GUIDE FOR REVIEW AND ATTESTATION OF CARDIAC SURGERY DATA

Pennsylvania Health Care Cost Containment Council
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OVERVIEW

Purpose of the Guide

This guide is provided to assist hospitals in completing the review and attestation of the UB-04 Uniform Claims and Billing data and the supplemental clinical data related to coronary artery bypass graft (CABG) and/or valve surgery cases for patients 18 years of age and older. The ultimate goal of this process is to provide an *accurate* set of data for analysis of cases included in PHC4's cardiac surgery report. While PHC4 staff can assist in providing the structure for data review and attestation, the data *accuracy* is ultimately the responsibility of the hospitals. PHC4 will analyze and publish the data as submitted and attested to by the surgeons and hospitals. This version of the guide is effective for Quarter 4, 2014 through Quarter 3, 2015 data.

When to Review the Cardiac Surgery Data

Review and attestation of the cardiac surgery data is to be completed on a quarterly basis after submission of the UB-04 Uniform Claims and Billing data. Schedules for completion of the review and due dates for submission of cardiac surgery data materials will be posted on PHC4's website at http://www.phc4.org.

Communication

If you have questions regarding the data review and attestation process, contact the Health Policy Research Department at (717) 232-6787 or e-mail heart@phc4.org.

Mailing Address

Send all cardiac surgery review and attestation materials to:

PHC4 Cardiac Surgery Project
225 Market St, Suite 400
Harrisburg, PA 17101

CARDIAC SURGERY DATA REVIEW AND ATTESTATION

Getting Started

Review and attestation of the cardiac surgery data is completed using the Cardiac Surgery Data Administration tool available on PHC4's secure portal at https://www.phc4submit.org.

Discharges included in the study population are identified by the presence of at least one of the ICD-9-CM *(International Classification of Diseases, Ninth Revision, Clinical Modification)* procedure codes listed in Appendix A of this guide for patients 18 years of age and older.

If your hospital submitted a cardiac surgery data file

If your hospital used the Data Upload tool in PHC4's secure portal to upload a quarterly cardiac surgery data file, the data is ready for review as outlined in this guide as soon as the upload is complete.

If your hospital chose to manually enter the supplemental clinical data

Once the UB-04 Uniform Claims and Billing data has been submitted to PHC4, hospitals can extract the "Required Linking" and "UB-04 Data" data elements from the UB-04 data into the web-based tool using the Cardiac Surgery Data Administration tool. The option to "Extract all cardiac surgery data from billing data" is displayed at the bottom of the Main Page. This will extract all of the records in your hospital's UB-04 data with a CABG and/or valve procedure code for patients 18 years of age and older.

Hospitals can then 1) enter the supplemental clinical data (as outlined in the *Cardiac Surgery Supplemental Clinical Data Reporting Manual*), 2) indicate requests for medical record documentation review, 3) add additional diagnosis and procedure codes (when applicable), and 4) review all of the cardiac surgery data as outlined in this guide.

Available options and reports

After your data has been uploaded/extracted to the Cardiac Surgery Data Administration tool you can choose to:

- Review and edit your cardiac surgery records.
- View and/or print a report displaying the status of all of your cardiac surgery records including any error or informational messages.
- View and/or print a report with record review requests to assist in compiling documentation to be sent to PHC4 for the medical record review for preoperative acute renal failure, preoperative cardiogenic shock and/or special request for exclusion.
- View a summary report of the status of your cardiac surgery record review.
- View and/or print your hospital's surgeon specific reports.
- Add individual records based on the presence of an ICD-9-CM procedure code (Appendix A) that are in the UB-04 Uniform Claims and Billing data that are not included in the list of your hospital's cardiac surgery records in the Cardiac Surgery Data Administration tool.

Details pertaining to each of these options and reports are outlined on the following pages of this guide.

Review and Edit Records – Summary Page

Select "Review and Edit Records" on the Cardiac Surgery Data Administration tool menu to access the list of your hospital's CABG and/or valve surgery records for patients 18 years or older for a particular quarter.

Confirm accuracy of records included in data upload/extraction

Review the list and verify that:

- All of your hospital's CABG and/or valve records for patients 18 years or older for a particular quarter are listed. If there are records missing, see "Extract Current Data, When Applicable (Additional Records)" in this guide for more details.
- Confirm that there are no records listed that do not meet the above criteria. If a record was submitted in error, you will need to delete the record. See "Delete records, when applicable" in this guide for details.

Identifying records that need to be reviewed

Unreviewed records can be identified at the top of the page by clicking on the "View all records that have not been reviewed" checkbox. When this box is checked only unreviewed records will be displayed on the list.

Information included on the Record List

The following fields are located on the Record List page and can be sorted by clicking on any of the headers except the Admission Date column:

- Record Status Indicator
- Record ID assigned by PHC4
- Control Number
- Medical Record Number
- Admission Date
- Through Date

Record Status Indicators

A status indicator is provided to assist in identifying the status of records during the review process.

- A **green** signifies the record has been reviewed and saved without errors.
- A **gray** indicates that the record has not been reviewed. You should review the data associated with each of your cases and save the record.
- A **yellow** indicates that the record has at least one error. When a record has this indicator further information will be displayed once the record is accessed. This record will not be considered reviewed while this Record Status Indicator is present.
- A **blue** indicates an informational message alerting you to missing data elements that are important for the cardiac surgery analysis including risk adjustment. When a record has this indicator further information will be displayed when the record is accessed. Click "Review and Save Record" to allow this record to be changed to a reviewed status.

- A **yellow** indicates that the record is locked and cannot be accessed at this time. This occurs when another staff person is utilizing the record and prevents added/updated information from being lost.

Review and Edit Records – Individual Records

Select a record from the Record List

Select the record you would like to review by clicking on the status indicator icon under the Record Status column.

Address error and/or informational messages

Error and/or informational messages are assigned based on the validations and edits described in the *Pennsylvania Uniform Claims and Billing Form Reporting Manual (Inpatient)* and the *Cardiac Surgery Supplemental Clinical Data Reporting Manual* (both of which are available at http://www.phc4.org/dept/dc/dcmanuals.htm) or in "Additional Field Edits for Cardiac Surgery Data Submission" in this guide**.** In order to provide accurate data for analysis you should complete the review process by addressing each of the error and/or informational messages.

Delete records, when applicable

When a record has been included in the data upload that does not meet the procedure or age criteria, delete the record from the Cardiac Surgery Data Administration tool by clicking on "Delete Record." You will be prompted to provide a reason for deleting the record in a comment box. Please provide a clear detailed explanation. As an example, if a record has 36.12 as a procedure code and the code should have been 31.62, you should provide this information in the explanation. You should also make the coding change in the UB-04 Uniform Claims and Billing data so that the record does not appear as a record that should be extracted from the billing data into the Cardiac Surgery Data Administration tool.

Update cardiac surgeon, as needed

For cases in which the principal procedure was not the *first* CABG and/or valve procedure performed during the admission, the operating physician may not be assigned accurately. In these cases, the CABG/Valve Operating Physician field may display "Unknown Cardiac Surgeon" or another surgeon's name. Correct this by selecting the appropriate cardiothoracic surgeon from the drop down box, which lists the name and license number of the cardiothoracic surgeons that have operated at your hospital in past quarters.

If a new cardiothoracic surgeon begins performing CABG and/or valve procedures at your hospital, you will need to add the surgeon to your list of available physicians by clicking on "Add Physician to your Facility's List." You may search for the surgeon by using the PA license number or by any part of the surgeon's name. For example, if you would like to add MD123456 John H Smith, enter MD123456 or Smith to begin the search. When a surgeon is added you will be required to update the name as the surgeon would like it displayed in the report. After you have completed these steps, click on the "Add" button.

