Measuring The Quality Of Pennsylvania's Commercial HMOs

A MANAGED CARE PERFORMANCE REPORT

CALENDAR YEAR 1999

TECHNICAL REPORT

THE PENNSYLVANIA HEALTH CARE COST CONTAINMENT COUNCIL

June 2001

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FOREWORD

The Pennsylvania Health Care Cost Containment Council (PHC4) wishes to thank all those who offered recommendations for the preparation of this study and who reviewed the many drafts of the final text. The Council offers special thanks to its Technical Advisory Group, a standing PHC4 committee charged with overseeing all technical and methodological aspects of the Council's research. The Council's Payor Advisory Group provided special guidance on matters related to the payor data included in *Measuring the Quality of Pennsylvania's Commercial HMOs – A Managed Care Performance Report*, including data provided by the National Committee on Quality Assurance®. We appreciate the interest that these groups have shown in this study and are grateful for their advice.

The Council also wishes to thank the Managed Care Association of Pennsylvania and the Insurance Federation of Pennsylvania for their assistance and support throughout this process.

A thank you is likewise extended to the Council's Data Systems Committee who reviewed all aspects of this report and the Education Committee for review of the report layout and text. We are also indebted to Dr. Thomas Smitherman and the clinical advisors at hospitals who took the time to personally advise Council staff regarding case selection and assisted with coding issues. Dr. Mary Simmonds advised staff on the technicalities of breast cancer treatment and reviewed the final language of the breast cancer procedures section. Dr. Mark Piasio advised on the neck and back procedures. Assistance and support for mental health text and measures came from Dr. Samuel Knapp and Rachael Baturin from the Pennsylvania Psychological Association and C. Lu Conser from the Pennsylvania Community Providers Association.

The Council wishes to acknowledge the efforts of hospital and HMO staff that checked and rechecked the data included in this study.

As we strive toward the goal of quality, cost-effective health care, as directed by managed care networks, we truly appreciate the efforts that these individuals and groups committed to this project.

Copies of *Measuring the Quality of Pennsylvania's Commercial HMOs - A Managed Care Performance Report* and this document, the *Technical Report*, can be obtained by contacting the Council, or can be accessed electronically via the Council's Web site.

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TECHNICAL REPORT
MEASURING THE QUALITY OF PENNSYLVANIA'S COMMERCIAL HMOS - CALENDAR YEAR 1999 MANAGED CARE PERFORMANCE REPORT

OVERVIEW

This technical supplement accompanies the Calendar Year 1999 version of *Measuring the Quality of Pennsylvania's Commercial HMOs—A Managed Care Performance Report* (hereafter referred to as the *Managed Care Performance Report*). Included in this *Technical Report* are detailed descriptions of the data and their sources, explanations for the adjustments to the data, and presentation of the methodology used for risk adjustment for the clinical outcomes data.

The *Managed Care Performance Report* provides information related to the quality of health care services received by members of commercial Health Maintenance Organizations (HMOs) licensed by the Department of Health to do business in Pennsylvania. The report brings together information from several sources that are of interest to purchasers, consumers, payors, and providers. This collection of information and data allows all interested readers to make comparisons among HMOs based upon a comprehensive set of data. Sources of information include

- Pennsylvania's hospitals and ambulatory surgery centers,
- the National Committee for Quality Assurance,
- the Pennsylvania Department of Health,
- the Pennsylvania Insurance Department,
- and the commercial HMOs in Pennsylvania.

Most of the content of the *Technical Report* describes calculations that serve as the basis for the clinical outcome measures found in the *Managed Care Performance Report*. Also included are detailed explanations for data collection and verification procedures, selection of clinical conditions and outcomes for study, and other comparative measures. Descriptions of financial indicators, ratings of HMOs by members, and plan profile information are further explained.

Outcome measures are provided for nine specific clinical conditions/treatments included in the public report. This *Technical Report* details the methodology for the age/sex adjustment of hospitalization rates, the risk adjustment for length of stay, in-hospital complication rates, and rehospitalization rates.

It is important to note that the research methodology yielding outcome ratings is complex and differs for these nine clinical conditions. Methodology development was based upon state-of-the-art research practice. This development included a review of the current medical outcome literature, discussions with practicing medical professionals, and careful examination and approval by the Council's Technical Advisory Group. Each clinical condition was selected because:

- of its high importance to purchasers and consumers
- it is generally a high-volume, high-risk, or high cost condition/procedure
- its management by HMOs and their providers can reasonably be expected (specific to the "preventable" conditions included in the report)

REFERENCE DATABASE

The Pennsylvania reference database for each of the nine clinical conditions (Pediatric Ear, Nose and Throat Infections; Adult Ear, Nose and Throat Infections; Gastrointestinal Infections; Kidney/Urinary Tract Infections; Hypertension; Chronic Obstructive Pulmonary Disease; Diabetes; Breast Cancer Procedures; and Neck/Back Procedures) is comprised of cases who(se):

- age is under 65 years (except for diabetes in which the age interval is 18 years to 75 years)
- met the clinical inclusion criteria for the condition being investigated
- were discharged from a Pennsylvania *acute care* hospital between January 1, 1999 and December 31, 1999 (or received care in an inpatient or ambulatory surgical setting for breast cancer procedures).

Only inpatient acute care hospitalizations (with the exception of breast cancer procedures) were analyzed for this report.

Listed in the table below are the reference standards (or comparative databases) used in the risk-adjustment process for each outcome measure that involved risk adjustment. For example, the statewide under 65 years of age population (adults only) was used as the comparative standard when determining the risk adjustment for the length of stay for neck and back procedures (an acute care condition).

PHC4 Reference Databases Used in This Report

Reported Data Element	*Information Used*
Hospitalization/Procedure Rate	
▪ Neck and back procedures	Enrollment (members 18 - 64 years) for the pooled group of HMOs listed in the report
▪ Breast cancer procedures	
▪ Diabetes	Enrollment (members 18 - 75 years) with diabetes for the pooled group of HMOs listed in the report
In-hospital Complication Rate	
▪ Neck and back procedures	All cases (age 18 - 64 years) in the study population for all payors — statewide
▪ Breast cancer procedures	
Average Length of Stay	
▪ Neck and back procedures	All cases (age 18 - 64 years) in the study population for all payors — statewide
▪ Breast cancer procedures	
▪ Diabetes	HMO Cases (members 18 - 75 years) hospitalized for diabetes for the pooled group of HMOs listed in the report
Rehospitalization Rate – 6 months	
▪ Diabetes	HMO Cases (members 18 - 75 years) hospitalized for diabetes for the pooled group of HMOs listed in the report

Based upon the Pennsylvania reference database, clinical outcome data were analyzed for:

- each commercial HMO licensed by the Pennsylvania Department of Health.
- an aggregate of all commercial HMOs (data are displayed as "Total/Average").
- a commercial, traditional "fee-for-service" sample (this group included only those patients who were clearly identified in a hospital record as a member of one of 67 of the major traditional fee-for-service plans in Pennsylvania). Hospitalization rates per member are not reported for this group because detailed enrollment data by plan are not available.

