 2009 and 2010

	Mortality (mortality/n, %)					
	Clinical Status					
	Elective		Urgent		Emergency	
2011	17/554	3.1	11/121	9.1	2/10	20.0
2010	22/563	3.9	5/107	4.7	2/7	28.6
2009	13/482	2.7	10/128	7.8	1/9	11.1
2008	12/348	3.4	8/102	7.8	0/7	-
2007	13/253	5.1	5/86	5.8	0/3	-

The data in Figure 25 and Table 25 suggest that the mortality of combined Aortic Valve Replacement and CABG for urgent cases is greater than that for elective cases in 2007-2011. Clinically 'Urgent' was more tightly defined in 2008-2009, however, the definition is not universally adhered to (see figure 11b).

Valve Surgery

Table 26 – Mortality by redo for AVR + CABG

	Mortality (mortality/n, %)			
	Redo			
	Yes		No	
2011	5/42	11.9	26/644	4.0
2010	2/65	3.1	27/613	4.4
2009	2/53	3.8	24/568	4.2
2008	5/35	14.3	17/425	4.0
2007	1/26	3.8	17/316	5.4

Table 26 suggests that although the results vary from year to year, the overall risk of redo surgery for AVR + CABG over the past five years is increased, at 7.4% compared to 4.4% for non-redo procedures.

Valve Surgery

Table 27 – Post-operative complications by valve position – Isolated single valve 2011 (% of cases)

	Valve Position			
	Aortic	Mitral	Tricuspid or Pulmonary	Total
n	1074	532	52	1658*
New Renal Failure	4.5	2.4	7.7	3.9
Cerebrovascular complication	3.2	2.2	-	2.8
Permanent Stroke	1.5	1.5	-	1.4
Transient Stroke	1.7	0.6	-	1.3
Continuous coma	0.3	0.4	-	0.3
Deep Sternal Infection (30 days post-op)	0.6	0.4	-	0.5
Septicaemia	0.9	1.3	5.8	1.2
Return to theatre (all cause)	6.1	6.8	15.4	6.6
Re-op for Bleeding	3.2	2.8	9.4	3.3
New Cardiac Arrhythmia	33.1	26.1	13.5	30.2
Pneumonia	3.0	2.6	1.9	2.8
GIT complication	1.5	1.7	1.9	1.6
Multi-system Failure	0.6	1.7	1.9	1.0
Anticoagulant complication	0.7	0.6	3.8	0.8
Red Blood Cells transfused	39.1	39.0	37.7	39.0
Non-RBC blood products	26.7	27.1	41.5	27.3

*9 missing data

Valve Surgery

Table 28 – Post-operative complications by valve position – Single valve with CABG 2009 and 2010 (% of cases)

	Valve Position							
	Aortic		Mitral		Tricuspid or Pulmonary		Total	
Year	2009	2010	2009	2010	2009	2010	2009	2010
n*	631	685	174	195	4	4	809	884
New Renal Failure	7.0	6.0	7.5	9.7	-	-	7.0	6.8
Cerebrovascular complication	3.2	3.1	5.2	3.1	-	-	3.6	3.0
Permanent Stroke	1.9	2.0	4.6	2.1	-	-	2.5	2.0
Transient Stroke	0.6	0.9		0.5	-	-	0.5	0.8
Continuous coma	1.1	0.1	2.3	0.5	-	-	1.4	0.2
Deep Sternal Infection (30 days post-op)	1.1	2.2	3.4	2.0	-	-	1.6	2.1
Septicaemia	1.3	2.0	2.3	2.1	-	-	1.5	2.0
Return to theatre (all cause)	9.5	10.7	10.9	14.9	-	-	9.8	11.5
Re-op for Bleeding	4.3	5.7	6.3	7.1	-	-	4.7	6.0
New Cardiac Arrhythmia	43.4	38.4	42.5	35.9	-	50.0	43.0	37.9
Pneumonia	4.4	2.9	6.9	7.2	-	-	4.9	3.8
GIT complication	2.4	0.9	3.4	0.5	-	-	2.6	0.8
Multi-system Failure	1.9	1.9	3.4	4.6	-	-	2.2	2.5
Anticoagulant complication	1.0	0.7	2.3	1.5	-	-	1.2	0.9
Red Blood Cells transfused	64.2	63.2	67.6	65.8	50.0	100.0	64.9	63.9
Non-RBC blood products	37.6	40.6	49.1	48.5	50.0	75.0	40.1	42.5

*4 missing data

Tables 27 and 28 indicate that the incidence of major post-operative complications tends to be higher for combined valve and CABG procedures. For the overall 2011 data see table 31a.

Valve Surgery

Table 29 – Resource utilisation by valve position – Isolated single valve (median value)

		Aortic	Mitral	Tricuspid or Pulmonary
Intubation Time (hours)	2011	10.0	10.0	9.0
	2010	11.0	10.5	7.5
	2009	11.0	11.0	7.0
	2008	11.0	11.0	8.0
	2007	10.0	10.0	10.0
Intensive Care Stay (hours)	2011	44.0	45.0	47.5
	2010	44.0	44.0	35.0
	2009	29.0	31.0	33.0
	2008	40.0	42.0	23.0
	2007	27.0	44.0	27.0
Post-op Length of Stay (days)	2011	8.0	7.9	8.0
	2010	8.0	8.0	6.5
	2009	7.0	8.0	7.5
	2008	8.0	9.0	7.0
	2007	8.0	8.0	7.0

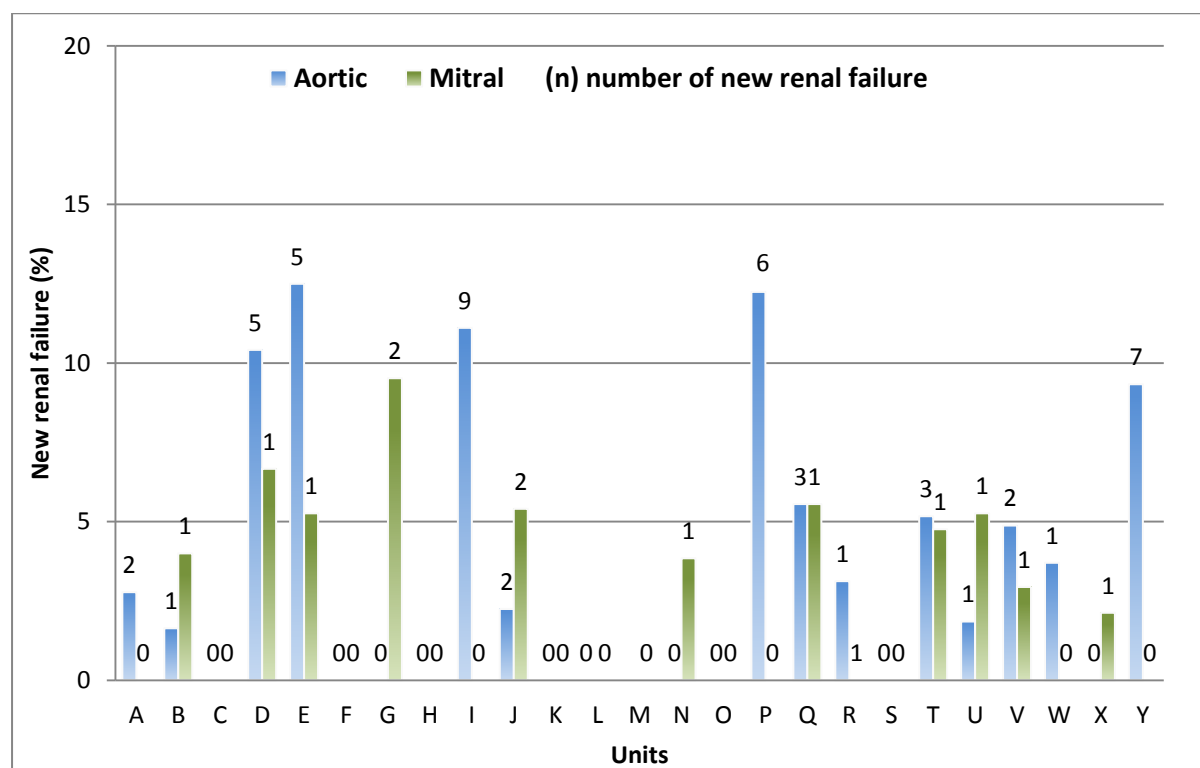
Valve Surgery

Table 30 – Resource utilization by valve position – Single valve with CABG (median value)

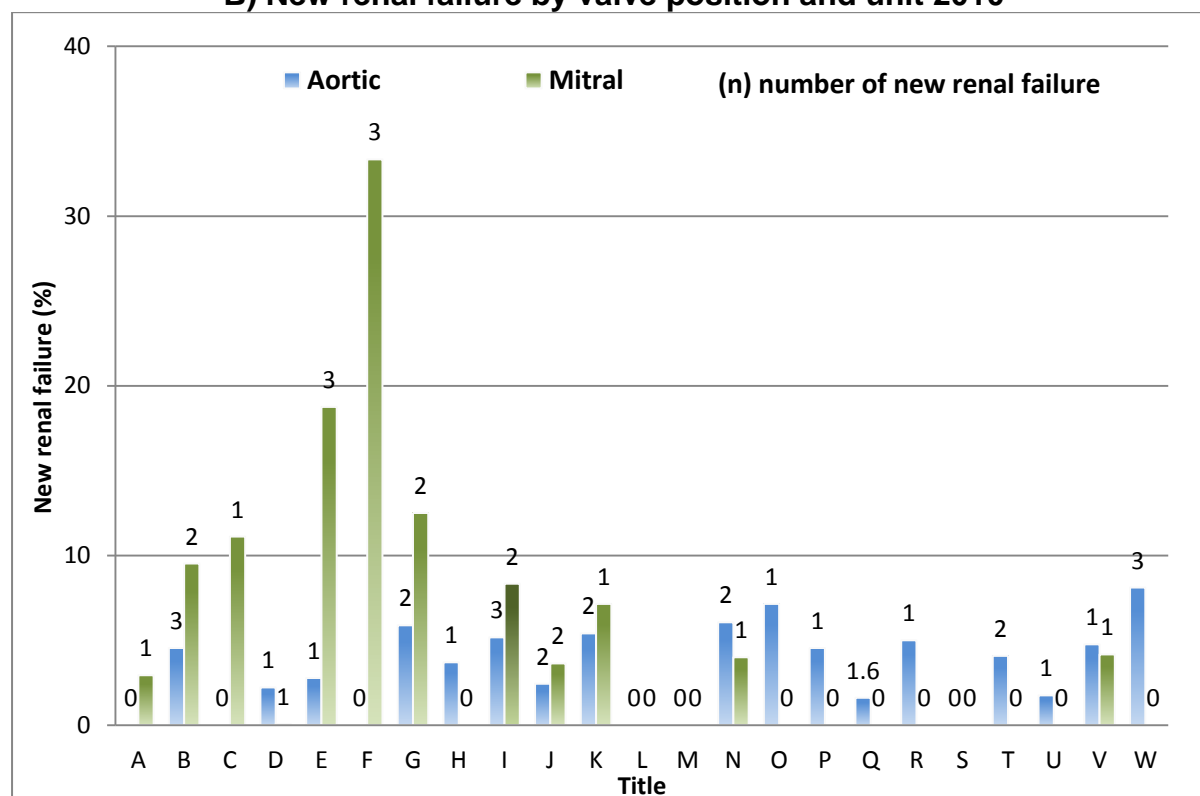
		Aortic	Mitral	Tricuspid or Pulmonary
Intubation Time (hours)	2011	12.0	13.0	9.0
	2010	14.0	18.0	12.0
	2009	14.0	18.0	15.0
	2008	13.0	15.0	128.5
	2007	12.0	15.0	28.0
Intensive Care Stay (hours)	2011	48.0	52.0	73.5
	2010	48.0	91.0	35.0
	2009	43.0	62.0	34.0
	2008	46.0	69.0	193.5
	2007	42.0	68.0	67.0
Post-op Length of Stay (days)	2011	9.0	10.0	13.5
	2010	9.0	10.0	12.0
	2009	9.0	9.0	6.5
	2008	9.0	10.0	34.5
	2007	8.0	11.0	19.0

Valve Surgery

Figure 26: Number of isolated single valve replacement procedures
A) New renal failure rate by valve position and unit 2011