If the surgeon is already included in the PHC4 cardiac surgeon database or was in a previous PHC4 public report, PHC4 staff will make appropriate changes to the surgeon's name to ensure consistency among facilities for public reporting purposes.

Request medical record documentation reviews

The Record Review Request data fields should be indicated as a "Yes" when a medical record documentation review is requested for preoperative cardiogenic shock, preoperative acute renal failure and/or special request for exclusion. The "Yes" can be submitted with the initial cardiac surgery data file upload or while reviewing and editing your hospital's cardiac surgery records.

These fields inform PHC4 that a hospital or surgeon is requesting a review of medical record documentation for 1) the presence of cardiogenic shock and/or acute renal failure in the time period immediately preceding surgery, and/or 2) a special request for exclusion of a case that does not meet the standard clinically complex exclusion criteria. Prior to requesting a medical record documentation review, see criteria for 1) preoperative cardiogenic shock and preoperative acute renal failure in the "Risk Adjustment" section of this guide, and 2) special request for exclusion in the "Exclusion" section of this guide.

Supporting medical record documentation is required for each request. See "Supporting Documentation" section for details.

Add additional diagnosis and procedure codes

To maximize the information in the cardiac surgery data, and to most accurately capture the patient's medical status at the time of surgery, hospitals are encouraged to take advantage of the opportunity to provide up to 25 diagnosis codes and 25 procedure codes for each record. If the Coding Summary for the record lists diagnosis and procedure codes that were not included in your hospital's initial UB-04 Uniform Claims and Billing data submission or cardiac surgery data file upload, you are encouraged to add the additional codes.

With the exception of the principal diagnosis and procedure codes, the order in which the codes appear is not relevant to the analysis. However, if a record's Coding Summary lists more than 25 diagnosis or 25 procedure codes, you are encouraged to provide the codes most relevant to understanding the case. The Cardiac Surgery Data Administration tool allows you to change any of the diagnosis or procedure codes in the initial data submission/upload to codes on the Coding Summary that may be more relevant for exclusion or risk adjustment. See the "Exclusions" and "Risk Adjustment" sections of this guide for more details.

Submit updates and verify that all errors have been corrected

When you have completed your review and updates for a particular record, select "Review & Save Record." The record will be validated after your updates have been made to ensure that there are no remaining errors. **Please note that this step is required for a record to be considered reviewed.**

If all errors have been corrected, you will be redirected to the Summary Page. If error and/or informational messages are still present, you will remain on the Individual Record page. If the record contains errors and you wish to continue with the review process and return to the record

at a later date, click the "Back to Summary" link at the top of the page. All errors should be corrected prior to the due date of the review and attestation process for the quarter.

Any informational messages not addressed will continue to be shown at the top of the individual record. However, you can click the "Back to Summary" link at the top of the page and return to the Summary Page at any time. Although data is acceptable and may be submitted with outstanding informational messages, you will need to click "Review & Save Record" in order for the record to be considered "reviewed" and ready for analysis.

Record Detail Status Report

Select "Record Detail Status Report" on the Cardiac Surgery Data Administration tool menu to obtain a report identifying all of the error and/or informational messages for each record.

Using the Record Detail Status Report

The report is sorted by Record ID and is provided to aid in completion of the individual record review process. This report can be used in conjunction with the Physician Sign-Off Report to help identify, document, and correct errors in the records. After all error and/or informational messages have been addressed, "Reviewed" will appear on the report for each individual record. If the report states "Unreviewed," access the individual record, review and edit the information, and then click on "Review & Save Record."

Record Review Request Report

Select "Record Review Request Report" on the Cardiac Surgery Data Administration tool menu to obtain a list of records for which a medical record documentation review for preoperative acute renal failure, preoperative cardiogenic shock, and/or special request for exclusion are requested. Provide this report to the personnel in your hospital who are responsible for copying the supporting documentation to include in your packet submission.

What should I do if a Record Review Request is missing from this report?

If the Record Review Request Report does not list all of your requested medical record documentation reviews for preoperative cardiogenic shock, preoperative acute renal failure and/or special request for exclusions:

1) access each of the missing records,
2) update the Record Review Indicator to "Yes,"
3) click "Review & Save Record."

What should I do if a Record Review Request is indicated but it should not be performed?

If the Record Review Request Report indicates a medical record documentation review for preoperative cardiogenic shock, preoperative acute renal failure and/or special request for exclusion but the review is not needed:

1) access the individual record,
2) update the Record Review Indicator to "No,"
3) click "Review & Save Record."

Summary Status Report

Select "Summary Status Report" on the Cardiac Surgery Data Administration tool menu to view the progress of the record reviews. This report will identify the total number of claims, total number of cardiac surgery records, total number of expected cardiac surgery records, and total number of cardiac surgery records that have been reviewed.

What should I do if the total number and expected numbers of records do not match?

The total number of cardiac surgery records and the total number of expected cardiac surgery records should be the same number. If not, there are records in your UB-04 Uniform Claims and Billing data that need to be extracted to the Cardiac Surgery Data Administration tool. When this occurs the details for extracting these records are available on the Main Reports page. See the section "Extract Current Data, When Applicable (Additional Records)" for further details.

What should I do if the total number and reviewed number of records do not match?

The total number of cardiac surgery records that have been reviewed should equal the total number of expected cardiac surgery records when the review process is complete. If the numbers are not equal there are records that need reviewed to complete the review process. Use the "Record Detail Status Report" to identify the "Unreviewed" records, access the individual records, review the information, and click on "Review & Save Record." Unreviewed records can also be identified on the Review and Edit Records Summary Page by clicking on the "View all records that have not been reviewed" checkbox at the top of the page.

Physician Sign-Off Report

View/Print Hospital or Physician Reports

View/print all of your hospital's cases or a particular physician's cases by selecting his/her name. When selecting a physician, if "Unknown Cardiac Surgeon" appears as an option there are cases that need to be assigned to a particular surgeon; complete these assignments before providing the surgeons with their reports. This function is available at any time during the review process and may aid in the collection of supplemental clinical data, additional diagnosis and procedure codes, and other administrative data needed to address error and/or informational messages.

Using the Physician Sign-Off Report as a worksheet

The Physician Sign-Off Reports may be used as a worksheet to add additional ICD-9-CM diagnosis and procedure codes or to review accuracy of supplemental clinical data, medical record documentation review requests and the UB-04 Uniform Claims and Billing data. Select the All Physicians option and print the entire report, distribute the worksheet and the Record Detail Status Report to the appropriate personnel within your hospital for review, then correct/add the relevant data.

Search the report

To search for a particular record or search for all cases containing particular information use the search function in the tool bar at the left of the screen. The search function is identified by the icon with a picture of binoculars. Enter the information you are looking for in the search field and then click "Search." All of your results for the search will be shown in in the bottom left

corner of the web page. This feature may vary depending upon the PDF viewing software installed on your computer.

Prepare final report for physicians

When the individual record review is complete and all error messages are corrected print a final report for the surgeons to review. Choose the All Physician option and the report will be organized by physician; the physician's name will appear on the top and bottom of each page of his/her cases. At the end of each physician's record list, the physician sign-off statement is printed with space for the physician's signature.

Obtain surgeon attestation

Provide each surgeon with a copy of their individual Physician Sign-Off Report. The physicians are encouraged to review their cases thoroughly. If during the physician review minor changes in the data are identified, these changes can be made on the Physician Sign-Off Report by crossing out the old data value and writing in the new value. For these changes to be reflected in the analysis, the cardiac surgery data in the web-based tool must be updated accordingly.