For the HEDIS and CAHPS (NCQA) measures (see next section for description) the following benchmarks were used to make comparisons:

Benchmarks for NCQA Measures

Reported Data Element	*Information Used*
HEDIS measures ▪ Diabetes ▪ Mental health ▪ Smoking cessation (no national benchmark) ▪ Breast cancer screening (average for pooled group of HMOs only)	National encounter information for all participating managed care plans Statewide weighted average for the pooled group of HMOs listed in the report and by managed care lines of business — calculated by PHC4
CAHPS measures	Nationally-derived customer satisfaction data Statewide weighted average for the pooled group of HMOs listed in the report and by managed care lines of business — calculated by PHC4

DATA COLLECTION AND VERIFICATION

The data utilized in the *Managed Care Performance Report* were obtained from several sources including: (1) discharge data submitted to PHC4 by Pennsylvania health care facilities, (2) the National Committee for Quality Assurance (NCQA) through the purchase of *Quality Compass®*, (3) the Pennsylvania Department of Health, and (4) the Pennsylvania Insurance Department. Pennsylvania hospitals verified data used to generate clinical outcomes, and HMO plans verified payor information listed in the hospital-submitted records. A more detailed explanation of the data and data sources follows.

PHC4 Data

Nine clinical conditions were selected for inclusion in the calendar year 1999 *Managed Care Performance Report* because of: (1) high volume, (2) the high cost associated with treatments, (3) the potential role of managed care plans in prevention and management of each condition, and (4) the high degree of interest in these clinical conditions among purchasers and consumers.

This report will include outcome measures specific to the following nine clinical conditions in Section 1 – Treatment Measures. Each measure is analyzed from the following data submitted to PHC4 by licensed Pennsylvania health care facilities:

Prevention and Wellness (Reducing Hospitalizations through Primary Care)

- Pediatric Ear, Nose and Throat Infection
- Adult Ear, Nose and Throat Infection
- Gastrointestinal Infections
- Kidney and Urinary Tract Infections
- Hypertension
- Chronic Obstructive Pulmonary Diseases (COPD)

Management of On-Going Illnesses

- Diabetes

Acute Care

- Breast Cancer Procedures
- Neck and Back Procedures

Refer to Appendix A: Description of Study Population by ICD.9.CM Code for a listing of the diagnosis and procedure codes that define each clinical condition in the *Managed Care Performance Report*.

Hospital-Submitted Data: HMO Verification of Payor

The process used by PHC4 to identify specific managed care payors for hospitalizations relied upon the National Association of Insurance Commissioners (NAIC) code in the discharge record. The NAIC code is used by the hospital to identify the primary payor of a patient's care and provides a coded name for the specific HMO. All records that clearly identified a managed care plan as the principal payor by the NAIC code were directly assigned to that respective HMO for verification. In addition, a record was sent to a managed care plan if any part of a discharge record pointed to that particular managed care plan as the payor. This was necessary to assure inclusion of all appropriate records.

Exact identification of primary payor is more difficult for those managed care plans that market several products under one generic product or company name. The most common

difficulty was separation of commercial (usually employer-paid benefits) from government-contracted members (primarily Medical Assistance and sometimes Medicare) within the same insurance company.

The verification process presented three options to HMO plans: 1) verify and return a record for inclusion in the analyses, 2) delete those records for which the plan was not the primary payor, or 3) add records that PHC4 did not include in the initial data file. Additions were possible if: 1) the record was based upon correct ICD.9.CM codes, 2) PHC4 was able to match the added record to a hospital discharge record, and 3) no other HMO plan in the statewide database claimed the same record.

Deletion of records by HMOs occurred for three common reasons:

- The patient was enrolled in a government-contracted HMO/POS plan, or a related PPO.
- The patient was enrolled in an out-of-state HMO.
- The patient was enrolled in a managed care point-of-service (POS) plan licensed by a traditional fee-for-service plan (the PHC4 *Managed Care Performance Report* includes only those HMOs and related point-of-service plans licensed by the Pennsylvania Department of Health).

Every HMO and related POS plan that received a file for verification from PHC4 reviewed, verified and returned the data.

NCQA

The National Committee for Quality Assurance (NCQA) is a private, not-for-profit organization dedicated to assessing and reporting on the quality of managed care plans. According to the NCQA Web site (www.ncqa.org): "NCQA's mission is to provide information that enables purchasers and consumers of managed health care to distinguish among plans based on quality, thereby allowing them to make more informed health care purchasing decisions." NCQA collects data via consumer surveys that assess health plan performance and member satisfaction with their HMO. These data, available collectively in NCQA's *Quality Compass* (the central repository of data collected nationally from the NCQA accreditation surveys), are then available for purchase. Select outcome measures from NCQA's *Quality Compass* (1999 calendar year) are included in this report.

The "Pennsylvania Plan Average" for each measure is calculated by PHC4 (derived from the *Quality Compass*). For calendar year 1999, three benchmarks for Pennsylvania are also calculated by PHC4 (derived from *Quality Compass*): "HMO only", "POS only" and "Combined HMO/POS Plans".

It is important to note that participation in NCQA accreditation activities is voluntary; hence, not every commercial HMO licensed in Pennsylvania submits data to be included in the *Quality Compass*. The *Managed Care Performance Report* includes calendar year 1999 HEDIS scores for all of the Pennsylvania plans included in the report except New Alliance (resulting in twelve sets of scores because HealthAmerica reports separate data for its HMO and POS products).

HEDIS Measures. The Health Plan Employer Data and Information Set® (HEDIS) is a health plan performance tool developed by NCQA and is a component of the NCQA accreditation process. The HEDIS *Effectiveness of Care* and *Use of Services* measures displayed in this report include:

- Advising Smokers to Quit
- Breast Cancer Screening Rate
- Comprehensive Diabetes Measures

- Follow-Up After Hospitalization for Mental Illness
- Antidepressant Medication Management
- Mental Health Utilization

Advising Smokers to Quit

This HEDIS measure is reported as the percent of commercial HMO members age 18 years and older as of December 31, 1999 who were continuously enrolled during 1999, were either current smokers or recent quitters, were seen by a plan provider during the reporting year, and received advice to quit smoking during 1999 from a plan practitioner (*HEDIS Technical Specifications Manual*). The *Technical Specifications Manual* provides a detailed description of the calculations used to determine the numerator and denominator for this measure.

Breast Cancer Screening Rate

The public report includes NCQA benchmark scores for Breast Cancer Screening. This screening measure determines if women are being screened for breast cancer. It estimates the percentage of the HMO's female members from the age of 52 to 69 who had at least one mammogram during the past two years.