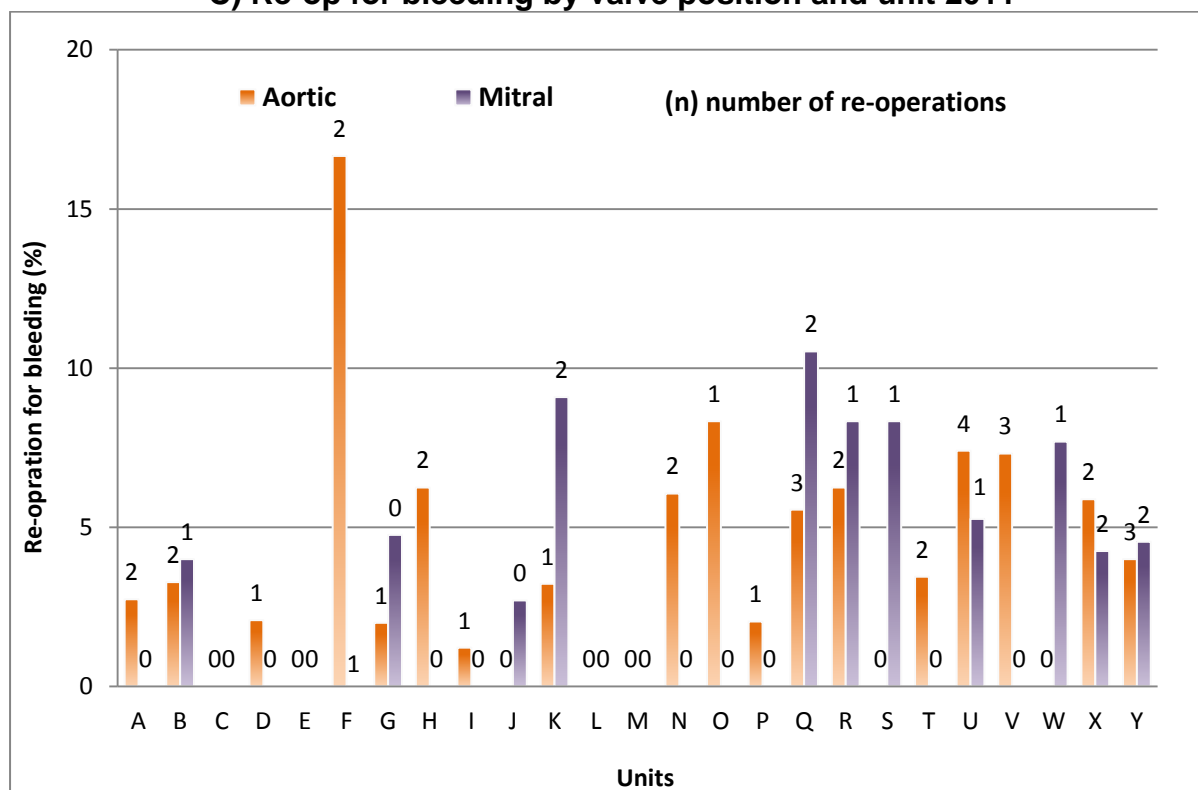


B) New renal failure by valve position and unit 2010

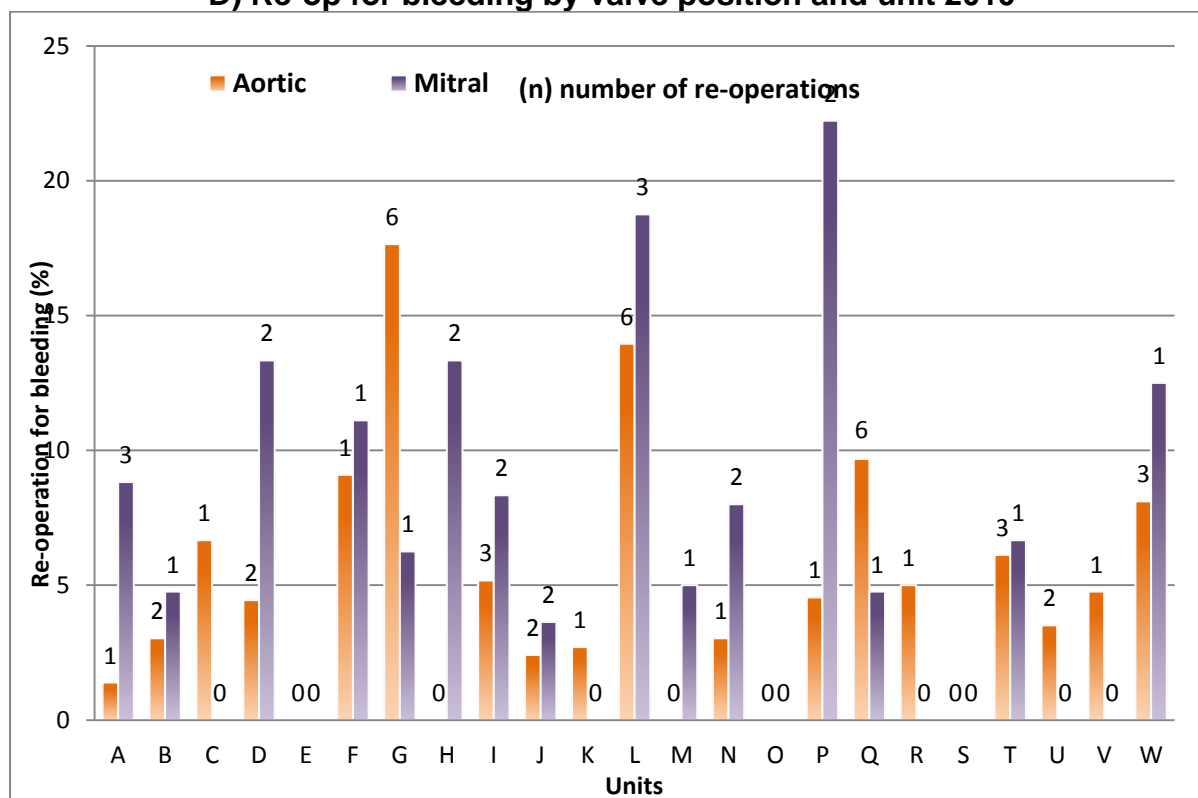


Valve Surgery

C) Re-op for bleeding by valve position and unit 2011



D) Re-op for bleeding by valve position and unit 2010



Valve Surgery

**Table 31a - Post-operative complications by age - Single valve with CABG 2011
(% of cases)**

	Age Group (%)						Total
	<40 years	40-49 yrs	50-59 yrs	60-69 yrs	70-79 yrs	80+ yrs	
n	4	18	53	215	358	247	895
New Renal Failure	-	-	5.7	5.1	8.4	10.1	7.7
Cerebrovascular complication	-	-	1.8	-	3.0	4.4	2.5
Permanent Stroke	-	-	1.9	-	1.7	3.2	1.7
Transient Stroke	-	-	-	-	1.1	1.2	0.8
Continuous Coma	-	-	-	-	0.3	-	0.1
Deep Sternal Infection (30 days post-op)	-	-	1.8	0.5	0.3	1.2	0.7
Septicaemia	-	5.6	-	1.9	0.8	1.2	1.2
Return to theatre (all cause)	-	11.1	3.8	9.3	9.5	9.7	9.2
Re-op for Bleeding	-	-	1.8	5.6	4.7	4.8	4.6
Peri-operative AMI	-	-	-	-	2.0	-	0.8
New Cardiac Arrhythmia	-	11.1	33.3	35.8	40.5	46.2	39.7
Pneumonia	-	5.6	1.9	3.3	5.9	3.6	4.4
GIT complication	-	-	-	0.5	1.1	2.4	1.2
Multi-system Failure	-	-	-	0.9	2.0	2.4	1.7
Anticoagulant complication	-	-	-	-	-	0.8	0.2
Red Blood Cells transfused	25.0	57.9	38.2	50.5	64.3	69.0	60.4
Non-RBC blood products	-	42.1	36.4	38.8	44.6	46.4	42.9

Valve Surgery

**Table 31b - Post-operative complications by age - Single valve with CABG 2010
(% of cases)**

	Age Group (%)						Total
	<40 years	40-49 yrs	50-59 yrs	60-69 yrs	70-79 yrs	80+ yrs	
n	6	14	48	217	368	231	884
New Renal Failure	-	7.1	8.3	5.5	7.1	7.4	6.8
Cerebrovascular complication	-	-	-	3.2	3.2	3.5	3.0
Permanent Stroke	-	-	-	2.3	2.2	2.2	2.0
Transient Stroke	-	-	-	0.5	0.8	1.3	0.8
Continuous Coma	-	-	-	0.5	0.3	-	0.2
Deep Sternal Infection (30 days post-op)	-	-	2.1	1.4	2.4	2.6	2.1
Septicaemia	-	-	4.2	1.4	2.2	2.2	2.0
Return to theatre (all cause)	33.3	21.4	8.3	10.6	12.2	10.8	11.5
Re-op for Bleeding	16.7	14.3	6.2	5.1	6.5	5.2	6.0
Peri-operative AMI	16.7	-	-	-	0.5	0.4	0.5
New Cardiac Arrhythmia	50.0	7.1	25.0	33.6	39.4	43.7	37.9
Pneumonia	-	7.1	6.2	2.3	5.2	2.6	3.8
GIT complication	-	-	-	-	0.5	2.2	0.8
Multi-system Failure	-	-	2.1	2.8	2.7	2.2	2.5
Anticoagulant complication	-	-	-	1.4	0.8	0.9	0.9
Red Blood Cells transfused	50.0	57.1	41.7	603.4	62.0	75.8	63.9
Non-RBC blood products	16.7	50.0	35.4	40.1	42.0	47.2	42.5

Valve Surgery

Table 32 – Resource utilisation by age - Single valve with CABG (median value)

		Age Group (years)					
		<40	40-49	50-59	60-69	70-79	80+
Intubation Time (hours)	2011	27.0	11.0	10.0	11.0	13.0	11.0
	2010	28.0	13.0	13.0	15.0	14.0	14.0
	2009	124.5	15.0	16.5	15.0	14.0	14.0
	2008	-	9.0	17.5	14.0	13.0	15.0
	2007	-	12.0	13.5	12.0	14.0	12.0
Intensive Care Stay (hours)	2011	45.0	52.0	45.0	46.0	51.0	50.0
	2010	74.5	80.0	48.0	52.0	48.0	62.0
	2009	182.5	45.0	45.5	44.5	45.0	47.0
	2008	-	57.5	47.0	41.5	46.0	65.0
	2007	-	28.0	43.5	46.0	43.0	45.0
Post-op Length of Stay (days)	2011	6.5	8.0	8.0	8.0	9.0	10.1
	2010	9.5	7.5	7.0	8.0	9.0	11.0
	2009	13.0	6.5	8.0	8.0	9.0	10.0
	2008	-	9.0	9.0	8.0	9.0	10.0
	2007	-	7.0	7.5	8.0	9.0	11.0

The effect of age on post-operative complications and Resource Utilisation after single valve and CABG surgery is illustrated in Tables 31 and 33. The incidence of most major complications is inconsistently related to age.

Valve Surgery

Table 33 – Resource utilisation by age - Multiple valves (median value)

		Age Group (years)					
		<40	40-49	50-59	60-69	70-79	80+
Intubation Time (hours)	2011	9.5	18.0	11.0	14.0	17.0	14.5
	2010	13.0	8.0	12.0	13.0	13.0	18.0
	2009	10.0	14.5	18.0	15.0	16.5	14.0
	2008	15.0	16.0	13.0	15.5	17.0	18.0
	2007	14.0	22.0	10.0	18.0	14.0	17.5
Intensive Care Stay (hours)	2011	45.5	49.5	48.0	47.0	64.0	68.5
	2010	47.0	42.0	39.0	56.0	45.0	94.0
	2009	48.0	27.5	53.0	48.5	70.0	65.0
	2008	49.0	26.5	42.5	45.0	45.0	91.0
	2007	49.0	54.0	44.5	42.0	50.0	103.5
Post-op Length of Stay (days)	2011	8.0	13.0	8.0	9.0	12.0	12.0
	2010	8.5	13.0	9.5	10.0	9.0	17.0
	2009	8.0	8.5	10.5	13.0	14.0	11.0
	2008	13.0	9.0	11.0	10.0	11.0	12.0
	2007	10.5	7.5	13.5	8.0	11.0	18.5

Other Group data

Table 34 - Other surgery types 2011

Surgery type (NOT mutually exclusive)	Total number of procedures	Mortality by procedure 2009	
		n (mort)	%
Left Ventricular Aneurysm	22	-	-
Acquired VSD	21	7	33.3
Aortic Procedure*	671	31	4.6
Aneurysm – Asc only	324	6	1.9
– Asc + Arch	62	4	6.5
– Arch only	10	-	-
– Desc	5	-	-
– Thor/Abd only	8	-	-
– Other	9	2	22.2
Dissection – Asc – Acute	84	11	13.1
– Asc – Chronic	8	-	-
– Desc – Acute	5	1	20.0
– Desc –Chronic	1	-	-
Acute Traumatic Aortic Transection	3	-	-
Cardiac Trauma	7	3	42.9
LVOT Myectomy for HOCM	35	2	5.7
LV Rupture Repair	7	1	14.3
Pericardiectomy	19	4	21.1
Pulmonary Thrombo-endarterectomy	9	2	22.2
Carotid Endarterectomy	30	2	6.7
Left Ventricular Reconstruction	3	-	-
Pulmonary Embolectomy	10	1	10.0
Cardiac Tumour	53	3	5.7
Cardiac Transplant	82	7	8.5
Congenital – ASD	121	2	1.7
– Other	57	1	1.8
Permanent LV Epicardial Lead	64	9	14.1
Atrial Arrhythmia Surgery	274	13	4.7

*Some units did not submit Aortic Procedure Type data despite answering yes to Aortic Procedure

Data for the entire cardiac surgical population

The following illustrates aspects of the effect of age, procedure type, left ventricular function, clinical urgency, redo-procedures and some pre-operative co-morbidities on post-operative outcomes and Resource Utilisation.

