CorHealth Ontario
Advancing cardiac, stroke and vascular care

Report on Adult Cardiac Surgery: Isolated Coronary Artery Bypass Graft (CABG) Surgery, Isolated Aortic Valve Replacement (AVR) Surgery and Combined CABG and AVR Surgery October 2011 - March 2016

April, 2018

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About CorHealth Ontario

In 2016, the Cardiac Care Network of Ontario and the Ontario Stroke Network merged to form one organization, with a mandate spanning cardiac, stroke and vascular care in the province. On June 22, 2017, after a year of transition, the new entity became CorHealth Ontario. CorHealth Ontario proudly advises the Ministry of Health and Long-Term Care, Local Health Integration Networks, hospitals, and care providers to improve the quality, efficiency, accessibility and equity of cardiac, stroke and vascular services for patients across Ontario. For more information, visit **corhealthontario.ca.**

This report was prepared by CorHealth Ontario, in collaboration with the Institute for Clinical Evaluative Sciences (ICES). The results and conclusions presented in this report are those of the authors and should not be attributed to the funding agencies.

Toronto, Ontario

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Parts of this material are based on data and/or information compiled and provided by CIHI. However, the analyses, conclusions, opinions and statements expressed in the material are those of the author(s), and not necessarily those of CIHI.

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Executive Summary

In collaboration with the Institute for Clinical Evaluative Sciences (ICES), CorHealth Ontario has been monitoring and reporting on trends in the case-mix and outcomes of patients receiving coronary artery bypass graft (CABG) surgery since 1994. These reports, which assist Ontario institutions to monitor their case-mix and patient outcomes, have been released publicly since 1999 to allow for greater transparency in the reporting of quality of care received by patients undergoing CABG surgery in the province.

For this report, CorHealth Ontario worked with ICES to monitor trends in the case-mix and outcomes of patients in a cohort including patients receiving CABG surgery and aortic valve replacement (AVR) surgery in Ontario. In this current study, the outcomes of patients receiving isolated CABG surgery, isolated AVR surgery, or combined CABG and AVR surgery in Ontario were examined for 2011/2013, 2013/2014, 2014/2015, and 2015/2016 at both the provincial level and the individual cardiac surgery program level. The intention of this report, when paired with regular dialogue among providers, is to help stimulate quality improvement activity both at the provincial level and within individual cardiac centers in the province of Ontario.

This study found that risk-adjusted, in-hospital mortality rates in the province of Ontario overall following isolated CABG surgery remained relatively stable over the course of the study. Provincial risk-adjusted in-hospital mortality rates following isolated CABG surgery were similar to those reported in CorHealth Ontario's previous report on adult cardiac surgery.[1] One year mortality rates and post-operative length of stay (LOS) were higher for isolated AVR surgery than those for isolated CABG surgery and combined CABG/AVR surgery had an even higher provincial rate of mortality and longer post-operative LOS.

Background

In the past 15-20 years there has been significant change in the cardiac surgery environment in Ontario manifested by a decline in the volume of CABG surgeries being performed. While the rate of CABG surgeries being performed has decreased, the rate of Percutaneous Coronary Intervention (PCI) procedures over the same time frame has greatly increased due to advances in technology and procedural skills. The shift in revascularization practices to PCI has resulted in a reduction in the overall number of CABG surgeries; in addition, patients referred for CABG now tend to be older and have more co-morbidities than they did 15-20 years ago, resulting in increased complexity. In contemporary clinical practice, the majority of patients who are referred for CABG are typically referred because they have extensive, multivessel coronary artery disease, and may or may not have co-existing valve disease; these types of patients are beyond the scope of PCI. In light of this shifting clinical profile, it is important to remain diligent in measuring and reporting of outcomes following all cardiac procedures to ensure a common standard of high quality care in the province of Ontario.

This report is based on a data set that includes all isolated CABG surgeries performed, isolated AVR surgeries performed and all combined CABG and AVR surgeries performed for the years 2011/2013, 2013/2014, 2014/2015, 2015/2016.

The primary outcomes included observed and risk-adjusted:

- In-hospital all-cause mortality rates
- 30-day all-cause mortality rates
- 1-year all-cause mortality rates
- Post-operative length of stay (LOS)
- Transfusion rates for red blood cells
- 30-day all-cause readmission
- The major adverse cardiac events (MACE) rate, 1-year procedure
- The acute myocardial infarction (AMI), unstable angina, or congestive heart failure (CHF) readmission rate, 1-year post-discharge

For isolated CABG surgeries the following observed and risk-adjusted outcomes were also reported:

- The revascularization readmission rate, 1-year post-discharge
- The catheterization (CATH) rate, 1-year post-procedure
- Use of arterial grafts
- Off-pump use

By linking cardiac surgery data from the CorHealth Ontario Cardiac Registry to data from the Canadian Institute for Health Information (CIHI) discharge abstract database (DAD), CIHI same day surgery (SDS) database, and CIHI National Ambulatory Care Reporting System (NACRS) database outcomes could be analyzed at the hospital level with adjustment for case mix. Patients who had a valid health card number in the linked CorHealth Ontario/CIHI data set were also linked to the Ontario Registered Persons Database (RPDB) and the Ontario Health insurance Plan (OHIP) database.

Methods

Methods used were similar to those of previous reports[1] and additional details are provided in Appendix A.

Time Frame 2011 – 2016

To evaluate hospital performance for the 2011/2012 to 2015/2016 time period, this report included all patients who had isolated CABG, isolated AVR surgery, or combined CABG and AVR surgery between October 1, 2011 and March 31, 2016, inclusive. For the year 2011, data is shown for October 1, 2011 to March 31, 2012 to accommodate the previous data report ending in September 2011. All subsequent years followed the fiscal year of April 1 to March 31.

General Comments

This report details most of the observed and risk-adjusted outcomes previously reported[1], including in-hospital and 30-day all-cause mortality rates after isolated CABG surgery, isolated AVR surgery, or combined CABG and AVR surgery. This report does not describe the post-operative complications of renal failure and stroke, as was previously reported, due to concerns with the quality of administrative data to accurately attribute these events to the cardiac surgery.

Statistical models to predict post-operative LOS were modeled using a Poisson regression model, while all other outcomes were modeled using logistic regression. As in previous CABG reports prepared jointly by CorHealth Ontario and ICES, the risk models were derived using the most recent data available. This report has been developed by CorHealth Ontario, with data analysis completed by ICES.

For 1-year outcomes, procedure data between October 2011 and March 2015 were used, as access to complete follow-up data was not available for all individuals who had procedures thereafter.

When reporting data, with all outcomes, if the sample size was 5 or less, the values were suppressed and reported in the table as "≤5". Additional measures were also taken at times to ensure small cells could not be calculated (i.e., suppression of other numbers).

Refer to Appendix A for additional details on Model Development and Analysis, and Data Linkage.

Data Sources

As before, in-hospital mortality status, procedure date and discharge date were obtained from the CIHI discharge database. Age and sex were obtained from the RPDB. Post-operative LOS was calculated using the procedure date and discharge date of the index episode.

Unless indicated, risk factors were taken from the CorHealth Ontario database. Previous valve surgery was taken from the CIHI discharge database alone. Overall indicators for peripheral vascular disease (PVD), previous PCI, atrial fibrillation and shock were constructed by combining the CIHI and CorHealth Ontario indicators and assuming a co-morbid condition was present when it was indicated by either source:

The final numbers of surgeries performed were as follows:

	CABG	AVR	Combined CABG/AVR
2011/2012*	3265	421	384
2012/2013	6410	814	731
2013/2014	6582	881	682
2014/2015	6578	906	708
2015/2016	6473	931	755

*Note: For the year 2011, data is shown for October 1 2011 to March 31 2012 and is therefore not a full fiscal year.

Results

Provincial Results

Table 1 illustrates a summary of the risk-adjusted outcomes following isolated CABG surgeries, isolated AVR surgeries and combined CABG/AVR surgeries performed in Ontario. Where provincial risk-adjusted rates were not available, only the observed rate was reported (denoted by *). For a more detailed presentation of the data see Appendix B Tables 6-34.

Table 1. Summary of risk-adjusted outcomes for the province.

	CABG				AVR	Combined CABG/AVR
	2011/2013	2013/2014	2014/2015	2015/2016	2011-2016	2011-2016
Number of surgeries performed	9675	6582	6578	6473	3953	3260
In-hospital mortality	1.89 (1.63 - 2.14)	1.67 (1.36 - 1.98)	1.98 (1.66 - 2.30)	1.75 (1.44 - 2.06)	1.72*	4.36*
30-day mortality	1.75 (1.50 - 2.00)	1.59 (1.29 - 1.90)	1.94 (1.62 - 2.25)	1.59 (1.29 - 1.89)	1.49*	3.68*
1-year mortality†	3.98 (3.62 - 4.35)	3.74 (3.29 - 4.19)	4.07 (3.61 - 4.52)	ND	5.39*	8.98*
Post-operative LOS	8.04 (7.90 - 8.16)	7.72 (7.59 - 7.85)	7.86 (7.70 - 8.01)	7.71 (7.57 - 7.85)	9.26*	12.07*
Blood transfusion – Red Blood Cells	36.17 (35.32 - 37.03)	34.27 (33.24 - 35.30)	33.94 (32.89 - 35.00)	34.00 (32.94 - 35.06)	36.3*	59.69*
30-day all-cause readmission	10.18 (9.60 - 10.77)	9.64 (8.93 - 10.35)	9.61 (8.90 - 10.32)	9.34 (8.63 - 10.06)	12.75*	12.98*
1-year MACE†	8.46 (7.92 - 8.99)	8.10 (7.45 - 8.75)	9.22 (8.56 - 9.88)	ND	5.96*	11.78*
1-year cardiac readmission for acute MI, unstable angina, or CHF†	6.63 (6.15 - 7.12)	6.66 (6.07 - 7.24)	6.77 (6.17 - 7.36)	ND	6.06*	9.18*
1-year cardiac readmission for revascularization	1.63 (1.38 - 1.88)	1.60 (1.30 - 1.90)	1.59 (1.29 - 1.90)	ND	ND	ND

	CABG				AVR	Combined CABG/AVR
	2011/2013	2013/2014	2014/2015	2015/2016	2011-2016	2011-2016
1-year post-catheterization	4.87 (4.44 - 5.30)	5.07 (4.55 - 5.60)	5.01 (4.49 - 5.54)	ND	ND	ND
Off-pump rate	17.37 (16.63 - 18.11)	17.20 (16.30 - 18.11)	18.75 (17.85 - 19.66)	18.48 (17.56 - 19.41)	ND	ND
Arterial graft rate	94.14 (93.72 - 94.55)	95.59 (95.08 - 96.09)	95.70 (95.21 - 96.20)	96.29 (95.79 - 96.80)	ND	67.64*

Abbreviations: CABG = coronary artery bypass graft; AVR = aortic valve replacement; ND = no data available; LOS = length of stay; MACE = major adverse cardiac events; CHF = congestive heart failure; *Observed rate reported; †Volume of surgeries used for calculating 1-year indicators are different than the value presented in table 1, see Appendix B for actual volumes; Note: 1-Year follow-up data was only available for those who had the procedure up until March 2015. Time periods – 2011/2013: October 1 2011 to March 31 2013; 2013/2014: April 1 2013 to March 31 2014; 2014/2015: April 1 2014 to March 31 2015; 2015/2016: April 1 2015 to March 31 2016.

Risk-adjusted in-hospital all-cause mortality rates (Tables 1 & 6), 30-day all-cause mortality rates (Tables 1 & 7), and 1-year all-cause mortality rates (Tables 1 & 8) following isolated CABG surgeries were low overall and relatively consistent at the province level during the reporting period.

The average mortality rates following isolated AVR surgery for the five years of this study remained low, with in-hospital and 30-day all-cause mortality rates similar to those observed for isolated CABG, however, 1-year all-cause mortality rates were slightly higher than those reported for isolated CABG surgery (Table 1). The mortality rates reported for combined CABG/AVR surgeries were higher than for either surgery on its own (Table 1).

Tables 36-38 demonstrate the prevalence of risk factors for patients undergoing isolated CABG surgery and isolated AVR and combined CABG/AVR surgery respectively. These risk factors remained relatively consistent over the period of this study.

Table 35 demonstrates the overall provincial distribution of risk factors by mortality for all three surgeries studied (isolated CABG, isolated AVR, or combined CABG/AVR). Females were found to have a higher mortality rate following all three surgeries than males.

Comparison of Cardiac Centre Results

Centre-specific risk-adjusted all-cause mortality rates were relatively consistent for isolated CABG and isolated AVR between all cardiac centres in the province of Ontario with more variation observed for combined CABG/AVR surgeries. Table 2 illustrates the provincial range of in-hospital, 30-day and 1-year risk-adjusted all-cause mortality rates and risk-adjusted LOS reported following isolated CABG, isolated AVR, combined CABG/AVR surgeries. Table 3 illustrates the variation of other cardiac surgery outcomes across the individual cardiac centers in Ontario. A more detailed presentation of the data including observed and risk-adjusted outcomes rate reported at each individual cardiac centre and for each individual year of the study can be found in Appendix B.

Table 2. Range of Risk-Adjusted All-Cause Mortality Rates and Post-Operative LOS across Individual Cardiac Centres in Ontario in 2011/16

	Isolated CABG	Isolated AVR	Combined CABG/AVR
In-hospital mortality	1.13 – 2.38	0 – 2.64	2.88 – 11.30
30-day mortality	0.96 – 2.28	0 – 2.04	2.37 – 6.05
1-year mortality	3.06 – 4.77	2.91 – 7.40	2.76 – 14.62
Post-operative LOS	6.33 – 9.26	7.46 – 11.72	9.88 – 17.83

For a more detailed presentation of the data see Appendix B Tables 6-9; 18-21; 26-29

Table 3. Range of Risk-Adjusted Cardiac Surgery Outcomes across Individual Cardiac Centres in Ontario in 2011/16

	Isolated CABG	Isolated AVR	Combined CABG/AVR
Blood transfusions - Red Blood Cells	23.25 – 43.95	15.34 – 45.73	38.6 – 67.98
30-day all-cause readmission	7.74 – 14.11	8.51 – 15.96	7.26 – 15.24
MACE rate 1-year post-procedure	6.66 – 10.87	2.92 – 9.27	6.41 – 17.56
1-year cardiac readmission (acute MI, unstable angina, CHF)	5.59 – 7.73	3.5 – 8.27	6.86 – 12.13
1-year readmission for revascularization	0.9 – 4.39	ND	ND
CATH rate 1-year post-procedure	3.7 – 7.91	ND	ND
Off-pump rate	0 – 76.15	ND	ND
Arterial graft rate	87.76 – 97.78	ND	47.37 – 81.8

For a more detailed presentation of the data see Appendix B Tables 10-17, 22-25, 30-34 ; MACE is a combination of death/MI readmission/revascularization; ND – No data.

Discussion

Results in Context

Table 4 compares the risk-adjusted 30-day all-cause mortality rates for the various cardiac surgeries reported in the province of Ontario to those reported by the Society of Thoracic Surgeons (STS). The STS is an international organization of thoracic surgeons that maintains one of the largest adult cardiac surgery databases in the world. In this report we have reported the in-hospital mortality rate, which includes all deaths that occur in-hospital regardless of length of stay, and the 30-day mortality rate, which includes all deaths that occur within 30 days of the surgery regardless of whether they occur. The STS reports a slightly different metric termed the risk-adjusted operative mortality rate, which is defined as all deaths that occur during the hospitalization in which the cardiac surgery was performed (regardless of length of stay) and any deaths within 30 days after the surgery, no matter where they occur. For this comparison we chose to compare the STS operative mortality rate to both the Ontario in-hospital mortality rate and the 30-day mortality rate. Risk-adjusted in-hospital and 30-day all-cause mortality rates reported in Ontario are less than or equal to the risk-adjusted operative mortality rate reported by STS for isolated CABG surgery and isolated AVR surgery. Risk-adjusted all-cause mortality rates reported in Ontario are similar or higher than the operative mortality rate reported by STS for the combined CABG/AVR surgery cohort. However, when making a direct comparison between the two data sets, consideration should be given to the fact that all-cause mortality rates reported in Ontario for Isolated AVR and Combined CABG/AVR surgical cohorts are observed rates, while STS rates are risk-adjusted. Also, the time periods reported for Ontario and the STS differ, as Ontario rates are measured over a period from October to March, or April to March, while STS reports for the calendar year (i.e., January to December). Despite these differences between the two data sets, using STS data as a comparison bench mark is a valuable method to put Ontario's cardiac surgery mortality rates into a broader context.

Table 4. Comparison of Risk-Adjusted In-Hospital Mortality and Risk-Adjusted 30-Day Mortality Rates Following Cardiac Surgery Reported in Ontario and by the Society of Thoracic Surgeons.

Isolated CABG				
Source of Outcomes Report	2011/2013	2013/2014	2014/2015†	2015/2016†
Province of Ontario (Risk-Adjusted In-Hospital Mortality)	1.89	1.67	1.98	1.75
Province of Ontario (Risk-Adjusted 30-Day Mortality)	1.75	1.59	1.94	1.59
Society of Thoracic Surgeons[6,7] (Risk-Adjusted Operative Mortality)	ND	ND	2.2	2.2
Isolated AVR				
Source of Outcomes Report	2011/2013	2013/2014	2014/2015†	2015/2016†
Province of Ontario (Observed In-Hospital Mortality)	1.72*			
Province of Ontario (Observed 30-Day Mortality)	1.49*			
Society of Thoracic Surgeons[6,7] (Risk-Adjusted Operative Mortality)	ND	ND	2.1	2.2
Combined CABG/AVR				
Source of Outcomes Report	2011/2013	2013/2014	2014/2015†	2015/2016†
Province of Ontario (Observed In-Hospital Mortality)	4.36*			
Province of Ontario (Observed 30-Day Mortality)	3.68*			
Society of Thoracic Surgeons[6,7] (Risk-Adjusted Operative Mortality)	ND	ND	3.9	3.3

The Society of Thoracic Surgeons defines Operative Mortality as all deaths that occur during the hospitalization in which the cardiac surgery was performed (regardless of length of stay) and any deaths within 30 days after the surgery, no matter where they occur; *Where provincial risk-adjusted rates were not available, only the observed rate was reported;†STS data for 2014/2015 includes only from January 1 2014 to December 31, 2015, STS data for 2015/2016 includes only from January 1 2016 to December 31 2016. Note: ND = No data available.

Limitations

Cardiac surgery report cards have proven to be very powerful tools to aid in quality improvement. They offer the opportunity to provide essential cardiac surgery outcomes data to members of the cardiac care sector as well as the general public. However, there are limitations to the current study that should be addressed.

Red blood cell transfusion rates were reported as quality indicators in this report. The method of risk adjustment of these outcomes must be considered when interpreting these data. Blood product transfusion rates were not risk adjusted according to preoperative hemoglobin levels as these values were not available. In addition, some of the risk factors considered in this study, risk factors that affect mortality, may not necessarily be the same as those that increase the need for a blood product transfusion.

The repeat cardiac CATH rate and the revascularization rate 1-year post-discharge were both used as quality indicators following isolated CABG surgery. When interpreting these results it is important to note that these indicators are affected by factors beyond the control of the cardiac surgery programs and individual cardiac surgeons. Variation in the practice of the physicians who are referring patients for these repeat procedures is a factor that will affect these rates considerably.

Similarly, the readmission rate for acute MI, unstable angina or CHF was used as a quality indicator for each of the cardiac surgeries studied. The limitation of using this readmission rate as an endpoint is that there isn't a qualitative way to measure the appropriateness of readmission. The readmission rate will be affected by the subjectivity of the physician responsible for the decision to readmit the patient.

Finally due to relatively low mortality rates measured following cardiac surgery, it now takes potentially only a few extra deaths for a hospital to become a "statistical outlier". Distinguishing between true outlier hospitals versus statistical outlier hospitals is becoming an increasing challenge. As such, for this report an analysis of statistical outlier hospitals was not presented as there wasn't confidence that any statistical outliers identified were in fact clinical outliers.

Despite these limitations, cardiac surgery outcomes reports are still necessary and important. This province wide cardiac surgery outcomes report provides both cardiac care providers and the general public with important information regarding the positive outcomes of cardiac surgery in this province and aids in identification of areas of improvement.

Conclusions

The growing emphasis for accountability has increased the demand for public reporting on the performance of healthcare providers and hospitals. Hospital report cards are being used increasingly to ensure that the high quality of care is delivered and support quality improvement. This Cardiac Surgery report represents an effort to track the case-mix and outcomes of patients undergoing isolated CABG surgery, isolated AVR surgery, or combined CABG/AVR surgery in Ontario.

One of the findings of this study is that risk-adjusted, in-hospital all-cause mortality rates in the province of Ontario following isolated CABG surgery, have remained relatively stable over the past eight years. In CorHealth Ontario's previous report, for the fiscal years of 2008/09, 2009/10 and 2010/11 risk-adjusted in-hospital all-cause mortality rates were reported to be 1.84%, 1.60%, and 1.74%, respectively.[1] In this study we report that the risk-adjusted in-hospital all-cause mortality rates following isolated CABG surgery were 1.89%, 1.67%, 1.98%, and 1.75% for the 2011/13, 2013/14, 2014/15, and 2015/16 study periods, respectively (Tables 1 & 6).

CABG surgery report cards have been in use in the province of Ontario for more than a decade.[1-5] A number of hospitals have launched quality improvement initiatives in response to the information contained in these reports. The information in this report suggest that they may have supported a positive impact as Ontario's mortality rates following CABG surgery are much lower than they were over ten to fifteen years ago.[3,4] However, we must continue to pursue excellence in clinical care and quality improvement initiatives to maintain low mortality rates and ensure the best possible outcomes for patients.

This study also reports on mortality rates following isolated AVR surgery and combined CABG/AVR surgery. This study identified that 1-year all-cause mortality rates and post-operative LOS were slightly higher for isolated AVR surgery than those for isolated CABG surgery; combined CABG/AVR surgery had an even higher rate of mortality and longer post-operative LOS. These data indicate that there may be a benefit to focus current and future quality improvement initiatives on improving practices for these surgeries.

For the past 20 years, CorHealth Ontario has worked with participating hospitals and care providers to improve the quality, efficiency, access and equity in the delivery of adult cardiac services in Ontario. Reports on health system and procedural outcomes are a resource to support continuous quality improvement efforts. As part of CorHealth Ontario's new corporate strategy, a key strategic direction established for the organization is to measure and report on quality and outcomes for cardiovascular care. As a first step towards this strategic direction, CorHealth has initiated a Quality Performance Measurement & Monitoring (QPMM) Cycle with all 20 advanced cardiac programs in

Ontario to provide a platform for regular measuring and monitoring of quality metrics for cardiac care across the province. The QPMM initiative was developed in conjunction with ongoing cardiac planning processes with all 19 advanced cardiac programs and their associated LHINs, with oversight from the MOHLTC. In addition to reporting on quality of care (safe, effective, timely, efficient, equitable, and patient-centered), through this process we will also share key information of patient outcomes. Where feasible and/or appropriate quality of care will be linked with these outcomes. We look forward to continuing to work together with all stakeholders to ensure that all Ontarians have access to the highest possible quality of cardiac care.