Comprehensive Diabetes Care

This composite measure is part of the HEDIS data set and is used to examine the frequency and results of certain tests for HMO members with diabetes. The measure evaluates HMO performance on six aspects of diabetes care using a single sample of members age 18 to 75 years old who have diabetes. The six components of the comprehensive diabetes care measure are expressed as a percentage of members with diabetes who had each of the following:

- Hemoglobin A1c (HbA1c) tested (i.e., at least one HbA1c test conducted during the measurement year).
- Poor HbA1c control (i.e., the most recent HbA1c test level within the measurement year that was greater than 9.5 percent. If no test was performed, then it is counted as poor HbA1c control).
- LDL-C screening performed (i.e., a low-density lipoprotein cholesterol test conducted during the measurement year or the year prior to the measurement year).
- LDL-C controlled (i.e., the most recent low-density lipoprotein cholesterol test level performed during the measurement year or the year prior to the measurement year was less than 130 mg/dL. If there was no valid LDL-C value within the last two measurement years, it is counted as exceeding the threshold).
- Eye exam performed (i.e., an eye screening for diabetic retinal disease conducted during the measurement year or, in certain circumstances, the year prior to the measurement year).
- Kidney disease monitored (i.e., a microalbuminuria screening performed during the measurement year, or previous evidence of kidney disease such as a positive microalbuminuria screening or medical treatment for kidney disease).

As a set, these six aspects of care provide a comprehensive picture of the clinical management of patients with diabetes. The specifications for this measure are consistent with recommendations of the Diabetes Quality Improvement Project.

Follow-up after Hospitalization for Mental Illness

This measure looks at continuity of care for mental illness. It estimates the percentage of HMO members age six and over who were hospitalized (and for how long they remained hospitalized) for selected mental disorders and consequently were seen on an ambulatory basis by a mental health provider within 30 days or within seven days after their discharge. The specifications for this measure are consistent with care guidelines, such as those of the National Institute of Mental Health and the Centers for Mental Health Services.

Most HMOs contract for the delivery of mental health care with independent networks of behavior health care providers. These subcontractors are listed in the public report.

Antidepressant Medication Management

This is a three-part measure that looks at whether adults (18 years and older) prescribed medication for depression are getting good care. The measure includes:

- the adequacy of clinical management of new treatment episodes (at least three follow-up office visits)
- the percentage of patients initiated on an antidepressant medication who received an adequate, acute phase trial or medications (three months)
- the percentage of patients who completed a period of continuous drug treatment for major depression for six months.

Based upon current treatment protocols outlined in the 1993 Agency for Healthcare Research and Quality *Depression in Primary Care Guideline*, these measures address clinical management and pharmacological treatment of depression.

HEDIS Rotation Strategy. Beginning with HEDIS 1999, NCQA implemented a measures rotation strategy. The purpose of the strategy is to reduce data collection burdens for the HMOs while still providing relevant and accurate data to consumers. The strategy allows HMOs to skip (for one year) the task of collecting data for certain HEDIS measures, and permits the plans to use the results from the previous year instead. Measures included in the rotation schedule must have been in the measurement set for two years and have stable data collection specifications. For this report, three HEDIS measures were subjected to the HEDIS rotation strategy in CY 1999:

- Advising Smokers to Quit Rate
- Follow-up After Hospitalization for Mental Illness (30 Days)
- Breast Cancer Screening Rate

For this report, all CY98 measures are footnoted in the appropriate HEDIS table. In addition, a summary of all rotation measures is included in the following table.

Occurrence of CY98 Outcome Measures in the CY99 Report Due to the HEDIS Rotation Schedule for Specific HEDIS Measures

	Advising Smokers to Quit Rate	Follow-up After Hospitalization for Mental Illness (30 Days)	Breast Cancer Screening Rate
Pennsylvania HMOs			
HealthAmerica HMO	CY98	CY98	CY98
KHP Central		CY98	CY98
Pennsylvania HMO/POS Combined			
First Priority	CY98		
Geisinger Health Plan		CY98	
KHP East			CY98
Pennsylvania POS			
HealthAmerica POS	CY98	CY98	CY98

CAHPS Measures. Another important component of the NCQA accreditation process is the Consumer Assessment of Health Plans Study® (CAHPS) survey instrument. Commercial HMOs hire vendors from an NCQA-approved list to administer this member satisfaction survey.

The *Managed Care Performance Report* includes calendar year 1999 CAHPS scores for nine Pennsylvania plans (11 lines of business; those plans listed for the HEDIS measures, excluding CIGNA Healthcare).

Pennsylvania Department of Health

Each HMO licensed by the Pennsylvania Department of Health files an *Annual Report* each April that summarizes enrollment, provider network and financial data from the previous calendar year (as of December 31st). Information from these *Annual Reports* is included in the "Access and Service" section of the *Managed Care Performance Report.*

Pennsylvania Insurance Department

Each HMO is required to file a detailed annual financial statement with the Pennsylvania Insurance Department (PID). PHC4, at the request of the HMOs included in this report, calculates the financial indicators in the *Managed Care Performance Report* using these data.

OUTCOMES AND DEFINITIONS

The outcome measures described in this report are tailored to each clinical condition. Listed below are the outcome measures reported for each of the clinical conditions included in calendar year 1999 report.

Reducing Hospitalizations through Primary Care (Preventable Hospitalizations)

Clinical Condition	Outcome Measure
1. Pediatric Ear, Nose and Throat Infections 2. Adult Ear, Nose and Throat Infections 3. Gastrointestinal Infections 4. Kidney/Urinary Tract Infections 5. Hypertension 6. Chronic Obstructive Pulmonary Disease (COPD)	• Hospital Admissions • Hospitalization Rate per 10,000 Members • Statistical Rating

The Management of On-Going Illnesses

Clinical Condition	Outcome Measure
Diabetes	• Number of Members with Diabetes • Hospital Admissions • Hospitalization Rate for Members with Diabetes • Statistical Rating of the HMO's Plan Hospitalization Rate • Length of Stay (risk adjusted; reported as days) • Percent of Admissions for Short-Term Complications of Diabetes • Rehospitalization Rate (risk adjusted) • Hemoglobin A1c (HbA1c) Tested (Percent) • HbA1c Poorly Controlled (Percent) • Eye Exam Performed (Percent) • LDL-C (Low Density Lipoprotein Cholesterol) Screening Performed (Percent) • LDL-C (Low Density Lipoprotein Cholesterol) Controlled (Percent) • Kidney Disease Monitored (Percent)