Once the surgeons have reviewed their cases they need to sign the report in the space provided, attesting to the following statement printed at the bottom of each physician's report:

> *"I affirm that the cases assigned to me are accurate as printed, or revised as requested, and that the data elements which include patient diagnosis and procedure codes are accurate and complete to the best of my knowledge."*

Each record with a CABG and/or valve procedure needs to be attested to by the operating physician unless circumstances prohibit this. If, for example, a physician is no longer on staff, the director/chairperson of the medical staff or cardiac surgery department can attest to the cases. Include a note indicating why the physician was not available and identify the person who signed for him/her by name and title. **Please remember to make a copy of the sign-off reports for your files.**

Extract Current Data, When Applicable (Additional Records)

If there is a record in the UB-04 Uniform Claims and Billing data that has a CABG and/or valve procedure code and the patient is 18 years of age and older and the record is not displayed in the Cardiac Surgery Data Administration tool, the message "__ outstanding record(s) needs to be extracted" will be displayed on the Main Page. Choose "Extract outstanding cardiac surgery records from billing data" and click on "Extract Cardiac Surgery Data" to extract these records.

Obtain Hospital Confirmation Statement

Each hospital needs to complete the *Hospital Confirmation Statement Form*. A copy of the form is available on the PHC4 website:

http://www.phc4.org/dept/dc/adobe/openheart_confirm.pdf

The form includes a checklist of all the items to return to PHC4, the confirmation statement displayed below, and a signature line for the PHC4 contact:

> *"I confirm, to the best of my knowledge, the accuracy of all data elements and physician assignments in the submitted files and that the final data in these files match the data listed in the Physician Sign-Off Reports."*

Prepare Documentation to Send to PHC4

- Hospital Confirmation Statement.
- Physician Sign-Off Reports. **Make a copy for your files before sending to PHC4.**
- Supporting medical record documentation packets for the following cases with relevant information indicated on the "Cover Sheet for Cardiac Surgery Supporting Documentation" (see Supporting Documentation section for details):
    - Preoperative cardiogenic shock *(present between admission and surgery up to the induction of anesthesia and ICD-9-CM diagnosis code of 785.51).*
    - Preoperative acute renal failure *(present between admission and surgery up to the induction of anesthesia and ICD-9-CM diagnosis code of 584.5-584.9).*
    - Special requests for exclusion *(a letter describing the reason for the request needs to be included).*

Mail Documentation

Send all cardiac surgery review and attestation materials to:

PHC4 Cardiac Surgery Project
225 Market St, Suite 400
Harrisburg, PA 17101

ADDITIONAL FIELD EDITS FOR CARDIAC SURGERY DATA

Address Error and/or Informational Messages Related to Cardiac Surgery Data

Additional fields have been calculated by PHC4 and included as error or informational messages for your review. If there are issues that need addressed an error flag and/or informational flag will be shown on the Record Summary page.

Admission Date is equal to Through Date and Discharge Status does not equal 20

Verify that the Admission/Start of Care Date, Statement Covers – Through Date and Discharge Status are correct. This informational message is provided to verify the discharge status on the record. Verify the discharge status to determine whether it should be 20 (expired) or 02 (transferred to another acute care facility).

Anesthesia Start Date does not equal *first* CABG and/or valve Procedure Date

Verify Anesthesia Start Date and/or *first* CABG and/or valve Procedure Date. This informational message is provided to alert you to a potential error in the Anesthesia Start Date and/or Principal or Other Procedure Date fields. The *first* CABG and/or valve surgery is the one performed first during the admission not the first one coded. This scenario is acceptable when the anesthesia was started prior to midnight and the surgery was performed the next calendar day (after midnight).

Hospital DRG (PPS) does not match PHC4 calculated CABG/Valve DRG (PPS)

Verify the patient Birth Date, Admission/Start of Care Date, Diagnosis and Procedure Codes, Present on Admission Indicators, Patient Sex and Discharge Status. PHC4 will recalculate the DRG (PPS) each time the record is "Reviewed & Saved":

- If you agree with the PHC4 calculated CABG/Valve DRG (PPS), update the Hospital DRG accordingly.
- If you do not agree with the PHC4 calculated CABG/Valve DRG (PPS), correct the Patient Birth Date, Admission/Start of Care Date, Diagnosis and Procedure Codes, Present on Admission Indicators, Patient Sex and/or Discharge Status so that the PHC4 Calculated CABG/Valve DRG (PPS) matches the value submitted by your hospital. PHC4 utilizes the most current grouper for calculating this field.

Laboratory Specimen Collection Date and Time is after Anesthesia Start Date and Time

Verify Specimen Collection Date and Time and/or Anesthesia Start Date and Time or provide laboratory test result prior to the start of anesthesia. If this informational message appears review the laboratory test results submitted to identify the result(s) with a collection date and time after the start of anesthesia date and time. It is our intention for risk adjustment purposes to continue using the laboratory test results from specimens collected prior to anesthesia start time and within the laboratory test collection timeframe specified in the *Laboratory Data Reporting Manual*. **Please note that your hospital's laboratory data must be submitted in order for this edit to calculate correctly.**

Missing CABG and/or valve surgery code in Principal or Other Procedure Code fields

Add a CABG or valve procedure code or delete the record. If the record was uploaded or extracted in error with your cardiac surgery data, delete the record from the cardiac surgery data and correct the procedure code in the UB-04 Uniform Claims and Billing data. Otherwise the tool will continue to indicate that the record needs to be extracted into the cardiac surgery data. See "Delete Records, When Applicable" in this guide for further details.

Patient stay is longer than 100 days

Verify Admission/Start of Care Date and/or Statement Covers – Through Date. This informational message is an alert that the length of stay is greater than 100 days. The length of stay is calculated using the Admission/Start of Care Date and the Statement Covers – Through Date. If the length of stay is correct, no action is needed. If there is an error in one of the two dates, the record will need to be deleted from the Cardiac Surgery Data Administration tool. You should then correct the Admission/Start of Care Date and/or the Statement Covers – Through Date in the UB-04 Uniform Claims and Billing data and extract the record back into the Cardiac Surgery Data Administration tool. See the sections "Delete Records, When Applicable" and "Extract Current Data, When Applicable (Additional Records)" in this guide for further details.

Principal or Other Procedure Date is before Admission Date

Verify the applicable Principal or Other Procedure Date and/or the Admission/Start of Care Date are correct and that the procedure in question was performed prior to admission.

Preoperative Acute Renal Failure equals "Y" and Diagnosis Code is not present

This error message will be displayed when a medical record documentation review is requested for preoperative acute renal failure but an ICD-9-CM diagnosis code of 584.5, 584.6, 584.7, 584.8, or 584.9 is not on the record. Add the relevant diagnosis code or update the Record Review Request to "No."

Preoperative Cardiogenic Shock equals "Y" and Diagnosis Code is not present

This error message will be displayed when a medical record documentation review is requested for preoperative cardiogenic shock but an ICD-9-CM diagnosis code of 785.51 is not on the record. Add the relevant diagnosis code or update the Record Review Request to "No."

Social Security Number is Invalid

This informational message is displayed when the Social Security Number (SSN) in the UB-04 Uniform Claims and Billing data is invalid. Valid SSNs are important when the analysis (e.g., readmissions) requires the linking of records. In order to resolve this issue when you have a valid SSN, the record will first need to be deleted from the Cardiac Surgery Data Administration tool, correct the SSN in the UB-04 Uniform Claims and Billing data, and extract the record back into the Cardiac Surgery Data Administration tool. See the sections "Delete Records, When Applicable" and "Extract Current Data, When Applicable (Additional Records)" in this guide for further details.

EXCLUSIONS

Certain cases are excluded from the CABG/valve analysis to achieve a clinically cohesive study population. These cases, however, are included in the data for review and attestation.

If any one of the standard or clinically complex exclusion criteria is present on the record, there is no need to request or complete medical record documentation review packets for special request for exclusion, preoperative cardiogenic shock, or preoperative acute renal failure.