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APPENDIX A

Additional Methods

Model Development and Analysis

The model development techniques used were similar to those in previous reports.[1] These models were created to permit statistical adjustment for patient case-mix at each centre prior to the comparison of outcomes.

A list of potential covariates for inclusion in the regression models was produced by consulting the literature (i.e., Society of Thoracic Surgeons Cardiac surgery risk models, New York State adult cardiac surgery models, and EuroSCORE). Based on data availability, data quality or clinical judgment, some covariates were eliminated from consideration.

Risk factors with p-values less than 0.25 at the univariate level (done separately for isolated CABG, isolated valve and combined CABG and AVR) were included in the backwards elimination model selection step.

For each cohort and outcome, backwards elimination at level 0.05 was performed for model selection; therefore, different covariates may be present for each outcome in the regression model. Risk adjustment models are provided in Appendix B.

For logistic regression models, the model's predictive power was measured with the c statistic, which is equal to the area under the receiver operating characteristic (ROC) curve. The Hosmer-Lemeshow goodness-of-fit statistic was used to assess model fit.

Yearly-risk adjusted outcomes by cardiac centre were calculated as the observed outcome divided by the expected outcome for an institution multiplied by the observed outcome for the province in that year. The overall expected outcome by institution was calculated as the sum (in-hospital all-cause mortality, 30-day all-cause mortality, 1-year all-cause mortality) or the mean (post-operative LOS) of the individual expected outcomes for each individual centre. Risk adjusted outcomes can be interpreted as the outcome that would be expected if each centre's case mix were identical to the provincial average.

For the longitudinal trend analysis of in-hospital all-cause mortality from 2011/2013 to 2015/2016, a risk model was derived based on the entire cohort. Yearly risk-adjusted all-cause mortality rates were calculated as the observed rate divided by the expected rate based on the statistical model multiplied by the overall provincial observed rate. This analysis allowed for trends in mortality rates across years to be identified.

Data linkage

The data linkage and creation steps followed were similar to those used in previous report cards. As such, patients who were classified by CorHealth Ontario as isolated CABG, isolated AVR or combined CABG/AVR, but who had other cardiac procedures listed on their linked CIHI record were excluded. Table 5 outlines the data linkage steps and the processes used to generate the final data sets. Starting with the CorHealth Ontario 2011/2012 to 2015/2016 files, only those records for isolated CABG, isolated AVR or combined CABG/AVR were retained for data linkage. In the case where a patient had more than one procedure in the same year, only the record for the first procedure was retained.

Data linkage between CorHealth Ontario records and CIHI discharge abstracts was performed on health card number, institution and procedure date. Provincial health card numbers were converted to a unique ICES encrypted Health Card Number (IKN) and used for data linkage.

To create the final analysis data set, records found in the CIHI database but not the CorHealth Ontario database, were excluded. The analysis data set was further restricted to those cases with isolated CABG, isolated AVR or combined CABG/AVR surgery. For this definition a case had to (a) be identified as either isolated CABG, isolated AVR, or combined surgery in CorHealth Ontario data (b) have no other valve or cardiac procedures performed during the same admission. For isolated AVR surgery and Combined CABG/AVR surgery, the following were identified by OHIP billing and excluded:

- Aortic valvotomy
- Modified Bentall
- Valve sparing aortic valve root replacement
- Replacement of ascending aorta
- Replacement of aortic arch
- Subaortic myectomy
- Aortic dissection
- Aortic valve repair

To capture 30-day and 1-year all-cause mortality, the records were linked by encrypted health card number/IKN to the RPDB to obtain out-of-hospital dates of death (Table 5). Therefore, the analysis for all indicators was restricted to those records that had a valid health card number and could be linked to the RPDB. Accordingly, non-Ontario residents who had isolated CABG, isolated AVR or combined CABG/AVR surgery in Ontario were not included in the analysis. One-year follow-up data was available for only those who had procedures up until March 2015.

APPENDIX B

Table 5a. Summary of data linkage and cohort creation for isolated CABG surgery

CorHealth Ontario data from October 2011 – March 2016	
-Include patients with valid Health Card Number, age >= 18, and offlist for Procedure Started	N=413,224
-Only keep patients who had CABG surgery, exclude aortic, mitral or other valve surgeries	N=29,945
-For each patient only keep one procedure per year	N=29,895
Link to CIHI DAD data to get the hospitalization data for each procedure	N=29,395
Link to RPDB data to get the death date for each patient and clean data (remove those with procedure date after death date)	N=29,385
Exclude patients who are non-Ontario residents on procedure date	N=29,352
Exclude those who are not eligible for OHIP coverage on procedure date	N=29,308
The final cohort for analysis	**N=29,308**

Table 5b. Summary of data linkage and cohort creation for isolated AVR and combined CABG/AVR surgery

CorHealth Ontario data from October 2011 – March 2016	AVR	CABG/AVR
-Include patients with valid Health Card Number, age >= 18, and offlist for Procedure Started	N=413,224	N=413,224
-For isolated AVR surgery only keep patients who had Aortic Valve Replacement surgery, exclude all who had mitral or other valve surgeries, TAVI, CABG procedure -For combined CABG/AVR surgeries only keep patients who had Aortic Valve Replacement surgery and CABG, exclude all who had mitral or other valve surgeries, TAVI	N=4,606	N=3,758
-For each patient only keep one procedure per year	N=4,598	N=3,758
Link to OHIP to get OHIP billing for the procedure. Keep patients who had Aortic Valve Replacement and exclude those who had an OHIP claim for Aortic valvotomy, Modified Bentall, Valve sparing aortic valve root replacement, Replacement for ascending aorta, Replacement of aortic arch, Subaortic myectomy, Aortic dissection, Aortic valve repair	N=4,127	N=3,332
Link to CIHI DAD data to get the hospitalization data for each procedure	N=3,961	N=3,266
Link to RPDB to get the death rate for each patient and clean data (remove those with procedure date after death date)	N=3,961	N=3,260
Exclude patients who are non-Ontario residents on procedure date and who were not eligible for OHIP coverage on the procedure date	N=3,953	
The final cohort for analysis	**N=3,953**	**N=3,260**

Table 6a. Observed and risk-adjusted in-hospital all-cause mortality rates by hospital following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	2.75	2.48	2.03 (1.71 – 2.34)
HSN	1309	2.37	1.84	2.35 (1.66 – 3.04)
KGH	1834	1.2	1.64	1.34 (0.70 – 1.97)
LHSC	3538	2.09	1.88	2.03 (1.62 – 2.45)
SHSC	1627	1.23	1.23	1.83 (1.04 – 2.61)
SMGH	1905	1.31	1.63	1.47 (0.84 – 2.09)
SMH	2814	1.56	1.5	1.91 (1.37 – 2.44)
SRHC	3068	1.56	1.93	1.48 (1.03 – 1.93)
THP	3706	1.7	1.64	1.90 (1.46 – 2.34)
UHN	2474	2.18	1.67	2.38 (1.85 – 2.91)
UOHI	2522	1.19	1.92	1.13 (0.64 – 1.62)
Ontario	29308	1.83		

*In-hospital mortality: CIHI DAD

Table 6b. Observed and risk-adjusted in-hospital all-cause mortality rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	3.27	2.48	2.41 (1.86 – 2.96)
HSN	426	2.11	1.72	2.24 (0.95 – 3.53)
KGH	613	1.47	1.61	1.67 (0.56 – 2.77)
LHSC	1151	1.91	1.96	1.78 (1.09 – 2.48)
SHSC	522	1.72	1.46	2.16 (0.89 – 3.42)
SMGH	644	2.02	1.7	2.17 (1.13 – 3.22)
SMH	950	2	1.53	2.38 (1.47 – 3.30)
SRHC	1062	1.32	1.91	1.26 (0.49 – 2.03)
THP	1195	1.51	1.63	1.68 (0.90 – 2.47)
UHN	842	1.54	1.79	1.57 (0.69 – 2.45)
UOHI	801	1.62	2.1	1.41 (0.60 – 2.22)
Ontario	9675	1.93	1.87	1.89 (1.63 - 2.14)

*In-hospital mortality: CIHI DAD

Table 6c. Observed and risk-adjusted in-hospital all-cause mortality rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	2.57	2.23	2.11 (1.43 – 2.79)
HSN	292	2.74	2.08	2.40 (1.10 – 3.70)
KGH	422	0.71	1.64	0.79 (0.00 – 2.12)
LHSC	809	1.73	1.88	1.68 (0.80 – 2.57)
SHSC	343	1.46	1.24	2.15 (0.45 – 3.85)
SMGH	431	0.93	1.7	0.99 (0.00 – 2.28)
SMH	652	1.69	1.6	1.93 (0.86 – 2.99)
SRHC	675	1.48	2.11	1.28 (0.37 – 2.19)
THP	832	0.96	1.66	1.06 (0.13 – 1.99)
UHN	557	2.51	1.53	3.00 (1.80 – 4.20)
UOHI	519	1.35	2.16	1.14 (0.13 – 2.15)
Ontario	6582	1.69	1.84	1.67 (1.36 - 1.98)

*In-hospital mortality: CIHI DAD

Table 6d. Observed and risk-adjusted in-hospital all-cause mortality rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	2.43	2.31	1.92 (1.24 – 2.61)
HSN	294	3.40	2.14	2.91 (1.56 – 4.26)
KGH	414	1.21	1.61	1.37 (0.01 – 2.72)
LHSC	763	2.23	1.84	2.21 (1.29 – 3.14)
SHSC	387	0.78	1	1.42 (0.00 – 3.22)
SMGH	402	0.75	1.62	0.84 (0.00 – 2.21)
SMH	648	1.39	1.37	1.85 (0.67 – 3.02)
SRHC	676	2.07	1.73	2.19 (1.17 – 3.21)
THP	862	1.86	1.64	2.06 (1.17 – 2.96)
UHN	516	3.1	1.64	3.44 (2.25 – 4.64)
UOHI	589	0.85	1.56	0.99 (0.00 – 2.12)
Ontario	6578	1.87	1.72	1.98 (1.66 - 2.30)

*In-hospital mortality: CIHI DAD

Table 6e. Observed and risk-adjusted in-hospital all-cause mortality rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	2.49	2.92	1.56 (0.95 – 2.17)
HSN	297	1.35	1.46	1.68 (0.04 – 3.31)
KGH	385	1.3	1.7	1.40 (0.03 – 2.76)
LHSC	815	2.58	1.8	2.61 (1.72 – 3.51)
SHSC	375	0.8	1.14	1.28 (0.00 – 2.97)
SMGH	428	1.17	1.49	1.43 (0.04 – 2.83)
SMH	564	0.89	1.47	1.10 (0.00 – 2.28)
SRHC	655	1.53	1.98	1.41 (0.45 – 2.37)
THP	817	2.57	1.61	2.91 (1.97 – 3.85)
UHN	559	1.97	1.66	2.16 (1.08 – 3.25)
UOHI	613	0.82	1.81	0.82 (0.00 – 1.85)
Ontario	6473	1.76	1.84	1.75 (1.44 - 2.06)

*In-hospital mortality: CIHI DAD

Table 7a. Observed and risk-adjusted 30-day all-cause mortality rates by hospital following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	2.59	2.25	1.98 (1.67 – 2.29)
HSN	1309	1.99	1.74	1.96 (1.29 – 2.63)
KGH	1834	1.31	1.55	1.46 (0.84 – 2.07)
LHSC	3538	2.09	1.73	2.08 (1.66 – 2.49)
SHSC	1627	1.11	1.21	1.57 (0.83 – 2.32)
SGH	1905	1.21	1.59	1.31 (0.71 – 1.91)
SMH	2814	1.24	1.41	1.52 (1.00 – 2.04)
SRHC	3068	1.53	1.82	1.45 (1.01 – 1.89)
THP	3706	1.67	1.59	1.81 (1.39 – 2.23)
UHN	2474	2.1	1.58	2.28 (1.76 – 2.80)
UOHI	2522	1.03	1.85	0.96 (0.49 – 1.43)
Ontario	29308	1.72		

*30-day mortality: RPDB

Table 7b. Observed and risk-adjusted 30-day all-cause mortality rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	2.86	2.25	2.19 (1.64 – 2.74)
HSN	426	1.17	1.65	1.22 (0.00 – 2.47)
KGH	613	1.79	1.52	2.03 (0.95 – 3.11)
LHSC	1151	2.09	1.8	1.99 (1.29 – 2.69)
SHSC	522	1.34	1.42	1.62 (0.41 – 2.83)
SMGH	644	1.86	1.67	1.92 (0.93 – 2.92)
SMH	950	1.47	1.46	1.74 (0.85 – 2.62)
SRHC	1062	1.22	1.79	1.18 (0.42 – 1.93)
THP	1195	1.59	1.61	1.70 (0.95 – 2.44)
UHN	842	1.54	1.7	1.56 (0.70 – 2.42)
UOHI	801	1.75	2.01	1.50 (0.70 – 2.29)
Ontario	9675	1.8	1.77	1.75 (1.50 – 2.00)

*30-day mortality: RPDB

Table 7c. Observed and risk-adjusted 30-day all-cause mortality rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	2.29	2.04	1.93 (1.25 – 2.61)
HSN	292	2.05	1.92	1.84 (0.53 – 3.15)
KGH	422	0.95	1.54	1.06 (0.00 – 2.35)
LHSC	809	1.73	1.73	1.72 (0.85 – 2.60)
SHSC	343	1.75	1.22	2.46 (0.84 – 4.07)
SMGH	431	0.93	1.65	0.97 (0.00 – 2.20)
SMH	652	1.23	1.48	1.43 (0.37 – 2.49)
SRHC	675	1.78	1.92	1.60 (0.69 – 2.50)
THP	832	1.08	1.62	1.15 (0.26 – 2.04)
UHN	557	2.33	1.48	2.71 (1.56 – 3.86)
UOHI	519	0.96	2.01	0.83 (0.00 – 1.83)
Ontario	6582	1.6	1.72	1.59 (1.29 – 1.90)

*30-day mortality: RPDB

Table 7d. Observed and risk-adjusted 30-day all-cause mortality rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	2.73	2.11	2.22 (1.53 – 2.90)
HSN	294	3.40	1.99	2.93 (1.60 – 4.26)
KGH	414	1.21	1.52	1.37 (0.05 – 2.68)
LHSC	763	2.23	1.69	2.26 (1.35 – 3.17)
SHSC	387	0.78	0.98	1.36 (0.00 – 3.07)
SMGH	402	0.75	1.54	0.83 (0.00 – 2.15)
SMH	648	1.23	1.3	1.63 (0.49 – 2.77)
SRHC	676	1.78	1.66	1.84 (0.85 – 2.82)
THP	862	1.86	1.6	2.00 (1.14 – 2.86)
UHN	516	3.1	1.56	3.41 (2.26 – 4.57)
UOHI	589	0.51	1.53	0.57 (0.00 – 1.65)
Ontario	6578	1.84	1.63	1.94 (1.62 – 2.25)

*30-day mortality: RPDB

Table 7e. Observed and risk-adjusted 30-day all-cause mortality rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	2.38	2.65	1.54 (0.93 – 2.15)
HSN	297	1.68	1.46	1.99 (0.44 – 3.54)
KGH	385	1.04	1.63	1.10 (0.00 – 2.41)
LHSC	815	2.33	1.68	2.39 (1.52 – 3.26)
SHSC	375	0.53	1.13	0.81 (0.00 – 2.40)
SMGH	428	0.93	1.43	1.12 (0.00 – 2.46)
SMH	564	0.89	1.35	1.13 (0.00 – 2.30)
SRHC	655	1.53	1.92	1.36 (0.44 – 2.28)
THP	817	2.2	1.52	2.49 (1.57 – 3.41)
UHN	559	1.79	1.52	2.02 (0.93 – 3.11)
UOHI	613	0.65	1.8	0.63 (0.00 – 1.60)
Ontario	6473	1.61	1.74	1.59 (1.29 – 1.89)

*30-day mortality: RPDB

Table 8a. Observed and risk-adjusted 1-year all-cause mortality rates by hospital following isolated CABG surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	3546	5.78	4.84	4.70 (4.16 – 5.24)
HSN	1012	4.94	4.08	4.77 (3.66 – 5.88)
KGH	1449	2.69	3.47	3.06 (2.01 – 4.10)
LHSC	2723	4.92	4.16	4.66 (3.99 – 5.33)
SHSC	1252	2.32	2.96	3.08 (1.86 – 4.30)
SMGH	1477	3.32	3.74	3.49 (2.51 – 4.48)
SMH	2250	3.64	3.42	4.20 (3.37 – 5.03)
SRHC	2413	3.36	4.2	3.14 (2.43 – 3.86)
THP	2889	2.87	3.54	3.19 (2.48 – 3.91)
UHN	1915	4.28	3.73	4.51 (3.65 – 5.37)
UOHI	1909	3.4	4.1	3.27 (2.46 – 4.08)
Ontario	22835	3.94		

*1-year mortality: RPDB; **1-year follow-up data was only available for those who had the procedure up until March 2015

Table 8b. Observed and risk-adjusted 1-year all-cause mortality rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	6.26	5.20	4.74 (3.94 – 5.55)
HSN	426	3.99	3.75	4.19 (2.35 – 6.03)
KGH	613	3.1	3.54	3.45 (1.86 – 5.04)
LHSC	1151	5.04	4.12	4.82 (3.79 – 5.84)
SHSC	522	3.26	3.24	3.96 (2.16 – 5.76)
SMGH	644	4.19	3.88	4.26 (2.80 – 5.71)
SMH	950	3.79	3.41	4.37 (3.09 – 5.66)
SRHC	1062	3.01	4.15	2.86 (1.77 – 3.95)
THP	1195	2.85	3.57	3.14 (2.02 – 4.25)
UHN	842	3.33	3.91	3.35 (2.09 – 4.60)
UOHI	801	4.24	4.26	3.93 (2.71 – 5.14)
Ontario	9675	4.07	4.03	3.98 (3.62 – 4.35)

*1-year mortality: RPDB

Table 8c. Observed and risk-adjusted 1-year all-cause mortality rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	5.52	4.42	4.92 (3.88 – 5.96)
HSN	292	4.79	4.18	4.51 (2.54 – 6.49)
KGH	422	1.66	3.44	1.90 (0.00 – 3.84)
LHSC	809	3.96	4.12	3.78 (2.53 – 5.03)
SHSC	343	2.33	2.93	3.13 (0.79 – 5.47)
SMGH	431	2.32	3.73	2.45 (0.61 – 4.28)
SMH	652	4.45	3.6	4.86 (3.37 – 6.36)
SRHC	675	3.7	4.59	3.17 (1.89 – 4.46)
THP	832	2.64	3.57	2.91 (1.57 – 4.25)
UHN	557	4.49	3.46	5.11 (3.43 – 6.80)
UOHI	519	3.28	4.57	2.82 (1.36 – 4.27)
Ontario	6582	3.75	3.95	3.74 (3.29 – 4.19)

*1-year mortality: RPDB

Table 8d. Observed and risk-adjusted 1-year all-cause mortality rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	5.36	4.76	4.43 (3.41 – 5.44)
HSN	294	6.46	4.45	5.71 (3.76 – 7.67)
KGH	414	3.14	3.4	3.64 (1.64 – 5.61)
LHSC	763	5.77	4.25	5.34 (4.07 – 6.60)
SHSC	387	1.03	2.6	1.56 (0.00 – 3.91)
SMGH	402	2.99	3.53	3.33 (1.38 – 5.28)
SMH	648	2.62	3.24	3.19 (1.58 – 4.80)
SRHC	676	3.55	3.9	3.59 (2.16 – 5.01)
THP	862	3.13	3.48	3.55 (2.24 – 4.85)
UHN	516	5.62	3.75	5.91 (4.25 – 7.56)
UOHI	589	2.38	3.46	2.70 (1.08 – 4.32)
Ontario	6578	3.92	3.80	4.07 (3.61 – 4.52)

*1-year mortality: RPDB; **1-year follow-up data was only available for those who had the procedure up until March 2015

Table 9a. Observed and risk-adjusted post-operative LOS (in days) following isolated CABG surgery in 2011/16

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	8.4	8.4	7.85 (7.67 – 8.01)
HSN	7.42	7.71	7.56 (7.23 – 7.87)
KGH	6.66	7.17	7.30 (7.07 – 7.53)
LHSC	7.87	8.03	7.69 (7.50 – 7.89)
SHSC	8.51	7.25	9.23 (8.92 – 9.54)
SMGH	7.99	7.83	8.01 (7.79 – 8.23)
SMH	7.47	7.37	7.96 (7.74 – 8.17)
SRHC	6.53	8.1	6.33 (6.17 – 6.50)
THP	7.39	7.66	7.58 (7.41 – 7.76)
UHN	8.47	7.9	8.42 (8.18 – 8.68)
UOHI	9.54	8.09	9.26 (9.00 – 9.52)
Ontario	7.85		

*Patients who died in hospital were excluded; patients whose post-operative LOS exceeded the 99th percentile were trimmed to the 99th percentile; **LOS: CIHI DAD

Table 9b. Observed and risk-adjusted post-operative LOS (in days) following isolated CABG surgery in 2011/13

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	9.05	8.46	8.40 (8.01 – 8.80)
HSN	7.56	7.73	7.68 (7.19 – 8.20)
KGH	6.44	7.24	6.99 (6.49 – 7.53)
LHSC	7.97	7.99	7.84 (7.48 – 8.18)
SHSC	8.65	7.47	9.10 (8.58 – 9.67)
SMGH	8.12	7.85	8.12 (7.73 – 8.47)
SMH	7.76	7.46	8.17 (7.79 – 8.57)
SRHC	6.85	8.04	6.69 (6.41 – 7.02)
THP	7.58	7.69	7.75 (7.40 – 8.06)
UHN	8.57	7.96	8.46 (8.04 – 8.96)
UOHI	9.72	8.05	9.48 (9.02 – 9.98)
Ontario	8.07	7.88	8.04 (7.90 – 8.16)

*Patients who died in hospital were excluded; patients whose post-operative LOS exceeded the 99th percentile were trimmed to the 99th percentile; **LOS: CIHI DAD

Table 9c. Observed and risk-adjusted post-operative LOS (in days) following isolated CABG surgery in 2013/14

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	8.06	8.17	7.74 (7.45 – 8.08)
HSN	7.72	7.6	7.97 (7.17 – 8.85)
KGH	6.31	7.05	7.03 (6.49 – 7.58)
LHSC	7.69	8.13	7.43 (7.06 – 7.79)
SHSC	7.94	7.3	8.54 (7.91 – 9.24)
SMGH	8.17	7.84	8.18 (7.76 – 8.66)
SMH	7.6	7.48	7.98 (7.50 – 8.52)
SRHC	6.22	8.23	5.94 (5.66 – 6.28)
THP	7.48	7.73	7.60 (7.22 – 8.08)
UHN	8.18	7.92	8.12 (7.67 – 8.58)
UOHI	9.86	8.29	9.34 (8.77 – 9.91)
Ontario	7.73	7.87	7.72 (7.59 – 7.85)