Table 35a – Major complication by age in cardiac surgical patients 2011 (% of cases)

	Age Group (years)						
	<40	40-49	50-59	60-69	70-79	80+	Total
n	424	672	1508	2701	2744	1164	9214
New Renal Failure	5.0	4.5	3.8	4.1	6.4	7.6	5.2
Cerebrovascular complication	0.7	2.1	1.1	2.0	2.6	3.9	2.2
Permanent Stroke	0.5	1.2	0.7	1.2	1.6	2.3	1.3
Transient Stroke	-	0.7	0.2	0.6	0.9	1.4	0.7
Continuous Coma	0.2	0.7	0.3	0.4	0.3	0.4	0.4
Deep Sternal Infection (30 days post-op)	0.5	1.2	0.6	1.1	0.9	1.1	0.9
Re-op for Bleeding	4.4	3.9	3.2	3.3	3.9	3.8	3.6

Resource utilisation 2011 (median value)

	Age Group (years)					
	<40	40-49	50-59	60-69	70-79	80+
Intubation Time (hours)	9.0	11.0	10.0	10.0	12.0	13.0
Intensive Care Stay (hours)	46.0	44.0	44.0	45.0	48.0	49.0
Post-op Length of Stay (days)	7.7	7.0	7.0	7.0	8.0	10.0

Data for the entire cardiac surgical population

Table 35b – Major complication by age in cardiac surgical patients 2010 (% of cases)

	Age Group (years)						
	<40	40-49	50-59	60-69	70-79	80+	Total
n	397	584	1580	2505	2589	1004	8659
New Renal Failure	3.8	3.9	4.1	4.4	5.3	6.5	4.8
Cerebrovascular complication	2.5	1.7	1.1	1.8	2.7	4.1	2.2
Permanent Stroke	1.3	0.5	0.6	1.0	1.8	2.5	1.3
Transient Stroke	0.3	0.7	0.4	0.7	0.7	1.3	0.7
Continuous Coma	1.8	0.5	0.3	0.3	0.4	0.5	0.4
Deep Sternal Infection (30 days post-op)	0.5	1.2	0.9	1.4	1.2	1.0	1.1
Re-op for Bleeding	4.5	4.1	3.4	3.5	4.8	4.7	4.1

Resource utilisation 2010 (median value)

	Age Group (years)					
	<40	40-49	50-59	60-69	70-79	80+
Intubation Time (hours)	11.0	11.0	10.0	11.0	13.0	14.0
Intensive Care Stay (hours)	45.0	42.0	43.0	45.0	46.0	49.0
Post-op Length of Stay (days)	7.0	7.0	7.0	7.0	8.0	10.0

Data for the entire cardiac surgical population

Table 36a – Major complication by procedure type in cardiac surgical patients 2011 (% of cases)

	Procedure Type				
	Isolated CABG	Valve(s) only	Valve(s) + CABG	Other	Total
n	4762	1874	981	1575	9214
New Renal Failure	3.6	4.5	8.6	8.9	5.2
Deep Sternal Infection (30 days post-op)	1.0	0.6	0.7	1.2	0.9
Re-op for Bleeding	2.5	3.6	5.0	6.2	3.6
Red Blood Cells transfused	38.9	41.1	61.5	53.4	44.3
Non-RBC blood products transfused	24.5	29.8	45.0	48.2	37.9

*46 missing

Resource utilisation 2011 (median value)

	Isolated CABG	Valve(s) only	Valve(s) + CABG	Other
Intubation Time (hours)	10.0	10.0	13.0	15.0
Intensive Care Stay (hours)	44.0	45.0	49.0	52.0
Post-op Length of Stay (days)	7.0	8.0	9.0	8.0

Data for the entire cardiac surgical population

Table 36b – Major complication by procedure type in cardiac surgical patients 2010 (% of cases)

	Procedure Type				
	Isolated CABG	Valve(s) only	Valve(s) + CABG	Other	Total
n	4810	1553	955	1341	8659
New Renal Failure	3.5	4.1	7.0	8.7	4.8
Deep Sternal Infection (30 days post-op)	1.2	0.8	2.0	0.6	1.1
Re-op for Bleeding	1.3	1.0	0.7	1.2	4.1
Red Blood Cells transfused	39.4	40.8	64.4	53.2	44.6
Non-RBC blood products transfused	23.8	28.2	44.2	46.9	30.4

Resource utilisation 2010 (median value)

	Isolated CABG	Valve(s) only	Valve(s) + CABG	Other
Intubation Time (hours)	11.0	11.0	15.0	16.0
Intensive Care Stay (hours)	43.0	45.0	51.0	56.0
Post-op Length of Stay (days)	7.0	8.0	9.0	9.0

Data for the entire cardiac surgical population

**Table 37a - Major complication by LV function in cardiac surgical patients 2011
(% of cases)**

	LV Dysfunction				
	Normal	Mild	Moderate	Severe	Total
n	4612	2816	1164	352	9214
New Renal Failure	4.4	4.8	7.5	11.4	5.2
Cerebrovascular complication	1.9	2.0	2.6	4.7	2.2
Permanent Stroke	1.2	1.1	1.5	3.1	1.3

Resource utilisation by LV function 2009 (median value)

	Normal	Mild	Moderate	Severe
Intubation Time (hours)	10.0	11.0	13.0	20.0
Post-op Length of Stay (days)	7.0	7.0	8.0	11.1

**Table 37b - Major complication by LV function in cardiac surgical patients 2010
(% of cases)**

	LV Dysfunction				
	Normal	Mild	Moderate	Severe	Total
n	4210	2547	1178	378	8659
New Renal Failure	3.9	4.0	7.0	10.3	4.8
Cerebrovascular complication	1.8	2.1	2.9	3.7	2.2
Permanent Stroke	1.0	1.4	1.6	1.3	1.3

Resource utilisation by LV function 2010 (median value)

	Normal	Mild	Moderate	Severe
Intubation Time (hours)	10.0	13.0	15.0	22.0
Post-op Length of Stay (days)	7.0	7.0	8.0	11.0

Data for the entire cardiac surgical population

Table 38 - Major complication by diabetes in cardiac surgical patients 2010 and 2011 (% of cases)

	Diabetes					
	Yes		No		Total	
	2010	2011	2010	2011	2010	2011
n	2522	2634	6119	6579	8641	9213
New Renal Failure	5.7	6.3	4.4	4.8	4.8	5.2
Cerebrovascular complication	2.1	2.4	2.3	2.1	2.2	2.2
Permanent Stroke	1.6	1.5	1.2	1.3	1.3	1.3
Deep Sternal Infection (30 days post-op)	2.1	1.3	0.7	0.8	1.1	0.9

Table 39 - Major complication by preoperative renal function 2010 and 2011 (% of cases)

	Pre-op EGFR					
	> 60 mL/min		≤ 60 mL/min		Total	
	2010	2011	2010	2011	2010	2011
New Renal Failure	3.5	3.5	8.2	9.8	4.8	5.2
Deep Sternal Infection (30 days post-op)	1.0	0.9	1.5	1.0	1.1	0.9
Re-op for Bleeding	3.4	3.2	5.9	4.9	4.1	3.6

Median value

	Pre-op EGFR > 60 mL/min		Pre-op EGFR ≤ 60 mL/min		Total	
	2010	2011	2010	2011	2010	2011
Post-op Length of stay (days)	7.0	7.0	9.0	9.0	7.0	8.0

Data for the entire cardiac surgical population

Table 40a – Major complication by clinical status 2011 (% of cases)

	Operative Status				
	Elective	Urgent	Emergency	Salvage	Total
n	6619	2220	354	21	9214
New Renal Failure	4.4	6.3	13.8	23.8	5.2
Cerebrovascular complication	1.9	2.3	6.8	7.7	2.2
Permanent Stroke	1.1	1.5	4.8	4.8	1.3
Re-op for Bleeding	3.3	4.3	5.7	-	3.6

Median value

	Elective	Urgent	Emergency	Salvage
Post-op Length of Stay (days)	7.0	8.0	10.0	5.0

Table 40b – Major complication by clinical status 2010 (% of cases)

	Operative Status				
	Elective	Urgent	Emergency	Salvage	Total
n	6205	2051	378	25	8659
New Renal Failure	3.9	5.6	13.5	28.0	4.8
Cerebrovascular complication	1.7	2.5	9.6	11.1	2.2
Permanent Stroke	1.0	1.5	4.0	12.0	1.3
Re-op for Bleeding	3.8	4.6	6.8	3.7	4.1

Median value

	Elective	Urgent	Emergency	Salvage
Post-op Length of Stay (days)	7.0	7.0	11.0	16.0

Data for the entire cardiac surgical population

Table 41 - Major complication by redo procedure in cardiac surgical patients 2010 and 2011 (% of cases)

	1st Proc		Redo		Total	
	2010	2011	2010	2011	2010	2011
n	7877	8401	782	813	8659	9214
New Renal Failure	4.6	4.8	6.8	9.8	4.8	5.2
Cerebrovascular complication	2.1	3.9	3.4	2.0	2.2	2.2
Permanent Stroke	1.3	1.3	1.8	1.6	1.3	1.3
Deep Sternal Infection (30 days post-op)	1.2	1.0	0.9	0.7	1.1	0.9
Re-op for Bleeding	3.9	3.3	5.7	7.2	4.1	3.6

*538 missing

Table 42a - Major complication by respiratory disease in cardiac surgical patients 2011 (% of cases)

	Respiratory Disease				
	No	Mild	Moderate	Severe	Total
n	7908	897	342	121	9272
Deep Sternal Infection (30 days post-op)	0.8	1.2	2.9	1.7	0.9

Median value

	No	Mild	Moderate	Severe	Total
Intubation Time	11.0	13.0	15.0	22.0	12.0

Data for the entire cardiac surgical population

Table 42b - Major complication by respiratory disease in cardiac surgical patients in 2010 (% of cases)

	Respiratory Disease				
	No	Mild	Moderate	Severe	Total
n	7492	804	292	93	8685
Deep Sternal Infection (30 days post-op)	1.0	1.9	3.1	2.2	1.1

Median value

	No	Mild	Moderate	Severe	Total
Intubation Time	11.0	12.0	14.0	20.0	11.0

Data for the entire cardiac surgical population

**Table 43a - Previous cerebrovascular disease - atrial arrhythmia - CPB time
2011 (% of cases)**

	Previous Cerebrovascular Disease			Atrial Arrhythmia		
	Yes	No	Total	Yes	No	Total
n	1045	8226	9271	1279	7993	9272
Cerebrovascular complication	4.5	1.9	2.2	2.8	2.1	2.2
Permanent Stroke	2.9	1.1	1.3	1.2	1.4	1.3
Transient Stroke	1.5	0.6	0.7	1.3	0.6	0.7
Continuous Coma	0.7	0.4	0.4	0.5	0.4	0.4

	CPB time			
	>0–1 hrs	>1–3 hrs	>3 hrs	Total
n	958	6836	923	9272
Cerebrovascular complication	1.7	1.9	5.6	2.2
Permanent Stroke	1.2	1.1	4.0	1.3
Transient Stroke	0.6	0.8	0.8	0.7
Continuous Coma	0.2	0.2	1.8	0.4

Data for the entire cardiac surgical population

**Table 43b - Previous cerebrovascular disease - atrial arrhythmia - CPB time
2010 (% of cases)**

	Previous Cerebrovascular Disease			Atrial Arrhythmia		
	Yes	No	Total	Yes	No	Total
n	1001	7661	8662	1151	7534	8685
Cerebrovascular complication	4.8	1.9	2.2	3.5	2.1	2.2
Permanent Stroke	3.0	1.1	1.3	2.2	1.2	1.3
Transient Stroke	1.6	0.6	0.7	0.9	0.7	0.7
Continuous Coma	0.5	0.4	0.4	0.7	0.4	0.4

	CPB time			
	>0–1 hrs	>1–3 hrs	>3 hrs	Total
n	902	6362	839	8685
Cerebrovascular complication	1.2	2.0	5.6	2.2
Permanent Stroke	0.1	1.2	3.4	1.3
Transient Stroke	0.7	0.6	1.7	0.7
Continuous Coma	0.4	0.3	1.1	0.4

Data for the entire cardiac surgical population

Table 44 – Deep Sternal Infection within 30 days of surgery – BITA – Obesity – Return to theatre by year (% of cases)

	BITA (%)			Obesity (%)			Return to theatre (all cause, %)		
Deep Sternal Infection (30 days post-op)	Yes	No	Total	Yes	No	Total	Yes	No	Total
2011	1.1	0.9	0.9	2.0	0.7	1.1	7.9	0.6	1.1
2010	1.5	1.1	1.1	1.7	0.9	1.1	7.9	0.6	1.1
2009	2.3	1.0	1.1	2.0	0.7	1.1	9.2	0.5	1.1
2008	1.8	1.2	1.2	1.3	1.2	1.2	8.5	0.6	1.3
2007	2.4	1.0	1.1	1.6	0.9	1.1	8.2	0.5	1.1

In-House reporting module - report from all units combined

The ANZSCTS online web system contains an In-House reporting module that provides a report on case numbers and outcomes for the individual unit as required. The following pages display a copy of that report generated by the same software, but with combined data of all the units for the 2011 Calendar year.