Standard Exclusions

Standard exclusions from the CABG/valve analysis include:

- Patients who left against medical advice during the admission in which the CABG/valve surgery was performed.
- Clinically complex cases – see below for more detailed information.

Clinically Complex Cases

Clinical Complexity Exclusions

Clinical complexity exclusions are defined by the ICD-9-CM codes listed in Appendix B. The clinical complexity exclusion codes are grouped into three procedure categories: CABG without Valve, Valve without CABG, and Valve with CABG. Some clinical complexity exclusions are applicable across all three procedure groups; they are listed on Table 1. See Table 2 for exclusions that are only applicable to CABG without Valve, Table 3 for exclusions only applicable to Valve without CABG, and Table 4 for exclusions only applicable to Valve with CABG.

As part of the ongoing research process PHC4's Technical Advisory Group (TAG) will periodically review the exclusion codes. If a code(s) is removed from the list of clinical complexity exclusions, you will be notified and will have an opportunity to submit documentation for medical record review prior to analysis for the cardiac surgery report.

CABG and/or valve cases that are excluded from the cardiac surgery analysis will continue to be displayed in the Cardiac Surgery Data Administration tool and will need to be reviewed and attested to by the cardiothoracic surgeon.

Organ Transplants

Patients who undergo organ transplant procedures during the same admission as CABG/valve surgery, as well as, patients with a personal history of an organ transplant or complications arising from an organ transplant are excluded from the study population. These cases are identified by ICD-9-CM diagnosis and procedure codes included in Table 1 of Appendix B.

Special Requests for Exclusion

Hospitals and/or physicians have the opportunity to request special exclusions for cases in which the patient's outcome was most directly associated with conditions unrelated to the CABG and/or valve surgery.

Prior to requesting a medical record documentation review, the special request for exclusion information presented below should be reviewed. Supporting medical record documentation packets, including a letter describing the **specific** reason for the request, are needed for each special exclusion request (see "Supporting Documentation" section in this guide).

In past reports, requests for exclusions based on the following clinical scenarios have not been approved:

- Preoperative, high-risk/multiple risk conditions
- Preoperative adverse events occurring in the catheterization lab
- Complex post-operative complications

Please keep in mind that when these requests for exclusion arrive, they are, invariably, for patients who expired. If we consider excluding patients for a specific procedure and/or condition, then it would only be fair to exclude all such patients regardless of outcome.

The cardiothoracic surgeon performing the surgery or the director/chairperson of the medical staff or cardiac surgery department still needs to attest to cases for which an exclusion is requested. Physicians are asked to attest to the accuracy of the data, not whether they believe the case should be included in the report. Cases will not be removed from the report because a physician did not attest to them.

RISK ADJUSTMENT

The goal of the review and attestation process is to ensure that the information which best describes a particular patient's condition at the time of surgery is available for inclusion in the analysis. The following paragraphs discuss factors that may play an important role in a particular patient's risk assessment. Laboratory data, supplemental clinical data, preoperative cardiogenic shock, and preoperative acute renal failure are likely to be important risk-adjustment factors. Other potential risk factors are also discussed.

Laboratory Data

For CABG and/or valve records, it is our intention for risk adjustment purposes to continue using the laboratory test results from specimens collected prior to anesthesia start time and within the laboratory test collection timeframe specified in the *Laboratory Data Reporting Manual* available at http://www.phc4.org/dept/dc/dcmanuals.htm. These records will be identified by comparing the "Anesthesia Start Date" and "Anesthesia Start Time" submitted in the supplemental clinical data with the "Date Specimen Collected" and "Time Specimen Collected" submitted in the laboratory data.

As such, when laboratory test results within the admission timeframe are available for both prior to and after the anesthesia start date and time for the *first* CABG and/or valve surgery, we strongly suggest that hospitals submit laboratory results collected prior to the anesthesia start date and time. Having these results will help to fully capture the patient's clinical condition (or risk) at the time of admission and prior to surgery.

- Example 1: A patient is admitted at 4:00 pm and has a CABG procedure performed at 7:00 pm (start time of anesthesia). Laboratory test results from Day 1 up to 7:00 pm should be reviewed for collection.
- Example 2: A patient is admitted at 9:00 pm on Day 1 and has a CABG procedure performed on Day 2 at 8:00 am (start time of anesthesia). Laboratory test results from Day 1 and Day 2 up to 8:00 am should be reviewed for collection.
- Example 3: A patient is admitted at 4:00 pm and has a CABG procedure performed on Day 5. Laboratory test results from Day 1 should be reviewed for collection.

Changes applicable to the collection of the cardiac surgery laboratory values may be made prior to the submission of the quarterly laboratory data or after submission by using the Laboratory Data Administration tool. An informational message will be displayed when the Laboratory Result Date and Time Specimen Collected for a particular record is after the Anesthesia Start Date and Time for that record. This message will also appear on the Record Detail Status Report.

Supplemental Clinical Data

Detailed information on the collection of the supplemental clinical data elements can be found in the *Cardiac Surgery Supplemental Clinical Data Reporting Manual* on PHC4's website at http://www.phc4.org/dept/dc/dcmanuals.htm.

Hospitals are required to submit the following supplemental clinical data elements for the *first* CABG and/or heart valve surgery discharges for patients 18 years of age and older:

- Anesthesia Start Date and Start Time
- American Society of Anesthesiologists (ASA) Class
- ASA Emergency Indicator
- Coronary Artery Disease (percent stenosis in various vessels)
- Ejection Fraction

Preoperative Cardiogenic Shock

Preoperative cardiogenic shock is an underlying factor that increases the patient's risk of mortality at the time of surgery. Cardiogenic shock that resolved, for example, a week prior to surgery does not meet this criterion. Therefore, it is denied. Cardiogenic shock is only considered if it was present between admission and surgery up to the induction of anesthesia and occurred within a reasonable time of surgery. The medical record documentation of the degree of illness must be provided in order to corroborate the claim of cardiogenic shock. When the documentation is inadequate to reach a conclusion, the request is denied.

In addition, the ICD-9-CM diagnosis code of 785.51 (cardiogenic shock) must be submitted to PHC4 as either the principal diagnosis or one of the secondary diagnosis codes. Note that the ICD-9-CM diagnosis code of 998.01 (post-operative cardiogenic shock) will be accepted as a replacement for 785.51 ONLY if the cardiogenic shock occurs after a procedure other than a CABG or valve and prior to the ***first*** CABG and/or valve surgery. For example, the patient has a PTCA in the morning of admission and develops cardiogenic shock during or as a result of the PTCA. The decision is made to take the patient to the operating room for a CABG procedure. The cardiogenic shock in this example will be coded using the 998.01 (post-operative cardiogenic shock) and is acceptable to submit for review. If the cardiogenic shock occurs after the ***first*** CABG and/or valve surgery the record should NOT be submitted for review.

A panel of physicians review the medical record documentation packets to determine if cardiogenic shock was present and occurred within a reasonable time of surgery. The decision to grant preoperative cardiogenic shock is based primarily on the **clinical presentation** of the patient and is guided by the information outlined below.

Clinical scenario – these clinical scenarios presented in the medical record documentation packet may indicate preoperative cardiogenic shock:

- Patient's condition "spiraling" downward – vasopressors, inotropes, IABP, ventilator, etc. required in the cardiac catheterization lab and the patient is taken emergently to the O.R.
- Cardiac arrest as a contributing or causal factor of cardiogenic shock within hours of surgery.
- Ruptured papillary muscle
- Patient would not survive without surgery if supportive treatment (inotropes, IABP, ventilator, etc.) was withdrawn.