The Management of On-Going Illnesses continued

Clinical Condition	Outcome Measure

Mental Health	• Percent of Members Receiving Any Mental Health Services
	• Total Hospital Admissions per 1,000 Members
	• Mental Health Inpatient Hospitalizations: Average Length of Stay (Days)
	• Follow-Up After Hospitalization for Mental Illness:
	  o Within 7 Days
	  o Within 30 Days
	• Adult Antidepressant Medication Management
	  o Percent of Members With At Least Three Follow-Up Visits
	  o Adequate Acute Phase Trial of Medications (Percent)
	  o Percent Who Complete Six Months of Treatment

Acute Care

Clinical Condition	Outcome Measure

Breast Cancer Procedures	• Total Breast Cancer Procedures
	• Breast Cancer Screening Rate
	• Procedure Rate per 10,000 Female Members
	• Statistical Rating
	• Percent Lumpectomy Procedures
	• Lumpectomy:
	  o Number Lumpectomy Procedures
	  o Percent Performed Inpatient
	  o Length of Stay (risk adjusted; reported as days)
	  o Actual Complications (Rate)
	  o Expected Complications (Rate)
	  o Statistical Rating for In-hospital Complications
	• Mastectomy
	  o Number Mastectomy Procedures
	  o Percent Performed Inpatient
	  o Length of Stay (risk adjusted; reported as days)
	  o Actual Complications (Rate)
	  o Expected Complications (Rate)
	  o Statistical Rating for In-hospital Complications
	• Percent of Mastectomies with Reconstruction During the Same Admission

Acute Care continued

Clinical Condition	Outcome Measure

Neck and Back Procedures	• Total Neck and Back Procedures
	• Hospitalization Rate (per 10,000 Members)
	• Statistical Rating
	• With Fusion
	  o Percent of Procedures with Fusion
	  o Number of Procedures with Fusion
	  o Length of Stay (Days) Risk-Adjusted
	  o Actual Complications (Rate)
	  o Expected Complications (Rate)
	  o Statistical Rating for In-hospital Complications
	• Without Fusion
	  o Number of Procedures without Fusion
	  o Length of Stay (Days) Risk Adjusted
	  o Actual Complications (Rate)
	  o Expected Complications (Rate)
	  o Statistical Rating for In-hospital Complications

"WHAT" IS ANALYZED

An episode of care is a string of contiguous acute care inpatient hospitalizations linked by date. The total medical event or episode may be composed of a single acute care hospitalization or several such hospitalizations (including transfers) coupled by date. For a multiple-hospitalization episode, the discharge date of the preceding hospitalization (in a string of contiguous hospitalizations) must be the same as the admission date of the subsequent hospitalization (independent of discharge status coding). The "**index hospitalization**" is the first hospitalization meeting the study population inclusion criteria. Single hospitalizations are especially frequent for the preventable hospitalizations [often referred to as ambulatory care sensitive conditions (ACSs)].

Clinical information used to evaluate particular outcome measures may be taken from *all* or only *a portion* of the hospitalizations within a multiple-hospitalization episode, depending on the outcome measure and clinical condition being investigated. Accordingly, all hospitalizations (in a multiple-hospitalization episode) or all episodes may not necessarily be used for each outcome measure associated with a clinical condition. For example, for diabetes, the main component of analysis involves the index hospitalization only (per member). Therefore, for hospitalization rate, length of stay analyses, and rehospitalization rate (the outcome measure analyzed for diabetes) the index hospitalization is the main unit of analysis. For each outcome measure within a clinical condition, however, additional information may be needed from other hospitalizations (in addition to the main component) to make accurate assessments of the effectiveness of care. In the case of diabetes, while the main unit of analysis is the index hospitalization, the last acute care hospitalization in the diabetes episode must be used as the reference in order to determine accurately a readmission beginning within six months. That is, for diabetes rehospitalization analysis, a hospitalization (diabetes-related) that begins no more than six months following the discharge date of the last hospitalization in the episode is included in the readmission analysis. It is necessary to use the last hospitalization in the episode as the reference; using only the index

hospitalization as the reference would not portray an accurate assessment of the rehospitalization rate across all patients hospitalized for diabetes.

Table 1A summarizes the main components used in the PHC4-calculated analyses for each clinical condition in the calendar year 1999 *Managed Care Performance Report*. The components used are different for each outcome measure within a clinical condition grouping because the clinical management and delivery of health care varies for each condition. Table 1B lists the hospitalizations from which clinical information is extracted for each applicable outcome measure. Refer to subsequent sections of this report that pertain to each clinical condition for detailed descriptions of the particular records excluded for each relevant outcome measure.

Table 1A. "What" is analyzed: A Comparison among Clinical Conditions

ACSs	*Diabetes*	*Breast Cancer*	*Neck and Back*
Index hospitalization only per member Exclusions: not applicable for hospitalization rate analyses. Risk adjustment: risk adjustment is based on the index hospitalization.	Index hospitalization only per member Exclusions: not applicable for hospitalization rate analyses. For length of stay and rehospitalization rate analyses, exclusions are taken out of the index hospitalization. Risk adjustment: risk adjustment is based on the index hospitalization.	Single encounter for a breast cancer procedure Exclusions and risk adjustment are based on a single encounter.	Single hospitalization for a neck or back procedure Exclusions and risk adjustment are based on a single hospitalization.

Table 1B. Hospitalizations Used for Outcome Measures

OUTCOME MEASURE	HOSPITALIZATIONS[1] USED			
	ACSs	*Diabetes*	*Breast Cancer*	*Neck and Back*
• Procedure Rate/Hospitalization rate per 10,000 members	Index hospitalization only (one per member)[2]	Index hospitalization only (one per member)[2]	All single patient encounters[3]	Single hospitalization
• In-hospital Complication Rate	N/A	N/A	Single hospitalization (inpatient only)	Single hospitalization
• Length of Stay	N/A	Index hospitalization only (one per member)[2]	Single hospitalization (inpatient only)	Single hospitalization
• Rehospitalization Rate – 6 months	N/A	Any diabetes-related hospitalization beginning no more than 6 months after the discharge date of the last acute care hospitalization[4] linked to the index hospitalization	N/A	N/A

[1] Includes those hospitalizations from which clinical information (needed for the associated outcome measure) is extracted.
[2] If records had matching valid social security numbers but had inconsistent birth dates or sex identifiers (that could not be resolved), each record was counted as a single index hospitalization.
[3] Encounter refers to a single patient visit, not number of procedures; for example, if a patient had both a lumpectomy and a mastectomy in the same medical encounter, only the more invasive procedure was counted as a single patient encounter.
[4] Non-index hospitalization that may or may not have a principal diagnosis related to diabetes.
N/A: not applicable

PROCEDURES USED FOR LINKING HOSPITALIZATIONS

Since identification of a patient's hospitalization history is crucial for 1) distinguishing single members (for the "preventable hospitalizations" and diabetes) and 2) the rehospitalization rate for members with diabetes, all hospitalizations and episodes in the study period are identified for each patient when possible. For diabetes, hospitalizations within an episode that have a principal diagnosis that is different from the index hospitalization are still considered in creating a patient's hospitalization history since such records could potentially be used in the rehospitalization rate analysis. Thus, additional acute care hospitalizations (for an individual patient) occurring after the index hospitalization are retained in the dataset as potential readmission cases.