PLEASE NOTE: Minor discrepancies may exist between the National Report and this Reporting Module and are due to differences in filtering processes prior to analysis.

2011 National Web Report



Web Report for Surgeon or Cardiac unit by date range

Report By All Hospital

Selected Date Range 01/01/2011 to 31/12/2011

Note: Incomplete data will affect the overall data presented in this report. Cases with missing procedure types or urgency status details have been excluded from this report. Only the first procedure in cases with mortality have been included.

Summary

Number of patients	9158	Salvage	30
Number of procedures	9282	Day of Surg Admission	2520
(number of procedures includes double mortality)		Redo	834
Average Age	65.66	Second procedure	520
Male / Female	6641 / 2641	Total Mortality	271
Elective	6644	Hospital Mortality	249
Urgent	2238	30-day Mortality	221
Emergency	370	Readmission	826

Table 1 Surgery Type

Surgery type (mutually exclusive)	Total number of procedures		Total Mortality by procedure	
	Number of procedures	% of total procedures	Number of patients	% of Surgery Type
Isolated CABG	4776	51.51 %	79	1.65 %
Valve(s) only	1886	20.34 %	54	2.86 %
Valve(s) + CABG	991	10.69 %	47	4.74 %
Other (COTH,NCOTH,AO)	1619	17.46 %	91	5.62 %
All Procedures	9272	100.00 %	271	2.92 %

Age

Surgery type (mutually exclusive)	Number of procedures				Total Mortality (exclude double mort)			
	Number of procedures		% of total procedures		Number of patients		% of Age Group	
	Isolated CABG	ALL	Isolated CABG	ALL	Isolated CABG	ALL	Isolated CABG	ALL
<40 years	47	435	0.98 %	4.69 %	0	10	0.00 %	2.30 %
40 - 59 years	1281	2193	26.82 %	23.65 %	13	44	1.01 %	2.01 %
60 - 69 years	1650	2712	34.55 %	28.56 %	20	64	1.21 %	2.36 %
70 - 79 years	1395	2762	29.21 %	29.25 %	32	99	2.29 %	3.58 %
80 + years	403	1170	8.45 %	12.62 %	14	54	3.47 %	4.62 %
All Procedures	4776	9272	51.41 %	100.00 %	79	265	1.65 %	2.86 %

Isolated Coronary artery surgery

Number of patients	4736	Total Radial Anastomoses	1770
Number of procedures	4776	Single Radials	1429
Male / Female	3813.0 / 963	Double Radials	342
	0		
Stable/Unstable Angina	2887 / 1179	GEPA Anastomoses	13
Clinical Status: Elective	3060	Graft Numbers:	
Urgent	1560	6-graft	66
Emergency/Salvage	156	5-graft	379
Total CABG Mortality	79	4-graft	1235
Offpump / Mort	415 / 5	3-graft	1822
Onpump / Mort	4361 / 73	2-graft	1001
Redo / Mort	133 / 6	1-graft	252
Total no. of arterial grafts	1315	30-day Mortality	65
Mean no. of grafts	3.15	30-day Mortality by elective	24
LIMA	4015	30-day Mortality by urgent	27
RIMA	34	30-day Mortality by emerg/sal	14
BIMA	402		
Total IMA conduits	4852		
Total SVG Anastomoses	3447		

Isolated Coronary artery surgery - Complications

Return to theatre	246	Pulmonary:	
Valve dysfunction	0	Prolonged Vent	387
Graft occlusion	7	Re-intubation	84
Reop Deep sternal inf	24	Pneumonia	150
Bleeding	118	Neurologic:	
Other cardiac	49	Stroke Permanent	44
Other non-cardiac	62	Stroke Transient	21
Deep Sternal Infections	23	Septicaemia	36
Renal failure	172	Anticoagulant complications	13
Haemofiltration	57	GIT complications	45
Peri-op AMI	31	Multi system failure	27
Peri-op Cardiogenic Shock	206	Inotrope use:	
New Cardiac Arrhythmia	1261	> 4 hrs	2114
Heartblock	16	low CO	885
Cardiac arrest	45	low SVR	985
Atrial Arrhythmia	1117		
Ventricular tachycardia	81		

Isolated Coronary artery surgery - Performance Indicators

Length of Stay (mean)	12.79	30-Day Sternal Infection	0.84 %
Post-procedure Length of Stay (mean)	9.02	Reop for bleeding	2.47 %
ICU hours (mean)	63.28	30 Day Mortality	1.36 %
Ventilation hours (mean)	21.83	Total Mortality	1.61 %

Isolated Valve(s) surgery

Number of patients	1858	30-day Mortality	46
Number of procedures	1886	Total Mortality	54
Male / Female	1104 / 782		
Redo	179		

Isolated Valve Surg & Prosthesis						
Surgery type (mutually exclusive)	Total number of procedures		Total Mortality by procedure		Total number of prosthesis	
	Number of procedures	% of total procedures	Number of patients	% of Surgery Type		
Aortic Valve replacement (AVR) Only	990	52.49 %	18	1.82 %	Mechanical	206
					Bioprosthesis	764
					Homo/Allograft	6
					Autograft	0
Other Aortic Valve Procedure (Only)	88	4.67 %	2	2.27 %		
Mitral Valve Replacement (Only)	228	12.09 %	12	5.26 %	Mechanical	119
					Bioprosthesis	106
					Homo/Allograft	0
Mitral Valve Repair (Only)	305	16.17 %	3	0.98 %	Ring	293
Aortic and Mitral Valve Procedure (Only)	90	4.77 %	5	5.56 %	Mechanical	85
					Bioprosthesis	65
					Homo/Allograft	1
					Autograft	0
					Ring	16
Mitral and Tricuspid Valve Procedure (Only)	79	4.19 %	3	3.80 %	Mechanical	27
					Bioprosthesis	26
					Homo/Allograft	0
					Ring	95
Aortic, Mitral and Tricuspid Valve Procedure (Only)	18	0.95 %	2	11.11 %	Mechanical	16
					Bioprosthesis	14
					Homo/Allograft	0
					Autograft	0
					Ring	18
Other Valve Procedures	92	4.88 %	5	5.43 %		
Total	1886	100.00 %	52	2.76 %		

Isolated Valve(s) surgery - Complications

Return to theatre	138	Pulmonary:	
Valve dysfunction	4	Prolonged Vent	184
Graft occlusion	0	Re-intubation	46
Reop Deep sternal inf	4	Pneumonia	55
Bleeding	66	Neurologic:	
Other cardiac	36	Stroke Permanent	28
Other non-cardiac	37	Stroke Transient	24
Deep Sternal Infections	7	Septicaemia	25
Renal failure	84	Anticoagulant complications	15
Haemofiltration	36	GIT complications	30
Peri-op AMI	6	Multi system failure	23
Peri-op Cardiogenic Shock	101	Inotrope use:	
New Cardiac Arrhythmia	559	> 4 hrs	764
Heartblock	49	low CO	366
Cardiac arrest	23	low SVR	309
Atrial Arrhythmia	475		
Ventricular tachycardia	30		

Isolated Valve(s) - Performance Indicators

Length of Stay (mean)	14.22	30-Day Sternal Infection	0.58 %
Post-procedure Length of Stay (mean)	10.98	Reop for bleeding	3.49 %
ICU hours (mean)	76.18	30 Day Mortality	2.44 %
Ventilation hours (mean)	27.07	Total Mortality	2.76 %

Valve Surgery and CABG						
Surgery type (mutually exclusive)	Total number of procedures		Total Mortality by procedure		Total number of prostheses	
	Number of procedures	% of total procedures	Number of patients	% of Surgery Type		
Aortic Valve replacement (AVR) + CABG	686	69.18 %	31	4.52 %	Mechanical	54
					Bioprosthesis	625
					Homo/Allograft	0
					Autograft	0
Other Aortic Valve Procedure + CABG	10	1.01 %	1	10.00 %		
Mitral Valve Replacement + CABG	70	7.05 %	2	2.86 %	Mechanical	23
					Bioprosthesis	44
					Homo/Allograft	0
Mitral Valve Repair + CABG	132	13.29 %	7	5.30 %	Ring	126
Aortic and Mitral Valve Procedure + CABG	50	5.14 %	1	2.00 %	Mechanical	22
					Bioprosthesis	52
					Homo/Allograft	0
					Autograft	0
					Ring	21
Mitral and Tricuspid Valve Procedure + CABG (Only)	22	2.22 %	3	13.64 %	Mechanical	2
					Bioprosthesis	6
					Homo/Allograft	0
					Ring	33
Aortic, Mitral and Tricuspid Valve Procedure + CABG (Only)	7	0.70 %	1	14.29 %	Mechanical	6
					Bioprosthesis	7
					Homo/Allograft	0
					Autograft	0
					Ring	8
Other Valve Procedures + CABG	14	1.01 %	1	7.14 %		
Total	991	100.00 %	47	4.74 %		

CABG and Valve(s) Surgery

Number of patients	958		
Number of procedures	991	CABG and MVR	70
Male / Female	697 / 294	CABG and AVR and MVR	14
Redo	24	CABG and MV repair	132
CABG and AVR	686	30-day Mortality	39

CABG and Valve(s) Surgery - Complications

Return to theatre	95	Pulmonary:	
Valve dysfunction	2	Prolonged Vent	165
Graft occlusion	0	Re-intubation	32
Reop Deep sternal Inf	5	Pneumonia	48
Bleeding	51	Neurologic:	
Other cardiac	28	Stroke Permanent	15
Other non-cardiac	20	Stroke Transient	6
Deep sternal infection	5	Septicaemia	14
Renal failure	83	Anticoagulant complications	2
Haemofiltration	36	GIT complications	12
Peri-op AMI	7	Multi system failure	17
Peri-op Cardiogenic Shock	68	Inotrope use:	
New Cardiac Arrhythmia	382	> 4 hrs	525
Heartblock	16	low CO	284
Cardiac arrest	17	low SVR	223
Atrial Arrhythmia	339		
Ventricular tachycardia	22		

CABG and Valve(s) Surgery - Performance Indicators

Length of Stay (mean)	15.75	30-Day Sternal Infection	0.63 %
Post-procedure Length of Stay (mean)	12.21	Reop for bleeding	5.32 %
ICU hours (mean)	73.80	30 Day Mortality	4.07 %
Ventilation hours (mean)	26.45	Total Mortality	4.91 %

Table 16 AVR Surgery and Aortic Procedures (+/-CABG)

Surgery type (mutually exclusive)	Total number of procedures		Total Mortality by procedure		Procedure Types	
	Number of procedures	% of total procedures	Number of patients	% of Surgery Type		
AVR + Aortic Aneurysm	92	36.65 %	2	2.17 %	Arch	12
					Ascending	88
					Thoracic/Abdo minal %	1
					Descending	2
AVR + Aortic Dissection	12	4.78 %	2	16.67 %	Ascending	12
					Descending	0
AVR + Acute Traumatic Aortic Transection	0	0.00 %	0	0.00 %		
AVR + CABG + Aortic Aneurysm	33	13.15 %	1	3.03 %	Arch	4
					Ascending	31
					Thoracic/Abdo minal %	0
					Descending	0
AVR + CABG + Aortic Dissection	1	0.40 %	1	100.00 %	Ascending	1
					Descending	0
AVR + CABG + Acute Traumatic Aortic Transection	0	0.00 %	0	0.00 %		
Total	251	36.65 %	9	3.59 %		