Clinical scenarios NOT considered cardiogenic shock – these clinical scenarios presented in the medical record documentation packet typically do not support the presence of preoperative cardiogenic shock:

- Insertion of an intra-aortic balloon pump (IABP) for management of angina.
- Patient taken to the O.R. for "tight" coronary anatomy.
- Patient taken to the O.R. (planned/scheduled) after acute problem(s) have been stabilized. That is, cardiogenic shock is resolved several days prior to surgery.
- Heart Failure – is severe, but does not meet the hemodynamic or clinical criteria for cardiogenic shock.

Hemodynamic status – these measures of hemodynamic status provide additional data to support the clinical scenario presented in the documentation packet:

- Hypoperfusion with a systolic blood pressure <80 mmHg and central filling pressure >20 mmHg without inotropes
- Cardiac index <1.8 $l/min/m^2$
- Inotropes with or without intra-aortic balloon pump (IABP) to maintain a cardiac index ≥1.8 $l/min/m^2$

Preoperative Acute Renal Failure

Acute renal failure is only considered if it was present between admission and surgery up to the induction of anesthesia. An ICD-9-CM principal or secondary diagnosis code of acute renal failure (584.5 - 584.9) needs to be included in the initial data submission or added during the review and attestation process of any record to be considered for preoperative acute renal failure review. The goal is to identify those patients who were in acute renal failure prior to surgery; therefore, the time period between the occurrence of acute renal failure and surgery should be reasonable.

For example, a case in which acute renal failure appeared to be present a week prior to surgery would not qualify. When the medical record documentation is inadequate to reach a conclusion, the request is denied.

Other Potential Risk Factors

The tables in Appendix C list variables that may influence a patient's outcomes. Table 1 lists variables that are relevant to all three procedure groups: CABG without Valve procedures, Valve without CABG, and Valve with CABG. Table 2 lists additional variables that are only relevant to surgeries involving CABG without Valve procedures, Table 3 lists additional variables that are only relevant to surgeries involving Valve without CABG, and Table 4 additional variables that are only relevant to surgeries involving Valve with CABG. The variables were identified through literature review and discussion with cardiothoracic surgeons. Based on recommendations from PHC4's Technical Advisory Group, these variables, along with laboratory data, supplemental clinical data and administrative data, will be considered in PHC4's model development that will adjust for the differences in patients' risk. The variable lists are very inclusive and we will not know how many or which of these variables will be predictive of outcomes and be retained in the risk models until analysis for the report is complete.

As you review data and provide additional codes, you may want to ask for input from the cardiothoracic surgeons regarding diagnosis and procedure codes that would best describe a particular patient's condition, even if the codes are not included in Appendix C.

SUPPORTING DOCUMENTATION

When is Supporting Documentation Required?

Supporting medical record documentation is needed for the following cases, unless the cases were submitted to PHC4 with a standard or clinically complex exclusion (see the "Exclusion" section of this guide for exclusion detail):

- Preoperative cardiogenic shock (present between admission and surgery up to the induction of anesthesia and ICD-9-CM diagnosis code of 785.51; documentation of this time period is all that is needed).
- Preoperative acute renal failure (present between admission and surgery up to the induction of anesthesia and ICD-9-CM diagnosis code of 584.5-584.9; documentation of this time period is all that is needed).
- Special request for exclusion (a letter describing the reason for the request needs to be included).

Required Documentation by Medical Record Review Type

The medical record documentation required for each of the medical record review types is indicated in the table below. The packet must include copies of the noted portions of the medical record in the order listed.

Preoperative Cardiogenic Shock	Preoperative Acute Renal Failure	Special Request for Exclusion	Medical Record Documentation
✓	✓	✓	Coding Summary/Face Sheet/Physician Attestation
		✓	Letter
✓	✓	✓	Discharge Summary
✓	✓	✓	History and Physical (type written preferred)
✓	✓	✓	Physician Progress Notes
	✓		Consult – Nephrology/Renal (type written preferred)
✓	✓	✓	Operative Report (type written preferred)
✓			Cardiac Catheterization Report & Case Log
✓			Anesthesia Record & Pre-anesthesia Evaluation Record
✓		✓	Medication Administration Record (MAR)
✓		✓	Vital Sign Sheets
✓	✓		ICU Nursing Flowsheets
	✓	✓	Intake & Output Sheets (I/O Sheets)
	✓	✓	Laboratory Reports
✓			Documentation from Transferring Facility (if applicable)
✓	✓	✓	Any other documents necessary to support request (e.g., pertinent consults, heart catheterization reports)

Preparing the Supporting Documentation for Mailing to PHC4

The relevant information pertaining to the reason for the request to review the medical record documentation should be highlighted (e.g., mention of hemodynamic measures for cardiogenic shock or clinical information related to special requests for exclusion). When submitting medical record documentation review packets, PHC4 recommends that you obscure any patient identifiers (e.g., name, address, phone number, social security number). If you find this burdensome and choose not to do so, you should be aware that PHC4 will be sending the records to physicians for review via overnight delivery services such as UPS and FedEx.

These documents should be fastened together securely (with a staple or binder clip). The *Cover Sheet for Cardiac Surgery Supporting Documentation Packet*, which needs to be fastened to the front of the medical record documentation and provides information regarding the order of the packet, is available on PHC4's website at:

http://www.phc4.org/dept/dc/adobe/openheart_cover.pdf

PHC4 Storage of Supporting Documentation

Medical record documentation review packets will be kept on file until 90 days after PHC4 releases the annual cardiac surgery report. At that time all medical record documentation will be shredded.

APPENDICES

Appendix A: ICD-9-CM Procedure Codes for Study Population

Table 1: CABG Procedure Codes

ICD-9-CM Code	Description
36.10	Aortocoronary bypass for heart revascularization, not otherwise specified
36.11	Aortocoronary bypass of one coronary artery
36.12	Aortocoronary bypass of two coronary arteries
36.13	Aortocoronary bypass of three coronary arteries
36.14	Aortocoronary bypass of four or more coronary arteries
36.15	Single internal mammary-coronary artery bypass
36.16	Double internal mammary-coronary artery bypass
36.17	Abdominal-coronary artery bypass
36.19	Other bypass anastomosis for heart revascularization

Table 2: Valve Procedure Codes

ICD-9-CM Code	Description
35.10	Open heart valvuloplasty without replacement, unspecified valve
35.11	Open heart valvuloplasty of aortic valve without replacement
35.12	Open heart valvuloplasty of mitral valve without replacement
35.13	Open heart valvuloplasty of pulmonary valve without replacement
35.14	Open heart valvuloplasty of tricuspid valve without replacement
35.20	Open and other replacement of unspecified heart valve
35.21	Open and other replacement of aortic valve with tissue graft
35.22	Open and other replacement of aortic valve
35.23	Open and other replacement of mitral valve with tissue graft
35.24	Open and other replacement of mitral valve
35.25	Open and other replacement of pulmonary valve with tissue graft
35.26	Open and other replacement of pulmonary valve
35.27	Open and other replacement of tricuspid valve with tissue graft
35.28	Open and other replacement of tricuspid valve
35.33	Annuloplasty
35.99	Other operations on valves of heart