*Patients who died in hospital were excluded; patients whose post-operative LOS exceeded the 99th percentile were trimmed to the 99th percentile; **LOS: CIHI DAD

Table 9d. Observed and risk-adjusted post-operative LOS (in days) following isolated CABG surgery in 2014/15

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	8.18	8.37	7.67 (7.29 – 8.05)
HSN	7.98	7.91	7.92 (7.15 – 8.70)
KGH	6.81	7.01	7.62 (7.07 – 8.15)
LHSC	7.89	8.11	7.64 (7.25 – 8.07)
SHSC	8.71	7.09	9.65 (9.04 – 10.28)
SMGH	7.79	7.81	7.84 (7.42 – 8.28)
SMH	7.24	7.29	7.80 (7.40 – 8.22)
SRHC	6.42	8.03	6.27 (5.90 – 6.70)
THP	7.36	7.59	7.62 (7.23 – 8.03)
UHN	8.44	7.9	8.39 (7.93 – 8.86)
UOHI	9.4	7.91	9.34 (8.78 – 9.93)
Ontario	7.81	7.80	7.86 (7.70 – 8.01)

**Patients who died in hospital were excluded; patients whose post-operative LOS exceeded the 99th percentile were trimmed to the 99th percentile; **LOS: CIHI DAD

Table 9e. Observed and risk-adjusted post-operative LOS (in days) following isolated CABG surgery in 2015/16

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	8.02	8.60	7.33 (7.00 – 7.64)
HSN	6.4	7.59	6.62 (6.19 – 7.11)
KGH	7.26	7.38	7.73 (7.15 – 8.39)
LHSC	7.88	7.93	7.80 (7.40 – 8.22)
SHSC	8.65	7.05	9.63 (8.93 – 10.42)
SMGH	7.8	7.81	7.85 (7.42 – 8.31)
SMH	7.1	7.17	7.77 (7.28 – 8.27)
SRHC	6.45	8.13	6.23 (5.92 – 6.58)
THP	7.05	7.62	7.27 (6.95 – 7.64)
UHN	8.63	7.79	8.70 (8.25 – 9.15)
UOHI	9.19	8.17	8.84 (8.36 – 9.27)
Ontario	7.71	7.85	7.71 (7.57 – 7.85)

*Patients who died in hospital were excluded; patients whose post-operative LOS exceeded the 99th percentile were trimmed to the 99th percentile; **LOS: CIHI DAD

Table 10a. Observed and risk-adjusted red blood cell transfusion rates following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	47.95	37.93	43.95 (42.79-45.11)
HSN	1309	40.87	34.58	41.10 (38.74-43.46)
KGH	1834	35.61	35.01	35.36 (33.36-37.36)
LHSC	3538	23.77	33.88	24.40 (22.95-25.84)
SHSC	1627	32.64	30.23	37.55 (35.18-39.91)
SMGH	1905	23.73	35.48	23.25 (21.33-25.18)
SMH	2814	38.1	33.4	39.66 (38.01-41.31)
SRHC	3068	31.65	35	31.44 (29.92-32.96)
THP	3706	29.06	34.3	29.46 (28.05-30.86)
UHN	2474	37.35	34.33	37.83 (36.11-39.54)
UOHI	2522	38.54	35.06	38.22 (36.56-39.88)
Ontario	29308	34.77		

*CIHI DAD

Table 10b. Observed and risk-adjusted red blood cell transfusion rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	50.31	37.93	46.12 (44.09 - 48.15)
HSN	426	42.49	35.18	42.00 (37.93 - 46.06)
KGH	613	36.05	34.24	36.61 (33.09 - 40.13)
LHSC	1151	26.76	32.93	28.26 (25.66 - 30.85)
SHSC	522	40.61	31.71	44.53 (40.49 - 48.58)
SMGH	644	20.65	38.7	18.55 (15.45 - 21.66)
SMH	950	38.95	33.46	40.47 (37.62 - 43.32)
SRHC	1062	34.27	35.31	33.75 (31.19 - 36.31)
THP	1195	26.53	34.5	26.74 (24.28 - 29.20)
UHN	842	39.43	34.9	39.29 (36.39 - 42.19)
UOHI	801	43.32	34.68	43.44 (40.47 - 46.41)
Ontario	9675	36.42	35.01	36.17 (35.32-37.03)

*CIHI DAD

Table 10c. Observed and risk-adjusted red blood cell transfusion rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	46.00	37.16	43.05 (40.60 - 45.50)
HSN	292	41.78	34.23	42.44 (37.45 - 47.44)
KGH	422	35.31	34.6	35.49 (31.26 - 39.72)
LHSC	809	25.34	34.93	25.22 (22.27 - 28.18)
SHSC	343	29.15	30.88	32.83 (27.79 - 37.88)
SMGH	431	25.29	33.78	26.03 (21.82 - 30.25)
SMH	652	38.5	34.15	39.20 (35.84 - 42.57)
SRHC	675	30.81	35.73	29.99 (26.81 - 33.16)
THP	832	29.45	35.73	28.65 (25.79 - 31.52)
UHN	557	33.93	35.54	33.20 (29.69 - 36.72)
UOHI	519	43.16	36.46	41.16 (37.64 - 44.68)
Ontario	6582	34.72	35.22	34.27 (33.24-35.30)

*CIHI DAD

Table 10d. Observed and risk-adjusted red blood cell transfusion rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	47.71	38.08	43.57 (41.15 - 46.00)
HSN	294	39.12	35.32	38.51 (33.63 - 43.39)
KGH	414	37.44	35.74	36.42 (32.24 - 40.60)
LHSC	763	22.94	35.2	22.66 (19.65 - 25.67)
SHSC	387	24.29	28.9	29.22 (24.21 - 34.23)
SMGH	402	26.12	33.82	26.86 (22.52 - 31.20)
SMH	648	37.65	33.01	39.66 (36.16 - 43.16)
SRHC	676	30.62	34.65	30.73 (27.43 - 34.03)
THP	862	27.15	33.54	28.14 (25.18 - 31.11)
UHN	516	37.79	34.14	38.49 (34.71 - 42.27)
UOHI	589	34.13	33.34	35.59 (31.98 - 39.19)
Ontario	6578	33.67	34.94	33.94 (32.89-35.00)

*CIHI DAD

Table 10e. Observed and risk-adjusted red blood cell transfusion rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	46.74	38.64	42.06 (39.61 - 44.50)
HSN	297	39.39	33.32	41.10 (35.93 - 46.28)
KGH	385	33.25	35.91	32.20 (27.97 - 36.42)
LHSC	815	18.77	32.94	19.82 (16.73 - 22.91)
SHSC	375	33.33	28.93	40.07 (34.98 - 45.16)
SMGH	428	24.53	33.92	25.15 (20.95 - 29.35)
SMH	564	36.7	32.87	38.82 (35.11 - 42.54)
SRHC	655	29.31	34.11	29.88 (26.52 - 33.24)
THP	817	34.39	33.38	35.83 (32.75 - 38.91)
UHN	559	37.21	32.46	39.85 (36.06 - 43.64)
UOHI	613	32.63	36.04	31.48 (28.16 - 34.79)
Ontario	6473	33.48	34.24	34.00 (32.94-35.06)

*CIHI DAD

Table 11a. Observed and risk-adjusted 30-day all-cause readmission rates following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	10.09	10.27	9.57 (8.74-10.40)
HSN	1309	12.99	9.91	12.78 (11.20-14.35)
KGH	1834	11.5	10.67	10.51 (9.23-11.79)
LHSC	3538	9.69	9.72	9.72 (8.75-10.69)
SHSC	1627	12.35	8.54	14.11 (12.56-15.65)
SMGH	1905	7.66	9.3	8.03 (6.67-9.39)
SMH	2814	8.99	9.47	9.26 (8.15-10.36)
SRHC	3068	10.1	10.14	9.72 (8.70-10.73)
THP	3706	8.69	9.27	9.14 (8.17-10.12)
UHN	2474	7.72	9.72	7.74 (6.59-8.90)
UOHI	2522	10.11	9.79	10.07 (8.92-11.21)
Ontario	29308	9.75		

*CIHI DAD

Table 11b. Observed and risk-adjusted 30-day all-cause readmission rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	10.35	10.42	9.68 (8.23 - 11.12)
HSN	426	13.38	10.09	12.93 (10.19 – 15.66)
KGH	613	13.05	10.24	12.42 (10.16 - 14.69)
LHSC	1151	9.73	9.57	9.91 (8.20 - 11.63)
SHSC	522	13.03	8.65	14.67 (11.97 - 17.37)
SMGH	644	7.14	9.22	7.55 (5.21 - 9.90)
SMH	950	9.16	9.27	9.63 (7.70 - 11.55)
SRHC	1062	11.21	10.07	10.85 (9.11 - 12.58)
THP	1195	9.71	9.33	10.15 (8.44 - 11.86)
UHN	842	7.48	9.82	7.42 (5.45 - 9.40)
UOHI	801	10.24	9.65	10.34 (8.29 - 12.38)
Ontario	9675	10.15	9.72	10.18 (9.60-10.77)

*CIHI DAD

Table 11c. Observed and risk-adjusted 30-day all-cause readmission rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	8.86	9.93	8.69 (6.94 - 10.45)
HSN	292	14.04	9.89	13.85 (10.51 - 17.18)
KGH	422	11.85	10.97	10.53 (7.90 -13.150)
LHSC	809	11	9.9	10.83 (8.83 - 12.84)
SHSC	343	12.54	8.48	14.41 (11.04 - 17.78)
SMGH	431	7.19	9.32	7.52 (4.67 - 10.37)
SMH	652	7.67	9.72	7.69 (5.43 - 9.95)
SRHC	675	11.7	10.32	11.05 (8.91 - 13.19)
THP	832	8.53	9.48	8.78 (6.75 - 10.81)
UHN	557	8.08	9.79	8.04 (5.61 - 10.48)
UOHI	519	9.25	10	9.02 (6.53 - 11.51)
Ontario	6582	9.72	9.83	9.64 (8.93-10.35)

*CIHI DAD

Table 11d. Observed and risk-adjusted 30-day all-cause readmission rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	10.32	10.27	9.80 (8.05 - 11.54)
HSN	294	15.65	10.12	15.07 (11.79 - 18.35)
KGH	414	10.87	11.39	9.30 (6.70-11.90)
LHSC	763	10.88	9.94	10.67 (8.61 - 12.73)
SHSC	387	10.08	8.38	11.73 (8.54 - 14.92)
SMGH	402	6.72	9.3	7.04 (4.09 - 10.00)
SMH	648	9.88	9.59	10.04 (7.75 - 12.32)
SRHC	676	7.1	10.09	6.86 (4.69 - 9.04)
THP	862	8.93	9.06	9.61 (7.56 - 11.66)
UHN	516	7.36	9.63	7.46 (4.90 - 10.01)
UOHI	589	10.19	9.45	10.51 (8.10 - 12.93)
Ontario	6578	9.62	9.76	9.61 (8.90-10.32)

*CIHI DAD

Table 11e. Observed and risk-adjusted 30-day all-cause readmission rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	10.78	10.41	10.09 (8.30 - 11.87)
HSN	297	8.75	9.45	9.03 (5.62 – 12.43)
KGH	385	9.35	10.26	8.89 (6.03 - 11.74)
LHSC	815	7.24	9.56	7.38 (5.34 - 9.42)
SHSC	375	13.6	8.6	15.42 (12.23 - 18.62)
SMGH	428	9.81	9.43	10.15 (7.30 - 12.99)
SMH	564	9.22	9.35	9.61 (7.12 - 12.10)
SRHC	655	9.77	10.1	9.43 (7.22 - 11.64)
THP	817	7.1	9.18	7.54 (5.45 - 9.63)
UHN	559	8.05	9.57	8.20 (5.74 -10.66)
UOHI	613	10.6	10.13	10.20 (7.93 - 12.48)
Ontario	6473	9.30	9.7	9.34 (8.63-10.06)

*CIHI DAD

Table 12a. Observed and risk-adjusted MACE rates 1-year post-procedure following isolated CABG surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	3546	10.58	9.94	9.11 (8.30-9.93)
HSN	1012	10.47	8.65	10.38 (8.73-12.03)
KGH	1449	6.76	8.24	7.03 (5.59-8.48)
LHSC	2723	9.62	8.82	9.35 (8.35-10.35)
SHSC	1252	8.55	6.85	10.69 (8.97-12.41)
SMGH	1477	7.58	8.3	7.83 (6.41-9.25)
SMH	2250	9.91	7.81	10.87 (9.69-12.06)
SRHC	2413	7.63	8.96	7.29 (6.24-8.35)
THP	2889	6.27	8.07	6.66 (5.63-7.68)
UHN	1915	8.88	8.27	9.20 (7.96-10.44)
UOHI	1909	7.28	8.67	7.20 (6.00-8.40)
Ontario	22835	8.57		

*A combination of Death/MI readmission/Revascularization. **Only applies to patients discharged alive. 1-year follow-up data was only available for those who had the procedure up until March 2015

Table 12b. Observed and risk-adjusted MACE rates 1-year post-procedure following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	11.03	10.21	9.25 (8.02 - 10.49)
HSN	426	7.75	8.37	7.94 (5.31 - 10.56)
KGH	613	7.67	8.13	8.08 (5.85 - 10.32)
LHSC	1151	9.9	8.64	9.82 (8.28 - 11.37)
SHSC	522	9	7.34	10.52 (7.96 - 13.08)
SMGH	644	6.99	8.28	7.23 (5.09 - 9.38)
SMH	950	9.58	7.83	10.48 (8.66 - 12.30)
SRHC	1062	7.91	8.83	7.68 (6.07 - 9.28)
THP	1195	5.94	8.08	6.30 (4.71 - 7.89)
UHN	842	8.08	8.37	8.27 (6.42 - 10.12)
UOHI	801	7.37	8.76	7.21 (5.37 - 9.04)
Ontario	9675	8.49	8.6	8.46 (7.92-8.99)

*A combination of Death/MI readmission/Revascularization. **Only applies to patients discharged alive

Table 12c. Observed and risk-adjusted MACE rates 1-year post-procedure following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	8.95	9.54	8.04 (6.51 - 9.57)
HSN	292	11.3	8.57	11.30 (8.24 - 14.36)
KGH	422	5.92	8.28	6.14 (3.46 - 8.81)
LHSC	809	8.16	8.84	7.91 (6.08 - 9.75)
SHSC	343	8.45	6.84	10.59 (7.30 - 13.87)
SMGH	431	5.57	8.31	5.75 (3.12 - 8.38)
SMH	652	10.89	7.97	11.71 (9.55 - 13.88)
SRHC	675	7.7	9.34	7.07 (5.12 - 9.02)
THP	832	6.49	8.23	6.76 (4.88 - 8.65)
UHN	557	8.8	8.16	9.24 (6.91 - 11.57)
UOHI	519	7.71	9.37	7.05 (4.85 - 9.25)
Ontario	6582	8.16	8.64	8.10 (7.45-8.75)

*A combination of Death/MI readmission/Revascularization. **Only applies to patients discharged alive

Table 12d. Observed and risk-adjusted MACE rates 1-year post-procedure following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	11.59	9.97	9.96 (8.45 - 11.46)
HSN	294	13.61	9.14	12.76 (9.81 - 15.70)
KGH	414	6.28	8.39	6.42 (3.73 - 9.10)
LHSC	763	10.75	9.08	10.15 (8.30 - 12.00)
SHSC	387	8.01	6.21	11.06 (7.80 - 14.32)
SMGH	402	10.7	8.32	11.02 (8.30 - 13.73)
SMH	648	9.41	7.63	10.58 (8.34 - 12.82)
SRHC	676	7.1	8.78	6.93 (4.90 - 8.96)
THP	862	6.5	7.89	7.06 (5.17 - 8.94)
UHN	516	10.27	8.22	10.71 (8.32 - 13.10)
UOHI	589	6.79	7.92	7.34 (5.05 - 9.64)
Ontario	6578	9.11	8.46	9.22 (8.56-9.88)

*A combination of Death/MI readmission/Revascularization. **Only applies to patients discharged alive

Table 13a. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following isolated CABG surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	3546	7.64	7.18	7.11 (6.34-7.88)
HSN	1012	8	6.91	7.73 (6.26-9.20)
KGH	1449	7.18	7.03	6.82 (5.59-8.05)
LHSC	2723	7.97	7.06	7.54 (6.65-8.43)
SHSC	1252	4.95	5.3	6.24 (4.71-7.78)
SMGH	1477	5.69	6.54	5.80 (4.54-7.07)
SMH	2250	5.2	5.76	6.03 (4.94-7.13)
SRHC	2413	7.21	7.41	6.50 (5.58-7.42)
THP	2889	5.47	6.54	5.59 (4.69-6.49)
UHN	1915	7	6.44	7.26 (6.14-8.38)
UOHI	1909	6.44	6.44	6.68 (5.57-7.79)
Ontario	22835	6.68		

*CIHI DAD; 1-year follow-up data was only available for those who had the procedure up until March 2015

Table 13b. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	8.03	7.37	7.28 (6.10 - 8.45)
HSN	426	6.81	6.91	6.58 (4.30 - 8.86)
KGH	613	7.67	6.66	7.69 (5.76 - 9.63)
LHSC	1151	8.17	6.87	7.93 (6.55 - 9.32)
SHSC	522	5.56	5.74	6.46 (4.18 - 8.75)
SMGH	644	4.97	6.38	5.20 (3.27 - 7.14)
SMH	950	6.53	5.95	7.33 (5.67 - 8.99)
SRHC	1062	6.4	7.37	5.80 (4.41 - 7.19)
THP	1195	4.77	6.65	4.79 (3.40 - 6.17)
UHN	842	7.24	6.53	7.40 (5.74 - 9.07)
UOHI	801	5.99	6.4	6.25 (4.53 - 7.97)
Ontario	9675	6.67	6.71	6.63 (6.15-7.12)

*CIHI DAD;

Table 13c. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	7.24	6.92	6.99 (5.54 - 8.44)
HSN	292	7.88	6.52	8.07 (5.25 - 10.89)
KGH	422	5.92	6.95	5.70 (3.41 - 7.99)
LHSC	809	7.42	7.25	6.83 (5.23 - 8.43)
SHSC	343	5.25	5.28	6.64 (3.69 - 9.58)
SMGH	431	5.34	6.68	5.34 (3.02 - 7.65)
SMH	652	4.29	5.73	5.00 (2.96 - 7.04)
SRHC	675	9.04	7.61	7.93 (6.22 - 9.65)
THP	832	6.37	6.66	6.39 (4.73 - 8.05)
UHN	557	7.18	6.44	7.45 (5.37 - 9.52)
UOHI	519	6.55	6.93	6.31 (4.26 - 8.36)
Ontario	6582	6.70	6.72	6.66 (6.07-7.24)

*CIHI DAD

Table 13d. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	7.50	7.18	6.98 (5.54 - 8.41)
HSN	294	9.86	7.32	9.00 (6.37 – 11.64)
KGH	414	7.73	7.66	6.74 (4.54 - 8.93)
LHSC	763	8.26	7.13	7.73 (6.07 - 9.40)
SHSC	387	3.88	4.71	5.49 (2.55 - 8.44)
SMGH	402	7.21	6.67	7.23 (4.83 - 9.63)
SMH	648	4.17	5.5	5.06 (2.96 - 7.16)
SRHC	676	6.66	7.27	6.11 (4.36 - 7.87)
THP	862	5.57	6.26	5.94 (4.26 - 7.63)
UHN	516	6.4	6.28	6.81 (4.62 - 8.99)
UOHI	589	6.96	6.07	7.66 (5.58 - 9.73)
Ontario	6578	6.67	6.59	6.77 (6.17-7.36)

*CIHI DAD

Table 14a. Observed and risk-adjusted 1-year readmission rates for revascularization following isolated CABG surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	3546	0.93	1.54	0.97 (0.55-1.39)
HSN	1012	1.68	1.55	1.75 (0.96-2.54)
KGH	1449	1.17	1.55	1.22 (0.56-1.88)
LHSC	2723	1.69	1.65	1.65 (1.18-2.11)
SHSC	1252	4.47	1.64	4.39 (3.70-5.08)
SMGH	1477	1.49	1.52	1.58 (0.92-2.24)
SMH	2250	1.78	1.6	1.79 (1.27-2.31)
SRHC	2413	0.91	1.63	0.90 (0.40-1.40)
THP	2889	1.28	1.64	1.26 (0.80-1.71)
UHN	1915	2.77	1.7	2.62 (2.07-3.17)
UOHI	1909	1.31	1.65	1.28 (0.72-1.83)
Ontario	22835	1.61		

*CIHI DAD; 1-year follow-up data was only available for those who had the procedure up until March 2015

Table 14b. Observed and risk-adjusted 1-year readmission rates for revascularization following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	1.02	1.55	1.06 (0.41 - 1.72)
HSN	426	1.64	1.56	1.69 (0.48 - 2.90)
KGH	613	1.31	1.54	1.36 (0.35 - 2.38)
LHSC	1151	1.65	1.66	1.61 (0.89 - 2.32)
SHSC	522	4.41	1.69	4.20 (3.15 - 5.25)
SMGH	644	1.24	1.49	1.34 (0.33 - 2.35)
SMH	950	1.79	1.58	1.83 (1.02 - 2.64)
SRHC	1062	1.13	1.62	1.12 (0.37 - 1.88)
THP	1195	0.92	1.66	0.90 (0.19 - 1.60)
UHN	842	3.09	1.7	2.92 (2.09 - 3.75)
UOHI	801	1.5	1.66	1.46 (0.60 - 2.32)
Ontario	9675	1.63	1.61	1.63 (1.38-1.88)

*CIHI DAD

Table 14b. Observed and risk-adjusted 1-year readmission rates for revascularization following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	0.48	1.55	0.50 (0.00 - 1.27)
HSN	292	2.4	1.53	2.53 (1.05 - 4.01)
KGH	422	1.18	1.55	1.23 (0.01 - 2.45)
LHSC	809	1.36	1.67	1.32 (0.46 - 2.17)
SHSC	343	3.79	1.68	3.64 (2.34 - 4.95)
SMGH	431	1.16	1.53	1.22 (0.00 - 2.44)
SMH	652	2.3	1.59	2.34 (1.36 - 3.31)
SRHC	675	0.89	1.64	0.87 (0.00 - 1.82)
THP	832	2.04	1.67	1.98 (1.14 - 2.82)
UHN	557	2.33	1.71	2.20 (1.19 - 3.21)
UOHI	519	1.73	1.7	1.64 (0.59 - 2.69)
Ontario	6582	1.61	1.62	1.60 (1.30-1.90)

