

# About the Report

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## Cardiac Surgery in Pennsylvania

This report presents outcomes for the 29,578 adult patients who underwent coronary artery bypass graft (CABG) surgery and/or heart valve surgery between January 1, 2014 and March 31, 2016 in the 60 Pennsylvania general acute care hospitals that performed these types of procedures during that period. The report displays risk-adjusted outcomes that can be used, in part, to evaluate both hospital and surgeon performance. Produced by the Pennsylvania Health Care Cost Containment Council (PHC4), the report includes:

- In-hospital mortality and 30-day readmission ratings for hospitals and surgeons.
- Average charges and average Medicare payments for hospitals.
- Key findings, including statewide trends.

Taken together, this information can be helpful to patients, families and purchasers in making more informed health care decisions and can serve as an aid to providers in highlighting additional opportunities for quality improvement and cost containment.

### About PHC4

Created by the Pennsylvania General Assembly in 1986, PHC4 is an independent state agency charged with collecting, analyzing and reporting information that can be used to improve the quality and restrain the cost of health care in the state. Today, PHC4 is a recognized national leader in public health care reporting. More than 840,000 public reports on patient treatment results are downloaded from the PHC4 website each year and nearly 100 organizations and individuals annually utilize PHC4's special requests process to access and use data. PHC4 is governed by a 25-member board of directors, representing business, labor, consumers, health care providers, insurers and state government.

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## About coronary artery bypass graft surgery and heart valve surgery

Coronary artery bypass graft (CABG) surgery is used to treat a blockage in a coronary artery by creating an alternate pathway for the blood to flow in order to reach vital heart muscle. CABG is typically recommended for severe or complex blockages that are not treatable by other methods. Heart valve surgery is used to treat narrowing (stenosis) or abnormal backflow of blood (regurgitation) of a heart valve. This can be accomplished by replacing the valve with an artificial (mechanical) or biological (animal or human tissue) valve or by restoring the shape of the heart valve. The CABG and heart valve surgeries included in this report are performed through an open chest incision (open heart surgery). Most patients stay in the hospital for several days and may participate in a cardiac rehabilitation program after hospital discharge.



Patients who may be too high-risk or too sick for open heart aortic valve replacement surgery now have a minimally invasive surgical option, transcatheter aortic valve replacement (TAVR). A TAVR procedure replaces the damaged aortic valve through a catheter that is typically threaded through a large vessel (e.g., femoral artery) or via a small chest incision. In Pennsylvania, the number of TAVR procedures without a CABG or valve procedure has nearly quadrupled between 2012 and 2015, from 478 cases to 1,872. These non-open heart procedures are not included in this report.

### Additional Resources

American Heart Association  
[www.heart.org](http://www.heart.org)

National Heart, Lung, and Blood Institute  
[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)

Society of Thoracic Surgeons  
[www.STS.org](http://www.STS.org)

## Why is it important to look at CABG and valve surgeries?

CABG and valve surgeries are costly, frequently performed surgeries. Although most CABG/valve patients have an excellent prognosis for survival, results following surgery may vary among hospitals and surgeons. There is evidence that information contained in reports such as this encourages hospitals and surgeons to examine their processes and make changes that can improve quality of care and ultimately save lives.

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## In this report

This report includes hospital-specific and surgeon-specific outcomes for coronary artery bypass graft (CABG) and valve surgeries, as defined by International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) or International Classification of Diseases, 10th Revision, Clinical Modification (ICD-10-CM) and Procedure Coding System (ICD-10-PCS) diagnosis and procedure codes. Technical Notes relevant to this report provide additional detail. They are posted to PHC4's website at [www.phc4.org](http://www.phc4.org).

- This report covers inpatient hospital discharges from January 1, 2014 through March 31, 2016 where the patient was age 30 or older.
- 60 Pennsylvania general acute care hospitals and 182 surgeons performed cardiac surgery during the time period covered in this report.
- The hospital names have been shortened in many cases for formatting purposes. Hospital names may be different today than during the time period covered in the report due to mergers and name changes.

### Also on PHC4's Website for Cardiac Surgery

**Statewide Statistics and Key Findings**

**Hospital Results**

**Surgeon Results**

**Hospital Medicare Payment**

**Technical Notes**

**Hospital and Surgeon Comments**

**Hospital and Surgeon Directories**

**Download the Data**

**Total CABG and/or Valve Volume**

PHC4 has also published a report on pediatric and congenital heart surgery, available on its website.