The patient identifier is fundamental to identifying each hospitalization and episode(s) for any individual patient. The patient's social security number (SSN) is used as the basic identifier; only valid SSNs are potentially usable.

In addition, for an SSN to be retained, the same sex-birth date combination must have been reported for all hospitalizations with that SSN. If there were conflicting sex-birth date combinations, these multiple combinations must have been reconciled based on the methodology used by PHC4 to link appropriate acute care hospitalizations (refer to Appendix B: Methods for Resolving Inconsistent Patient Identifier Information).

EXCLUSION CRITERIA

To account for clinical complexities and other special circumstances associated with each clinical condition and corresponding outcome measure, distinct restrictions and limitations (i.e., exclusion criteria) are incorporated into the current methodology. Specific information about the outcome measures and exclusions to the analyses for each clinical condition are described in the appropriate methodology sections (see "PREVENTABLE HOSPITALIZATIONS", "DIABETES", and "ACUTE CARE" sections below). Table 2 summarizes the outcome measures and the corresponding exclusions for each of the PHC4-calculated clinical conditions included in the *Managed Care Performance Report*.

Table 2. *CY99 Managed Care Performance Report:* EXCLUSIONS TO ANALYSES FOR PREVENTABLE HOSPITALIZATIONS

PREVENTABLE HOSPITALIZATIONS	
Pediatric Ear, Nose & Throat	Adult Ear, Nose & Throat
Hospitalization Rate • Neonates (age < 28 days) • Metastatic cancer • Cancer of ear, nose or throat • Lung cancer • HIV infection • Extensive OR procedures unrelated to principal diagnosis • Mechanical ventilator • Tracheostomy • Cleft lip and palate repair • Non-extensive OR procedures unrelated to principal diagnosis • Tracheitis	Hospitalization Rate • Metastatic cancer • Cancer of ear, nose or throat • Lung cancer • HIV infection • Extensive OR procedures unrelated to principal diagnosis • Mechanical ventilator • Tracheostomy • Cleft lip and palate repair • Non-extensive OR procedures unrelated to principal diagnosis • Tracheitis

PREVENTABLE HOSPITALIZATIONS			
Gastrointestinal Infections	Kidney & Urinary Tract Infection	Hypertension	COPD
Hospitalization Rate • Neonates (age < 28 days) • GI cancer • Metastatic cancer • HIV infection • Extensive OR procedures unrelated to principal diagnosis • Major large and small bowel procedures • Other digestive system OR procedures with complications	Hospitalization Rate • Neonates (age < 28 days) • Metastatic cancer • Kidney/urinary tract cancer • HIV infection • Chronic renal failure • Renal dialysis • Extensive OR procedures unrelated to principal diagnosis • Kidney, ureter and major bladder procedures	Hospitalization Rate • Age < 18 years • Metastatic cancer • HIV infection • Renal dialysis • Open-heart surgery • Extensive OR procedures unrelated to principal diagnosis • Angioplasty/Stent • Mechanical ventilator	Hospitalization Rate • Age < 18 years • All diagnosis related groups except COPD (DRG 088) • Metastatic cancer • Lung cancer • HIV infection • Mechanical ventilator

Table 2 continued. *CY99 Managed Care Performance Report:* EXCLUSIONS TO ANALYSES FOR DIABETES

Diabetes
Hospitalization Rate • Major organ transplants • Metastatic cancer cases • HIV infection • Other clinically complex cases based upon procedures performed during the same admission
Length of Stay • Hospitalization rate exclusions *plus*: • Death in hospital • Missing *Atlas Outcomes*® PLOS or ASG • Outliers (LOS > 30 days)
Rehospitalization Rate– 6 months • Length of Stay exclusions *plus*: • Non-linkable cases
Diabetes HEDIS Measures • As defined by NCQA

List of Abbreviations: OR - Operating Room; PLOS - Predicted Length of Stay; ASG - Atlas Severity Group; NCQA - National Committee for Quality Assurance

Table 2 continued. *CY99 Managed Care Performance Report:* EXCLUSIONS TO ANALYSES FOR ACUTE CARE PROCEDURES

ACUTE CARE PROCEDURES

Breast Cancer Procedures	Neck and Back Procedures
Procedure Rate (Inpatient and Ambulatory) • Age < 18 years • HIV infection • Breast cancer not principal diagnosis	Hospitalization Rate • Age < 18 years • Spinal refusion procedure • Pathological spinal fractures • Spinal nerve root injury • Paraplegia • Unspecified paralysis • Spinal fracture • HIV infection • Quadriplegia • Hemiplegia • Infantile cerebral palsy
In-Hospital Complication Rate (Inpatient only) • Hospitalization Rate exclusions *plus:* • Missing *Atlas Outcomes*® PLOS	
Length of Stay (Inpatient only) • In-Hospital Complication Rate exclusions *plus:* • Death in hospital • Outliers (LOS > 30 days)	In-Hospital Complication Rate • Same as Hospitalization Rate exclusions
Breast Cancer Screening – HEDIS Measure • As defined by NCQA	Length of Stay • In-Hospital Complication Rate exclusions *plus:* • Death in hospital • Outliers (LOS > 30)

List of Abbreviations: PLOS - Predicted Length of Stay; NCQA - National Committee for Quality Assurance

DATA ANALYSIS

Age and Sex Adjustment Approach

Age and sex adjustment methods take into account, for example, an HMO that has a higher proportion of older patients, in comparison to a plan that has younger members. PHC4's system "expects" more health problems in the HMO with an older population and makes appropriate adjustments. Gender is often an important risk factor, and the system also accounts for differences among HMOs in this category. The hospitalization rate data are adjusted using age and sex cohorts derived from the total membership population of each HMO. These cohorts were constructed with the assistance and review of each HMO.

Risk Adjustment Approach

Based on a complex mathematical formula that assesses the degree of illness or risk for patients, PHC4 calculates expected, or predicted, numbers or rates. Managed care plans that have sicker members are given "credit" in the system; patients that are more seriously ill can be expected to have a greater probability of death, to have longer lengths of stay, to be readmitted, or to have complications. These events are "expected". This system is used to measure outcomes taking into account patient illness or risk factors.