Other surgery

Number of patients	1613
Number of procedures	1619
Male / Female	1018.0 0

Table 3 Other surgery types

Surgery type (mutually exclusive)	Number of procedures	Total Mortality
Aortic Procedure	678	31
Aneurysm - Asc	393	12
- Arch	79	6
- Desc	16	3
- Thor/Abd	12	0
Dissection - Asc - Acute	103	13
- Asc - Chronic	13	0
- Desc - Acute	11	1
- Desc - Chronic	6	0
Acute Traumatic Aortic Transection	3	0
Carotid Endarterectomy	30	2
Lung Resection	9	0
Left Ventricular Aneurysm	22	0
Acquired VSD	21	7
Congenital ASD	121	2
Cardiac Trauma	7	3
LVOT Myectomy for HOCM	35	2
LV Rupture Repair	7	1
Pericardiectomy	19	4
Pulmonary Thrombo-endarterectomy	9	2
Left Ventricular Reconstruction	3	0
Pulmonary Embolectomy	10	1
Cardiac Tumour	52	2
Cardiac Transplant	82	7
Congenital Other	58	1
Permanent LV Epicardial Lead	64	8
Atrial Arrhythmia Surgery	280	12
Others	337	20

Other surgery - Complications

Return to theatre	224	Pulmonary:	
Valve dysfunction	8	Prolonged Vent	307
Graft occlusion	1	Re-intubation	57
Reop Deep sternal inf	12	Pneumonia	85
Bleeding	102	Neurologic:	
Other cardiac	77	Stroke Permanent	36
Other non-cardiac	52	Stroke Transient	14
Deep Sternal Infections	8	Septicaemia	31
Renal failure	142	Anticoagulant complications	14
Haemofiltration	73	GIT complications	29
Peri-op AMI	7	Multi system failure	33
Peri-op Cardiogenic Shock	98	Inotrope use:	
New Cardiac Arrhythmia	454	> 4 hrs	807
Heartblock	40	low CO	445
Cardiac arrest	30	low SVR	345
Atrial Arrhythmia	324		
Ventricular tachycardia	51		

Other - Performance Indicators

Length of Stay (mean)	16.18	30-Day Sternal Infection	0.92 %
Post-procedure Length of Stay (mean)	13.32	Reop for bleeding	6.27 %
ICU hours (mean)	108.62	30 Day Mortality	4.40 %
Ventilation hours (mean)	41.99	Total Mortality	5.52 %

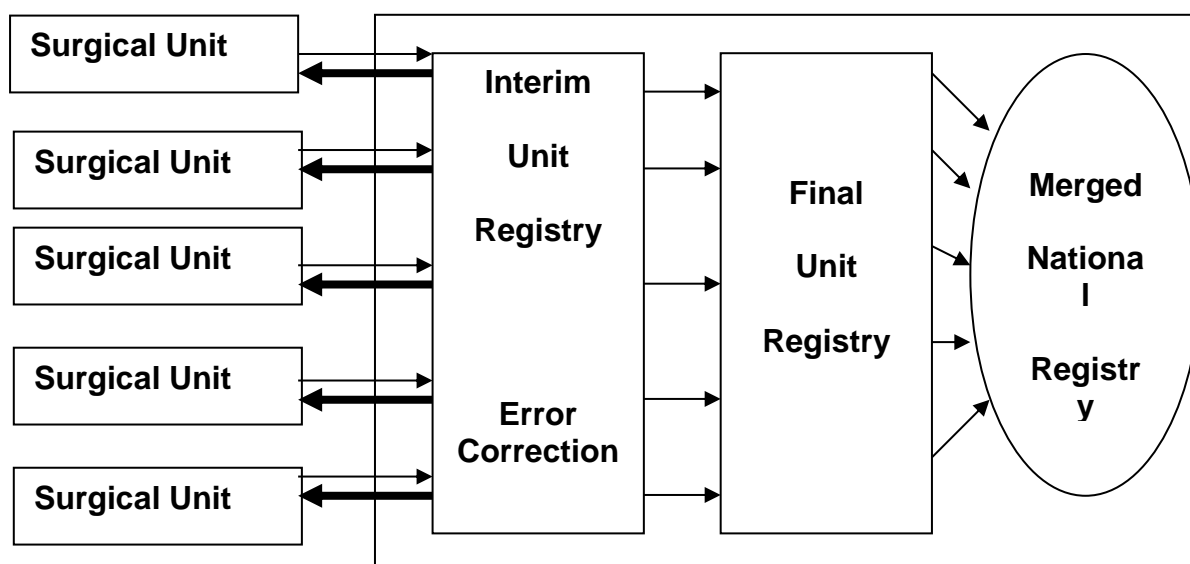
Processes

The following pages outline formal processes relating to the conduct of the project. These include:

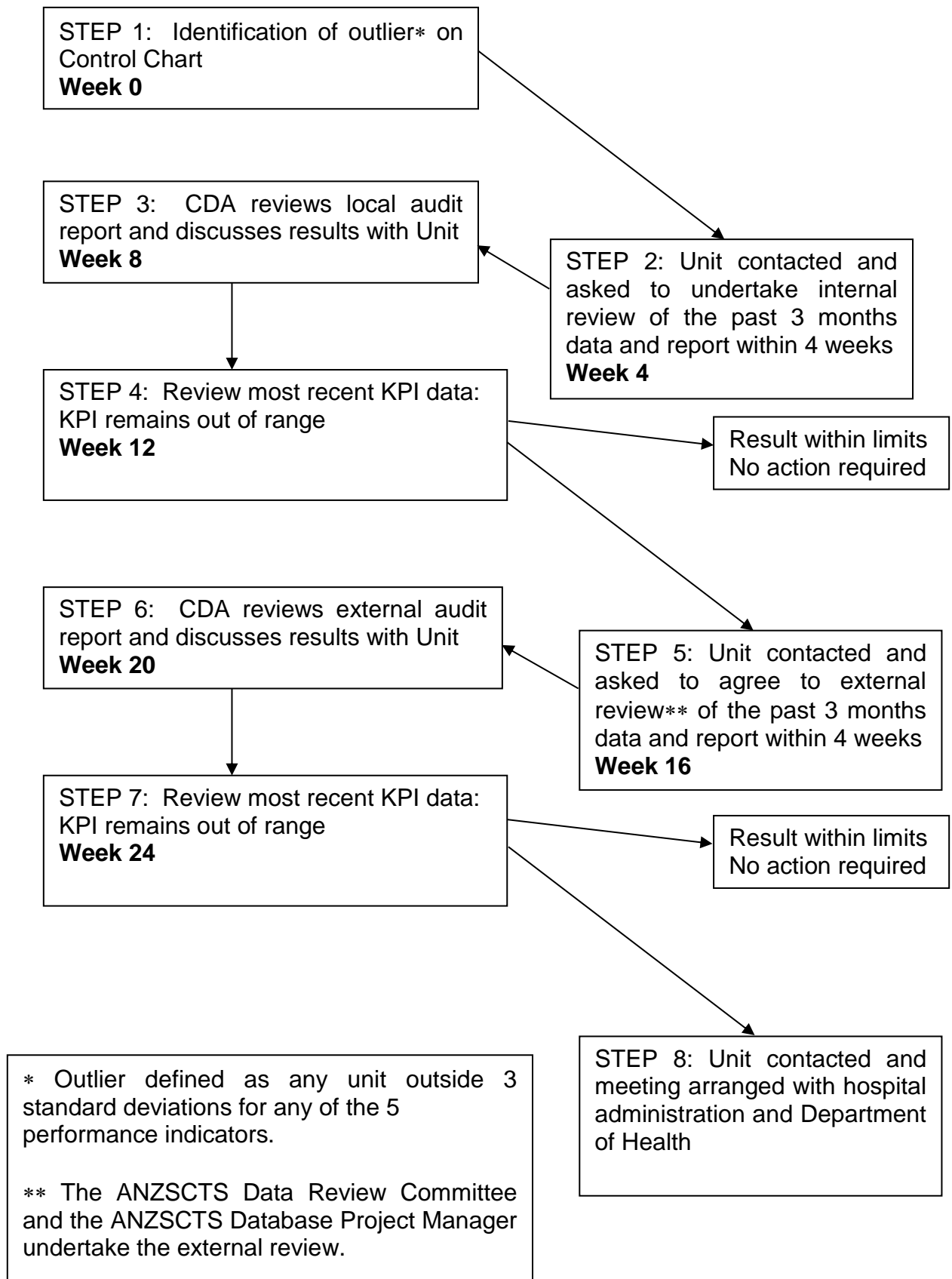
- Data management
- Peer Review mechanism
- Data collection form
- Patient Information Sheet
- Opt-off procedure

Data Management

All data collected as part of the ANZSCTS project is forwarded to the Department of Epidemiology and Preventive Medicine, Monash University. The flow of information into the data centre is outlined in the following figure.



Current Peer Review Mechanism for identification of Unit Outliers



Data Collection Form

General Description

The following pages show the ANZSCTS Data Collection Form. This form contains only the ANZSCTS Minimum Dataset. Individual hospitals may have a slightly different form depending on the type and amount of additional data each hospital wishes to collect.

The ANZSCTS Data collection form consists of 3 parts: Pre operative, Intra Operative and Post Operative.

Pre Operative:

We recommend that this section of the form be completed by the Resident.

This part of the form contains information on the patient's demographics, risk factors, pre operative cardiac status and previous interventions.

Intra Operative:

We recommend that this section of the form be completed by the Surgeon.

This part of the form contains information on the patient's haemodynamic data, operative status, and information directly related to the procedure performed.

Post Operative:

We recommend that this section of the form be completed by the Registrar.

This part of the form contains information on post operative complications and mortality.

We also recommend that the Data Manager check all parts of the form for completeness, make any amendments as required and notify the Data Management Centre at Baker Heart Research Institute.

Each part is contained on separate pages from the other parts. They can therefore be separated from each other for the purposes of data collection if required.

Submission of data to the ANZSCTS Data Management Centre

When all 3 parts of the form have been completed and checked this should be indicated on the top of the first page. The data is then entered on the onsite database. When entry is completed, it is then sent to the Department of Epidemiology and Preventive Medicine via encrypted e-mail.



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Section 1. Patient Demographics

Medicare Number	The full Medicare number of the patient (i.e. family number plus person number) if the patient is registered with Medicare.
DOSA Patient	Patient admitted for scheduled elective procedure on same day as procedure .
Admission Date	Date patient admitted/transferred to hospital where surgery performed.
Surgery Date	Date on which the first surgical incision was made for the current cardiac surgical procedure.
Discharge Date	Date Patient discharged from being an inpatient at the hospital where the procedure was performed. Discharge to Hospital in the Home, rehabilitation hospital or unit or to a local referring hospital is considered as discharge from hospital.
Operation Number	Number of operation(s) done on the day for this patient.

Section 2. Patient Risk Factors

Smoking History	A history confirming any form of tobacco use in the past.
Current Smoker	Smoked within one month of surgery.
Family History of CAD	Direct blood relatives having following at age <55 . a.) angina; b.) myocardial infarct; c.) sudden cardiac death without obvious cause (presume Ischaemic Heart Disease); d.) Previous coronary intervention.
Diabetes	A history of diabetes, regardless of duration of disease or need for anti-diabetic agents.
Hypercholesterolaemia	History of fasting cholesterol > 5.0 mmol/L, HDL <1.0 mmol/L or triglycerides >2.0 mmol/L or on treatment.
Creatinine	Enter creatinine in µmol/L. To convert from mmol/L multiply by 1000 (ie move decimal point 3 spaces to the right).
Hypertension	Blood pressure exceeding 140/90 mmHg or a history of high blood pressure, or the need for anti-hypertensive medications.
Cerebrovascular Disease	Documentation by any of the following; Unresponsive coma >24hrs or CVA or RIND (recovery within 72hrs) or TIA or non-invasive carotid test with 50% diameter stenosis (equivalent to 75% cross-sectional area stenosis).
Peripheral Vascular Disease	Any of the following; claudication or amputation for arterial insufficiency or vascular reconstruction or documented aortic aneurysm or renal artery stenosis or positive non-invasive testing.
Respiratory Disease	Specify if any, and severity of chronic lung disease. Mild = on chronic inhaled or oral bronchodilator therapy. Moderate = chronic oral steroid therapy aimed at lung disease Severe = room air pO ₂ <60 or Room air pCO ₂ >50 or mechanical ventilation for chronic lung disease
Infective Endocarditis	A patient presenting with valvular disease of infectious aetiology with past or present positive blood culture or postop pathology confirmation. Active = currently being treated for endocarditis
Immunosuppressive Rx	Use of any form of immunosuppressive therapy within 30 days or less preceding the operative procedure (eqv. to Prednisolone dosage ≥ 5mg).