[www.phc4.org](http://www.phc4.org)

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## About the data

The hospital inpatient discharge data used in this analysis was submitted to PHC4 by the general acute care hospitals in Pennsylvania that perform CABG and/or heart valve surgery. The data submitted to PHC4 by the hospitals was subject to standard validation processes by PHC4. Hospitals and surgeons were asked to verify data accuracy at the individual case level. Hospitals were also given an opportunity to confirm the Medicare payment data. The ultimate responsibility for data accuracy and completeness lies with each individual hospital. PHC4 wishes to acknowledge and thank the Pennsylvania hospitals and surgeons who participated in the data submission and verification processes used for this report.

The Medicare fee-for-service payment data was obtained from the Centers for Medicare and Medicaid Services. The most recent Medicare and Medicaid payment data available to PHC4 for use in this report was for 2014.

## Accounting for patient risk

Some patients who undergo CABG and/or heart valve surgery are more seriously ill than others. Included in the data PHC4 receives from Pennsylvania hospitals is information indicating, in simple terms, “how sick the patient was” on admission to the hospital—information that is used to account for high-risk patients. Even though two patients may be admitted to the hospital with the same illness, there may be differences in the seriousness of their conditions. In order to report fair comparisons among hospitals, PHC4 uses a complex mathematical formula to risk adjust the in-hospital mortality and 30-day readmission measures included in this report, meaning that hospitals receive “extra credit” for treating patients who are more seriously ill or at a greater risk than others. Risk adjusting the data is important because sicker patients may be at a greater risk of dying or being readmitted.

*PHC4 uses a complex mathematical formula to risk adjust the mortality and readmission measures. Risk adjusting the data is important because sicker patients may be at a greater risk of dying or being readmitted.*

PHC4 uses results from laboratory blood tests and other clinical data submitted by hospitals, patient characteristics such as age and gender, and billing codes that describe the patient’s medical conditions such as the presence of heart attack, coronary artery disease, etc., to calculate risk for the patients in this report. A comprehensive description of the risk-adjustment techniques used for this report can be found in the Technical Notes on PHC4’s website at [www.phc4.org](http://www.phc4.org).

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## What is measured in this report and why is it important?

PHC4's mission is to provide the public with information that will help to improve the quality of health care services while also providing opportunities to restrain costs. The measurement of quality in health care is not an exact science. As such, there may be a number of ways to define quality. Measures for this report were chosen because they are important components in examining quality of care and resource use for patients undergoing CABG and/or heart valve surgery.

Results for the measures included in this report are displayed for the following four procedure groups:

- **CABG without Valve:** Patients who had at least one CABG procedure (without any valve procedures on the same day).
- **Total Valve:** Patients who had at least one valve procedure with or without a CABG procedure (on the same day).
  - **Valve without CABG:** Patients who had at least one valve procedure (without any CABG procedures on the same day).
  - **Valve with CABG:** Patients who had at least one valve procedure and at least one CABG procedure (on the same day).

The following measures are reported:

- **Number of Cases.** This is the number of surgeries analyzed in this report. This information provides an idea of the experience each hospital or surgeon has in performing these procedures. Studies have suggested that, in at least some areas, the volume of cases treated by a physician or hospital can be a factor in the success of the treatment. It is important to note, that some CABG/valve patients were not counted in this analysis (for example, those who underwent other complex procedures during the same hospital admission as the CABG/valve surgery, procedures done in Veterans' hospitals or those performed in other states by surgeons who also practice outside Pennsylvania).
- **In-Hospital Mortality (risk adjusted).** This measure is reported as a statistical rating that represents the number of patients who died during the hospital stay in which the CABG/valve surgery was performed. To determine the mortality rating, PHC4 compares the number of patients one could reasonably expect to die, after accounting for patient risk,

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with the actual number of deaths. (Please see “Understanding the Symbols” box on this page.) A rating is reported for hospitals and surgeons who performed 30 or more procedures in a particular procedure group.