*CIHI DAD

Table 14c. Observed and risk-adjusted 1-year readmission rates for revascularization following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	1.27	1.53	1.33 (0.54 - 2.12)
HSN	294	1.02	1.55	1.06 (0.00 - 2.53)
KGH	414	0.97	1.56	1.00 (0.00 - 2.23)
LHSC	763	2.1	1.64	2.07 (1.18 - 2.95)
SHSC	387	5.17	1.55	5.38 (4.10 - 6.66)
SMGH	402	2.24	1.56	2.32 (1.07 - 3.57)
SMH	648	1.23	1.65	1.21 (0.25 - 2.17)
SRHC	676	0.59	1.65	0.58 (0.00 - 1.52)
THP	862	1.04	1.61	1.05 (0.21 - 1.89)
UHN	516	2.71	1.7	2.58 (1.52 - 3.63)
UOHI	589	0.68	1.6	0.69 (0.00 - 1.71)
Ontario	6578	1.58	1.6	1.59 (1.29-1.90)

*CIHI DAD

Table 15a. Observed and risk-adjusted CATH rates 1-year post-procedure following isolated CABG surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	3546	4.6	4.85	4.71 (3.99-5.44)
HSN	1012	4.84	4.85	4.97 (3.61-6.32)
KGH	1449	4.83	4.99	4.81 (3.70-5.93)
LHSC	2723	6.32	5.07	6.19 (5.38-7.00)
SHSC	1252	7.75	4.87	7.91 (6.70-9.13)
SMGH	1477	3.72	4.72	3.92 (2.78-5.06)
SMH	2250	4.98	4.85	5.10 (4.19-6.01)
SRHC	2413	4.1	4.99	4.08 (3.22-4.95)
THP	2889	3.77	5.07	3.70 (2.91-4.48)
UHN	1915	6.42	5.16	6.19 (5.23-7.14)
UOHI	1909	4.5	5.13	4.36 (3.40-5.32)
Ontario	22835	4.97		

*CIHI DAD/SDS. ** Only applies to patients discharged alive. 1-year follow-up data was only available for those who had the procedure up until March 2015

Table 15b. Observed and risk-adjusted CATH rates 1-year post-procedure following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	4.77	4.83	4.91 (3.78 - 6.03)
HSN	426	3.29	4.89	3.34 (1.26 - 5.41)
KGH	613	4.57	4.92	4.62 (2.89 - 6.35)
LHSC	1151	6.69	5.09	6.54 (5.30 - 7.77)
SHSC	522	8.43	5.01	8.36 (6.51 - 10.22)
SMGH	644	2.64	4.59	2.86 (1.11 - 4.61)
SMH	950	4.74	4.83	4.88 (3.48 - 6.28)
SRHC	1062	4.61	5	4.58 (3.28 - 5.88)
THP	1195	3.6	5.13	3.49 (2.28 - 4.70)
UHN	842	6.06	5.14	5.86 (4.42 - 7.30)
UOHI	801	4.12	5.13	3.99 (2.52 - 5.47)
Ontario	9675	4.87	4.97	4.87 (4.44-5.30)

*CIHI DAD/SDS. ** Only applies to patients discharged alive

Table 15c. Observed and risk-adjusted CATH rates 1-year post-procedure following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	3.9	4.9	3.96 (2.64 - 5.29)
HSN	292	7.53	4.81	7.78 (5.25 - 10.32)
KGH	422	5.21	5.03	5.15 (3.10 - 7.21)
LHSC	809	5.56	5.09	5.44 (3.96 - 6.91)
SHSC	343	7	4.93	7.06 (4.75 - 9.37)
SMGH	431	3.48	4.75	3.64 (1.54 - 5.74)
SMH	652	4.75	4.8	4.93 (3.23 - 6.62)
SRHC	675	4.44	4.95	4.46 (2.82 - 6.10)
THP	832	5.05	5.12	4.90 (3.45 - 6.35)
UHN	557	6.64	5.23	6.32 (4.56 - 8.07)
UOHI	519	5.2	5.29	4.89 (3.08 - 6.69)
Ontario	6582	5.10	5	5.07 (4.55-5.60)

*CIHI DAD/SDS. ** Only applies to patients discharged alive

Table 15d. Observed and risk-adjusted CATH rates 1-year post-procedure following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	5.06	4.83	5.21 (3.87 - 6.56)
HSN	294	4.42	4.81	4.57 (2.04 - 7.09)
KGH	414	4.83	5.05	4.75 (2.68 - 6.83)
LHSC	763	6.55	5.03	6.47 (4.94 - 8.00)
SHSC	387	7.49	4.62	8.05 (5.81 - 10.30)
SMGH	402	5.72	4.89	5.81 (3.67 - 7.95)
SMH	648	5.56	4.93	5.60 (3.92 - 7.27)
SRHC	676	2.96	5.02	2.93 (1.30 - 4.56)
THP	862	2.78	4.95	2.79 (1.34 - 4.25)
UHN	516	6.78	5.12	6.58 (4.74 - 8.42)
UOHI	589	4.41	5.01	4.38 (2.64 - 6.13)
Ontario	6578	4.99	4.94	5.01 (4.49-5.54)

*CIHI DAD/SDS. ** Only applies to patients discharged alive

Table 16a. Observed and risk-adjusted off-pump rates following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	6.41	18.98	6.04 (4.98-7.10)
HSN	1309	0.15	15.39	0.18 (0.00-2.39)
KGH	1834	2.94	7.72	6.82 (4.10-9.54)
LHSC	3538	9.64	18.31	9.41 (8.19-10.64)
SHSC	1627	21.45	19.78	19.39 (17.67-21.11)
SMGH	1905	4.46	19.29	4.14 (2.52-5.75)
SMH	2814	0	14.65	0.00 (0.00-1.54)
SRHC	3068	0.1	17.37	0.10 (0.00-1.45)
THP	3706	95.33	22.39	76.15 (75.10-77.21)
UHN	2474	7.64	19.74	6.92 (5.52-8.32)
UOHI	2522	15.7	17.51	16.03 (14.55-17.52)
Ontario	29308	17.88		

Table 16b. Observed and risk-adjusted off-pump rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	11.23	18.78	10.70 (8.82 - 12.57)
HSN	426	0.47	15.17	0.55 (0.00 - 4.47)
KGH	613	2.94	9.04	5.81 (1.49-10.13)
LHSC	1151	9.99	18.05	9.90 (7.73 - 12.07)
SHSC	522	19.73	19.28	18.30 (15.22 - 21.38)
SMGH	644	6.99	20.15	6.20 (3.50 - 8.91)
SMH	950	0	16.58	0.00 (0.00 - 2.49)
SRHC	1062	0.19	17.96	0.19 (0.00 - 2.44)
THP	1195	93.64	22.18	75.51 (73.64 - 77.38)
UHN	842	7.96	19.92	7.14 (4.76 - 9.53)
UOHI	801	8.99	17.96	8.95 (6.35 - 11.56)
Ontario	9675	17.65	18.18	17.37 (16.63-18.11)

Table 16c. Observed and risk-adjusted off-pump rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	5.52	19.38	5.10 (2.93 - 7.27)
HSN	292	0	13.77	0.00 (0.00 - 5.00)
KGH	422	2.61	5.98	7.79 (1.28 - 14.30)
LHSC	809	9.52	18.11	9.40 (6.81 - 11.98)
SHSC	343	17.49	20.62	15.17 (11.51 - 18.83)
SMGH	431	4.64	19.04	4.36 (0.94 - 7.78)
SMH	652	0	14.11	0.00 (0.00 - 3.28)
SRHC	675	0.15	17.69	0.15 (0.00 - 3.00)
THP	832	95.79	22.53	76.05 (73.83 - 78.26)
UHN	557	5.21	20.19	4.61 (1.71 - 7.51)
UOHI	519	14.26	17.72	14.39 (11.12 - 17.65)
Ontario	6582	17.12	17.8	17.20 (16.30-18.11)

Table 16d. Observed and risk-adjusted off-pump rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	3.70	19.46	3.40 (1.21 - 5.59)
HSN	294	0	14.72	0.00 (0.00 - 4.81)
KGH	414	2.9	4.42	11.72 (4.02 - 19.42)
LHSC	763	10.88	19.19	10.14 (7.57 - 12.71)
SHSC	387	25.84	20.73	22.29 (18.85 - 25.73)
SMGH	402	2.74	18.88	2.59 (0.00 - 6.16)
SMH	648	0	12.73	0.00 (0.00 - 3.47)
SRHC	676	0	17.36	0.00 (0.00 - 2.89)
THP	862	97.22	22.84	76.11 (73.95 - 78.27)
UHN	516	7.95	19.67	7.22 (4.15 - 10.29)
UOHI	589	17.32	17.97	17.24 (14.20 - 20.28)
Ontario	6578	18.62	17.76	18.75 (17.85-19.66)

Table 16e. Observed and risk-adjusted off-pump rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	2.90	18.32	2.83 (0.49 - 5.18)
HSN	297	0	17.96	0.00 (0.00 - 4.27)
KGH	385	3.38	11.06	5.46 (0.50 - 10.41)
LHSC	815	8.1	18.05	8.02 (5.44 - 10.60)
SHSC	375	22.93	18.72	21.91 (18.22 - 25.61)
SMGH	428	2.1	18.63	2.02 (0.00 - 5.51)
SMH	564	0	14.23	0.00 (0.00 - 3.49)
SRHC	655	0	16.12	0.00 (0.00 - 3.07)
THP	817	95.35	22.07	77.24 (74.97 - 79.51)
UHN	559	9.3	19.07	8.72 (5.71 - 11.73)
UOHI	613	24.14	16.31	26.47 (23.33 - 29.61)
Ontario	6473	18.25	17.65	18.48 (17.56-19.41)

Table 17a. Observed and risk-adjusted arterial graft rates following isolated CABG surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	4511	94.9	94.74	95.45 (94.82-96.09)
HSN	1309	91.75	95.59	91.46 (90.37-92.55)
KGH	1834	96.24	95.8	95.72 (94.83-96.62)
LHSC	3538	96.33	95.34	96.28 (95.60-96.96)
SHSC	1627	94.65	95.53	94.42 (93.43-95.41)
SMGH	1905	96.33	95.71	95.90 (95.01-96.80)
SMH	2814	96.13	95.09	96.33 (95.55-97.12)
SRHC	3068	97.98	95.48	97.78 (97.06-98.51)
THP	3706	97.06	95.7	96.65 (96.01-97.29)
UHN	2474	87.79	95.33	87.76 (86.94-88.58)
UOHI	2522	95.88	94.58	96.59 (95.73-97.45)
Ontario	29308	95.29		

Table 17b. Observed and risk-adjusted arterial graft rates following isolated CABG surgery in 2011/13

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1469	94.21	94.82	94.69 (93.57 - 95.80)
HSN	426	91.55	95.37	91.48 (89.51 - 93.45)
KGH	613	95.27	95.75	94.81 (93.24 - 96.38)
LHSC	1151	95.48	95.31	95.47 (94.27 - 96.66)
SHSC	522	93.3	94.84	93.73 (91.87 - 95.60)
SMGH	644	94.72	95.76	94.26 (92.73 - 95.79)
SMH	950	94.53	94.98	94.84 (93.47 - 96.20)
SRHC	1062	96.99	95.54	96.73 (95.51 - 97.96)
THP	1195	95.98	95.66	95.61 (94.48 - 96.74)
UHN	842	85.39	95.15	85.52 (84.09 - 86.94)
UOHI	801	93.88	94.34	94.83 (93.28 - 96.39)
Ontario	9675	94.06	95.21	94.14 (93.72-94.55)

Table 17c. Observed and risk-adjusted arterial graft rates following isolated CABG surgery in 2013/14

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1050	94.48	94.85	94.91 (93.62 - 96.20)
HSN	292	90.75	95.43	90.63 (88.29 - 92.96)
KGH	422	95.02	95.53	94.79 (92.87 - 96.70)
LHSC	809	96.54	95.14	96.69 (95.25 - 98.14)
SHSC	343	94.17	95.51	93.96 (91.79 - 96.12)
SMGH	431	97.68	95.52	97.45 (95.54 - 99.36)
SMH	652	98.16	95.05	98.41 (96.77 - 100.04)
SRHC	675	98.81	95.29	98.82 (97.25 - 100.00)
THP	832	97.72	95.62	97.38 (96.01 - 98.74)
UHN	557	86.54	95.32	86.51 (84.78 - 88.24)
UOHI	519	96.34	94.27	97.39 (95.45 - 99.32)
Ontario	6582	95.49	95.19	95.59 (95.08-96.09)

Table 17d. Observed and risk-adjusted arterial graft rates following isolated CABG surgery in 2014/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	1027	95.91	95.00	96.21 (94.91 - 97.51)
HSN	294	93.2	95.55	92.94 (90.63 - 95.26)
KGH	414	96.14	96.1	95.33 (93.51 - 97.15)
LHSC	763	96.2	95.51	95.98 (94.53 - 97.43)
SHSC	387	96.12	96.1	95.32 (93.41 - 97.22)
SMGH	402	95.77	95.63	95.43 (93.47 - 97.40)
SMH	648	96.14	94.86	96.58 (94.91 - 98.24)
SRHC	676	99.11	95.76	98.63 (97.13 - 99.51)
THP	862	97.45	95.83	96.90 (95.60 - 98.20)
UHN	516	88.57	95.32	88.54 (86.74 - 90.34)
UOHI	589	96.6	95.13	96.76 (95.06 - 98.47)
Ontario	6578	95.88	95.47	95.70 (95.21-96.20)

Table 17e. Observed and risk-adjusted arterial graft rates following isolated CABG surgery in 2015/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	965	95.34	94.22	96.42 (95.00 - 97.83)
HSN	297	91.58	96.12	90.80 (88.63 - 92.96)
KGH	385	99.22	95.87	98.62 (96.67 - 99.40)
LHSC	815	97.42	95.41	97.30 (95.89 - 98.71)
SHSC	375	95.47	95.91	94.85 (92.88 - 96.82)
SMGH	428	97.9	95.91	97.27 (95.41 - 99.12)
SMH	564	96.45	95.57	96.18 (94.51 - 97.84)
SRHC	655	97.56	95.3	97.55 (95.95 - 99.14)
THP	817	97.55	95.67	97.16 (95.81 - 98.51)
UHN	559	91.95	95.61	91.64 (89.97 - 93.31)
UOHI	613	97.39	94.64	98.06 (96.31 - 99.80)
Ontario	6473	96.34	95.34	96.29 (95.79-96.80)

Table 18. Observed and risk-adjusted in-hospital all-cause mortality rates following isolated AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	505	2.97	2.47	2.07 (1.19 – 2.95)
HSN	332	2.11	1.38	2.64 (1.09 – 4.18)
KGH	166	1.2	1.64	1.26 (0.00 – 3.27)
LHSC	534	1.87	1.81	1.78 (0.75 – 2.81)
SHSC	230	2.17	1.56	2.40 (0.68 – 4.12)
SMGH	148	0	1.65	0.00 (0.00 – 2.10)
SMH	457	1.97	1.54	2.20 (0.95 – 3.44)
SRHC	386	1.81	1.65	1.89 (0.59 – 3.19)
THP	240	0.42	1.96	0.37 (0.00 – 1.87)
UHN	408	0.98	1.61	1.05 (0.00 – 2.31)
UOHI	547	1.46	1.44	1.75 (0.57 – 2.93)
Ontario	3953	1.72		

*In-hospital mortality: CIHI DAD

Table 19. Observed and risk-adjusted 30-day all-cause mortality rates following isolated AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	505	2.18	2.01	1.62 (0.74 – 2.50)
HSN	332	1.81	1.32	2.04 (0.67 – 3.41)
KGH	166	1.81	1.52	1.78 (0.00 – 3.60)
LHSC	534	1.31	1.5	1.31 (0.30 – 2.31)
SHSC	230	0.87	1.62	0.80 (0.00 – 2.26)
SMGH	148	0	1.4	0.00 (0.00 – 2.01)
SMH	457	1.75	1.35	1.93 (0.77 – 3.09)
SRHC	386	1.81	1.43	1.89 (0.67 – 3.11)
THP	240	1.67	1.64	1.52 (0.07 – 2.96)
UHN	408	1.23	1.48	1.23 (0.08 – 2.39)
UOHI	547	1.1	1.19	1.38 (0.25 – 2.51)
Ontario	3953	1.49		

*30-day mortality: RPDB

Table 20. Observed and risk-adjusted 1-year all-cause mortality rates following isolated AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	392	7.14	6.79	5.67 (3.79 – 7.56)
HSN	258	6.59	4.8	7.40 (4.55 – 10.25)
KGH	128	5.47	4.49	6.57 (2.35 – 10.78)
LHSC	420	5.48	5.28	5.60 (3.51 – 7.69)
SHSC	172	6.4	5	6.89 (3.58 – 10.21)
SMGH	87	3.45	6.38	2.91 (0.00 – 7.12)
SMH	336	4.46	5.13	4.70 (2.30 – 7.09)
SRHC	295	4.75	5.42	4.72 (2.26 – 7.19)
THP	186	4.84	5.86	4.45 (1.49 – 7.41)
UHN	313	3.83	5.05	4.09 (1.64 – 6.55)
UOHI	435	5.52	5.06	5.88 (3.75 – 8.02)
Ontario	3022	5.39		

*1-year mortality: RPDB; **1-year follow-up data was only available for those who had the procedure up until March 2015

Table 21. Observed and risk-adjusted post-operative LOS (in days) following isolated AVR surgery in 2011/16

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	9.8	10.2	8.89 (8.21 – 9.58)
HSN	7.4	8.51	8.05 (7.46 – 8.70)
KGH	8.44	8.5	9.19 (8.13 – 10.72)
LHSC	9.64	9.5	9.39 (8.81 – 10.02)
SHSC	11.03	8.9	11.47 (10.14 – 13.16)
SMGH	8.72	9.46	8.54 (7.58 – 9.88)
SMH	8.71	8.96	9.00 (8.30 – 9.66)
SRHC	7.61	9.45	7.46 (6.90 – 8.09)
THP	9.57	9.62	9.21 (8.24 – 10.41)
UHN	8.03	8.93	8.32 (7.91 – 8.76)
UOHI	11.56	9.13	11.72 (10.75 – 12.57)
Ontario	9.26		

*Patients who died in hospital and whose post-operative LOS exceeded the 99th percentile were excluded;
** LOS: CIHI DAD

Table 22. Observed and risk-adjusted red blood cell transfusion rates following isolated AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	505	48.91	38.82	45.73 (42.17 - 49.30)
HSN	332	36.14	35.69	36.76 (31.91 - 41.62)
KGH	166	42.17	34.8	43.99 (37.01 - 50.97)
LHSC	534	27.15	36.75	26.82 (23.15 - 30.49)
SHSC	230	33.91	35.76	34.43 (28.69 - 40.17)
SMGH	148	17.57	41.58	15.34 (8.95 - 21.72)
SMH	457	35.23	35.2	36.33 (32.21 - 40.46)
SRHC	386	34.2	36.47	34.04 (29.69 - 38.39)
THP	240	46.67	39.35	43.05 (37.86 - 48.24)
UHN	408	27.94	33.56	30.23 (25.71 - 34.75)
UOHI	547	42.05	34.68	44.02 (40.18 - 47.86)
Ontario	3953	36.3		

*CIHI DAD

Table 23. Observed and risk-adjusted 30-day all-cause readmission rates following isolated AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	505	15.64	13.24	15.06 (12.23 - 17.89)
HSN	332	14.46	12.55	14.69 (11.10 - 18.29)
KGH	166	12.65	12.82	12.58 (7.56 - 17.60)
LHSC	534	13.11	12.96	12.90 (10.12 - 15.68)
SHSC	230	14.78	11.81	15.96 (11.48 - 20.45)
SMGH	148	10.81	13.03	10.58 (5.31 - 15.85)
SMH	457	12.47	12.55	12.67 (9.61 - 15.74)
SRHC	386	14.25	12.98	14.00 (10.73 - 17.26)
THP	240	10.83	12.87	10.73 (6.56 - 14.90)
UHN	408	8.09	12.11	8.51 (5.20 - 11.82)
UOHI	547	11.88	12.94	11.70 (8.96 - 14.45)
Ontario	3953	12.75		

*CIHI DAD

Table 24. Observed and risk-adjusted MACE rates 1-Year post-procedure following isolated AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	392	7.4	7.31	6.03 (4.03 - 8.04)
HSN	258	8.91	5.73	9.27 (6.40 - 12.13)
KGH	128	5.47	5.14	6.34 (1.98 - 10.70)
LHSC	420	5.95	5.64	6.29 (4.05 - 8.53)
SHSC	172	6.98	5.52	7.53 (3.99 - 11.07)
SMGH	87	3.45	7.02	2.92 (0.00 - 7.29)
SMH	336	5.06	5.68	5.30 (2.79 - 7.81)
SRHC	295	5.42	5.87	5.50 (2.88 - 8.12)
THP	186	5.91	6.54	5.38 (2.28 - 8.49)
UHN	313	4.15	5.69	4.34 (1.79 - 6.90)
UOHI	435	5.52	5.59	5.88 (3.64 - 8.12)
Ontario	3022	5.96		

*A combination of Death/MI readmission/Revascularization. ** Only applies to patients discharged alive

Table 25. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following isolated AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	392	7.65	7.35	6.31 (4.24 - 8.37)
HSN	258	7.75	6.99	6.72 (4.10 - 9.34)
KGH	128	3.91	5.61	4.21 (0.03 - 8.39)
LHSC	420	6.43	6.25	6.23 (4.05 - 8.41)
SHSC	172	6.98	5.47	7.72 (4.07 - 11.37)
SMGH	87	4.6	7.01	3.97 (0.00 - 8.47)
SMH	336	5.95	4.36	8.27 (5.33 - 11.21)
SRHC	295	5.76	6.68	5.22 (2.73 - 7.71)
THP	186	8.06	6.4	7.63 (4.37 - 10.90)
UHN	313	3.19	5.52	3.50 (0.83 - 6.18)
UOHI	435	5.29	5.44	5.88 (3.56 - 8.20)
Ontario	3022	6.06		

Table 26. Observed and risk-adjusted in-hospital all-cause mortality rates following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	661	4.54	5.11	3.87 (2.52 – 5.22)
HSN	191	5.24	4.46	5.12 (2.37 – 7.87)
KGH	151	3.97	5.64	3.07 (0.35 – 5.79)
LHSC	376	5.05	3.93	5.60 (3.52 – 7.69)
SHSC	76	6.58	2.54	11.30 (5.30 – 17.30)
SMGH	125	3.2	3.55	3.93 (0.03 – 7.83)
SMH	215	5.58	4.22	5.76 (3.04 – 8.48)
SRHC	396	4.29	4.49	4.16 (2.25 – 6.08)
THP	252	3.97	4.25	4.07 (1.60 – 6.54)
UHN	336	2.08	3.15	2.88 (0.34 – 5.42)
UOHI	481	4.57	4.56	4.37 (2.68 – 6.07)
Ontario	3260	4.36		