Atlas Outcomes® Admission Severity/PLOS Approach for Risk Adjustment. In a contractual agreement with MediQual® Systems, Inc. in Marlborough, Massachusetts, acute care hospitals are required to use MediQual's *Atlas Outcomes* Severity of Illness System to classify each patient's condition upon admission to the hospital and covering the first two days of the hospital stay (or a maximum of 30 hours, based on when the patient was admitted to the hospital). This system represents a summarization of patient risk/severity, characterized as the probability of in-hospital death or the predicted length of stay (PLOS), and is based on objective data found in the medical record. Ultimately, this system is used here to risk adjust outcomes (for diabetes and breast cancer) to allow for fair comparisons among HMO plans.

The *Atlas Outcomes* system is based on the examination of numerous Key Clinical Findings (KCFs) such as lab tests, EKG readings, vital signs, the patient's medical history, imaging results, pathology, age, sex, and operative/endoscopy findings. Hospital personnel abstract these KCFs during specified timeframes in the hospitalization. Some pre-admission data are also captured (e.g., cardiac catheterization findings) as are some history findings. The KCF results are entered into algorithms that calculate the overall probability of death or the PLOS. The *Atlas Outcomes* system utilizes 67 different disease-specific scoring algorithms to obtain the admission severity.

Two systems developed by MediQual Systems, Inc. to rate patient risk that PHC4 uses in this study are described below and include the probability of death measure (i.e., the ASG score, see below) and the PLOS:

Probability of Death: Admission Severity Groups

The algorithm-derived probability of death for any one patient is categorized into one of five groups, or Admission Severity Groups (ASG), ranked 0 to 4, which correspond to levels of patient risk. These ASG scores range from minimally sick (ASG 0) to maximum probability of death (ASG 4).

The ASG scores are assigned by *Atlas* as follows:

ASG	Description	Probability of Death
0	No risk of clinical instability	0.000 – 0.001
1	Minimum risk of clinical instability	0.002 – 0.011
2	Moderate risk of clinical instability	0.012 – 0.057
3	Severe risk of clinical instability	0.058 – 0.499
4	Maximum risk of clinical instability	0.500 – 1.000

Source: Atlas version 3.3, 2000 MediQual Systems, Inc.

PLOS: Predicted Length of Stay.

The PLOS is a continuous variable, meaning it has values that range on a continuum. In order to use PLOS as a risk-adjustment variable, the PLOS must be categorized. Four population percentiles are used to categorize the PLOS into five categories. The percentiles used are approximately the 2.5^{th}, 16^{th}, 84^{th}, and 97.5^{th} percentiles of the population's distribution curve.

Atlas Outcomes disease groups 1010 ("diabetes") and 900 ("breast disorder" for breast cancer procedures) are used to determine ASG/PLOS scores. The principal diagnosis determines the scoring algorithm used for a particular case.

Tables C1-C3 comprising Appendix C: *Atlas Outcomes* Admission Severity Scoring/PLOS provide more detail about each of the disease groups and the corresponding clinical measures used in computing PLOS and ASG. Tables C.1b and C.2b list the ICD.9.CM codes associated with the two disease groups. Tables C.1a and C.2a show the percentages of hospitalizations for the clinical conditions in the *Managed Care Performance Report* (which used ASG or PLOS as a risk adjustor variable) that were coded according to the most predominant *Atlas Outcomes* disease groups. Also included in this appendix is a list of the KCFs used to identify variables that predict the length of stay (referred to as "clinical LOS" in Appendix C) associated with diabetes (Tables C.1d and C.1e), breast cancer procedures (Tables C.2d and C.2e), or the likelihood of in-hospital death (referred to as "clinical mortality" in Appendix C) associated with diabetes (Tables C.1c and C.1e). Note that tables C.3a - 3e describe *Atlas Outcome* information for disease group 810 ("spinal disorder" for neck and back procedures). This information is included since PLOS and ASG were included in the risk adjustment model for neck and back procedures even though neither was determined to be a significant risk adjustor variable (see section below entitled "Determination of Risk Adjustment Factors by PHC4"). Table C.4 is a complete list and description of all *Atlas Outcomes* variables used in the determinations of Atlas PLOS or ASG for any one of the three severity-adjusted conditions (diabetes, breast cancer procedures, or neck and back procedures) studied in the *Managed Care Performance Report* and includes the source documents referenced in a hospital medical record.

Eligibility criteria for considering a variable in a model are: a) the variable must be present in at least 3% of the hospitalizations, or b) the variable must occur in 1% of the hospitalizations if the data includes at least 30 deaths. Only variables found to be significant (after being entered into the appropriate MediQual algorithm) are included in the final model as *predictor variables*.

Determination of Risk-Adjustment Factors by PHC4. For each clinical condition in the *Managed Care Performance Report*, a list of potential risk factors is identified. Each of the three factors actually used for risk-adjusting is determined for each outcome measure using (forward) stepwise regression. For those outcome measures generated from binary response factors (in-hospital complication rate and rehospitalization rate), logistic regression is used. The length-of-stay outcome measure is created from a continuous factor and thus, a linear regression technique is used.

The first step in the stepwise process is to identify the risk factor that explains more of the variability among the specific response factor (i.e., in-hospital complication rate, rehospitalization rate, or length-of-stay) values than does any other individual risk factor. In the second step, the second risk factor is identified. This factor is one that, when coupled with the first factor, explains more response factor variability than any of the other remaining factors in the list. The third risk factor determined is that factor from the list that, when considered with the first two factors, explains the most additional response factor variability. A stepwise selection method is a dynamic process since a factor selected at one step is removed at a later step if it is no longer statistically significant given the other factors that have been selected by that later step.

Categorization of Risk Factors. As mentioned above, the PHC4 methodology uses three categorical risk factors. The strongest factor (i.e., the first risk factor determined in the selection process) can have at most five categories, while both the second and third factors can have a maximum of three categories each. Categories for any risk factor with more than the maximum number are combined to the extent necessary to make that risk factor compatible with the PHC4 methodology.

Shown below (and see Table 3) is the order in which the three most significant risk adjustors were ranked for each clinical condition and appropriate outcome measure. The risk adjustor variable that explained the most variability was ranked #1, while the second and third variables were ranked #2 and #3, respectively. Appendix E: Risk Factors Considered lists the candidate variables evaluated as potential risk adjustors for each of the clinical conditions and includes hospitalization information (e.g., average length of stay, complications, etc.) for each of the variables tested. Each of the final three risk adjustors was consequently subcategorized when necessary for the risk adjustment process. Listed below are the categories used for each of the risk adjustor variables for each clinical condition and applicable outcome measure. A minimum of 20 hospitalizations statewide per risk adjustor category was required for the statistical methods that were utilized. Risk adjustor categories containing less than 20 hospitalizations were combined as indicated below.