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Medical
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PRE OPERATIVE PAGE 2

Section 3. Preoperative Cardiac StatusMyocardial infarction ☐ YES ☐ NOif YES

When

☐ ≤6 Hrs ☐ 8 - 21 Days
☐ >6 - <24 Hrs ☐ >21 Days
☐ 1 - 7 Days
Type ☐ NSTEMI ☐ STEMIAngina CCS Class (0 - 4)
(see definition overleaf)

Treatment of Angina (during current admission & continuing to surgery)

i-v GTN ☐ YES ☐ NOi-v Heparin ☐ YES ☐ NOFull dose Low MW
heparinoids ☐ YES ☐ NO
(eg s.c. Clexane, s.c. Fragmin)History of
Congestive Heart Failure
(CHF) ☐ YES ☐ NOif YESCHF at current
admission ☐ YES ☐ NODyspnoea NYHA Class (I - IV)
(see definition overleaf)Cardiogenic Shock ☐ YES ☐ NOResuscitation
(within 1 hour pre-op) ☐ YES ☐ NOArrhythmia ☐ YES ☐ NOif YESType ☐ Atrial ☐ HeartBlock ☐ Ventricular ☐ Otherif ATRIALtype ☐ Paroxysmal ☐ Persistent ☐ PermanentPermanent Pacemaker
In Situ ☐ YES ☐ NO**Medications at time of Surgery**Inotropes ☐ YES ☐ NOIV nitrates ☐ YES ☐ NOAnticoagulation therapy ☐ YES ☐ NOSteroids ☐ YES ☐ NO

Aspirin or other antiplatelet therapy within 7 days of surgery

Aspirin ☐ YES ☐ NOif YESWhen ☐ ≤2 days ☐ 3 - 7 daysClopidogrel ☐ YES ☐ NO☐ ≤2 days ☐ 3 - 7 daysIib/IIIa (Abciximab) ☐ YES ☐ NO☐ ≤2 days ☐ 3 - 7 daysAggrostat (Tyrofiban) ☐ YES ☐ NO☐ ≤2 days ☐ 3 - 7 daysOther ☐ YES ☐ NO☐ ≤2 days ☐ 3 - 7 days

DEFINITIONS OVERLEAF ➡



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Section 3. Preoperative Cardiac Status

Myocardial Infarction	<p>History hospitalisation for a MI in the medical record. Specify if MI is either NSTEMI or STEMI:</p> <table border="1"> <tr> <td> 1. Non ST Elevation MI (NSTEMI) A. BIOCHEMICAL indicators of myocardial necrosis. 1. Troponin T or I > the institutional decision limit on at least one occasion during the first 24 hrs after the index event. 2. CKMB >2x the upper limit of normal on one occasion during the first 24 hrs. 3. CKMB > upper limit of normal on 2 successive samples. AND one of the following: B. ECG CHANGES - either ST segment depression OR T-wave abnormalities OR C. CLINICAL ISCHAEMIC SYMPTOMS such as: 1. Unexplained nausea or vomiting, &/or 2. Persistent SOB secondary to LVF, &/or 3. Unexplained weakness, dizziness or syncope </td><td> 2. ST elevation MI (STEMI) A. BIOCHEMICAL indicators as for NSTEMI AND B. ECG CHANGES 1. ST segment elevation: New or presumed new ST elevation at the J-point in two or more contiguous leads with cut-off points => 0.2 mV in leads V1, V2 or V3 OR => 0.1mV in other leads. OR 2. Development of any new Q wave in leads V1 through V3 OR a new Q wave with duration =>0.03 sec and => 1mm deep in any other two contiguous leads. </td></tr> </table>	1. Non ST Elevation MI (NSTEMI) A. BIOCHEMICAL indicators of myocardial necrosis. 1. Troponin T or I > the institutional decision limit on at least one occasion during the first 24 hrs after the index event. 2. CKMB >2x the upper limit of normal on one occasion during the first 24 hrs. 3. CKMB > upper limit of normal on 2 successive samples. AND one of the following: B. ECG CHANGES - either ST segment depression OR T-wave abnormalities OR C. CLINICAL ISCHAEMIC SYMPTOMS such as: 1. Unexplained nausea or vomiting, &/or 2. Persistent SOB secondary to LVF, &/or 3. Unexplained weakness, dizziness or syncope	2. ST elevation MI (STEMI) A. BIOCHEMICAL indicators as for NSTEMI AND B. ECG CHANGES 1. ST segment elevation: New or presumed new ST elevation at the J-point in two or more contiguous leads with cut-off points => 0.2 mV in leads V1, V2 or V3 OR => 0.1mV in other leads. OR 2. Development of any new Q wave in leads V1 through V3 OR a new Q wave with duration =>0.03 sec and => 1mm deep in any other two contiguous leads.
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History of Congestive Heart Failure	A history of CHF diagnosed by one of the following; paroxysmal nocturnal dyspnoea (PND), Dyspnoea on exertion due to HF, or X-ray showing pulmonary congestion, OR medication prescribed to treat CHF.		
Cardiogenic Shock	A clinical state of hypoperfusion characterised by hypotension (systolic pressure < 90 mmHg &/or OR CI <0.2 for at least 30 mins or the need for supportive measures to maintain a systolic pressure > or = 90 mmHg or a CI >2.0.		
Resuscitation	CPR or initiation of treatment for cardiogenic shock within 1 hr of procedure.		
Arrhythmia	The presence of AF/flutter requiring therapy, heart block, VT or VF, or other arrhythmia.		
Aspirin or other antiplatelet therapy within 7 days of surgery	Patient has taken aspirin or other antiplatelet agent within the last seven days.		

Classification Key

CCS Class	CCS (Canadian Cardiovascular Class)
0	No Angina.
1	Ordinary physical activity, such as walking or climbing the stairs does not cause angina. Angina may occur with strenuous, rapid or prolonged exertion at work or recreation.
2	There is slight limitation of ordinary activity. Angina may occur with moderate activity such as walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals or in the cold, in the wind, or under emotional stress, or walking more than two blocks on the level, and climbing more than one flight of stairs at normal pace under normal conditions.
3	There is marked limitation of ordinary physical activity. Angina may occur after walking one or two blocks on the level or climbing one flight of stairs under normal conditions at a normal pace.
4	There is inability to carry on any physical activity without discomfort; angina may be present at rest.

NYHA Class	NYHA (New York Heart Association functional class)
I	Patients with cardiac disease but without resulting limitation of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnoea.
II	Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitations, or dyspnoea.
III	Patients with cardiac disease resulting in marked limitation of physical activity. They are comfortable at rest. Less than ordinary physical activity results in fatigue, palpitations, or dyspnoea.
IV	Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency may be present even at rest. If any physical activity is undertaken, discomfort is increased.



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first character here INTERVENTION & HAEMODYNAMIC

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Section 4. Previous InterventionPrevious Cardiothoracic Intervention (surgical or percutaneous) ☐ YES ☐ NOif YES

No. Prior cardiac operations with cardiopulmonary bypass

--	--	--	--

No. Prior cardiac operations without cardiopulmonary bypass

--	--	--	--

Types of Previous surgery (select all that apply)

☐ CABG☐ OFF PUMP CABG☐ Valve☐ OTHER Cardiac

(Any other previous cardiac surgery, including operation on the ascending aorta and/or aortic arch, including pericardiectomy)

Previous Percutaneous Intervention

PTCA/Stent

☐ YES☐ NO

in which admission?

☐ Prior Admission☐ This Admissionif YES on this Admission, then Interval

--	--	--	--

 hrs

Thrombolysis (if same admission)

☐ YES☐ NOif YES

Interval (if same admission)

--	--	--	--

 hrs

Non Surgical Balloon Valvuloplasty

☐ YES☐ NO

ASD Device Closure

☐ YES☐ NO

VSD Device Closure

☐ YES☐ NO

Percutaneous SVT/VT Ablation

☐ YES☐ NO**Section 5. Haemodynamic Data**

Patient Height

--	--	--	--

cm

Patient Weight

--	--	--	--

kg

} Perfusionist to complete

Catheter:

☐ YES☐ NOif YES

Date

d	d	m	m	y	y	y	y

LVEF Method

☐ No☐ LVgram☐ Radionuclide☐ ECHO☐ MRI

EF:

--	--	--

 %

If Estimate:

☐ Normal(>60%)☐ Mild Impairment(46-60%)☐ Mod(30-45)☐ Severe(<30%)

Left Main Stenosis >50%:

☐ YES☐ NO

No. Diseased Systems:

--

(left main=2, or=3 if left dominant)
(0,1,2,3)

DEFINITIONS OVERLEAF ➡



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Section 4. Previous Intervention

Previous Cardiothoracic Intervention	Has the patient undergone any previous cardiovascular intervention, either surgical or non-surgical, which may include those done during the current admission. This includes all forms of percutaneous angioplasty and thrombolytic therapy for cardiac indications.
ASD Device Closure	Closure by percutaneous technique of Atrial Septal Defect
VSD Device Closure	Closure by percutaneous technique of Ventricular Septal Defect

Section 5. Haemodynamic Data

LVEF Method	Was the Left Ventricular Ejection Fraction measured, and how was this information obtained? 1 = None of the following were done 2 = Left Ventriculogram 3 = Radionuclide 4 = Echocardiogram 5 = Magnetic Resonance Imaging
Left Main Stenosis > 50%	Any stenosis that involves any parts of the Left Main. Left Main Coronary stenosis is present when there is > 50% compromise of vessel diameter in any angiographic view.
Number of Diseased Coronary System	The number of major coronary systems (LAD system, Circumflex system, and/or Right System) with > 50% narrowing in any angiographic view. The number of diseased systems should be the number of systems requiring surgical approach at that operation. NOTE: Left main disease (>50%) is counted as TWO systems (LAD and Circumflex). For example, left main and RCA would count as THREE in total. Dominant circumflex counts as TWO systems.



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INTRA OPERATIVE PAGE 1

Section 6. Operation Status/Category

Consultant Surgeon	<input type="text"/>	(code)
Operating Surgeon	<input type="radio"/> Consultant <input type="radio"/> Senior Registrar <input type="radio"/> Trainee Registrar <input type="radio"/> Overseas Fellow <input type="radio"/> Oversight	

Status: ☐ Elective ☐ Urgent ☐ Emergency ☐ SalvageDirect transfer from cathlab to theatre ☐ YES ☐ NO
(see definition overleaf)**Category:**

Coronary Artery Bypass	<input type="radio"/> YES <input type="radio"/> NO
Valve	<input type="radio"/> YES <input type="radio"/> NO
Other Cardiac	<input type="radio"/> YES <input type="radio"/> NO if YES <div style="display: inline-block; vertical-align: top; width: 45%;"> <input type="radio"/> LV Aneur. <input type="radio"/> acq. VSD <input type="radio"/> ASD <input type="radio"/> Trauma <input type="radio"/> Other <input type="radio"/> LVOT Myectomy for HOCM <input type="radio"/> LV Rupture Repair </div> <div style="display: inline-block; vertical-align: top; width: 45%;"> <input type="radio"/> Pericardiectomy <input type="radio"/> Pulm. Thrombo-Endarterectomy <input type="radio"/> LV Reconstruction <input type="radio"/> Pulmonary Embolectomy <input type="radio"/> Cardiac Tumour <input type="radio"/> Cardiac Transplant <input type="radio"/> Other Congenital <input type="radio"/> Permanent LV epicardial lead <input type="radio"/> Atrial Arrhythmia Surgery <i>(complete section below)</i> </div>

Atrial Arrhythmia Surgery

if YES to Other Cardiac-Atrial Arrhythmia Surgery, indicate the PREDOMINANT Lesion Set and Technique

Lesion Set (1 - 8)Energy Source (1 - 8)

Aortic Procedure	<input type="radio"/> YES <input type="radio"/> NO
Aortic aneurysm	<input type="radio"/> YES <input type="radio"/> NO if YES Type: <input type="radio"/> Asc <input type="radio"/> Arch <input type="radio"/> Desc <input type="radio"/> Thor/Abd
Aortic dissection	<input type="radio"/> YES <input type="radio"/> NO if YES Type: <input type="radio"/> Asc <input type="radio"/> Desc (only) When: <input type="radio"/> Acute (<=2 weeks) <input type="radio"/> >2 weeks
Acute Traumatic Aortic Transection: (within 2 weeks of trauma)	<input type="radio"/> YES <input type="radio"/> NO
Other Non Cardiac Procedure	<input type="radio"/> YES <input type="radio"/> NO
Carotid Endarterectomy	<input type="radio"/> YES <input type="radio"/> NO
Lung Resection	<input type="radio"/> YES <input type="radio"/> NO
Other Vascular	<input type="radio"/> YES <input type="radio"/> NO
Other Thoracic	<input type="radio"/> YES <input type="radio"/> NO
Other	<input type="radio"/> YES <input type="radio"/> NO



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Section 6. Operation Status/Category

Status

Elective	The procedure could be deferred without increased risk of compromised cardiac outcome.
Urgent	Not routine - medical reasons for operating this admission - a) Within 72 hours from angiography if on the same admission that angiography was performed (in this case, "same admission" includes the situation when angiography is performed at another hospital and the patient is transferred directly to the hospital where surgery is to be performed) or 2) Within 72 hours after an unplanned admission (in a patient who had a previous angiogram and was scheduled for surgery but was admitted acutely).
Emergency	Unscheduled surgery required in next available theatre on same day due to refractory angina or cardiac compromise.
Salvage	The patient is undergoing CPR en route to the operating room prior to surgical incision.