*In-hospital mortality: CIHI DAD

Table 27. Observed and risk-adjusted 30-day all-cause mortality rates following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	661	3.33	3.98	3.08 (1.76 – 4.39)
HSN	191	5.76	3.51	6.05 (3.38 – 8.71)
KGH	151	3.97	5.09	2.87 (0.42 – 5.32)
LHSC	376	4.52	3.48	4.78 (2.90 – 6.66)
SHSC	76	2.63	2.14	4.52 (0.00 – 10.06)
SMGH	125	3.2	3.25	3.62 (0.17 – 7.07)
SMH	215	5.12	3.95	4.77 (2.39 – 7.15)
SRHC	396	3.54	3.91	3.33 (1.58 -5.07)
THP	252	4.76	3.81	4.61 (2.42 – 6.79)
UHN	336	1.79	2.77	2.37 (0.08 – 4.67)
UOHI	481	3.12	3.66	3.14 (1.50 – 4.77)
Ontario	3260	3.68		

*30-day mortality: RPDB

Table 28. Observed and risk-adjusted 1-year all-cause mortality rates following combined CABG/AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	511	9.2	9.66	8.55 (6.28 – 10.82)
HSN	149	13.42	9.01	13.38 (8.98 – 17.78)
KGH	121	9.09	9.96	8.19 (3.53 – 12.86)
LHSC	289	9.34	8.14	10.31 (6.95 – 13.66)
SHSC	66	10.61	6.51	14.62 (6.55 – 22.70)
SMGH	76	6.58	8.76	6.75 (0.42 – 13.08)
SMH	169	12.43	8.27	13.49 (9.07 – 17.91)
SRHC	299	7.36	9.34	7.07 (4.00 – 10.15)
THP	186	12.37	9.88	11.25 (7.49 – 15.00)
UHN	261	2.3	7.48	2.76 (0.00 – 6.50)
UOHI	378	9.52	9.48	9.02 (6.36 – 11.68)
Ontario	2505	8.98		

*1-year mortality: RPDB; 1-year follow-up data was only available for those who had the procedure up until March 2015

Table 29. Observed and risk-adjusted post-operative LOS (in days) following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	12.4	12.93	11.58 (10.88 – 12.33)
HSN	9.85	11.31	10.51 (9.21 – 11.87)
KGH	11.26	11.49	11.83 (10.49 – 13.23)
LHSC	12.92	12.06	12.92 (11.79 – 14.22)
SHSC	16.07	10.87	17.83 (13.89 – 22.00)
SMGH	9.55	11.67	9.88 (8.87 – 10.99)
SMH	10.85	11.14	11.75 (10.70 – 12.97)
SRHC	9.89	11.99	9.96 (9.19 – 10.83)
THP	12.01	11.99	12.09 (10.73 – 13.68)
UHN	10.88	11.41	11.52 (10.55 – 12.60)
UOHI	15.32	12.67	14.60 (13.55 – 15.53)
Ontario	12.07		

*Patients who died in hospital and whose post-operative LOS exceeded the 99th percentile were excluded;
** LOS: CIHI DAD

Table 30. Observed and risk-adjusted red blood cell transfusion rates following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	661	71.1	62.44	67.98 (64.73-71.22)
HSN	191	58.12	57.15	60.70 (53.87-67.53)
KGH	151	67.55	59.58	67.68 (60.32-75.03)
LHSC	376	48.14	56.61	50.76 (45.84-55.68)
SHSC	76	57.89	52.29	66.10 (54.03-78.16)
SMGH	125	38.4	59.39	38.60 (30.66-46.54)
SMH	215	59.07	60.49	58.29 (52.26-64.32)
SRHC	396	53.54	60.12	53.15 (48.69-57.62)
THP	252	58.73	60.37	58.07 (52.53-63.62)
UHN	336	52.68	56.73	55.43 (50.21-60.66)
UOHI	481	67.78	61.63	65.64 (61.73-69.55)
Ontario	3260	59.69		

*CIHI DAD

Table 31. Observed and risk-adjusted 30-day all-cause readmission rates following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	661	13.01	13.06	12.93 (10.39 - 15.47)
HSN	191	15.18	14.98	13.15 (8.82 - 17.49)
KGH	151	14.57	13.47	14.04 (8.83 - 19.24)
LHSC	376	10.64	12.81	10.78 (7.37 - 14.18)
SHSC	76	14.47	12.32	15.24 (7.48 - 22.99)
SMGH	125	7.2	12.87	7.26 (1.37 - 13.15)
SMH	215	12.56	12.79	12.74 (8.23 - 17.25)
SRHC	396	15.4	13.31	15.01 (11.77 - 18.25)
THP	252	13.89	12.78	14.10 (9.94 - 18.27)
UHN	336	11.9	12.05	12.82 (9.08 - 16.56)
UOHI	481	13.1	12.73	13.35 (10.33 - 16.37)
Ontario	3260	12.98		

Table 32. Observed and risk-adjusted MACE rates 1-year post-procedure following combined CABG/AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	511	12.72	13.04	11.49 (9.00 - 13.98)
HSN	149	17.45	11.7	17.56 (12.62 - 22.51)
KGH	121	10.74	11.83	10.70 (5.22 - 16.18)
LHSC	289	13.15	11.07	13.98 (10.31 - 17.65)
SHSC	66	10.61	8.31	15.03 (5.73 - 24.33)
SMGH	76	7.89	11.37	8.18 (1.06 - 15.30)
SMH	169	14.79	10.31	16.90 (11.81 - 22.00)
SRHC	299	11.04	13.23	9.83 (6.59 - 13.07)
THP	186	13.44	12.41	12.75 (8.47 - 17.04)
UHN	261	5.36	9.86	6.41 (2.21 - 10.60)
UOHI	378	11.38	11.83	11.32 (8.24 - 14.41)
Ontario	2505	11.78		

*A combination of Death/MI readmission/Revascularization. ** Only applies to patients discharged alive

Table 33. Observed and risk-adjusted 1-year cardiac readmission rates (for acute MI, unstable angina, or CHF) following combined CABG/AVR surgery in 2011/15

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	511	9.78	9.78	9.19 (6.81 - 11.56)
HSN	149	11.41	10.59	9.89 (5.72 - 14.06)
KGH	121	10.74	10.22	9.66 (4.89 - 14.42)
LHSC	289	11.42	8.65	12.13 (8.75 - 15.51)
SHSC	66	6.06	8.12	6.86 (0.00 - 14.18)
SMGH	76	7.89	8.58	8.45 (1.81 - 15.08)
SMH	169	11.24	8.74	11.81 (7.40 - 16.22)
SRHC	299	9.36	9.95	8.64 (5.57 - 11.72)
THP	186	6.99	9.27	6.92 (2.86 - 10.98)
UHN	261	6.9	7.7	8.22 (4.41 - 12.04)
UOHI	378	7.67	8.77	8.03 (5.09 - 10.97)
Ontario	2505	9.18		

Table 34. Observed and risk-adjusted arterial graft rates following combined CABG/AVR surgery in 2011/16

Cardiac Centre	Volume	Observed Rate	Expected Rate	Adjusted Rate (95% CI)
HHS	661	58.09	64.78	60.66 (57.01 - 64.30)
HSN	191	58.12	70.3	55.92 (50.03 -61.80)
KGH	151	85.43	70.64	81.80 (75.25 - 88.34)
LHSC	376	81.12	69.07	79.43 (75.08 - 83.78)
SHSC	76	75	68.8	73.74 (63.86 - 83.62)
SMGH	125	81.6	67.92	81.26 (73.57 - 88.95)
SMH	215	55.35	67.12	55.77 (49.71 - 61.84)
SRHC	396	77.78	69.22	76.00 (71.79 - 80.20)
THP	252	67.46	67.39	67.71 (62.20 - 73.22)
UHN	336	46.13	65.88	47.37 (42.38 - 52.35)
UOHI	481	75.88	68.48	74.95 (71.10 - 78.80)
Ontario	3260	67.64		

Table 35. Provincial distribution of risk factors by mortality for isolated CABG surgery, isolated AVR surgery and combined CABG/AVR surgery for 2011/16

Risk Factor		Isolated CABG Surgery		Isolated AVR Surgery		Combined CABG/AVR Surgery	
		In-Hospital Mortality	30-Day Mortality	In-Hospital Mortality	30-Day Mortality	In-Hospital Mortality	30-Day Mortality
Age	<65	1	1	1.2	1.3	1.5	1.5
	65-74	1.7	1.6	1.3	1.2	3.6	3.1
	≥75	3.8	3.4	2.6	1.9	5.7	4.7
Sex	Male	1.5	1.5	1.6	1.4	3.8	3.3
	Female	3	2.8	1.9	1.6	6.1	4.8
Ejection fraction	≥50%	1.1	1.1	1.6	1.5	3.3	2.9
	35% - 39%	2	1.8	2	*≤5*	5.4	3.4
	20% - 34%	4.3	4.1	*≤5*	3.4	10.1	9.3
	<20%	8	8.4	*≤5*	0	*≤5*	*≤5*
	Missing, not done, or unknown	2.7	2.6	*≤5*	*≤5*	8.6	6.9
BMI	<25%	2.2	2	2.2	1.7	4.5	3.5
	25% - 30%	1.8	1.7	1.3	1.1	3.5	3.3
	>30%	1.6	1.6	1.8	1.8	4.9	4.0
	Unknown	2	1.9	*≤5*	*≤5*	*5.6*	*5*
Creatinine level (µmol/L)	0 - 120	1.4	1.4	1.1	0.9	3.6	3.1
	121 - 180	3.9	3.5	4.6	5.0	5.7	4.6
	>180	7.5	6.5	11.9	8.3	12.2	8.1
	Missing	1.5	1.4	*≤5*	*≤5*	6.2	6.2
Previous PCI	Yes			3.5	3.1		
Dialysis	Yes	7.9	6.3	*≤5*	*≤5*	9.5	*≤5*
Atrial fibrillation	Yes	4.5	3.9	3.6	2.8	7.6	5.8
Shock	Yes	22.7	19.3	*≤5*	*≤5*	36.8	*≤5*
Hypertension	Yes	1.9	1.8	1.9	1.7	4.4	3.9
PVD	Yes	3.9	3.5	3.6	3.2	9.0	7.8
Aortic stenosis	Yes			1.5	1.3	4.1	3.3
CCS/ACS class	Stable Angina or missing	1	1			3.2	2.8
	ACS - Low risk	1.9	1.8			7.9	5.6

Risk Factor			Isolated CABG Surgery		Isolated AVR Surgery		Combined CABG/AVR Surgery	
			In-Hospital Mortality	30-Day Mortality	In-Hospital Mortality	30-Day Mortality	In-Hospital Mortality	30-Day Mortality
	ACS - Intermediate risk		2.3	2.2			7.7	7.0
		ACS - High risk	4.1	3.8			9.6	7.2
		ACS - Emergent risk	10.2	9.6			21.2	18.4
Left main disease		Yes	2.3	2.2			6.2	5.0
COPD		Yes	3.7	3.0	1.9	2.7	5.9	3.7
CVD		Yes	3.5	3.2	3.6	2.3	7.2	6.9
Diabetes		Yes	2.0	1.8	2.6	2.1	4.2	3.6
NYHA class		1			1.1	0.9	4.1	3.2
		2			1.0	1.0	3.4	2.7
		3			2.0	1.6	4.9	4.5
		4			8.9	7.8	9.3	6.8
		No known heart failure,			*≤5*	*≤5*	4	3.7
Active infectious		Yes			7.5	7.5		
Previous valve		Yes			3.5	3.1	*≤5*	10.7
Recent MI		Yes	201	2.9			8.5	7.5
Priority		Urgent	3.6	3.3	1.8	1.7	4.9	4.3
	Semi-Urgent		1.4	1.4	*≤5*	*≤5*	5	4.2
	Elective		0.8	0.8	1.0	0.7	3.2	2.3
	Missing		5.1	4.6	2.6	2.1	3.9	3.3

*Risk factors: CIHI DAD and CorHealth Ontario data; Blank cells indicate data was not available.

Table 36a. Prevalence of risk factors for isolated CABG surgery in 2011/16

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean ± SD	67.49 ± 9.94	65.97 ± 9.20	65.25 ± 9.61	66.17 ± 9.88	64.55 ± 9.80	66.43 ± 9.74	64.84 ± 9.75	66.12 ± 10.08	65.20 ± 9.96	65.41 ± 10.17	66.55 ± 9.77	65.94 ± 9.90
	<65	36.9%	42.3%	45.7%	41.7%	47.6%	40.6%	46.8%	42.8%	46.3%	44.6%	40.7%	42.8%
	65-75	37.0%	38.8%	35.2%	37.3%	35.6%	37.2%	36.4%	34.3%	34.2%	35.2%	36.6%	36.0%
	≥75	26.1%	18.9%	19.1%	21.0%	16.8%	22.2%	16.8%	23.0%	19.5%	20.2%	22.7%	21.1%
Sex	Female	22.2%	20.1%	20.9%	21.2%	17.9%	19.2%	19.3%	19.4%	20.0%	20.5%	20.7%	20.3%
Ejection Fraction	≥50%	66.3%	49.4%	53.3%	60.5%	63.1%	52.0%	66.8%	51.8%	59.1%	68.0%	66.8%	60.7%
	35% - 49%	24.3%	20.2%	22.7%	26.0%	21.3%	30.8%	19.2%	30.4%	26.0%	19.4%	17.8%	23.9%
	20% - 34%	8.5%	8.0%	7.6%	10.1%	9.2%	11.7%	8.6%	11.2%	11.7%	9.5%	7.7%	9.6%
	<20%	*36-40	3.7%	1.7%	1.8%	2.3%	2.1%	0.9%	1.5%	2.7%	2.2%	1.5%	1.8%
	Unknown	*1-5	18.7%	14.6%	1.6%	4.2%	3.5%	4.4%	5.1%	0.4%	1.0%	6.3%	4.1%
BMI	<25%	*864-8	13.6%	5.8%	*679-83	24.8%	35.9%	27.3%	21.3%	26.2%	24.3%	20.7%	21.9%
	25% - 30%	40.3%	31.4%	11.6%	39.7%	44.1%	30.3%	39.0%	40.0%	40.3%	40.7%	39.7%	37.4%
	>30%	40.5%	31.1%	12.4%	40.9%	29.6%	32.8%	28.3%	34.9%	31.1%	34.5%	38.4%	33.6%
	Unknown	*1-5	23.9%	70.3%	*1-5	1.5%	1.0%	5.4%	3.8%	2.4%	0.5%	1.2%	7.0%
Creatinine level (µmol/L)	0 - 20	85.0%	84.1%	42.9%	88.9%	91.6%	87.8%	62.9%	87.0%	86.2%	86.9%	88.3%	82.0%
	121 - 180	10.0%	8.9%	3.8%	7.7%	5.9%	8.9%	5.4%	8.2%	9.1%	8.9%	7.1%	7.9%
	>180	*222-26	3.0%	1.4%	3.1%	2.2%	2.4%	3.8%	2.7%	3.5%	3.8%	3.5%	3.3%
	Unknown	*1-5	4.0%	52.0%	0.2%	0.4%	0.9%	27.9%	2.1%	1.2%	0.4%	1.1%	6.7%
Dialysis	Yes	2.6%	1.5%	1.3%	1.6%	1.1%	0.8%	1.7%	1.7%	1.6%	2.7%	1.1%	1.7%
Atrial Fibrillation	Yes	11.4%	8.3%	9.3%	8.6%	6.8%	8.8%	7.7%	10.1%	7.3%	8.9%	9.8%	9.0%
Shock	Yes	2.0%	1.1%	0.7%	1.0%	0.6%	0.6%	0.9%	*1-5	1.0%	0.5%	1.6%	1.0%
Hypertension	Yes	77.1%	72.0%	62.3%	79.0%	77.1%	75.1%	74.0%	77.2%	76.3%	79.5%	67.2%	75.0%
PVD	Yes	18.2%	13.1%	9.8%	12.6%	6.9%	12.7%	8.0%	11.6%	7.9%	14.3%	11.7%	11.9%
CCS	Stable Angina or Missing	49.3%	55.2%	45.6%	50.7%	82.2%	56.1%	81.7%	43.9%	51.8%	53.0%	48.4%	54.9%
	ACS – Low risk	35.7%	33.6%	21.5%	15.6%	8.7%	30.9%	10.6%	17.3%	30.8%	11.6%	3.1%	20.7%
	ACS – Intermediate risk	6.0%	8.4%	25.1%	27.6%	6.4%	9.4%	4.3%	21.5%	14.0%	27.7%	36.9%	17.1%
	ACS – High risk	2.3%	1.2%	5.0%	4.4%	2.0%	2.2%	2.0%	15.8%	2.3%	5.9%	6.3%	4.7%

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	ACS – Emergent risk	6.6%	1.5%	2.8%	1.8%	0.6%	1.4%	1.4%	1.6%	1.1%	1.7%	5.3%	2.6%
Left Main Disease	Yes	33.0%	34.9%	27.2%	31.1%	29.7%	31.4%	30.0%	27.9%	23.1%	30.9%	39.3%	30.5%
COPD	Yes	9.4%	8.3%	9.2%	12.7%	4.7%	6.4%	5.5%	9.9%	4.5%	6.6%	8.2%	8.0%
CVD	Yes	10.8%	8.6%	6.7%	8.6%	6.2%	9.0%	6.9%	9.0%	7.3%	10.4%	8.1%	8.5%
Diabetes	Yes	41.0%	40.0%	33.9%	37.1%	42.2%	36.4%	43.6%	35.6%	45.3%	41.8%	36.6%	39.7%
Recent MI	Yes	42.2%	39.0%	39.5%	37.2%	21.6%	45.2%	25.0%	41.7%	33.0%	25.6%	28.4%	34.9%
Priority	Urgent	18.8%	15.8%	31.9%	34.3%	12.2%	18.4%	10.0%	37.8%	20.2%	35.7%	45.0%	26.0%
	Semi-Urgent	34.4%	33.1%	25.6%	28.0%	33.3%	33.1%	32.4%	23.9%	31.6%	23.3%	22.6%	29.3%
	Elective	45.4%	48.5%	40.1%	37.1%	48.9%	47.8%	46.3%	36.7%	47.5%	39.5%	29.9%	42.2%
	Missing	1.4%	2.6%	2.4%	0.6%	5.7%	0.7%	11.3%	1.6%	0.7%	1.5%	2.5%	2.6%
Hyperlipidemia/ dyslipidemia	Yes	73.4%	68.6%	55.6%	77.9%	80.9%	73.3%	63.9%	76.2%	79.1%	80.9%	69.6%	73.4%
Smoker	Current	22.8%	25.1%	20.0%	21.4%	17.4%	20.6%	16.5%	20.7%	16.6%	18.0%	35.0%	21.1%
	Former	43.8%	36.4%	31.7%	45.0%	33.1%	46.8%	25.6%	39.9%	29.4%	40.5%	12.5%	35.5%
	Never, Unknown, Missing	33.4%	38.5%	48.4%	33.6%	49.5%	32.7%	57.9%	39.4%	54.0%	41.5%	52.5%	43.3%
Previous CABG	Yes	0.7%	0.7%	1.3%	1.2%	*1-5	0.6%	0.5%	0.9%	1.1%	1.1%	1.3%	0.9%

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated.

Table 36b. Prevalence of risk factors for isolated CABG surgery in 2011/13

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean ± SD	67.74 ± 9.97	66.16 ± 9.17	65.10 ± 10.21	65.87 ± 10.03	65.01 ± 10.17	66.57 ± 9.85	65.11 ± 10.15	66.48 ± 10.01	64.97 ± 10.18	65.48 ± 10.17	66.34 ± 10.02	66.00 ± 10.07
	<65	36.4	41.1	46.7	42.1	46.2	40.4	46.2	40.9	47.9	43.7	42.7	42.8
	65-75	35.9	39.4	31.8	38.3	34.7	34.5	35.4	34.9	32.7	36.0	33.6	35.2
	≥75	27.7	19.5	21.5	19.5	19.2	25.2	18.4	24.2	19.4	20.3	23.7	22.1
Sex	Female	21.9	21.6	23.2	20.2	16.5	18.6	19.5	20.4	20.7	21.3	19.7	20.5
Ejection Fraction	≥50%	64.5	44.8	57.7	58.0	56.9	48.3	63.3	52.3	56.2	64.1	65.4	58.5
	35% - 49%	25.2	20.0	22.8	28.2	25.5	33.2	21.8	29.0	28.7	21.3	17.7	25.3
	20% - 34%	9.4	*37 - 41	8.8	10.3	11.7	12.3	11.5	11.5	11.5	12.0	9.4	10.7
	<20%	0.9	*12 - 16	2.0	2.1	3.6	2.0	0.9	1.8	2.9	1.7	2.0	1.9
	Unknown	0.0	22.8	8.6	1.4	2.3	4.2	2.5	5.5	0.6	1.0	5.5	6.2
BMI	<25%	*283-87	15.5	8.3	17.5	*133-37	67.4	27.3	20.8	25.8	*199-203	21.2	24.1
	25% - 30%	40.8	30.8	16.0	41.6	45.2	12.4	41.9	41.3	40.7	42.3	41.4	37.6
	>30%	39.6	33.8	15.0	40.8	28.4	19.3	27.6	32.3	31.3	33.5	36.0	32.1
	Unknown	*1-5	20.0	60.7	0.0	*1-5	0.9	3.3	5.6	2.3	*1-5	1.4	6.2
Creatinine level (µmol/L)	0 - 20	84.2	84.0	50.1	90.7	90.4	85.9	75.8	87.7	82.3	87.8	87.5	83.2
	121 - 180	11.3	7.3	*24 - 28	6.0	6.5	11.3	6.9	6.9	12.7	8.3	7.5	8.5
	>180	4.5	3.1	*2 - 6	*33-37	*11-15	*13-17	2.8	2.3	3.1	*28-32	3.4	3.0
	Unknown	0.0	5.6	45.0	*1-5	*1-5	*1-5	14.4	3.2	1.9	*1-5	1.6	5.3
Dialysis	Yes	2.7	2.3	*4-8	1.1	1.5	*1-5	0.7	1.7	1.1	2.3	0.9	1.5
Atrial Fibrillation	Yes	12.9	8.5	10.4	7.9	5.9	8.9	7.7	9.4	7.9	8.8	10.1	9.2
Shock	Yes	1.2	*1-5	*1-5	1.0	0.0	*1-5	*1-5	0.0	0.7	*1-5	1.9	0.7
Hypertension	Yes	78.1	72.8	55.0	78.0	79.7	74.7	73.1	76.0	74.5	78.9	67.4	74.3
PVD	Yes	20.2	14.3	10.8	14.6	7.5	11.6	7.6	11.3	7.3	16.9	13.6	12.8
CCS	Stable Angina or Missing	51.9	55.6	54.8	50.3	74.3	63.5	74.6	41.7	50.3	53.0	52.7	55.1
	ACS – Low risk	32.5	36.2	13.1	12.9	12.3	26.1	15.7	23.6	27.3	14.5	5.5	20.5
	ACS – Intermediate risk	6.7	5.9	25.9	29.9	10.3	6.7	6.3	21.3	19.0	24.7	33.6	17.7
	ACS – High risk	2.5	*5 - 9	4.9	5.0	*11 - 15	2.5	2.3	12.3	2.7	5.9	3.7	4.4

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	ACS – Emergent risk	6.3	*1-5	1.3	1.9	*1-5	1.2	1.1	1.0	0.8	1.9	4.5	2.3
Left Main Disease	Yes	32.3	30.3	29.0	34.1	32.2	32.0	28.8	27.1	21.0	31.9	37.3	30.3
COPD	Yes	9.3	8.2	10.4	11.7	4.6	4.8	5.5	9.5	4.6	7.2	8.5	7.9
CVD	Yes	10.7	10.3	6.7	8.3	6.3	7.9	7.6	10.4	7.6	11.8	9.5	9.0
Diabetes	Yes	39.8	38.0	30.8	35.5	40.2	34.5	42.8	36.1	43.4	41.4	33.5	38.3
Recent MI	Yes	41.4	38.3	34.6	36.0	24.5	45.5	27.9	38.5	34.0	25.4	27.1	34.4
Priority	Urgent	19.3	13.4	30.7	36.6	15.7	*105 - 109	12.4	34.7	23.8	33.7	39.1	25.9
	Semi-Urgent	33.3	31.7	26.1	*331-35	34.5	34.5	32.5	24.6	28.2	26.8	25.8	29.5
	Elective	45.7	50.7	40.0	34.1	38.5	48.4	43.7	39.0	47.3	37.6	31.8	41.4
	Missing	1.6	4.2	3.3	*2-6	11.3	*1-5	11.4	1.7	0.8	1.8	3.2	3.1
Hyperlipidemia/ dyslipidemia	Yes	74.1	70.0	53.7	79.8	82.0	73.1	57.9	77.0	78.0	80.9	71.0	73.2
Smoker	Current	22.1	26.8	20.2	23.3	17.8	19.9	19.9	20.3	16.9	17.2	31.3	21.2
	Former	45.7	39.0	33.1	45.4	37.5	46.7	26.4	41.3	28.9	39.8	18.6	37.0
	Never, Unknown, Missing	32.3	34.3	46.7	31.4	44.6	33.4	53.7	38.3	54.2	43.0	50.1	41.8
Previous CABG	Yes	1.0	*4-8	1.1	*11-15	*1-5	*1-5	0.6	1.0	1.5	1.3	1.9	1.1

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated.