Appendix B: Clinical Complexity Exclusions – ICD-9-CM Codes

Table 1: Exclusions Applicable to All Procedure Groups

ICD-9-CM Code	Description
Diagnosis or procedure in any position	
32.22	Lung volume reduction surgery performed *the same time as* CABG/valve procedure
33.50	Lung transplantation, not otherwise specified
33.51	Unilateral lung transplantation
33.52	Bilateral lung transplantation
33.6	Combined heart-lung transplantation
35.42	Creation of septal defect in heart
35.50	Repair of unspecified septal defect of heart with prosthesis
35.51	Repair of atrial septal defect with prosthesis, open technique
35.53	Repair of ventricular septal defect with prosthesis, open technique
35.54	Repair of endocardial cushion defect with prosthesis
35.60	Repair of unspecified septal defect of heart with tissue graft
35.61	Repair of atrial septal defect with tissue graft
35.62	Repair of ventricular septal defect with tissue graft
35.63	Repair of endocardial cushion defect with tissue graft
35.70	Other and unspecified repair of unspecified septal defect of heart
35.72	Other and unspecified repair of ventricular septal defect
35.73	Other and unspecified repair of endocardial cushion defect
35.81	Total repair of tetralogy of Fallot
35.82	Total repair of total anomalous pulmonary venous connection
35.83	Total repair of truncus arteriosus
35.84	Total correction of transposition of great vessels, not elsewhere classified
35.91	Interatrial transposition of venous return
35.92	Creation of conduit between right ventricle and pulmonary artery
35.93	Creation of conduit between left ventricle and aorta
35.94	Creation of conduit between atrium and pulmonary artery
37.32	Excision of aneurysm of heart
37.35	Partial ventriculectomy
37.51	Heart transplantation
37.52	Implantation of total internal biventricular heart replacement system
37.53	Replacement or repair of thoracic unit of (total) replacement heart system
38.12	Carotid endarterectomy
38.34	Resection of aorta with anastomosis
38.35	Resection of other thoracic vessel with anastomosis
38.36	Resection of abdominal arteries with anastomosis
38.44	Resection of abdominal aorta with replacement
38.45	Resection of other thoracic vessel with replacement
38.46	Resection of abdominal arteries with replacement
39.51	Clipping of aneurysm
39.52	Other repair of aneurysm
39.71	Endovascular implantation of other graft in abdominal aorta
39.73	Endovascular implantation of graft in thoracic aorta

ICD-9-CM Code	Description
Diagnosis or procedure in any position	
Table 1: Exclusions Applicable to All Procedure Groups *continued*	
39.78	Endovascular implant of branch or fenestrated graft(s) in aorta
41.00	Bone marrow transplant, not otherwise specified
41.02	Allogeneic bone marrow transplant with purging
41.03	Allogeneic bone marrow transplant without purging
41.05	Allogeneic hematopoietic stem cell transplant without purging
41.06	Cord blood stem cell transplant
41.08	Allogeneic hematopoietic stem cell transplant with purging
41.09	Autologous bone marrow transplant with purging
41.94	Transplantation of spleen
46.97	Transplant of intestine
50.51	Auxiliary liver transplant
50.59	Other transplant of liver
52.80	Pancreatic transplant, not otherwise specified
52.82	Homotransplant of pancreas
52.83	Heterotransplant of pancreas
52.85	Allotransplantation of cells of islets of Langerhans
52.86	Transplantation of cells of islets of Langerhans, not otherwise specified
55.61	Renal autotransplantation
55.69	Other kidney transplantation
423.2 plus 37.31	Diagnosis of constrictive pericarditis **and** undergoing pericardiectomy
441.00	Dissection of aorta, unspecified site
441.01	Dissection of aorta, thoracic
996.81	Complications of transplanted kidney
996.82	Complications of transplanted liver
996.83	Complications of transplanted heart
996.84	Complications of transplanted lung
996.85	Complications of bone marrow transplant
996.86	Complications of transplanted pancreas
996.87	Complications of transplanted intestine
996.88	Complications of transplanted stem cell
V42.0	Kidney replaced by transplant
V42.1	Heart replaced by transplant
V42.6	Lung replaced by transplant
V42.7	Liver replaced by transplant
V42.81	Bone marrow transplant
V42.82	Peripheral stem cells replaced by transplant
V42.83	Pancreas transplant
V42.84	Intestine transplant
V43.21	Heart replacement by heart assist device
V43.22	Heart replacement by fully implantable artificial heart

Table 2: Additional Exclusions Applicable to CABG without Valve Procedure Group

ICD-9-CM Code	Description
Procedure in any position:	
35.31	Operations on papillary muscle
35.32	Operations on chordae tendineae
35.34	Infundibulectomy
35.35	Operations on trabeculae carneae cordis
35.39	Operations on other structures adjacent to valves of heart
35.71	Other and unspecified repair of atrial septal defect
35.95	Revision of corrective procedure on heart
35.98	Other operations on septa of heart
36.91	Repair of aneurysm of coronary vessel
37.33	Excision or destruction of other lesion or tissue of heart, open approach
37.36	Excision, destruction or exclusion of left atrial appendage (LAA)

Table 3: Additional Exclusions Applicable to Valve without CABG Procedure Group

ICD-9-CM Code	Description
Principal diagnosis only:	
036.42	Meningococcal endocarditis
038.x & 038.xx	Septicemia
074.22	Coxsackie endocarditis
093.20	Syphilitic endocarditis, valve unspecified
093.21	Syphilitic endocarditis, mitral valve
093.22	Syphilitic endocarditis, aortic valve
093.23	Syphilitic endocarditis, tricuspid valve
093.24	Syphilitic endocarditis, pulmonary valve
098.84	Gonococcal endocarditis
112.81	Candidal endocarditis
115.04	Histoplasmosis capsulatum endocarditis
115.14	Histoplasmosis duboisii endocarditis
115.94	Histoplasmosis endocarditis
391.1	Acute rheumatic endocarditis
421.0	Acute and subacute bacterial endocarditis
421.1	Acute and subacute infective endocarditis in diseases classified elsewhere
421.9	Acute endocarditis, unspecified
424.90	Endocarditis, valve unspecified, unspecified cause
424.91	Endocarditis in diseases classified elsewhere
424.99	Endocarditis, valve unspecified, specified cause except rheumatic
996.02	Mechanical complication due to heart valve prosthesis
996.61	Infection and inflammatory reaction due to cardiac device/implant/graft
996.71	Other complications due to heart valve prosthesis
Diagnosis in any position:	
277.30 plus 425.7	Amyloidosis, unspecified **and** nutritional & metabolic cardiomyopathy
277.39 plus 425.7	Other amyloidosis **and** plus nutritional & metabolic cardiomyopathy
414.10	Aneurysm of heart (wall)
414.19	Other aneurysm of heart

Table 4: Additional Exclusions Applicable to Valve with CABG Procedure Group

ICD-9-CM Code	Description
Principal diagnosis only	
036.42	Meningococcal endocarditis
038.x & 038.xx	Septicemia
074.22	Coxsackie endocarditis
093.20	Syphilitic endocarditis, valve unspecified
093.21	Syphilitic endocarditis, mitral valve
093.22	Syphilitic endocarditis, aortic valve
093.23	Syphilitic endocarditis, tricuspid valve
093.24	Syphilitic endocarditis, pulmonary valve
098.84	Gonococcal endocarditis
112.81	Candidal endocarditis
115.04	Histoplasmosis capsulatum endocarditis
115.14	Histoplasmosis duboisii endocarditis
115.94	Histoplasmosis endocarditis
391.1	Acute rheumatic endocarditis
421.0	Acute and subacute bacterial endocarditis
421.1	Acute and subacute infective endocarditis in diseases classified elsewhere
421.9	Acute endocarditis, unspecified
424.90	Endocarditis, valve unspecified, unspecified cause
424.91	Endocarditis in diseases classified elsewhere
424.99	Endocarditis, valve unspecified, specified cause except rheumatic
996.02	Mechanical complication due to heart valve prosthesis
996.61	Infection and inflammatory reaction due to cardiac device/implant/graft
996.71	Other complications due to heart valve prosthesis
Diagnosis in any position:	
277.30 plus 425.7	Amyloidosis, unspecified **and** nutritional & metabolic cardiomyopathy
277.39 plus 425.7	Other amyloidosis **and** plus nutritional & metabolic cardiomyopathy
414.10	Aneurysm of heart (wall)
414.19	Other aneurysm of heart
Procedure in any position:	
35.95	Revision of corrective procedure on heart
35.98	Other operations on septa of heart
36.91	Repair of aneurysm of coronary vessel