Direct Transfer from Cathlab to Theatre

As a result of a cardiac catheter lab complication, in the opinion of the operator or the responsible physician, the patient needed to be moved directly to surgery from the cath lab or hospital ward. Typically due to indications such as ongoing ischaemia, rest angina despite maximal treatment, pulmonary oedema requiring intubation, or shock.

Other Cardiac

LVOT Myectomy for HOCM	This procedure is performed for either hypertrophic obstructive cardiomyopathy or left ventricular muscular dynamic LVOT obstruction, or in cases of tunnel stenosis in the left ventricular outflow tract. This procedure involves excision of left ventricular endocardial muscle out of the left ventricular outflow tract.
LV Rupture Repair	This is ischaemic rupture of the free wall of the left ventricle. Therefore does not include traumatic rupture.
Pulm. Thrombo-Endarterectomy	Operation performed for chronic pulmonary thrombo-embolic disease. It involves cardiopulmonary bypass, and mostly hypothermic circulatory arrest, and incisions are made in the right and left (or both) pulmonary arteries, and an endarterectomy performed out into the distal branches.
LV reconstruction	Reshaping of the left ventricle by lateral excision (Batista) or antero-septal reconstruction (Dor). Does not include resection and repair of left ventricular aneurysm, by whatever technique.
Permanent LV epicardial lead	Insertion of a permanent LV Epicardial Lead in association with a cardiac procedure.
Atrial Arrhythmia surgery	Current surgical procedure is for paroxysmal, persistent or permanent atrial tachy arrhythmia.

Atrial Arrhythmia surgery

Lesion Set:	Technique or Energy Source:
1=Cox-Maze III	1=Cut & Sew
2=Radial	2=Unipolar RF
3=Mini-Maze	3=Bipolar RF
4=Left Atrial Reduction	4=Cryoblation
5=Pulmonary Vein Isolation	5=Microwave
6=Left Atrial Only	6=Laser
7=Right Atrial Only	7=Ultrasound
8=Other	8=Other



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INTRA OPERATIVE PAGE 2

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Section 7. Minimally Invasive

Minimally Invasive Technique Attempted (non-standard incision) ☐ YES ☐ NO **if YES** Indication ☐ Surgeon/Patient choice
☐ Contraind Std Approach
☐ CombCathIntervention

Operation performed Off Pump ☐ YES ☐ NO

Robotically Assisted ☐ YES ☐ NO

Section 8. Cardiopulmonary Bypass and Support Data

Cardiopulmonary Bypass used ☐ YES ☐ NO

Cardioplegia ☐ YES ☐ NO

Cumulative cross-clamp time min

Cumulative cardiopulmonary bypass time min

IABP ☐ YES ☐ NO **When** ☐ Preop ☐ Intraop ☐ Postop
Indication ☐ Haemodynamicinstability ☐ CBP Wean
☐ PTCA support ☐ Prophylactic
☐ UnstableAngina

Rota-pump ☐ YES ☐ NO **When** ☐ Preop ☐ Intraop ☐ Postop
Indication ☐ Haemodynamicinstability ☐ CBP Wean
☐ PTCA support ☐ Prophylactic
☐ UnstableAngina

Other mechanical support (VAD/ECMO etc) ☐ YES ☐ NO **When** ☐ Preop ☐ Intraop ☐ Postop
Indication ☐ Haemodynamicinstability ☐ CBP Wean
☐ PTCA support ☐ Prophylactic
☐ UnstableAngina

Intra-Operative TOE ☐ YES ☐ NO **if YES** Type: ☐ ElectiveInsertion ☐ Non-ElectiveInsertion

Intra-Operative antifibrinolytic use ☐ YES ☐ NO **if YES** Type: ☐ Trasylol ☐ Tranexamic ☐ Other

Section 9. Coronary Bypass Data

Intraoperative decision to graft coronary artery ☐ YES ☐ NO

IMA used ☐ YES ☐ NO **if YES** LIMA ☐ YES ☐ NO
RIMA ☐ YES ☐ NO

No. of Distal Arterial grafts

No. of IMA Distal Anastomoses

No. of RA Conduits harvested

No. of Radial Distal Anastomoses

No. of Vein Distal Anastomoses

No. of GEPA Distal Anastomoses

Were Arterial T or Y grafts used ☐ YES ☐ NO

Total No. Distal Anastomoses

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Section 7. Minimally Invasive

Minimally Invasive Technique Attempted	Was a non-standard incision used to minimise trauma, either as a beating heart off-pump coronary artery procedure or as an on-pump cardiac procedure, utilising any form of cardiopulmonary bypass.
Robotically Assisted	Any procedure performed with the assistance of a robot (e.g. DaVinci, AESOP)

Section 8. Cardiopulmonary Bypass and Support Data

Cross Clamp Time	Total number of minutes the aorta is completely cross-clamped and the heart was ischaemic during bypass. Enter zero if no cross clamp was used.
Cumulative Cardiopulmonary Bypass Time	Total number of minutes on cardiopulmonary bypass. Enter zero if no cardiopulmonary bypass was used.
Intra-Operative TOE	Elective Insertion = Routine Insertion of TOE, planned before commencement of operation. Non-Elective Insertion = Unplanned insertion of TOE, for whatever reason.

Section 9. Coronary Bypass Data

IMA used	Was an Internal Mammary Artery Used for Coronary Bypass?
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INTRA OPERATIVE PAGE 3

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Section 10. Valve Surgery Data

	<u>Procedure</u>	<u>Prosthesis</u>												
Aortic	<table border="1"><tr><td></td><td></td></tr></table>			Implant	Model No <table border="1"><tr><td></td><td></td></tr></table>			Serial <table border="1"><tr><td></td><td></td></tr></table>			Size <table border="1"><tr><td></td><td></td></tr></table>			
Explant	Model No <table border="1"><tr><td></td><td></td></tr></table>			Serial <table border="1"><tr><td></td><td></td></tr></table>			Size <table border="1"><tr><td></td><td></td></tr></table>							
Mitral	<table border="1"><tr><td></td><td></td></tr></table>			Implant	Model No <table border="1"><tr><td></td><td></td></tr></table>			Serial <table border="1"><tr><td></td><td></td></tr></table>			Size <table border="1"><tr><td></td><td></td></tr></table>			
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Tricuspid	<table border="1"><tr><td></td><td></td></tr></table>			Implant	Model No <table border="1"><tr><td></td><td></td></tr></table>			Serial <table border="1"><tr><td></td><td></td></tr></table>			Size <table border="1"><tr><td></td><td></td></tr></table>			
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Pulmonary	<table border="1"><tr><td></td><td></td></tr></table>			Implant	Model No <table border="1"><tr><td></td><td></td></tr></table>			Serial <table border="1"><tr><td></td><td></td></tr></table>			Size <table border="1"><tr><td></td><td></td></tr></table>			
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Procedure codes:

- | | |
|--|---|
| 1 No | 10 Commissurotomy with annuloplasty ring |
| 2 Annuloplasty Only | 11 Commissurotomy without annuloplasty ring |
| 3 Replacement | 12 Repair Paravalvular leak |
| 4 Repair/Reconstruction with Annuloplasty | 13 Valvectomy (no replacement) |
| 5 Repair/reconstruction without Annuloplasty | 14 Valvotomy |
| 6 Root Reconstruction with Valve Conduit | 15 Ross procedure |
| 7 Root Reconstruction with Valve Sparing | 16 Inspection only |
| 8 Resuspension Aortic Valve | 17 Decalcification of valve only |
| 9 Resection Sub-Aortic Stenosis | |

Valve Pathophysiology

<u>Valve Data</u>	Aortic	Mitral	Tricuspid	Pulmonary								
Stenosis	<input type="radio"/> YES <input type="radio"/> NO	<input type="radio"/> YES <input type="radio"/> NO	<input type="radio"/> YES <input type="radio"/> NO	<input type="radio"/> YES <input type="radio"/> NO								
Insufficiency (0-4) (see definition overleaf)	<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>		
Aetiology (see definition overleaf)	<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>			<table border="1"><tr><td></td><td></td></tr></table>		



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Section 10. Valve Data

Code	Insufficiency
0	None
1	Trivial
2	Mild
3	Moderate
4	Severe

Code	Aetiology
1	Rheumatic
2	Congenital
3	Ischaemic
4	Idiopathic Calcific
5	Myxomatous degen.
6	Failed prior repair
7	Prosthetic valve failure
8	Peri-prosthetic leak
9	Prosthetic valve thrombosis
10	Active Infection
11	Previous Infection
12	Marfans
13	Annuloaortic ectasia
14	Other degen. disease
15	Dissection
16	Tumour
17	Trauma
18	Iatrogenic
19	Functional (mitral valve)
20	Functional (tricuspid valve)
99	Other

Section 11. Postoperative Data

Blood Bank Products:

RBC ☐ YES ☐ NO
 Non RBC ☐ YES ☐ NO

PERIOPERATIVE TRANSFUSION (not autologous)

Bank RBC (units)

 Platelets (units)

 Novo 7 (units)

 FFP (units)

 Cryo (units)

ICU Admission - Date/Time

d	d

 /

m	m

 /

y	y	y	y

hrs			

 Extubation - Date/Time

d	d

 /

m	m

 /

y	y	y	y

hrs			

 ICU Discharge - Date/Time

d	d

 /

m	m

 /

y	y	y	y

hrs			

 Readmitted to ICU ☐ YES ☐ NO
 Reintubation ☐ YES ☐ NO
 Reintubation - Date/Time

d	d

 /

m	m

 /

y	y	y	y

hrs			

 Reextubation - Date/Time

d	d

 /

m	m

 /

y	y	y	y

hrs			

 ICC LOSS (First 4 hours post surgery):

mls			

Complications

Return to theatre ☐ YES ☐ NO if YES
 Reop Valve Dysfunction ☐ YES ☐ NO
 Reop Bleeding or Tamponade ☐ YES ☐ NO
 Reop Graft Occlusion ☐ YES ☐ NO
 Reop Deep Sternal Infection ☐ YES ☐ NO
 Reop Other Cardiac ☐ YES ☐ NO
 Reop Other Non Cardiac ☐ YES ☐ NO
 New Renal Failure ☐ YES ☐ NO if YES
 Peri-Operative AMI ☐ YES ☐ NO
 Peri-op Cardiogenic Shock ☐ YES ☐ NO
 Haemofiltration ☐ YES ☐ NO
 Highest post-op Creatinine level

μmol/l			

 Cardiac (Mark all that apply) Inotrope use for longer than 4 hours post-operatively ☐ YES ☐ NO
 for Low Cardiac Output Syndrome ☐ YES ☐ NO
 for Low SVR Syndrome ☐ YES ☐ NO
 New Cardiac Arrhythmia ☐ YES ☐ NO if YES
 Heart Block (requiring PPM) ☐ YES ☐ NO
 Other Brady-arrhythmia (requiring PPM) ☐ YES ☐ NO
 Cardiac Arrest ☐ YES ☐ NO
 Atrial Arrhythmia (requiring Rx) ☐ YES ☐ NO
 Ventricular Tachycardia ☐ YES ☐ NO
 New Neurologic

Stroke Permanent (>72hrs)			
Stroke Transient			
Continuous Coma > 24 hrs			

 New Pulmonary

Ventilation Prolonged >24 hrs			
Pulmonary Embolism			
Pneumonia			
Reintubation & Ventilation			