Table 36c. Prevalence of risk factors for isolated CABG surgery in 2013/14

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean	66.99 ± 10.36	65.91 ± 9.67	64.91 ± 9.12	65.57 ± 9.96	64.70 ± 9.46	66.30 ± 10.07	65.19 ± 9.72	66.37 ± 10.14	65.22 ± 9.92	65.87 ± 10.37	66.68 ± 9.85	66.01 ± 9.98
	<65	39.0	44.2	45.5	40.2	48.4	41.8	44.2	42.1	45.2	43.4	41.4	42.6
	65-75	36.0	35.6	38.6	36.3	35.3	37.4	37.6	33.9	35.5	33.9	35.5	35.9
	≥75	25.0	20.2	15.9	23.5	16.3	20.9	18.3	24.0	19.4	22.6	23.1	21.5
Sex	Female	21.7	19.2	18.5	22.4	20.4	16.7	20.7	20.0	22.7	22.4	21.8	21.0
Ejection Fraction	≥50%	68.7	53.4	55.2	60.9	63.0	49.7	68.3	48.7	60.1	69.7	67.2	61.4
	35% - 49%	22.9	18.2	21.8	26.6	23.9	30.6	17.8	34.7	24.4	18.5	18.1	23.8
	20% - 34%	7.4	*16-20	*33-37	9.8	10.2	14.6	8.4	10.7	13.0	8.4	9.2	9.7
	<20%	*6-10	*3-7	*6-10	1.6	*5-9	2.3	1.1	2.2	*16-20	*2.2*	1.7	1.7
	Unknown	*1-5	20.5	12.8	1.1	*1-5	2.8	4.4	3.7	*1-5	1.3	3.7	7.7
BMI	<25%	21.3	11.6	4.7	*174-78	*87-91	*106-10	27.6	22.1	26.8	*140-44	*104-08	22.1
	25% - 30%	39.4	27.7	11.1	39.4	42.0	37.4	35.4	40.0	41.5	39.1	40.8	37.1
	>30%	39.2	24.3	12.6	38.4	31.2	36.9	30.5	34.2	28.8	34.8	38.0	33.0
	Unknown	0.0	36.3	71.6	*1-5	*1-5	*1-5	6.4	3.7	2.9	*1-5	*2-6	7.7
Creatine level (µmol/L)	0 - 20	86.4	83.6	24.6	89.4	91.8	89.1	60.9	85.0	86.5	86.5	86.9	80.5
	121 - 180	9.0	9.6	*2-6	7.4	5.2	7.7	4.8	10.1	8.3	9.2	8.1	7.6
	>180	*43-47	2.1	*5-9	*21-25	2.9	1.6	4.3	3.3	3.8	*19-23	*21-25	3.4
	Unknown	*1-5	4.8	72.7	*1-5	0.0	1.6	30.1	1.6	1.3	*1-5	*1-5	8.4
Dialysis	Yes	2.3	*1-5	1.7	1.9	*1-5	*1-5	2.0	2.5	2.0	3.1	1.3	1.9
Atrial Fibrillation	Yes	9.0	8.6	9.7	10.4	6.4	10.4	9.7	10.7	7.5	6.3	10.4	9.1
Shock	Yes	1.6	2.1	*1-5	*1-5	*1-5	*1-5	*1-5	*1-5	0.8	*1-5	2.3	0.9
Hypertension	Yes	78.0	68.5	59.2	80.5	77.0	71.9	75.3	78.8	77.2	79.9	69.7	75.4
PVD	Yes	15.7	13.4	11.4	10.5	7.6	13.9	8.3	12.7	9.4	14.4	14.1	12.1
CCS	Stable Angina or Missing	47.9	58.6	48.3	50.1	83.1	51.5	84.4	49.5	50.2	48.3	47.4	54.8
	ACS – Low risk	38.4	27.1	19.4	13.8	9.0	34.1	7.7	18.2	31.6	12.7	3.9	21.0
	ACS – Intermediate risk	5.0	9.6	22.7	27.9	5.8	9.5	4.3	16.7	14.2	30.2	41.0	16.8
	ACS – High risk	1.8	*4 - 8	4.3	5.8	*3 - 7	3.5	2.0	14.4	2.6	7.2	3.5	4.5

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	ACS – Emergent risk	6.9	*6 - 10	5.2	2.3	*1-5	1.4	1.7	1.2	1.3	1.6	4.2	2.9
Left Main Disease	Yes	31.6	36.0	24.6	31.0	27.7	31.3	28.5	26.7	23.4	30.0	41.6	29.9
COPD	Yes	9.2	6.8	9.2	12.1	4.7	7.4	4.9	12.9	5.4	5.9	10.4	8.4
CVD	Yes	10.5	8.2	6.6	7.8	6.4	9.7	7.2	9.3	7.7	10.4	7.9	8.5
Diabetes	Yes	40.0	39.4	36.5	37.2	45.5	35.7	44.8	36.7	45.1	41.8	38.5	40.2
Recent MI	Yes	42.6	39.0	34.6	36.3	21.3	44.5	26.1	42.5	33.3	24.6	32.8	35.1
Priority	Urgent	17.1	*43-47	29.4	36.8	12.8	*85-89	10.7	31.7	*173-77	37.2	45.7	25.6
	Semi-Urgent	34.2	34.2	25.8	26.5	32.1	33.9	31.3	27.4	32.2	21.7	21.4	29.3
	Elective	47.2	48.3	41.0	35.7	48.7	45.2	47.5	38.5	46.4	40.0	29.3	42.4
	Missing	1.4	*4-8	3.8	1.0	6.4	*1-5	10.4	2.4	*1-5	1.1	3.7	2.7
Hyperlipidemia/ dyslipidemia	Yes	75.6	66.4	55.2	76.4	85.7	70.8	63.8	77.2	79.4	81.9	70.3	73.8
Smoker	Current	25.5	21.9	16.8	20.0	16.9	20.6	13.2	23.0	16.8	17.4	35.3	20.9
	Former	42.0	38.4	27.5	46.2	32.9	48.3	25.9	39.4	28.2	41.8	14.8	35.6
	Never, Unknown, Missing	32.5	39.7	55.7	33.7	50.1	31.1	60.9	37.6	54.9	40.8	49.9	43.5
Previous CABG	Yes	*6-10	*1-5	*2-6	1.6	0.0	1.6	*1-5	1.2	1.2	1.4	*6-10	1.1

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated.

Table 36d. Prevalence of risk factors for isolated CABG surgery in 2014/15

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean	67.71 ± 9.80	66.01 ± 8.98	65.64 ± 9.23	66.39 ± 9.90	64.88 ± 9.64	66.18 ± 9.72	64.28 ± 9.63	65.62 ± 10.31	65.45 ± 9.96	65.53 ± 10.05	66.64 ± 9.44	65.98 ± 9.82
	<65	36.6	41.8	45.4	41.2	46.0	41.3	49.7	44.7	44.8	45.5	37.9	42.8
	65-75	36.8	37.4	35.5	36.0	35.9	38.6	34.9	33.6	35.6	33.3	40.7	36.1
	≥75	26.6	20.7	19.1	22.8	18.1	20.1	15.4	21.7	19.6	21.1	21.4	21.1
Sex	Female	23.4	18.7	20.3	22.9	18.6	20.9	17.7	18.3	18.4	19.6	20.2	20.2
Ejection Fraction	≥50%	66.9	47.3	51.0	57.9	71.8	49.0	67.3	52.1	60.3	69.4	70.5	61.3
	35% - 49%	23.6	18.7	23.4	27.0	18.3	32.6	19.1	28.7	25.6	18.0	19.0	23.5
	20% - 34%	8.7	10.2	*28-32	10.1	7.2	12.7	*37-41	12.1	11.3	9.1	6.1	9.2
	<20%	0.9	4.8	*2-6	2.1	*3-7	2.2	*1-5	*1-5	*19-23	*11-15	1.0	1.6
	Unknown	0.0	19.0	17.4	2.9	*1-5	3.5	6.8	*43-47	*1-5	*1-5	3.4	7.5
BMI	<25%	18.6	9.9	4.3	*143-47	*81-85	*66-70	28.2	21.6	26.3	*123-27	20.5	20.4
	25% - 30%	40.2	29.3	9.2	39.2	48.1	40.5	38.1	41.0	39.9	40.3	37.2	37.7
	>30%	41.2	29.3	9.7	41.4	29.7	41.8	29.9	35.4	31.1	34.7	40.4	34.4
	Unknown	0.0	31.6	76.8	*1-5	*1-5	*1-5	3.7	2.1	2.7	*2-6	1.9	7.5
Creatine level (µmol/L)	0 - 20	85.7	83.0	11.8	85.6	92.8	90.5	53.7	88.5	89.1	87.0	89.0	79.6
	121 - 180	9.0	10.2	*7 - 11	9.7	*22 - 26	6.5	4.3	7.1	6.7	9.3	7.1	7.3
	>180	5.4	4.4	*1-5	*31-35	*2-6	*7-11	4.2	3.3	*29-33	3.7	*18-22	3.6
	Unknown	0.0	2.4	85.7	*1-5	0.0	*1-5	37.8	1.2	*1-5	0.0	*1-5	9.6
Dialysis	Yes	3.1	*1-5	1.9	2.6	*1-5	1.5	2.8	1.5	1.4	2.9	1.0	2.1
Atrial Fibrillation	Yes	11.7	8.2	8.2	7.7	7.2	6.0	8.2	10.1	6.0	10.1	9.2	8.6
Shock	Yes	1.4	*1-5	*1-5	*1-5	0.0	*1-5	*1-5	*1-5	0.9	*1-5	*1-5	0.7
Hypertension	Yes	76.7	74.8	67.1	78.0	77.3	75.4	73.1	75.9	76.0	80.6	65.5	74.9
PVD	Yes	16.9	11.6	7.5	12.6	6.5	12.9	9.4	10.5	9.2	14.0	10.7	11.5
CCS	Stable Angina or Missing	48.5	52.7	40.3	53.9	87.1	49.0	86.0	39.2	53.0	55.0	53.1	55.4
	ACS – Low risk	39.6	35.4	20.5	21.9	8.0	37.3	6.5	17.6	35.5	9.9	*8 - 12	22.4
	ACS – Intermediate risk	4.0	9.2	30.0	21.4	3.4	10.9	3.4	24.0	8.5	27.9	35.0	15.5
	ACS – High risk	1.8	*1-5	6.3	2.1	*1-5	*2-6	2.3	18.2	1.7	5.4	5.4	4.3

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	ACS – Emergent risk	6.1	*4-8	2.9	0.8	*1-5	*5-9	1.9	1.0	1.3	1.7	*26-30	2.4
Left Main Disease	Yes	32.2	41.5	26.1	29.4	29.2	33.3	31.9	28.3	24.8	32.6	39.6	31.1
COPD	Yes	9.7	10.9	6.5	14.2	5.2	8.2	6.3	8.3	3.5	5.8	6.8	7.9
CVD	Yes	12.0	7.1	6.0	9.2	6.7	9.7	6.5	7.4	8.9	10.1	6.5	8.6
Diabetes	Yes	40.7	39.1	32.9	40.1	41.1	36.3	42.7	36.2	45.9	39.9	37.5	39.9
Recent MI	Yes	42.9	40.1	44.7	37.4	18.6	44.8	23.1	45.1	31.3	24.8	25.3	34.7
Priority	Urgent	15.9	19.4	36.7	25.3	*36-40	19.2	8.2	42.2	*132-36	36.4	42.6	24.2
	Semi-Urgent	36.6	33.3	*95-99	*248-52	34.1	34.3	32.9	22.6	34.0	22.7	22.6	30.4
	Elective	46.8	44.6	38.6	41.5	55.0	45.0	43.8	34.2	49.8	39.1	33.3	42.9
	Missing	0.7	2.7	*3-7	*1-5	*2-6	1.5	15.1	1.0	*4-8	1.7	1.5	2.5
Hyperlipidemia/ dyslipidemia	Yes	72.5	70.4	55.1	78.4	79.8	73.9	69.0	73.7	81.4	82.2	69.4	73.9
Smoker	Current	23.6	25.2	20.8	19.1	15.5	23.6	19.0	20.7	15.9	18.0	37.9	21.6
	Former	39.5	36.7	31.2	42.6	33.6	43.5	23.3	36.1	30.0	39.3	7.8	33.1
	Never, Unknown, Missing	36.9	38.1	48.1	38.3	50.9	32.8	57.7	43.2	54.1	42.6	54.3	45.3
Previous CABG	Yes	*1-5	0.0	2.2	1.6	0.0	*1-5	*1-5	*1-5	*1-5	*1-5	*1-5	0.7

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated.

Table 36e. Prevalence of risk factors for isolated CABG in 2015/16

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean	67.40 ± 9.59	65.71 ± 9.04	95.42 ± 9.59	65.98 ±9.54	63.42 ± 9.69	66.57 ± 9.27	64.62 ± 9.19	65.80 ± 9.90	65.23 ± 9.66	64.76 ± 10.05	66.61 ± 9.69	66.61 ± 9.69
	<65	35.9	42.8	44.9	43.2	50.7	39.3	47.3	44.6	46.6	46.3	40.1	40.1
	65-75	39.9	42.4	36.4	37.9	36.8	40.0	38.5	34.2	33.5	37.0	37.5	37.5
	≥75	24.2	14.8	18.7	18.9	12.5	20.8	14.2	21.2	19.8	16.6	22.3	22.3
Sex	Female	21.8	20.2	20.8	20.0	17.1	20.8	19.1	18.3	17.7	18.2	21.5	21.5
Ejection Fraction	≥50%	65.7	53.9	46.8	65.8	62.7	62.6	70.4	53.7	61.1	70.8	64.6	64.6
	35% - 49%	25.2	24.2	22.9	21.5	16.0	25.5	16.7	29.9	24.2	18.6	16.3	16.3
	20% - 34%	8.3	6.1	5.5	10.3	6.9	7.0	*38-42	10.4	11.3	7.0	5.5	5.5
	<20%	0.8	5.1	1.8	1.2	*4-8	1.9	*3-7	*8-12	*20-24	*13-17	1.1	1.1
	Unknown	0.0	10.8	23.1	1.2	*46-50	3.0	5.0	*27-31	*4-8	*3-7	12.4	12.4
BMI	<25%	17.2	16.5	4.4	*150-54	24.5	16.6	25.7	21.1	25.9	*129-33	*125-29	*125-29
	25% - 30%	40.4	38.0	7.5	37.9	40.3	40.4	39.4	36.9	39.0	40.4	38.8	38.8
	>30%	42.4	35.7	10.9	43.1	29.9	40.7	25.0	39.2	33.2	35.4	40.0	40.0
	Unknown	0.0	9.8	77.1	*1-5	5.3	2.3	9.9	2.7	1.8	*2-6	*1-5	*1-5
Creatine level (µmol/L)	0 - 20	83.9	85.9	84.9	89.2	91.7	86.7	54.1	86.3	88.6	86.0	90.0	90.0
	121 - 180	10.1	9.1	8.1	8.5	*18-22	8.9	5.0	9.8	7.2	9.1	5.7	5.7
	>180	6.0	2.4	3.1	*14-18	*5-9	*14-18	4.4	2.3	*26-30	3.8	3.1	3.1
	Unknown	0.0	2.7	3.9	*1-5	*1-5	*1-5	36.5	1.7	*4-8	1.1	1.1	1.1
Dialysis	Yes	2.5	*1-5	*1-5	0.9	*1-5	1.6	1.8	1.2	2.1	3.0	1.3	1.3
Atrial Fibrillation	Yes	11.5	7.7	8.3	8.7	8.0	9.6	5.1	10.7	7.6	10.4	9.5	9.5
Shock	Yes	4.5	*1-5	1.8	2.1	*5-9	*1-5	2.5	0.0	1.8	*1-5	*8-12	≤5
Hypertension	Yes	75.0	71.7	71.9	80.0	73.6	78.5	75.2	78.9	78.5	78.9	66.6	66.6
PVD	Yes	19.2	12.5	8.8	11.8	6.1	12.9	6.7	11.9	6.0	10.9	8.3	8.3
CCS	Stable Angina or Missing	47.9	53.9	33.8	49.1	87.5	56.3	85.6	46.4	54.1	56.0	39.0	39.0
	ACS – Low risk	33.6	34.7	38.2	15.2	4.3	28.7	10.3	5.6	30.4	7.9	*3-7	≤5
	ACS – Intermediate risk	8.2	10.1	21.3	29.8	4.5	12.1	2.0	24.1	12.1	29.7	39.6	39.6
	ACS – High risk	3.1	*1-5	4.4	4.0	*9-13	*2-6	1.1	20.5	2.1	5.2	12.7	12.7

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	ACS – Emergent risk	7.3	*1-5	2.3	1.8	≤5	*6 - 10	1.1	3.4	1.3	1.3	*46-50	≤5
Left Main Disease	Yes	36.5	34.0	28.1	28.6	28.5	29.0	31.4	29.9	24.0	28.8	39.5	39.5
COPD	Yes	9.5	7.4	10.1	13.1	4.3	5.8	5.1	9.0	4.5	7.0	7.3	7.3
CVD	Yes	10.2	8.1	7.5	9.4	5.3	9.1	5.7	8.1	4.9	8.6	8.0	8.0
Diabetes	Yes	44.4	44.1	36.9	36.4	42.9	40.2	44.3	33.1	47.5	44.0	38.2	38.2
Recent MI	Yes	42.4	39.1	47.3	39.8	20.8	46.0	21.1	42.6	32.9	27.7	29.2	29.2
Priority	Urgent	23.0	*45-49	31.4	36.8	*32-36	*76-80	7.1	44.7	19.0	36.5	54.5	54.5
	Semi-Urgent	34.1	33.7	*101-05	*196-200	32.0	29.0	33.0	20.3	33.4	20.2	19.4	19.4
	Elective	41.3	49.5	41.0	38.4	57.1	52.1	52.0	33.7	46.8	42.0	24.5	24.5
	Missing	1.6	*1-5	*1-5	*2-6	*5-9	*1-5	8.0	1.2	0.9	1.3	1.6	1.6
Hyperlipidemia/ dyslipidemia	Yes	71.1	67.0	59.7	76.4	76.3	75.7	68.4	76.3	77.7	78.9	67.2	67.2
Smoker	Current	20.0	25.6	22.1	22.2	19.2	18.7	11.7	19.1	16.6	19.7	36.9	36.9
	Former	47.6	30.6	34.5	45.5	26.7	48.4	26.6	42.0	30.7	41.3	7.0	7.0
	Never, Unknown, Missing	32.4	43.8	43.4	32.3	54.1	32.9	61.7	38.9	52.6	39.0	56.1	56.1
Previous CABG	Yes	0.8	0.0	*1-5	*1-5	0.0	0.0	0.0	*4-8	*8 - 12	*1-5	1.3	1.3

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated.