Diabetes

Length of Stay:

#1 Surgical DRG/Renal Failure

1: surgical DRG w/ renal failure
2: surgical DRG w/o renal failure
3: non-surgical DRG w/ renal failure
4: non-surgical DRG w/o renal failure

Categories were combined when necessary as follows:

- Categories 1 and 2 were combined
- Categories 3 and 4 were combined

#2 *Atlas Outcomes*® Predicted Length of Stay (PLOS)
1: 0 – 4.256 days
2: 4.257 – 8.826 days
3: 8.827+ days

#3 *Atlas Outcomes*® Admission Severity Group (ASG)
1: 0, 1
2: 2
3: 3, 4

Rehospitalization:

#1 Surgical DRG/Renal Failure
1: surgical DRG w/ renal failure
2: surgical DRG w/o renal failure
3: non-surgical DRG w/ renal failure
4: non-surgical DRG w/o renal failure

Categories were combined when necessary as follows:
- Categories 1 and 2 were combined
- Categories 3 and 4 were combined

#2 Diabetes Complication Level
1: uncomplicated
2: short-term complications
3: long-term complications

#3 Age
1: 18 – 35 years
2: 36 – 55 years
3: 56 – 75 years

Breast Cancer

In-hospital Complication Rate:

#1 Concurrent Reconstruction – 2 categories: yes or no

#2 *Atlas Outcomes* PLOS Group – 3 categories
1: below 2.398
2: 2.398 – 4.430
3: above 4.430

#3 Diagnostic Stage of Breast Cancer – 3 categories:
1: In Situ
2: Malignant neoplasm
3: Metastasized

(Note: It was necessary to collapse Malignant Neoplasm and In Situ cancer for the cells associated with no reconstruction and PLOS category 3. It was necessary to combine all the cancer categories for reconstruction (yes) and PLOS category 3 - this was not deemed problematic since the complication rate was the same for all three cancer groups.)

Length of Stay:

(Note: In the statewide reference base, it was not necessary to further combine categories in order to achieve a minimum of 20 cases within each cell.)

#1 Breast Procedure Type – 3 categories:
1: Lumpectomy/subtotal mastectomy
2: Mastectomy without concurrent reconstruction
3: Mastectomy with concurrent reconstruction

#2 *Atlas Outcomes* PLOS Group – 3 categories
   1: below 2.398
   2: 2.398 – 3.303
   3: above 3.303
#3 Race – 2 categories: White or Black/Other

Neck/Back Procedures

In-hospital Complication Rate:
#1 Fusion Location – 4 categories:
   1: No fusion
   2: Cervical/Atlas Axis/fusion NOS
   3: Lumbar/Lumbosacral
   4: Dorsal/Dorsolumbar
#2 Principal Diagnosis Groupings – 3 categories:
   1: Disc displacement
   2: Disc degeneration or Narrowing of spinal canal
   3: Other disc disorders/back pain
   Categories were combined when necessary as follows:
   - Categories 1 and 3 were combined
   - Categories 1, 2 and 3 were combined
#3 Age – 3 categories:
   1: 18 – 39
   2: 40 – 49
   3: 50 – 64
   Categories were combined when necessary (based on counts) as follows:
   - Categories 1 and 2 were combined or Categories 2 and 3 were combined

Length of Stay:
#1 Fusion Location – 4 categories:
   1: No fusion
   2: Cervical/Atlas Axis/fusion not specified
   3: Lumbar/Lumbosacral
   4: Dorsal/Dorsolumbar
#2 Principle Diagnosis Groupings – 3 categories:
   1: Disc displacement
   2: Disc degeneration or Narrowing of spinal canal
   3: Other disc disorders/back pain
   Categories were combined when necessary as follows:
   - Categories 1 and 3 were combined
   - Categories 1, 2 and 3 were combined
#3 Race – 3 categories
   1: Black
   2: White
   3: Other
   Categories were combined when necessary (based on counts) as follows:
   - Categories 1 and 2 were combined
   - Categories 1, 2 and 3 were combined

Indirect Standardization. Statewide or HMO pooled rates are used as the benchmarks for *complication rate* and *rehospitalization rate* analyses to statistically evaluate the associated rate of acute care outcomes for each HMO plan. However, directly comparing the statewide (or pooled HMO) rate to the associated HMO crude rate can be misleading. For example,

when statistical modeling is used to evaluate the neck and back procedures, complication rates vary by the fusion location, type of diagnosis, and patient age. Statewide (or across the pooled group of HMOs), the distribution of these three risk factors may be very different than the distribution of these same factors within a particular HMO plan. Indirect standardization is a technique that is used to adjust for these differences and allow for discrepancies in the risk factor structure between the state and each HMO plan.

Indirect standardization is also used to calculate the age- and sex-adjusted hospitalization rates for each HMO plan. Enrollment data, reported in age and sex categories, are collected from HMO plans only. Since this enrollment data is not available (that is, is not collected) from the insurance groups that comprise the "traditional fee for service" category, these hospitalization rates cannot be reported. Indirect standardization, using the risk factors of age and sex, is used to compare the hospitalization rates for each HMO plan against the statewide HMO-aggregated hospitalization rates for each clinical condition.

Risk Index Adjustment for Lengths of Stay Analyses. The risk-adjusted *length of stay* (LOS) averages are reported by each HMO and traditional fee-for-service sample (for diabetes and the acute care conditions). *Length of stay* values may vary within a clinical condition due to variance in risk adjustor variables used. Therefore, in order to report a comparable risk-adjusted average *length of stay* for each appropriate clinical condition within each HMO, a risk adjustment technique (comparable to a case mix index) is employed. The following steps are used:

1) Statewide relative weights for each risk adjustor variable combination within each clinical condition are determined using LOS averages aggregated from the statewide reference database. After all exclusions are satisfied and outliers removed, the relative weight for each risk adjustor combination within each clinical condition is calculated using the formula:

$$\text{Relative Weight} = \frac{\text{Average LOS for a cell (i.e., combination of risk adjustors)}}{\text{Average LOS for the clinical condition}}$$

2) Each HMO's risk index for each clinical condition is calculated:

$$\text{An HMO's risk index for a particular clinical condition} = \frac{\Sigma(n_i \times RW_i)}{\Sigma n_i}$$

where, for each of the risk adjustor combinations (cell) within the clinical condition,
RW_i = the statewide relative weight for the i^{th} combination (cell)
n_i = the number of hospitalizations for the HMO of the i^{th} combination
Σn_i = the total number of hospitalizations for the HMO plan for a clinical condition

3) For each HMO, the risk-adjusted average *length of stay* is then calculated for each of the clinical conditions:

$$\text{Risk-Adjusted Avg. Length of Stay} = \frac{\text{Avg. Length of Stay for a Clinical Condition}}{\text{Risk Index for a Clinical Condition}}$$

where the average LOS for an HMO's clinical condition is derived by adding up all the LOSs for the hospitalizations remaining in the analysis for that HMO's clinical condition and dividing by the number of hospitalizations.