- **30-Day Hospital Readmission (risk adjusted).** This measure is reported as a statistical rating that represents the number of patients who were readmitted to a Pennsylvania general acute care hospital within 30 days of being discharged from the hospital where the CABG/valve surgery was performed. A readmission was counted only if the patient was readmitted with a principal diagnosis that indicated a heart-related condition, an infection or a complication. Readmissions for other reasons were not included in the analysis. To accommodate a transition in hospital coding requirements (from ICD-9-CM to ICD-10-CM) that became effective October 1, 2015, the readmission analysis was based on discharges from January 1, 2014 through August 31, 2015. September 2015 was used to identify 30-day readmissions for patients discharged in August 2015. To determine the risk-adjusted readmission rating, PHC4 compares the number of patients one could reasonably expect to be readmitted, after accounting for patient risk, with the actual number of readmissions. (Please see “Understanding the Symbols” box on this page.) A rating is reported for hospitals and surgeons who performed 30 or more procedures in a particular procedure group.

Readmission is an outcome that may be influenced by the quality of inpatient and outpatient care, including coordination of care, discharge planning and medication reconciliation. Identifying readmissions provides information that can inform quality improvement efforts that have the potential to improve patient experience and lower health care costs. While some rehospitalizations can be expected, high quality care may lessen the need for subsequent, unplanned hospitalizations.

*See Technical Notes on PHC4’s website ([www.phc4.org](http://www.phc4.org)) for additional detail.*

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## Understanding the Symbols

The symbols displayed in this report represent a comparison of actual mortality or readmission rates to what is expected after accounting for patient risk.

- **Rate was significantly lower than expected.** Fewer patients died or were readmitted than could be attributed to patient risk and random variation.
  - ◉ **Rate was not significantly different than expected.** The number of patients who died or were readmitted was within the range anticipated based on patient risk and random variation.
  - **Rate was significantly higher than expected.** More patients died or were readmitted than could be attributed to patient risk and random variation.
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- **Average Hospital Charge (case-mix adjusted).** The amount a hospital bills for a patient's care is known as the charge. The charge includes the facility fee but does not include professional fees (e.g., physician fees) or other additional post-discharge costs such as rehabilitation treatment, long-term care and/or home health care. In almost all cases, hospitals do not receive full charges from private insurance carriers or government payers. Hospitals typically receive actual payments that are considerably less than the listed charge. Hospital charges often vary by individual hospital and by regions of the state. The average charge included in this report was adjusted for the mix of cases specific to each hospital and reflects the entire length of stay. The average charge is reported for each hospital with 11 or more cases in a particular procedure group.
- **Average Medicare Fee-for-Service Payment.** A separate section of the report displays the average amount a hospital is paid for a Medicare patient in the fee-for-service system (Pennsylvania residents), along with the number of cases included in the average payment and average hospital charge (trimmed and case-mix adjusted) for these cases. Payments from Medicare Advantage plans are not included. The average Medicare payment was trimmed for outliers and calculated using the dollar amount the Centers for Medicare and Medicaid Services provided for the Medicare Part A hospital insurance fund payment. Patient liabilities (e.g., coinsurance and deductible dollar amounts) were not included. Hospitals were given an opportunity to verify the average Medicare payments reported for their facilities prior to the public release of the information. The most recent Medicare payment data available to PHC4 was for calendar year 2014.

Medicare payments are based on formulas that take into account regional variation in the cost of delivering care, the increased costs from teaching doctors still in training, higher costs for hospitals that service large numbers of low-income patients and for costs of new technologies. Medicare payments are based on the entire hospital stay, as are the average hospital charges for the Medicare fee-for-service patients. The average Medicare payment and average hospital charge for these cases are reported for each hospital with 11 or more cases in a particular procedure group.

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## Uses of this report

This report can be used as a tool to examine hospital performance. It is not intended to be a sole source of information for making health care decisions, nor should it be used to generalize about the overall quality of care provided by a hospital. Readers of this report should use it in discussions with their physicians who can answer specific questions and concerns about their care.

- ***Patients/Consumers*** can use this report as an aid in making decisions about where to seek treatment. This report should be used in conjunction with a physician or other health care provider when making health care decisions.
- ***Group Benefits Purchasers/Insurers*** can use this report as part of a process in determining treatment options for employees, subscribers, members or participants.
- ***Health Care Providers*** can use this report as an aid in identifying opportunities for quality improvement and cost containment.
- ***Policymakers/Public Officials*** can use this report to enhance their understanding of health care issues, to ask provocative questions, to raise public awareness of important issues and to help constituents identify health care options.
- ***Everyone*** can use this information to raise important questions about why differences exist in the quality and efficiency of care.