Table 37. Prevalence of risk factors for isolated AVR surgery in 2011/16

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean	69.42 ± 12.60	68.23 ± 10.39	67.57 ± 10.25	68.51 ± 12.62	68.70 ± 11.98	69.43 ± 11.4	68.27 ± 11.16	69.56 ± 11.35	71.24 ± 10.17	64.99 ± 13.80	69.20 ± 10.96	68.58 ± 11.82
	<65	30.3	34.6	40.4	32.4	30.9	29.7	31.3	29.5	21.7	41.9	31.1	32.2
	65-75	30.5	32.8	28.3	31.3	31.7	29.7	37.4	32.9	36.3	30.4	32.0	32.3
	≥75	39.2	32.5	31.3	36.3	37.4	40.5	31.3	37.6	42.1	27.7	36.9	35.5
Sex	Female	38.2	34.3	34.3	43.1	36.5	43.2	38.9	42.7	40.4	37.5	38.2	39.1
Ejection Fraction	≥50%	85.1	62.7	60.2	83.9	79.6	79.1	79.9	78.2	75.0	81.6	85.0	79.2
	35% - 49%	10.3	10.2	6.6	10.1	9.1	14.2	7.9	13.2	14.6	10.0	8.0	10.1
	20% - 34%	4.6	*7-11	*3-7	4.1	7.8	4.1	*16-20	5.2	7.1	6.4	*15-19	4.5
	<20%	0.0	*2-6	*1-5	*5-9	*1-5	*1-5	*1-5	*1-5	*4-8	*1-5	*1-5	0.8
	Unknown	0.0	23.2	28.9	*1-5	*3-7	*1-5	7.7	*8-12	*1-5	*3-7	3.3	5.3
BMI	<25%	*109-13	9.6	4.8	21.9	27.0	42.6	26.0	19.2	*45-49	*95-99	*111-15	21.5
	25% - 30%	34.5	18.1	13.3	35.2	43.5	28.4	35.9	34.7	38.8	34.6	34.6	33.1
	>30%	43.0	30.7	20.5	42.9	26.5	25.0	31.9	40.7	40.4	40.9	44.2	37.7
	Unknown	*1-5	41.6	61.4	0	3.0	4.1	6.1	5.4	*1-5	*1-5	*1-5	7.8
Creatinine level (µmol/L)	0 - 20	89.1	81.0	42.8	89.5	88.7	81.1	48.4	86.5	82.9	91.2	89.4	81.1
	121 - 180	7.5	9.3	*4 - 8	6.4	6.1	15.5	5.0	9.3	12.9	6.4	6.9	7.6
	>180	3.4	3.0	*1-5	*17-21	*7-11	*1-5	2.4	1.6	4.2	*5-9	*15-19	2.8
	Unknown	0.0	6.6	51.8	*1-5	*1-5	*1-5	44.2	2.6	0.0	*1-5	*1-5	8.5
Previous PCI	Yes	3.8	11.7	6.0	6.0	6.5	5.4	6.6	3.9	5.8	4.9	10.1	6.5
Dialysis	Yes	2.4	1.8	*1-5	3.0	*1-5	*1-5	2.0	*1-5	*1-5	*1-5	*1-5	1.5
Atrial Fibrillation	Yes	24.2	13.3	23.5	16.9	11.7	24.3	22.1	24.1	25.0	16.4	21.2	20.1
Shock	Yes	1.6	0.0	*1-5	*1-5	0.0	0.0	*1-5	*1-5	0.0	*1-5	*1-5	0.6
Hypertension	Yes	65.0	69.6	45.2	67.0	67.4	66.2	61.3	66.1	66.3	62.7	58.5	63.6
PVD	Yes	17.2	5.1	6.0	5.4	*1-5	8.8	4.8	6.7	5.0	6.4	5.7	7.0
Aortic Stenosis	Yes	85.7	90.7	88.0	90.1	80.9	78.4	92.1	87.8	81.3	77.5	92.0	86.9
COPD	Yes	8.7	8.7	10.8	17.2	4.3	8.1	6.8	11.4	7.1	6.6	8.4	9.4
CVD	Yes	11.9	4.2	8.4	9.4	4.8	12.2	5.0	8.0	5.4	7.8	7.9	7.8
Diabetes	Yes	28.9	31.0	21.1	26.8	21.7	25.7	21.9	24.1	27.9	24.0	23.4	25.3
Priority	Urgent	61.6	22.9	53.6	56.4	50.0	37.2	20.1	16.1	67.9	51.2	31.1	41.6
	Semi-Urgent	10.9	6.9	12.0	9.7	14.8	22.3	5.7	4.1	11.7	22.5	14.6	11.6
	Elective	11.5	34.0	9.0	22.7	16.5	24.3	31.3	5.4	10.8	13.0	45.3	22.1

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
	Missing	16.0	36.1	25.3	11.2	18.7	16.2	42.9	74.4	9.6	13.2	9.0	24.8
NYHA class	1	15.2	22.3	11.4	20.2	12.2	31.8	54.0	18.4	10.0	19.4	49.5	26.4
	2	24.6	22.7	38.6	29.8	50.0	33.1	16.4	31.6	45.8	43.1	28.7	31.4
	3	47.7	*43-47	39.8	38.8	24.8	*39-43	21.0	33.2	37.9	29.2	15.0	29.7
	4	*58-62	*1-5	*1-5	4.1	5.2	*1-5	1.8	4.4	3.3	*29-33	2.0	4.5
	No known heart failure, unknown, or missing	*1-5	35.5	*12-16	7.1	7.8	5.4	6.8	12.4	2.9	*1-5	4.8	7.9
Active infectious endocarditis	Yes	5.0	*1-5	*1-5	2.4	3.9	*1-5	1.3	2.8	3.3	3.7	2.6	2.7
Previous valve surgery	Yes	4.0	5.4	5.4	4.9	4.8	15.5	5.7	5.2	15.0	6.9	6.8	6.4

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated

Table 38. Prevalence of risk factors for combined CABG/AVR surgery

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Age	Mean	74.52 ± 8.43	72.33 ± 7.71	71.93 ± 8.39	73.90 ± 8.45	71.32 ± 9.09	74.61 ± 7.93	72.73 ± 8.67	74.43 ± 8.57	74.63 ± 7.57	72.76 ± 8.18	73.28 ± 8.68	73.64 ± 8.41
	<65	12.3	16.8	19.9	14.4	17.1	17.6	17.2	12.4	9.9	15.5	15.2	14.4
	65-75	33.1	38.7	37.1	33.2	46.1	26.4	34.9	32.3	35.3	37.2	37.4	34.9
	≥75	54.6	44.5	43.0	52.4	36.8	56.0	47.9	55.3	54.8	47.3	47.4	50.7
Sex	Female	26.8	22.0	21.9	24.7	23.7	18.4	26.5	26.0	25.8	24.7	21.6	24.5
Ejection Fraction	≥50%	75.8	56.5	66.9	73.7	72.4	72.0	74.0	70.2	69.0	82.1	75.1	73.0
	35% - 49%	17.9	15.2	12.6	14.9	14.5	16.8	14.0	14.1	19.0	11.6	15.2	15.3
	20% - 34%	*36-40	*6-10	7.3	8.5	13.2	7.2	6.0	9.1	9.1	5.4	7.3	7.3
	<20%	*1-5	*1-5	0.0	*4-8	0	*1-5	*1-5	*1-5	*2-6	*1-5	*1-5	0.8
	Unknown	*1-5	22.5	13.2	*3-7	0	*1-5	*5-9	*21-25	*1-5	*1-5	*7-11	3.6
BMI	<25%	21.8	14.7	7.9	14.4	19.7	37.6	23.3	19.4	*59-63	*54-58	*119-23	20.3
	25% - 30%	36.5	29.3	7.3	38.0	34.2	32.0	45.1	37.1	38.5	41.4	39.9	36.5
	>30%	41.8	33.0	17.9	47.6	46.1	*33-37	27.9	40.2	35.7	41.1	34.3	37.7
	Unknown	0.0	23.0	66.9	0	0.0	*1-5	3.7	3.3	*2-6	*1-5	*1-5	5.5
Creatine level (µmol/L)	0 – 20	80.0	82.7	37.7	86.7	90.8	87.2	50.7	80.1	81.0	84.8	79.6	78.1
	121 - 180	13.3	7.9	4.6	9.0	*2-6	*11-15	6.5	14.1	14.7	11.3	13.3	11.4
	>180	6.7	4.7	*1-5	*11-15	*1-5	*1-5	5.6	2.5	*6-10	*8-12	*29-33	4.5
	Unknown	0.0	4.7	*82-86	*1-5	0.0	0.0	37.2	3.3	*1-5	*1-5	*1-5	6.0
Dialysis	Yes	3.8	*1-5	*1-5	*1-5	0.0	*1-5	2.8	1.5	*1-5	1.8	1.5	1.9
Atrial Fibrillation	Yes	25.0	21.5	23.8	18.1	18.4	20.8	21.4	22.0	18.3	18.8	27.0	22.1
Shock	Yes	1.4	0.0	*1-5	*1-5	0.0	0.0	*1-5	0.0	0.0		*1-5	0.6
Hypertension	Yes	79.4	79.1	60.9	87.2	78.9	82.4	74.0	80.3	73.0	80.4	69.6	
PVD	Yes	21.2	16.2	8.6	15.4	9.2	15.2	13.5	17.7	13.9	14.0	13.1	15.7
CCS/ACS class	Stable Angina or Missing	76.2	75.9	81.5	81.9	96.1	*101-05	92.6	70.5	79.4	84.2	71.7	78.7
	ACS Low risk	18.3	19.9	9.3	3.5	*1-5	9.6	3.7	8.6	*28-32	*15-19	3.1	9.3
	ACS Intermediate risk	2.7	*1-5	5.3	13.0	*1-5	4.8	*1-5	*36-40	7.1	9.5	18.9	8.3
	ACS High risk	*1-5	*1-5	*1-5	*1-5	0.0	*1-5	*1-5	10.6	*1-5	*2-6	3.5	2.5
	Emergent	*13-17	0.0	*1-5	*1-5	0.0	*1-5	*1-5	*1-5	*1-5	0.0	2.7	1.2

Risk Factor		HHS	HSN	KGH	LHSC	SHSC	SMGH	SMH	SRHC	THP	UHN	UOHI	Ont.
Left Main Disease	Yes	15.1	18.3	14.6	19.7	13.2	19.2	13.0	15.2	13.1	12.8	18.7	15.9
Aortic Stenosis	Yes	92.0	74.9	83.4	89.9	81.6	80.0	93.0	86.4	77.4	86.0	79.4	85.4
COPD	Yes	11.6	11.0	15.2	13.0	≤5	6.4	12.1	15.4	8.7	6.0	9.1	10.9
CVD	Yes	15.9	13.1	8.6	13.3	7.9	15.2	11.2	15.9	10.3	11.9	9.8	12.8
Diabetes	Yes	38.7	36.6	35.8	41.0	48.7	39.2	33.0	33.8	37.3	35.4	35.1	37.0
Recent MI	Yes	18.9	23.0	12.6	13.3	10.5	15.2	9.3	16.4	15.1	6.8	12.1	14.4
Priority	Urgent	64.9	23.0	55.0	61.4	56.6	51.2	25.6	27.0	61.5	68.5	49.1	51.4
	Semi-Urgent	4.5	12.6	9.3	7.4	11.8	7.2	6.5	6.1	12.7	7.7	10.6	8.0
	Elective	16.6	35.6	17.2	19.7	15.8	30.4	30.2	6.8	17.1	15.8	34.9	21.0
	Missing	13.9	28.8	18.5	11.4	15.8	11.2	37.7	60.1	8.7	8.0	5.4	19.6
NYHA class	1	21.0	31.4	*30-34	21.8	*4-8	22.4	55.8	23.2	8.7	19.9	52.6	27.6
	2	20.7	*41-45	45.0	31.6	52.6	40.8	14.4	28.0	44.4	37.8	22.9	29.2
	3	43.7	12.6	26.5	33.0	15.8	20.0	*39-43	29.0	30.2	32.7	18.7	29.0
	4	12.3	*1-5	*1-5	3.2	*1-5	*2-6	*3-7	4.0	2.4	4.8	2.9	5.0
	No known heart failure, unknown, or missing	2.3	31.9	5.3	10.4	19.7	*15-19	8.4	15.7	14.3	4.8	2.9	9.2
Previous CABG	Yes	2.9	*1-5	4.6	1.9	*1-5	*1-5	*1-5	3.8	4.4	3.3	5.4	3.4
Previous valve surgery	Yes	1.1	*1-5	*1-5	*1-5	0.0	*1-5	*1-5	2.0	2.8	2.4	*1-5	1.7

*Measures were undertaken (i.e., suppression of other numbers) to ensure small cells could not be calculated. ** Risk factors: CIHI DAD and CorHealth Ontario data; Blank cells indicate data was not available.

APPENDIX C

Table 1. Multivariable regression model and model fit statistics for in-hospital all-cause mortality following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-6.0538	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.4552	0.0002
	≥75	1.1203	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2897	0.0133
	20% - 34%	0.7698	<.0001
	<20%	1.3682	<.0001
	Missing (not done or unknown)	0.2898	0.163
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.5247	<.0001
	> 180	0.9336	<.0001
	Missing	0.1363	0.4926
Dialysis	Yes vs. No	0.6689	0.0055
Atrial fibrillation	Yes vs. No	0.568	<.0001
Shock	Yes vs. No	1.5253	<.0001
Sex	Female vs. Male	0.6247	<.0001
PVD	Yes vs. No	0.4725	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.2001	0.1592
	ACS Intermediate Risk	0.09861	0.6052
	ACS High Risk	0.3862	0.0822
	Emergent	0.9561	<.0001
COPD	Yes vs. No	0.4097	0.0014
CVD	Yes vs. No	0.3324	0.0108
Recent MI	Yes vs. No	0.4907	<.0001
Priority	Elective	Ref.	
	Semi-urgent	0.1833	0.2008
	Urgent	0.3452	0.0731
	Missing	1.3406	<.0001
Previous CABG	Yes vs. No	0.751	0.027
Model fit statistics			
Area under the ROCC (c-statistic)		0.8216	
Hosmer-Lemeshow Test (p-value)		0.4353	
Somers' D		0.6432	

Table 2. Multivariable regression model and model fit statistics for 30-day all-cause mortality following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-5.928	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.3474	0.0048
	≥75	0.9622	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2538	0.0364
	20% - 34%	0.8207	<.0001
	<20%	1.55	<.0001
	Missing (not done or unknown)	0.335	0.1104
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.5059	0.0002
	> 180	1.0986	<.0001
	Missing	0.07641	0.7086
Atrial fibrillation	Yes vs. No	0.5124	<.0001
Shock	Yes vs. No	1.2538	<.0001
Sex	Female vs. Male	0.592	<.0001
PVD	Yes vs. No	0.4999	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.2048	0.1572
	ACS Intermediate Risk	0.1478	0.4485
	ACS High Risk	0.4579	0.0441
	Emergent	1.0555	<.0001
CVD	Yes vs. No	0.3526	0.0085
Recent MI	Yes vs. No	0.4263	0.0003
Priority	Elective	Ref.	
	Semi-urgent	0.2625	0.072
	Urgent	0.3423	0.0847
	Missing	1.2752	<.0001
Previous CABG	Yes vs. No	0.8375	0.0131
Model fit statistics			
Area under the ROCC (c-statistic)		0.8009	
Hosmer-Lemeshow Test (p-value)		0.1792	
Somers' D		0.6018	

Table 3. Multivariable regression model and model fit statistics for 1-year all-cause mortality following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-5.019	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.344	0.0003
	≥75	1.092	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2963	0.0008
	20% - 34%	0.5755	<.0001
	<20%	1.0217	<.0001
	Missing (not done or unknown)	0.2253	0.2033
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.5606	<.0001
	> 180	1.1802	<.0001
	Missing	0.1305	0.3765
Dialysis	Yes vs. No	0.5594	0.0035
Atrial fibrillation	Yes vs. No	0.7598	<.0001
Shock	Yes vs. No	1.4237	<.0001
Sex	Female vs. Male	0.3612	<.0001
PVD	Yes vs. No	0.5682	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	-0.09806	0.3682
	ACS Intermediate Risk	-0.03199	0.8326
	ACS High Risk	0.1163	0.5348
	Emergent	0.4747	0.0187
COPD	Yes vs. No	0.5602	<.0001
CVD	Yes vs. No	0.2531	0.0139
Diabetes	Yes vs. No	0.2434	0.001
Recent MI	Yes vs. No	0.5059	<.0001
Priority	Elective	Ref.	
	Semi-urgent	0.2245	0.0295
	Urgent	0.3074	0.043
	Missing	0.9027	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.7951	
Hosmer-Lemeshow Test (p-value)		0.01752	
Somers' D		0.5903	

Table 4. Multivariable regression model and model fit statistics for post-operative LOS following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		1.6276	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.1238	<.0001
	≥75	0.334	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.04911	<.0001
	20% - 34%	0.1617	<.0001
	<20%	0.2758	<.0001
	Missing (not done or unknown)	0.03635	0.0008
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.03426	<.0001
	>30	0.03865	<.0001
	Missing	-0.08525	<.0001
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.1456	<.0001
	> 180	0.3568	<.0001
	Missing	-0.01681	0.088
Dialysis	Yes vs. No	0.1895	<.0001
Atrial fibrillation	Yes vs. No	0.235	<.0001
Shock	Yes vs. No	0.2667	<.0001
Sex	Female vs. Male	0.1463	<.0001
Hypertension	Yes vs. No	0.01889	0.0003
PVD	Yes vs. No	0.08722	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.03644	<.0001
	ACS Intermediate Risk	0.05062	<.0001
	ACS High Risk	0.116	<.0001
	Emergent	0.2112	<.0001
Left main disease	Yes vs. No	0.07061	<.0001
COPD	Yes vs. No	0.1441	<.0001
CVD	Yes vs. No	0.08243	<.0001
Diabetes	Yes vs. No	0.08953	<.0001
Recent MI	Yes vs. No	0.07026	<.0001
Priority	Elective	Ref.	
	Semi-urgent	-0.00452	0.4935
	Urgent	0.06164	<.0001
	Missing	0.1414	<.0001

Table 5. Multivariable regression model and model fit statistics for red blood cell transfusion following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-1.6315	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.3717	<.0001
	≥75	0.8393	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	-0.00037	0.9912
	20% - 34%	0.2219	<.0001
	<20%	0.5889	<.0001
	Missing (not done or unknown)	0.208	0.0026
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.4336	<.0001
	>30	-0.7859	<.0001
	Missing	-0.462	<.0001
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.6295	<.0001
	> 180	1.5395	<.0001
	Missing	0.1742	0.0036
Dialysis	Yes vs. No	0.8106	<.0001
Atrial fibrillation	Yes vs. No	0.1234	0.0083
Shock	Yes vs. No	0.9939	<.0001
Sex	Female vs. Male	1.2952	<.0001
PVD	Yes vs. No	0.3013	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.3227	<.0001
	ACS Intermediate Risk	0.1122	0.112
	ACS High Risk	0.352	<.0001
	Emergent	0.9426	<.0001
Left main disease	Yes vs. No	0.2169	<.0001
COPD	Yes vs. No	0.1358	0.0067
CVD	Yes vs. No	0.1382	0.0042
Diabetes	Yes vs. No	0.244	<.0001
Recent MI	Yes vs. No	0.2821	<.0001
Priority	Elective	Ref.	
	Semi-urgent	0.04768	0.2631
	Urgent	0.1688	0.027
	Missing	0.4436	<.0001
Smoker	Current	Ref.	
	Former	0.05717	0.1491
	Never, unknown, or missing	0.1552	<.0001
Previous CABG	Yes vs. No	0.6702	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.7474	
Hosmer-Lemeshow Test (p-value)		0.005712	
Somers' D		0.4948	

Table 6. Multivariable regression model and model fit statistics for 30-day all-cause readmission following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-2.8452	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.03851	0.4128
	≥75	0.2783	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.01362	0.7806
	20% - 34%	0.1622	0.013
	<20%	0.06277	0.6655
	Missing (not done or unknown)	0.2802	0.0026
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.2572	0.0001
	> 180	0.4555	<.0001
	Missing	0.2468	0.0013
Dialysis	Yes vs. No	0.3889	0.0059
Atrial fibrillation	Yes vs. No	0.425	<.0001
Sex	Female vs. Male	0.2834	<.0001
Hypertension	Yes vs. No	0.1887	0.0005
PVD	Yes vs. No	0.2715	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.127	0.0143
	ACS Intermediate Risk	0.1671	0.0022
	ACS High Risk	0.3802	<.0001
	Emergent	0.3358	0.0031
COPD	Yes vs. No	0.3164	<.0001
Diabetes	Yes vs. No	0.2489	<.0001
Hyperlipidemia	Yes vs. No	-0.1166	0.0186
Model fit statistics			
Area under the ROCC (c-statistic)		0.623	
Hosmer-Lemeshow Test (p-value)		0.174	
Somers' D		0.2459	

Table 7. Multivariable regression model and model fit statistics for 1-year MACE following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-3.5833	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.09449	0.117
	≥75	0.5951	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.1479	0.0127
	20% - 34%	0.1862	0.0206
	<20%	0.4083	0.0087
	Missing (not done or unknown)	0.03669	0.7703
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.3228	<.0001
	> 180	1.0546	<.0001
	Missing	0.1298	0.1779
Dialysis	Yes vs. No	0.4317	0.0049
Atrial fibrillation	Yes vs. No	0.4649	<.0001
Shock	Yes vs. No	1.1284	<.0001
Sex	Female vs. Male	0.3395	<.0001
PVD	Yes vs. No	0.3458	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.1461	0.0436
	ACS Intermediate Risk	0.08429	0.4449
	ACS High Risk	0.1983	0.1538
	Emergent	0.5058	0.0009
COPD	Yes vs. No	0.3197	<.0001
CVD	Yes vs. No	0.2155	0.005
Diabetes	Yes vs. No	0.2597	<.0001
Recent MI	Yes vs. No	0.46	<.0001
Priority	Elective	Ref.	
	Semi-Urgent	0.23	0.0006
	Urgent	0.3038	0.0056
	Missing	0.7581	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.7025	
Hosmer-Lemeshow Test (p-value)		0.8194	
Somers' D		0.4051	

Table 8. Multivariable regression model and model fit statistics for 1-year cardiac readmission for acute MI, unstable angina, or CHF following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-4.0815	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.1593	0.0184
	≥75	0.5723	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.4224	<.0001
	20% - 34%	0.6314	<.0001
	<20%	0.8862	<.0001
	Missing (not done or unknown)	0.3311	0.0152
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.3388	<.0001
	> 180	0.6815	<.0001
	Missing	0.298	0.004
Atrial fibrillation	Yes vs. No	0.5911	<.0001
Shock	Yes vs. No	0.4309	0.0469
Sex	Female vs. Male	0.4809	<.0001
Hypertension	Yes vs. No	0.3486	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.438	<.0001
	ACS Intermediate Risk	0.4344	0.0003
	ACS High Risk	0.5315	0.0004
	Emergent	0.3669	0.0444
COPD	Yes vs. No	0.3964	<.0001
Diabetes	Yes vs. No	0.4288	<.0001
Recent MI	Yes vs. No	0.1761	0.0087
Priority	Elective	Ref.	
	Semi-Urgent	-0.02072	0.7849
	Urgent	0.07408	0.5311
	Missing	0.4299	0.0064
Smoker	Current	Ref.	
	Former	-0.1086	0.1511
	Never, unknown, or missing	-0.2329	0.0022
Model fit statistics			
Area under the ROCC (c-statistic)		0.7144	
Hosmer-Lemeshow Test (p-value)		0.04505	
Somers' D		0.4288	

Table 9. Multivariable regression model and model fit statistics for 1-year cardiac readmission revascularization following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-4.5554	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.3412	0.0045
	≥75	-0.4126	0.0045
Sex	Female vs. Male	0.3045	0.0123
Previous CABG	Yes vs. No	0.8553	0.0194
Diabetes	Yes vs. No	0.2758	0.0107
Hyperlipidemia	Yes vs. No	0.3196	0.0169
Priority	Elective	Ref.	
	Semi-Urgent	0.2444	0.0594
	Urgent	0.3716	0.0048
	Missing	0.5471	0.0558
Model fit statistics			
Area under the ROCC (c-statistic)		0.5966	
Hosmer-Lemeshow Test (p-value)		0.4994	
Somers' D		0.1931	