Appendix C: Other Potential Risk Factors – ICD-9-CM Codes

Table 1: All Procedure Groups

Potential Risk Factor	ICD-9-CM Codes
Acute Myocardial Infarction (AMI) – Initial Episode of Care	Principal diagnosis (pdx) – 410.01, 410.11, 410.21, 410.31, 410.41, 410.51, 410.61, 410.71, 410.81, 410.91
Acute Myocardial Infarction (AMI) – Subsequent Episode of Care	410.02, 410.12, 410.22, 410.32, 410.42, 410.52, 410.62, 410.72, 410.82, 410.92
Alcohol-Related Disorders	291.0, 291.1, 291.2, 291.3, 291.5, 291.81, 291.82, 291.89, 291.9, 303.00, 303.01, 303.02, 303.90, 303.91, 303.92, 305.00, 305.01, 305.02
Anemia	280.1, 280.8, 280.9, 281.0, 281.1, 281.2, 281.3, 281.4, 281.8, 281.9, 282.0, 282.1, 282.2, 282.3, 282.40, 282.41, 282.42, 282.43, 282.44, 282.45, 282.46, 282.47, 282.49, 282.5, 282.60, 282.61, 282.62, 282.63, 282.64, 282.68, 282.69, 282.7, 282.8, 282.9, 283.0, 283.10, 283.11, 283.19, 283.2, 283.9, 284.01, 284.09, 284.11, 284.12, 284.19, 284.2, 284.81, 284.89, 284.9, 285.0, 285.21, 285.22, 285.29, 285.3, 285.8
Angina	411.1, 413.0, 413.1, 413.9
Cancer	140.0-209.36, 209.70-209.79, 230.0-239.9
Cardiac Adhesions	423.1, 519.3
Cardiac Assist Device Prior to First CABG/Valve Surgery Date	37.60, 37.62, 37.65, 37.66, 37.68
Cardiomyopathy	425.11, 425.18, 425.3, 425.4, 425.5, 425.8, 425.9, 429.3
Cardiopulmonary Resuscitation (CPR) Prior to First CABG/Valve Surgery Date	93.93, 99.60, 99.62, 99.63
Cerebrovascular Disease	433.00, 433.10, 433.20, 433.30, 433.80, 433.90, 434.00, 434.10, 434.90, 437.0, 437.1, 437.3, 437.4, 442.81, 446.5
Chronic Kidney Disease	403.00, 403.01, 403.10, 403.11, 403.90, 403.91, 404.00, 404.02, 404.10, 404.12, 404.90, 404.92, 585.1, 585.2, 585.3, 585.4, 585.5, 585.6, 585.9
Chronic Lung Disease	491.0, 491.1, 491.20, 491.21, 491.22, 492.0, 492.8, 493.20, 493.21, 493.22, 494.0, 494.1, 496, 500, 501, 502, 503, 504, 505, 506.4, 508.1, 515, 518.2, 518.83
Chronic Pulmonary Hypertension	416.0, 416.1, 416.2, 416.8, 416.9
Coagulopathy	286.0, 286.1, 286.2, 286.3, 286.4, 287.30, 287.31, 287.32, 287.33, 287.39, 289.81
Congenital Heart Anomalies	745.0, 745.10, 745.11, 745.12, 745.19, 745.2, 745.3, 745.4, 745.5, 745.60, 745.61, 745.69, 745.7, 745.8, 745.9, 746.01, 746.02, 746.09, 746.1, 746.2, 746.3, 746.4, 746.5, 746.6, 746.7, 746.81, 746.82, 746.83, 746.84, 746.85, 746.86, 746.87, 746.89, 746.9, 747.0, 747.10, 747.11, 747.20, 747.21, 747.22, 747.29, 747.31, 747.32, 747.39, 747.40, 747.41, 747.42, 747.49
Dental Extraction Prior to First CABG/Valve Surgery Date	23.09, 23.19
Diabetes	249.00, 249.01, 249.10, 249.11, 249.20, 249.21, 249.30, 249.31, 249.40, 249.41, 249.50, 249.51, 249.60, 249.61, 249.70, 249.71, 249.80, 249.81, 249.90, 249.91, 250.00, 250.01, 250.02, 250.03, 250.10, 250.11, 250.12, 250.13, 250.20, 250.21, 250.22, 250.23, 250.30, 250.31, 250.32, 250.33, 250.40, 250.41, 250.42, 250.43, 250.50, 250.51, 250.52, 250.53, 250.60, 250.61, 250.62, 250.63, 250.70, 250.71, 250.72, 250.73, 250.80, 250.81, 250.82, 250.83, 250.90, 250.91, 250.92, 250.93
Extracorporeal Membrane Oxygenation (ECMO) Prior to First CABG/Valve Surgery Date	39.65

Potential Risk Factor	ICD-9-CM Codes
Table 1: All Procedure Groups *continued*	
Gastroparesis	536.3
Heart Failure	398.91, 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.0, 428.1, 428.20, 428.21, 428.22, 428.23, 428.30, 428.31, 428.32, 428.33, 428.40, 428.41, 428.42, 428.43, 428.9
History of CABG or Valve Surgery	414.02, 414.03, 414.04, 414.05, V13.65, V42.2, V43.3, V45.81 pdx for the following: 996.02, 996.03, 996.61, 996.71, 996.72
History of Cancer	V10.00, V10.01, V10.02, V10.03, V10.04, V10.05, V10.06, V10.07, V10.09, V10.11, V10.12, V10.20, V10.21, V10.22, V10.29, V10.3, V10.40, V10.41, V10.42, V10.43, V10.44, V10.45, V10.46, V10.47, V10.48, V10.49, V10.50, V10.51, V10.52, V10.53, V10.59, V10.60, V10.61, V10.62, V10.63, V10.69, V10.71, V10.72, V10.79, V10.81, V10.82, V10.83, V10.84, V10.85, V10.86, V10.87, V10.88, V10.89, V10.90, V10.91
History of Chronic Steroid Use	V58.65, V87.44, V87.45, V87.46
History of Lower Extremity Amputation	V49.70, V49.71, V49.72, V49.73, V49.74, V49.75, V49.76, V49.77
History of Pacemaker or Defibrillator	V45.01, V45.02, V45.03, V53.31, V53.32, V53.39
History of Peripheral Vascular Disease	440.0, 440.1, 440.20, 440.21, 440.22, 440.23, 440.24, 440.29, 440.30, 440.31, 440.32, 440.4, 440.8, 440.9, 441.2, 441.4, 441.7, 441.9, 442.0, 442.1, 442.2, 442.3, 442.82, 442.83, 442.84, 443.0, 443.1, 443.81, 443.82, 443.89, 443.9, 447.70, 447.71, 447.72, 447.73, 453.50, 453.51, 453.52, 453.71, 453.72, 453.73, 453.74, 453.75, 453.76, 453.77, 453.79, 454.0, 454.1, 454.2, 454.8, 454.9, 459.30, 459.31, 459.32, 459.33, 459.39, 459.81, 557.1, 593.81
History of PTCA/Stent	V45.82
History of Stroke	438.0, 438.10, 438.11, 438.12, 438.13, 438.14, 438.19, 438.20, 438.21, 438.22, 438.30, 438.31, 438.32, 438.40, 438.41, 438.42, 438.50, 438.51, 438.52, 438.53, 438.6, 438.7, 438.81, 438.82, 438.83, 438.84, 438.85, 438.89, 438.9, V12.54
History of Thrombosis or Embolism	V12.51, V12.55
Hypercholesterolemia	272.0, 272.1, 272.2, 272.3, 272.4
Hypertension	401.0, 401.1, 401.9, 402.00, 402.10, 402.90, 405.01, 405.09, 405.11, 405.19, 405.91, 405.99
Illegal Drug-Related Disorders	292.0, 292.11, 292.12, 292.2, 292.81, 292.82, 292.83, 292.84, 292.85, 292.89, 292.9, 304.00, 304.01, 304.02, 304.10, 304.11, 304.12, 304.20, 304.21, 304.22, 304.30, 304.31, 304.32, 304.40, 304.41, 304.42, 304.50, 304.51, 304.52, 304.60, 304.61, 304.62, 304.70, 304.71, 304.72, 304.80, 304.81, 304.82, 304.90, 304.91, 304.92, 305.20, 305.21, 305.22, 305.30, 305.31, 305.32, 305.40, 305.41, 305.42, 305.50, 305.51, 305.52, 305.60, 305.61, 305.62, 305.70, 305.71, 305.72, 305.80,
Intra-Aortic Balloon Pump (IABP) Prior to First CABG/Valve Surgery Date	37.61
Ischemic Heart Disease	414.8, 414.9, 429.0, 429.1
Liver Disease	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.70, 070.71, 456.0, 456.1, 456.20, 456.21, 571.0, 571.1, 571.2, 571.3, 571.40, 571.41, 571.42, 571.49, 571.5, 571.6, 571.8, 571.9, 572.3, 572.4, 572.8, 573.0, 573.1, 573.2, 573.3, 573.5
Long-term Use of Anticoagulants and Antiplatelets	V58.61, V58.63
Long-term Use of Insulin	V58.67