 New Infection

Sternal Deep			
Thoracotomy			
Septicaemia			

 New Vascular

Aortic Dissection			
Acute Limb Ischaemia			

 New Other

Anticoagulant Complications			
GIT Complications			
Multi-system Failure			

Section 11. Postoperative Data

Blood Products: RBC	Were red blood cell products transfused intra and/or postoperatively? Do not include pre-donated blood, pump residual blood, cell-saver blood or chest tube recirculated blood.
Blood Products: Non RBC	Was a transfusion of blood products other than RBC (eg. FFP, Platelets) given intra and/or post-operatively? (Exclude Albumin)
Perioperative Transfusion Units	Indicate the number of units of Bank RBC, Platelets, Novo 7, FFP and Cryo units used.
ICU Admission - Date/Time	Indicate the date and time of admission to ICU from OR.
Extubation - Date/Time	Indicate the date post-operation when the patient was extubated.
ICU Discharge - Date/Time	Indicate the date and time of discharge from ICU to HDU or General Ward or death.
Readmitted to ICU	Was patient readmitted to ICU following transfer to the HDU or General Ward?
Reintubation	Indicate whether the patient was reintubated during hospital stay after the initial extubation.
Reintubation - Date/Time	Indicate the date and time when the patient was reintubated.
Reextubation - Date/Time	Indicate the date and time when the patient was extubated following the reintubation.
ICC loss	Indicate the fluid loss in mls from the Pericardial/mediastinal drains in the first 4hrs postoperation.
New Renal Failure	At least two of the following: a.) creatinine increased to > 0.2mmol/l; b.) a doubling or greater increase in creatinine over pre-op value; c.) a new requirement for dialysis/haemofiltration
Haemofiltration	Acute institution of haemofiltration for renal failure. Excludes haemofiltration for removal of fluid with normal serum urea and creatinine
Perioperative Cardiogenic Shock	A clinical state of hypoperfusion characterised by hypotension (systolic pressure < 90 mmHg &/or OR CI < 0.2 for at least 30 mins or the need for supportive measures to maintain a systolic pressure > or = 90 mmHg or a CI > 2.0.
Return to Theatre	Did patient return to the operating theatre for management of complications. Includes operative procedures done in the ICU that normally would be performed in the operating theatre.
Perioperative MI	Diagnosed by finding at least two of the following criteria: a.) Enzyme level elevation: either 1) CK-MB > 30; or 2) troponin > 20.0 micrograms /L, or established level at own institution; b.) New wall motion abnormalities; c.) Serial ECG (at least two) showing New Q waves.
Cardiac- Inotrope Use for Low Cardiac Output Syndrome	When an inotrope is administered with the intent to improve cardiac output, irrespective of the reasons for that decision.
Cardiac- Inotrope Use for Low SVR Syndrome	When a primarily alpha adrenergic agonist is given with the intent to increase SVR. This is usually in presence of high cardiac output. Does not include Noradrenalin given with Milrinone.
Heart Block	New heart block requiring implantation of permanent pacemaker.
Other Brady-Arrhythmia	New other Brady-arrhythmia requiring implantation of PPM.
Cardiac Arrest	Either a.) VF; b.) VT with haemodynamic instability; c.) asystole.
New Atrial Arrhythmia	New onset atrial fibrillation/flutter requiring treatment.
New Ventricular Tachycardia	New onset of ventricular tachycardia (> 6 beat run) requiring treatment.
Stroke Permanent	A central neurological deficit persisting for > 72 hours.
Stroke Transient	A transient neurological deficit (TIA, RIND).
Continuous Coma > 24hrs	New postoperative coma that persists for at least 24 hours.
Intubation Prolonged > 24hrs	Pulmonary insufficiency requiring ventilatory support > 24hrs (cumulative).
Pulmonary Embolism	Diagnosed by study such as V/Q scan or angiogram.
Pneumonia	Diagnosed by positive cultures and c/w clinical findings.
Infection - Sternal Deep	Involves muscle and bone, with or without mediastinal involvement, as demonstrated by surgical exploration. Must have wound debridement and one of following: a.) positive culture; b.) treatment with antibiotics.
Infection - Thoracotomy	Involving thoracotomy or parasternal site (Conditions as above).
Infection - Septicaemia	Septicaemia requires positive blood cultures supported by at least two of the following indices of clinical infection: a.) Fever; b.) Elevated granulocyte cell counts; c.) Elevated and increasing CRP; d.) Elevated and increasing ESR, post-operatively.
Aortic Dissection	Dissection occurring in any part of the aorta.
Acute Limb Ischaemia	Any complication producing limb ischaemia.
Anticoagulation comps.	Bleeding, hemorrhage, and /or embolic events related to anticoagulant therapy.
GI complications	Postop occurrence of any GI complication including: a.) GI bleeding requiring transfusion; b.) pancreatitis requiring nasogastric suction; c.) cholecystitis requiring cholecystectomy or drainage; d.) mesenteric ischaemia requiring exploration; e.) other GI comps.
Multi-system failure	Two or more of the following major organ systems fail concurrently for at least 48 hours: a.) Renal - New renal failure (defined previously); b.) Respiratory - Requires endotracheal intubation for respiratory dysfunction; c.) Cardiac - the use of inotropes and/or IABP to treat low cardiac output.

Section 12. Mortality / Discharge/ Readmission**Discharge:** ☐ Home ☐ Hospital in the Home ☐ Rehabilitation Unit/Hospital ☐ Local or Referring Hospital ☐ Hospital Mortality**Mortality:****Post Discharge within 30 days of surgery:** ☐ YES ☐ NO**Mortality
Date:**

d	d

m	m

y	y	y	y

Provide date of death in hospital during the index admission at any time after the procedure, or death after discharge from hospital within thirty days of the procedure

Mortality Location:**Mortality Primary Cause:**
(choose one of the following)

- ☐ Operating Room ☐ Hospital ☐ Home (incl. hospital in the home) ☐ Other Care facility
- ☐ Cardiac **If yes →** ☐ Ischaemic ☐ Other
- ☐ Neurologic
- ☐ Renal
- ☐ Vascular
- ☐ Multisystem failure
- ☐ Infection **If yes →** ☐ Septicaemia ☐ Endocarditis ☐ Other
- ☐ Respiratory Failure
- ☐ Valvular
- ☐ Other
- ☐ Unknown
- ☐ Pulmonary Embolism
- ☐ Aortic Dissection

Cognisant patient elected to withdraw from treatment (see definition) ☐ YES**Readmission:****Readmitted <=30 Days from procedure:** ☐ YES ☐ NO
(Does not include planned transfer to Rehabilitation facility)**Readmitted reason:**
(choose one of the following)

- ☐ Anticoagulant Complication
- ☐ Arrhythmia
- ☐ Congestive Heart Failure (CHF)
- ☐ Valve Dysfunction
- ☐ Pericardial Effusion
- ☐ Cardiac Tamponade
- ☐ Other Complication related to Cardiac Surgery (e.g. renal, hepatic, GI etc)
- ☐ Deep sternal Infection
- ☐ Other Incisional Complication
- ☐ Pneumonia or other Respiratory Complication
- ☐ Myocardial Infarction (MI)
- ☐ Recurrent Angina
- ☐ Other readmission unrelated to Cardiac Surgery

Definitions

Discharge	<p>1 = Home: Discharged to home, with no planned contact before routine review.</p> <p>2 = Hospital in the home: Discharged to home, with planned visits to home by medical or paramedical staff.</p> <p>3 = Rehabilitation Hospital: Discharged for inpatient rehabilitation.</p> <p>4 = Local or referring hospital: Discharged for continuing acute care.</p> <p>5 = Hospital Mortality</p>
Mortality Post-discharge	Specify whether the patient died after discharge from hospital.
Mortality - Cardiac complication	Specify whether the patient died from cardiac ischaemia or from another cardiac complication.
Mortality - Infection complication	Specify whether the patient died from septicaemia, endocarditis or other infection.
Cognisant patient withdraws from treatment	Patient who was aware of the consequences to his/her actions, elected to withdraw treatment in circumstances where they would survive if treatment was continued. NOTE: Completing "yes" to this field implies automatic review of patient's hospital file and permission for ASCTS personnel to review their case.
Congestive heart failure	Readmitted within 30 days from the date of surgery for CHF, diagnosed by one of following; paroxysmal nocturnal dyspnoea (PND), dyspnoea on exertion due to HF, X-ray showing pulmonary congestion, OR medication prescribed to treat CHF - ACE inhibition, diuretics, Carvedilol or digoxin.
Recurrent angina	Objective confirmation that chest pain is due to ischaemia by exercise test (nuclear, echo, treadmill or angiography).
Pneumonia or other respiratory complication	Diagnosed by one of the following; positive cultures of sputum or trans-tracheal aspirate and consistent with clinical findings of pneumonia.

Opt-off procedure

ANZSCTS CARDIAC SURGERY DATABASE ***Information for Data Managers***

In order to “Opt-off” from the ANZSCTS Cardiac Surgery Program, the patient, or their representative must call the 1800 number provided to him/her on the Patient Information Sheet.

An “Opt-off” cannot be done by staff at the hospital where the patient is undergoing the cardiac procedure.

The following procedure will be followed by the Project Manager when a patient rings the 1800 number to request that they not be included in the ANZSCTS Cardiac Surgery Program. This is provided here in case the patient wishes to have more information about the Opt-off procedure prior to calling the 1800 number.

The Data Manager Centre (DMC) will not retain the patient’s identifying details, but will retain the Procedural and Outcome information. The DMC will also record the information that a patient who underwent a surgical procedure at that hospital in the calendar month of the Date of Surgery withdrew their data from the database, and the reasons for withdrawal.

Project Manager’s Procedure For Processing Opt-Off Requests

1. Obtains Name, date of birth, Hospital where surgery was performed, approximate date that surgery was performed and contact phone number (in order to identify the record to be deleted).
2. Asks if the patient has any questions about the database or would like any further explanation of how and why the data is collected.
3. Asks the Patient “Would you like me to not add your information to the Register?”
4. Asks the patient “You do not have to tell me, but may I ask you why you would not like your information to be included in the database?”
5. After receiving the answer to the above question, the Project manager will not offer any more explanations or try to change the patient’s mind – the patient’s decision is final.
6. Thanks the patient – notifies them that if they undergo a new surgical procedure they will need to Opt-off again.
7. Check the database for the appropriate record. If a near match is found but not sure then contact the patient to confirm. If a match is not found then retain the information until the record arrives (records will not be received until at least 1 month post-surgery).

Appendix A

All Procedures Model Risk Adjustment

The All Procedures Score is the first validated model for risk-adjustment and risk prediction for 30-day mortality for all cardiac surgery in Australia. The model has been developed on a large number of procedures using standardised data collection methodology and the subsequent validation of the model shows that it is a good fit for Australian data and correctly classified a large number of procedures.

The Risk Adjusted Mortality takes into account a number of risk factors, selected as independent predictors of mortality, which includes age, gender, urgency of procedures, procedure type, previous cardiac surgery, NYHA class, inotropic medication, ejection fraction estimate, preoperative dialysis, hypercholesterolaemia, previous vascular disease, and body mass index. The ratio of the actual mortality to the expected mortality indicates the relative performance adjusted for the severity of illness or risk: a ratio of 1 indicates results as expected; less than 1 indicates results better than expected and greater than 1 indicates results worse than expected. This ratio is then multiplied by the Observed Average Mortality Rate to yield a Risk Adjusted Mortality Rate (RAMR) which normalises the individual unit/surgeon to the case mix.

The Risk Adjusted Mortality Rate (RAMR) is calculated as follows:

$$\text{RAMR} = \left[\frac{\text{Observed Mortality Rate}}{\text{Predicted Mortality Rate}} \right] \times \text{Average Observed Mortality Rate}$$

The Risk Adjusted Mortality Rate is therefore, a predictor of mortality for a given patient set which takes into account the risks for those patients.

Appendix B

Analysis of 95% Confidence Intervals for Risk Adjusted Data used in this report.

An example of 95% Confidence Interval (CI) representation is shown in Figure 8B, describing the risk-adjusted mortality rate for 2011 for each NSW unit for Isolated CABG. The green horizontal line represents the risk adjusted mortality rate state average (%) and the red horizontal line represents the observed mortality rate state average (%). The black dot represents the Risk Adjusted Mortality Rate (RAMR) for each unit with a vertical red line striking through, representing the 95% CI. There are upper and lower intervals (the vertical red line) for each unit which are above and below each black dot, respectively. To compare each unit's mortality rate (%) to the state average one would interpret the upper and lower intervals as follows: if the upper interval is below the state average then the hospital would be deemed to have performed better than the state average. Alternatively, if the lower interval is above the state average, then the hospital would be deemed to have performed poorer than the state average. If the interval includes the state average, there is no difference between the unit and the state performance.

Appendix C

CUSUM Test

The CUSUM analysis presented in this report indicates the performance of all units or individual units' 30-day Risk-adjusted mortality for Isolated CABG procedures. The CUSUM score represents the acceptable level of performance based on risk adjusted mortality. All cases are monitored for a given period of time and compared to the acceptable level of performance. The CUSUM charts indicate a rejection line (represented as the red line) where those units above this line have a non-acceptable level of performance and require further investigation. As a death occurs, the performance line (represented as the blue line) increases towards the rejection line. The continuous occurrence of mortality causes a cumulative increase towards the rejection line, however the occurrence of a non-death causes the performance line to move towards 0 which represents no deaths for a given period of time.