Table 10. Multivariable regression model and model fit statistics for 1-year post-catheterization following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-3.2044	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.2304	0.0008
	≥75	-0.4368	<.0001
Sex	Female vs. Male	0.3248	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.1718	0.0368
	ACS Intermediate Risk	0.4221	0.0025
	ACS High Risk	0.2032	0.3016
	Emergent	0.4632	0.027
Diabetes	Yes vs. No	0.1543	0.0146
Priority	Elective	Ref.	
	Semi-Urgent	0.01499	0.8492
	Urgent	-0.0922	0.5099
	Missing	0.4207	0.0116
Hyperlipidemia	Yes vs. No	0.19	0.0107
Previous CABG	Yes vs. No	0.5443	0.0289
Model fit statistics			
Area under the ROCC (c-statistic)		0.578	
Hosmer-Lemeshow Test (p-value)		0.7951	
Somers' D		0.156	

Table 11. Multivariable regression model and model fit statistics for off-pump rate following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		-1.4823	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.1075	0.0031
	≥75	-0.01079	0.8047
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.00277	0.9428
	20% - 34%	0.1898	0.0016
	<20%	0.3724	0.0025
	Missing (not done or unknown)	-0.9166	<.0001
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.1091	0.0063
	>30	-0.3393	<.0001
	Missing	-0.8619	<.0001
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.1311	0.0209
	> 180	0.1544	0.0653
	Missing	-1.5254	<.0001
Atrial fibrillation	Yes vs. No	-0.2734	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.4411	<.0001
	ACS Intermediate Risk	0.2201	0.0116
	ACS High Risk	-0.3503	0.0049
	Emergent	-0.5277	0.0011
Left main disease	Yes vs. No	-0.2608	<.0001
COPD	Yes vs. No	-0.2788	<.0001
Diabetes	Yes vs. No	0.08568	0.0094
Recent MI	Yes vs. No	-0.2764	<.0001
Priority	Elective	Ref.	
	Semi-Urgent	-0.1072	0.0287
	Urgent	-0.2516	0.0075
	Missing	-1.0738	<.0001
Hyperlipidemia	Yes vs. No	0.308	<.0001
Smoker	Current	Ref.	
	Former	-0.0323	0.4921
	Never, unknown, or missing	0.3785	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.6612	
Hosmer-Lemeshow Test (p-value)		0.02452	
Somers' D		0.3224	

Table 12. Multivariable regression model and model fit statistics for arterial graft rate following isolated CABG surgery

Covariates		Effect Estimate	P-value
Intercept		3.3834	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.1153	0.0803
	≥75	-0.2419	0.0011
Ejection fraction	≥50%	Ref.	
	35% - 49%	-0.01732	0.8071
	20% - 34%	-0.3719	<.0001
	<20%	-0.4578	0.0102
	Missing (not done or unknown)	-0.02339	0.8622
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	-0.03885	0.7059
	> 180	-0.4877	0.0001
	Missing	0.2319	0.055
Shock	Yes vs. No	-1.0551	<.0001
Sex	Femals vs. Males	-0.3719	<.0001
PVD	Yes vs. No	-0.2772	0.0006
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.2012	0.0167
	ACS Intermediate Risk	0.01777	0.8895
	ACS High Risk	0.05165	0.7585
	Emergent	-1.1474	<.0001
CVD	Yes vs. No	-0.2601	0.0048
Diabetes	Yes vs. No	0.227	0.0002
Priority	Elective	Ref.	
	Semi-urgent	0.09147	0.2452
	Urgent	-0.04382	0.7363
	Missing	-1.3172	<.0001
Previous CABG	Yes vs. No	-2.0705	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.6544	
Hosmer-Lemeshow Test (p-value)		0.2003	
Somers' D		0.3089	

Table 13. Multivariable regression model and model fit statistics for in-hospital all-cause mortality following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-5.3448	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.02982	0.9369
	≥75	0.6309	0.0591
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	1.0786	0.0012
	> 180	1.9734	<.0001
	Missing	0.4234	0.3848
NYHA class	1	Ref.	
	2	0.006725	0.9871
	3	0.3886	0.3009
	4	1.6557	0.0001
	No known heart failure, unknown, or missing	0.1751	0.768
Atrial fibrillation	Yes vs. No	0.7565	0.0047
Previous PCI	Yes vs. No	0.7071	0.0624
Shock	Yes vs. No	1.4459	0.032
Model fit statistics			
Area under the ROCC (c-statistic)		0.8088	
Hosmer-Lemeshow Test (p-value)		0.2829	
Somers' D		0.6176	

Table 14. Multivariable regression model and model fit statistics for 30-day all-cause mortality following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-5.1137	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.1652	0.65
	≥75	0.2536	0.4339
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	1.569	<.0001
	> 180	1.8695	<.0001
	Missing	0.6406	0.193
NYHA class	1	Ref.	
	2	0.2032	0.6438
	3	0.4179	0.3132
	4	1.9323	<.0001
	No known heart failure, unknown, or missing	0.2824	0.6424
Model fit statistics			
Area under the ROCC (c-statistic)		0.7393	
Hosmer-Lemeshow Test (p-value)		0.9561	
Somers' D		0.4787	

Table 15. Multivariable regression model and model fit statistics for 1-year all-cause mortality following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-3.7922	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.23	0.3516
	≥75	0.5299	0.0124
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.8574	0.0003
	> 180	1.7872	<.0001
	Missing	0.1115	0.7359
NYHA class	1	Ref.	
	2	-0.235	0.352
	3	0.03096	0.8939
	4	1.1141	0.0003
	No known heart failure, unknown, or missing	0.108	0.7675
Atrial fibrillation	Yes vs. No	0.7739	<.0001
PVD	Yes vs. No	0.6021	0.0126
COPD	Yes vs. No	0.4609	0.0489
Diabetes	Yes vs. No	0.4606	0.0092
Model fit statistics			
Area under the ROCC (c-statistic)		0.7509	
Hosmer-Lemeshow Test (p-value)		0.8984	
Somers' D		0.5019	

Table 16. Multivariable regression model and model fit statistics for post-operative LOS following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		1.9401	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.06282	<.0001
	≥75	0.2743	<.0001
Ejection fraction	≥ 50%	Ref.	
	35% - 49%	0.0398	0.0219
	20% - 34%	0.1602	<.0001
	<20%	0.2613	<.0001
	Missing (not done, or unknown)	0.07917	0.0016
BMI categories (kg/m^2)	<25	Ref.	
	25 - 30	-0.07504	<.0001
	>30	-0.01872	0.1899
	Missing	-0.1915	<.0001
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.1999	<.0001
	> 180	0.4821	<.0001
	Missing	0.01368	0.5124
NYHA class	1	Ref.	
	2	-0.05637	0.005
	3	0.06199	0.0027
	4	0.2048	<.0001
	No known heart failure, unknown, or missing	0.03878	0.0853
Previous PCI	Yes vs. No	0.1408	<.0001
Dialysis	Yes vs. No	0.1624	<.0001
Atrial fibrillation	Yes vs. No	0.1671	<.0001
Shock	Yes vs. No	0.5546	<.0001
Sex	Females vs. Males	0.1086	<.0001
Hypertension	Yes vs. No	-0.07484	<.0001
PVD	Yes vs. No	0.06295	0.0011
COPD	Yes vs. No	0.04793	0.0053
CVD	Yes vs. No	0.1916	<.0001
Diabetes	Yes vs. No	0.08504	<.0001
Priority	Elective	Ref.	
	Semi-Urgent	-0.04709	0.0568
	Urgent	0.02471	0.2624
	Missing	0.0331	0.0824
Active and infectious endocarditis	Yes vs. No	0.4119	<.0001

Table 17. Multivariable regression model and model fit statistics for red blood cell transfusion following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-1.3728	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.2097	0.0287
	≥75	0.8098	<.0001
BMI categories (kg/m^2)	<25		
	25-30	-0.5098	<.0001
	>30	-0.712	<.0001
	Missing	-0.2305	0.1341
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.721	<.0001
	> 180	2.0363	<.0001
	Missing	0.06114	0.6535
Previous PCI	Yes vs. No	0.6399	<.0001
Dialysis	Yes vs. No	1.1203	0.004
Shock	Yes vs. No	1.3641	0.0172
Sex	Femals vs. Males	1.0312	<.0001
PVD	Yes vs. No	0.3194	0.025
Diabetes	Yes vs. No	0.2166	0.0111
NYHA class	1	Ref.	
	2	-0.09181	0.351
	3	0.1912	0.0521
	4	0.5577	0.0038
	No known heart failure, unknown, or missing	0.2163	0.1409
Active and infectious endocarditis	Yes vs. No	1.9861	<.0001
Previous valve surgery	Yes vs. No	0.8287	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.7419	
Hosmer-Lemeshow Test (p-value)		0.4445	
Somers' D		0.4837	

Table 18. Multivariable regression model and model fit statistics for 30-day all-cause readmission following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-2.234	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.03434	0.7841
	≥75	0.2007	0.0963
COPD	Yes vs. No	0.4768	0.0009
Atrial fibrillation	Yes vs. No	0.4229	0.0001
Previous PCI	Yes vs. No	0.5119	0.002
PVD	Yes vs. No	0.3792	0.021
Model fit statistics			
Area under the ROCC (c-statistic)		0.5967	
Hosmer-Lemeshow Test (p-value)		0.2826	
Somers' D		0.1934	

Table 19. Multivariable regression model and model fit statistics for 1-year MACE following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-3.7512	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.09935	0.668
	≥75	0.5427	0.0079
Creatinine level (µmol/L)	0-120		
	121 - 180	0.7503	0.0012
	> 180	1.7352	<.0001
	Missing	0.1432	0.6399
Previous PCI	Yes vs. No	0.5268	0.044
Atrial fibrillation	Yes vs. No	0.7103	<.0001
PVD	Yes vs. No	0.4854	0.0417
Diabetes	Yes vs. No	0.4861	0.0038
NYHA class	1	Ref.	
	2	-0.07602	0.7499
	3	0.1205	0.5917
	4	1.2132	<.0001
	No known heart failure, unknown, or missing	0.3231	0.3324
Model fit statistics			
Area under the ROCC (c-statistic)		0.7338	
Hosmer-Lemeshow Test (p-value)		0.2994	
Somers' D		0.4675	

Table 20. Multivariable regression model and model fit statistics for 30-day all-cause readmission following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-2.234	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.03434	0.7841
	≥75	0.2007	0.0963
COPD	Yes vs. No	0.4768	0.0009
Atrial fibrillation	Yes vs. No	0.4229	0.0001
Previous PCI	Yes vs. No	0.5119	0.002
PVD	Yes vs. No	0.3792	0.021
Model fit statistics			
Area under the ROCC (c-statistic)		0.5967	
Hosmer-Lemeshow Test (p-value)		0.2826	
Somers' D		0.1934	

Table 21. Multivariable regression model and model fit statistics for 1-year cardiac readmission (acute MI, unstable angina, or CHF) following isolated AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-4.7922	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.5777	0.0191
	≥75	0.9419	<.0001
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.4569	0.0375
	>30	-0.279	0.179
	Missing	0.4638	0.1382
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.373	0.1272
	> 180	1.0999	0.0007
	Missing	-0.7423	0.0526
Atrial fibrillation	Yes vs. No	0.8133	<.0001
Aortic stenosis	Yes vs. No	0.8271	0.0105
COPD	Yes vs. No	0.5679	0.0083
Diabetes	Yes vs. No	0.3576	0.0354
NYHA class	1	Ref.	
	2	0.418	0.0903
	3	0.5746	0.0158
	4	1.2907	0.0001
	No known heart failure, unknown, or missing	0.3756	0.3137
Model fit statistics			
Area under the ROCC (c-statistic)		0.7311	
Hosmer-Lemeshow Test (p-value)		0.9	
Somers' D		0.4622	

Table 22. Multivariable regression model and model fit statistics for in-hospital all-cause mortality following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-5.5923	<.0001
Age group (years)	< 65	Ref.	
	65-74	1.0396	0.0176
	≥75	1.5274	0.0003
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2983	0.2193
	20% - 34%	0.8672	0.0013
	<20%	1.3224	0.0469
	Missing (not done or unknown)	0.6827	0.0731
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.1525	0.5665
	> 180	1.0738	0.0003
	Missing	0.7465	0.0254
Atrial fibrillation	Yes vs. No	0.5961	0.0017
Shock	Yes vs. No	1.9911	0.0006
Sex	Females vs. Males	0.6418	0.0009
PVD	Yes vs. No	0.8888	<.0001
CCS/ACS class	Stable angina or missing		
	ACS Low Risk	0.8015	0.0019
	ACS Intermediate Risk	0.6664	0.0152
	ACS High Risk	0.456	0.2767
	Emergent	1.0518	0.0366
Previous CABG	Yes vs. No	1.3314	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.7638	
Hosmer-Lemeshow Test (p-value)		0.5587	
Somers' D		0.5275	

Table 23. Multivariable regression model and model fit statistics for 30-day all-cause mortality following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-5.4814	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.8495	0.0538
	≥75	1.3163	0.0019
Ejection fraction	≥50%	Ref.	
	35% - 49%	-0.04519	0.8751
	20% - 34%	0.9741	0.0005
	<20%	1.9985	0.0008
	Missing (not done or unknown)	0.4862	0.2472
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	-0.00169	0.9954
	> 180	0.6695	0.0538
	Missing	0.9251	0.0061
Atrial fibrillation	Yes vs. No	0.4203	0.0444
Shock	Yes vs. No	1.3974	0.029
Sex	Femals vs. Males	0.4639	0.0286
PVD	Yes vs. No	0.8632	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.6155	0.0361
	ACS Intermediate Risk	0.7908	0.0055
	ACS High Risk	0.3094	0.5091
	Emergent	1.2829	0.0151
Previous CABG	Yes vs. No	1.1082	0.0025
Previous valve surgery	Yes vs. No	1.0302	0.041
Model fit statistics			
Area under the ROCC (c-statistic)		0.7562	
Hosmer-Lemeshow Test (p-value)		0.02678	
Somers' D		0.5125	

Table 24. Multivariable regression model and model fit statistics for 1-year all-cause mortality following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-3.6313	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.4401	0.1115
	≥75	0.6831	0.0101
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.5583	0.0031
	20% - 34%	0.8134	0.0004
	<20%	1.2916	0.0205
	Missing (not done or unknown)	0.3652	0.2917
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.6224	0.0017
	> 180	0.9927	0.0002
	Missing	0.5283	0.0614
Atrial fibrillation	Yes vs. No	0.6192	<.0001
Sex	Femals vs. Males	0.5871	0.0003
PVD	Yes vs. No	0.5268	0.0026
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.7162	0.0007
	ACS Intermediate Risk	0.6986	0.0017
	ACS High Risk	0.2109	0.6094
	Emergent	0.9486	0.0445
Aortic stenosis	Yes vs. No	-0.3746	0.0436
Previous CABG	Yes vs. No	0.752	0.0127
Model fit statistics			
Area under the ROCC (c-statistic)		0.7305	
Hosmer-Lemeshow Test (p-value)		0.04762	
Somers' D		0.461	

Table 25. Multivariable regression model and model fit statistics for post-operative LOS following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		2.0134	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.1137	<.0001
	≥75	0.325	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2139	<.0001
	20% - 34%	0.1248	<.0001
	<20%	0.1964	0.0001
	Missing (not done or unknown)	0.05741	0.0502
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.1052	<.0001
	>30	-0.00978	0.4849
	Missing	0.005356	0.8402
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.1779	<.0001
	> 180	0.4307	<.0001
	Missing	-0.05205	0.0372
Atrial fibrillation	Yes vs. No	0.2697	<.0001
Shock	Yes vs. No	0.3185	<.0001
Sex	Females vs. Males	0.1441	<.0001
PVD	Yes vs. No	0.09413	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.008247	0.6709
	ACS Intermediate Risk	0.166	<.0001
	ACS High Risk	0.1702	<.0001
	Emergent	0.234	<.0001
COPD	Yes vs. No	0.07916	<.0001
CVD	Yes vs. No		
Diabetes	Yes vs. No	0.1064	<.0001
Recent MI	Yes vs. No	0.05118	0.002
Priority	Elective	Ref.	
	Semi-urgent	0.1125	<0.0001
	Urgent	0.03431	0.0662
	Missing	-0.03525	0.0618
NYHA class	1	Ref.	
	2	-0.03841	0.0268
	3	0.000057	0.9974
	4	0.09087	0.0003
	No known heart failure, unknown, or missing	-0.1085	<.0001
Previous valve surgery	Yes vs. No	-0.32	<.0001

Table 26. Multivariable regression model and model fit statistics for red blood cell transfusion following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		0.06368	0.7134
Age group (years)	< 65	Ref.	
	65-74	0.4133	0.0005
	≥75	0.7627	<.0001
BMI categories (kg/m^2)	<25	Ref.	
	25-30	-0.5449	<.0001
	>30	-0.8639	<.0001
	Missing	-0.6519	0.001
Creatinine level (µmol/L)	0-120	Ref.	
	121 - 180	0.6079	<.0001
	> 180	1.7885	<.0001
	Missing	0.4502	0.0106
Sex	Females vs. Males	1.1104	<.0001
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.6702	<.0001
	ACS Intermediate Risk	0.508	0.0021
	ACS High Risk	0.6191	0.0316
	Emergent	1.2583	0.0231
Left main disease	Yes vs. No	0.2738	0.0136
Aortic stenosis	Yes vs. No	-0.3432	0.0029
Diabetes	Yes vs. No	0.1709	0.0388
Recent MI	Yes vs. No	0.3089	0.033
NYHA class	1	Ref.	
	2	-0.05982	0.5597
	3	0.03264	0.7561
	4	0.4794	0.027
	No known heart failure, unknown, or missing	-0.3092	0.0358
Previous CABG	Yes vs. No	0.748	0.0011
Model fit statistics			
Area under the ROCC (c-statistic)		0.7207	
Hosmer-Lemeshow Test (p-value)		0.839	
Somers' D		0.4413	

Table 27. Multivariable regression model and model fit statistics for 30-day all-cause readmission following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-2.2997	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.1501	0.3934
	≥75	0.2955	0.0776
Ejection fraction	≥50%	Ref.	
	25% - 49%	0.1491	0.3048
	20% - 34%	0.2597	0.1782
	<20%	0.4427	0.3794
	Missing (not done or unknown)	0.7151	0.0027
Previous CABG	Yes vs. No	-0.7457	0.0459
Recent MI	Yes vs. No	0.3033	0.0309
Atrial fibrillation	Yes vs. No	0.3261	0.0065
Model fit statistics			
Area under the ROCC (c-statistic)		0.5799	
Hosmer-Lemeshow Test (p-value)		0.8719	
Somers' D		0.1598	

Table 28. Multivariable regression model and model fit statistics for 1-year MACE following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-3.304	<.0001
Age group (years)	< 65	Ref.	
	65-74	0.0111	0.9604
	≥75	0.2141	0.3124
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.7151	0.0006
	ACS Intermediate Risk	0.7074	0.0012
	ACS High Risk	0.7408	0.0302
	Emergent	0.625	0.1715
Creatinine level (µmol/L)	0-120	Ref.	
	121-180	0.5862	0.0011
	>180	0.8562	0.0005
	Missing	0.3008	0.2613
Left main disease	Yes vs. No	0.3283	0.0456
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.3753	0.0289
	20% - 34%	0.5979	0.0049
	<20%	0.8159	0.1479
	Missing (not done or unknown)	0.1753	0.588
Previous CABG	Yes vs. No	0.7937	0.0042
Recent MI	Yes vs. No	0.463	0.0118
Atrial fibrillation	Yes vs. No	0.5833	<.0001
PVD	Yes vs. No	0.5625	0.0003
Sex	Females vs. Males	0.6667	<.0001
Model fit statistics			
Area under the ROCC (c-statistic)		0.728	
Hosmer-Lemeshow Test (p-value)		0.3053	
Somers' D		0.456	

Table 29. Multivariable regression model and model fit statistics for 1-year cardiac readmission (acute MI, unstable angina, or CHF) for combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		-3.074	<.0001
Age group (years)	< 65	Ref.	
	65-74	-0.03973	0.8694
	≥75	0.2042	0.3679
COPD	Yes vs. No	0.4873	0.0128
Creatinine level (µmol/L)	0-120	Ref.	
	121-180	0.5832	0.002
	>180	0.1155	0.7214
	Missing	0.1616	0.5706
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.4125	0.0251
	20% - 34%	0.3292	0.1763
	<20%	-0.8158	0.4351
	Missing (not done or unknown)	0.699	0.0224
Recent MI	Yes vs. No	0.7729	<.0001
Atrial fibrillation	Yes vs. No	0.5081	0.0011
Sex	Females vs. Males	0.3485	0.026
Model fit statistics			
Area under the ROCC (c-statistic)		0.6664	
Hosmer-Lemeshow Test (p-value)		0.3424	
Somers' D		0.3328	

Table 30. Multivariable regression model and model fit statistics for arterial graft rate following combined CABG and AVR surgery

Covariates		Effect Estimate	P-value
Intercept		0.5131	0.0059
Age group (years)	< 65	Ref.	
	65-74	0.04126	0.7384
	≥75	0.1412	0.2378
Aortic stenosis	Yes vs. No	-0.3009	0.0235
BMI categories (kg/m^2)	<25	Ref.	
	25 - 30	0.263	0.0168
	>30	0.1559	0.16
	Missing	0.6156	0.0027
CCS/ACS class	Stable angina or missing	Ref.	
	ACS Low Risk	0.08126	0.569
	ACS Intermediate Risk	0.6018	0.0011
	ACS High Risk	0.6461	0.0347
	Emergent	-0.08044	0.8476
Diabetes	Yes vs. No	0.2254	0.0079
Left main disease	Yes vs. No	1.2754	<.0001
Ejection fraction	≥50%	Ref.	
	35% - 49%	0.2909	0.0151
	20% - 34%	-0.08536	0.5996
	<20%	0.6982	0.1744
	Missing	-0.4267	0.0569
NYHA class	1	Ref.	
	2	-0.1582	0.2707

	3	-0.3922	0.0081
	4	-0.5355	0.0132
	No known heart failure, unknown, or missing	0.1996	0.2379
Previous CABG	Yes vs. No	-2.1324	<.0001
Priority	Elective	Ref.	
	Semi-urgent	0.5201	0.0089
	Urgent	0.2634	0.0859
	Missing	0.3217	0.0274
Previous valve surgery	Yes vs. No	-1.009	0.0012
Sex	Females vs. Males	-0.2743	0.0027
Model fit statistics			
Area under the ROCC (c-statistic)		0.6842	
Hosmer-Lemeshow Test (p-value)		0.5905	
Somers' D		0.3685	