Potential Risk Factor	ICD-9-CM Codes
Table 1: All Procedure Groups *continued*	
Lupus Erythematosus, Systemic	710.0
Malnutrition	261, 262, 263.0, 263.1, 263.2, 263.8, 263.9, 799.4, V85.0
Mental Disorders	295.00-295.95, 296.00-296.99, 297.0, 297.1, 297.2, 297.3, 297.8, 297.9, 298.0, 298.1, 298.4, 298.8, 298.9, 299.00, 299.01, 299.10, 299.11, 299.80, 299.81, 299.90, 299.91, 300.00, 300.01, 300.02, 300.09, 300.10, 300.11, 300.12, 300.13, 300.14, 300.15, 300.16, 300.19, 300.20, 300.21, 300.22, 300.23, 300.29, 300.3, 300.4, 300.5, 300.6, 300.7, 300.81, 300.82, 300.89, 300.9, 301.0, 301.10, 301.11, 301.12, 301.13, 301.20, 301.21, 301.22, 301.3, 301.4, 309.1, 311, 317, 318.0, 318.1, 318.2, 319, 331.0, 332.0
Myocardial Infarction, Old	412
Non-Invasive Mechanical Ventilation (NIMV) Prior to First CABG/Valve Surgery Date	93.90
Obesity	278.00, 278.01, V85.30, V85.31, V85.32, V85.33, V85.34, V85.35, V85.36, V85.37, V85.38, V85.39, V85.41, V85.42, V85.43, V85.44, V85.45
Obstructive Sleep Apnea and Obesity-Related Hypoventilation Syndrome	278.03, 327.23
Osteoporosis	733.00, 733.01, 733.02, 733.03, 733.09
Other Open Heart Procedure Same Day as First CABG/Valve Surgery	35.00, 35.01, 35.02, 35.03, 35.04, 35.31, 35.32, 35.34, 35.35, 35.39, 35.71, 35.95, 35.98, 36.2, 36.31, 36.32, 36.39, 36.91, 36.99, 37.10, 37.11, 37.12, 37.31, 37.41, 37.49, 37.51, 37.52, 37.53
Oxygen Therapy Dependence (long-term)	V46.11, V46.2
Percutaneous Valve Procedures Prior to or Same Day as First CABG/Valve Surgery	35.05, 35.06, 35.07, 35.08, 35.09, 35.96, 35.97
Preoperative Acute Renal Failure	584.5, 584.6, 584.7, 584.8, 584.9 plus confirmation of acute renal failure prior to *first* CABG and/or valve surgery based on review of medical record documentation.
Preoperative Cardiogenic Shock	785.51 plus confirmation of cardiogenic shock prior to *first* CABG and/or valve surgery based on review of medical record documentation.
PTCA/Stent Prior to or Same Day as First CABG/Valve Surgery	00.66, 17.55, 36.06, 36.07, 36.09

Table 2: CABG without Valve Procedure Group

Potential Risk Factor	ICD-9-CM CODES
Heart Valve Disease	394.0, 394.1, 394.2, 394.9, 395.0, 395.1, 395.2, 395.9, 396.0, 396.1, 396.2, 396.3, 396.8, 396.9, 397.0, 397.1, 424.0, 424.1, 424.2, 424.3

Table 3: Valve without CABG Procedure Group

Potential Risk Factor	ICD-9-CM CODES
Coronary Artery Disease	414.00, 414.01
Excision of Left Atrial Appendage (LAA) Same Day as First CABG/Valve Surgery	37.36
Excision of Other Lesion Same Day as First CABG/Valve Surgery	37.33, 37.37
Multiple Valve Procedures Same Day as First CABG/Valve Surgery	Any combination of valve procedure codes (i.e., replacements and/or repairs): 35.10, 35.11, 35.12, 35.13, 35.14, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 35.33, 35.99
Heart Valve Disease (Rheumatic) (only codes for rheumatic heart valve disease apply to valve cases)	394.0, 394.1, 394.2, 394.9, 395.0, 395.1, 395.2, 395.9, 396.0, 396.1, 396.2, 396.3, 396.8, 396.9, 397.0, 397.1
Type of Valve Procedure – Annuloplasty, Same Day as First CABG/Valve Surgery	35.33
Type of Valve Procedure – Aortic, Same Day as First CABG/Valve Surgery	35.11, 35.21, 35.22
Type of Valve Procedure – Mitral, Same Day as First CABG/Valve Surgery	35.12, 35.23, 35.24
Type of Valve Procedure – Pulmonary, Same Day as First CABG/Valve Surgery	35.13, 35.25, 35.26
Type of Valve Procedure – Tricuspid, Same Day as First CABG/Valve Surgery	35.14, 35.27, 35.28
Valve Replacement Same Day as First CABG/Valve Surgery	35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28

Table 4: Valve with CABG Procedure Group

Potential Risk Factor	ICD-9-CM CODES
Excision of Left Atrial Appendage (LAA) Same Day as First CABG/Valve Surgery	37.36
Excision of Other Lesion Same Day as First CABG/Valve Surgery	37.33, 37.37
Multiple Valve Procedures Same Day as First CABG/Valve Surgery	Any combination of valve procedure codes (i.e., replacements and/or repairs): 35.10, 35.11, 35.12, 35.13, 35.14, 35.20, 35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28, 35.33, 35.99
Heart Valve Disease (Rheumatic) (only codes for rheumatic heart valve disease apply to valve cases)	394.0, 394.1, 394.2, 394.9, 395.0, 395.1, 395.2, 395.9, 396.0, 396.1, 396.2, 396.3, 396.8, 396.9, 397.0, 397.1
Type of Valve Procedure – Annuloplasty, Same Day as First CABG/Valve Surgery	35.33
Type of Valve Procedure – Aortic, Same Day as First CABG/Valve Surgery	35.11, 35.21, 35.22
Type of Valve Procedure – Mitral, Same Day as First CABG/Valve Surgery	35.12, 35.23, 35.24
Type of Valve Procedure – Pulmonary, Same Day as First CABG/Valve Surgery	35.13, 35.25, 35.26
Type of Valve Procedure – Tricuspid, Same Day as First CABG/Valve Surgery	35.14, 35.27, 35.28
Valve Replacement Same Day as First CABG/Valve Surgery	35.21, 35.22, 35.23, 35.24, 35.25, 35.26, 35.27, 35.28