Tests of Significance

Binomial versus Poisson Distributions. Significance tests were performed for the following outcomes:

Outcome Measure	Clinical Conditions	Distribution Used
Rehospitalization Rate (Readmission vs. No Readmission)	Diabetes	Binomial
In-Hospital Complication Rate (Complication vs. No Complication)	Breast Cancer Procedures Neck/Back Procedures	Binomial
Hospitalization Rate	Preventable Hospitalizations Diabetes	Binomial
Procedure/Hospitalization Rate (Rate of hospitalizations for a given clinical condition per HMO population)	Breast Cancer Procedures Neck/Back Procedures	Poisson

Although the outcome measures for any single HMO plan may be comparable to the statewide norm (or the pooled HMO average, depending upon the outcome measure), random variation plays a role in such comparisons. Statistical evaluation is used to determine whether the difference between the observed and the expected (or average/norm) value is *too large* to be attributed solely to chance.

The type of distribution chosen (i.e., binomial or Poisson) is based on the nature of the outcomes in question, and requires certain assumptions:

Binomial Distribution

- Each observation included in the study has one of two observable outcomes (e.g., in-hospital complication vs. no complication). In other words, the response is dichotomous.
- The probability of complication (or hospitalization or rehospitalization) for each observation studied within a clinical condition group (as adjusted by the risk factors for that clinical condition) is equal to the rate provided by the statewide reference database.
- The outcome for any one observation in the analyses has no impact on the outcome of another observation. In other words, the observations are independent.

Poisson Distribution

- The number of episodes possible for a given clinical condition within a year for a group of members may be any whole number.
- The rate of hospitalization for members within an age/sex category for a given clinical condition is equal to the rate calculated using the enrollment numbers provided by

the HMO plans and the hospitalization records in the HMO-aggregated reference database.

- The occurrence of a hospitalization in a group of members has no effect on the hospitalization rate for the remainder of the year for the group. In other words, the members are independent, and the rate of hospitalization is constant.

A probability distribution is created for each outcome within each HMO plan based on the expected value or expected rate (risk-adjusted and derived using the statewide reference database), and the type of distribution (binomial or Poisson) appropriate for the outcome. Using the probability distribution, a p-value is calculated for each observed value. This p-value is the probability, or likelihood, that the observed value could have occurred by chance. If it is very unlikely ($p < 0.05$; see "Inferential Error" section below) that the observed value could have occurred only by chance, then it is concluded that the observed value is "significantly different" from the expected value (see "Statistical Rating" section below).

Inferential Error. A type of inferential error that can be made in statistics is called a Type I error or "false positive". The probability of committing a Type I error is equal to the level of significance established by the researcher. For the current analysis, the level of significance has been set to 0.05. In the context of the *Managed Care Performance Report*, a Type I error occurs when the difference between the observed in-hospital complication rate and the expected in-hospital complication rate is declared statistically significant, when in fact, the difference is due to chance. That is, for a particular clinical condition, the HMO plan is declared to be statistically higher or lower than expected, when in reality the HMO plan's level of performance is comparable to the state norm. Since the level of significance has been set to 0.05, there is a 5% (or 1 in 20) chance of committing this type of error.

Outcome Measures using the Binomial Test. The binomial distribution is used to determine the p-value used to test for significant differences between observed and expected rates for the hospitalization and complication rates. The p-value is calculated as shown below.

p-value Calculation: Binomial Distribution

Calculating the p-value for the binomial test is defined by a formula which sums discrete probabilities based upon the binomial distribution. The binomial formula (see below) is used, in part, to derive the p-value. The probability that a binomial random variable takes on a specific value is defined by the following equation (i.e., the binomial formula):

$$P(X=a) = [(N!)/(a!(N-a)!)]\, p^{a}(1-p)^{N-a}$$

where (for in-hospital complication rate analysis),

- $P(X=a)$ is the probability that the binomial random variable (X) takes on a specific value (a)
- X is the binomial random variable. X is a discrete random variable that can range from 0 through N ($0 \leq X \leq N$). For complication rate analysis, it would be defined as the number of complications for that plan.
- N is the number of observations for a particular HMO plan's clinical condition
- p is the overall expected probability of patient complication for a particular HMO plan's clinical condition

The p-value for a specific result is determined to be the sum of all probabilities associated with that outcome and all other outcomes that are more extreme. The p-value associated with the observed number of complications is calculated for each HMO plan and clinical condition.

Actual versus Expected Rates

Using neck and back in-hospital complications as an example, fusion location, principal diagnosis and age are used as risk adjustors in this analysis. The *expected* statewide complication rate is calculated for each of the final combinations of risk adjustor factors (i.e., fusion location/principal diagnosis/age combinations). The same approach is taken to calculate the expected complication rate for breast cancer procedures, using the risk adjustor factors specific to breast cancer (i.e., reconstruction, PLOS and breast cancer type). Expected rates are computed for each risk adjustor combination by dividing the total number of complications in that combination by the total number of patients in that combination.

Using, again, in-hospital complication as an example, the *actual* or observed in-hospital complication rate is the number of complications for each HMO within each clinical condition. The number of complications expected for each HMO within each clinical condition is calculated using the statewide-expected (or average) complication rates for each of the risk adjustor category combinations for a particular clinical condition.

Since there are various combinations of risk adjustor variables for each outcome measure and clinical condition, the variable **i** shown in the calculation for the expected number of complications covers a range of possible combinations, depending upon the clinical condition being studied. For a particular clinical condition, the maximum of the variable **i** is given by the number of final combinations of the risk adjustor factors. The $\mathbf{i^{th}}$ combination is a generic term used to signify each of the final combinations of these risk adjustor categories.

The expected number of complications for each clinical condition within each HMO is calculated as follows:

Expected number of complications = $\Sigma(p_i \times n_i)$

where, for each of the final combinations of the risk adjustors within the clinical condition,

p_i = the statewide complication rate for the i^{th} combination
n_i = the number of hospitalizations for the HMO of the i^{th} combination

The expected complication rate for each clinical condition within each HMO is calculated as follows:

Expected rate = $\Sigma(p_i \times n_i)/\Sigma n_i$

Similar calculations are made for the Hospitalization Rate (for the "preventable hospitalizations" and diabetes) and the Rehospitalization Rate (for diabetes) analyses using the pooled HMO rates.

Outcome Measures using the Poisson Test. The Poisson distribution is used to determine the p-value used for hospitalization rate analyses for breast cancer and neck and back

procedures; it is used to test for significant differences between observed and expected/average hospitalization/procedure rates. The p-value is calculated as shown below.

p-value Calculation: Poisson Distribution

The Poisson formula is defined by the following equation:

$$P(X=a) = (e^{-\mu}\,\mu^{a})/a!)$$

where,

P(X=a) is the probability that the Poisson random variable (X) takes on a specific value (a)

X is the Poisson random variable (X is a discrete random variable taking on the value of a whole number where $X \geq 0$)

μ is the estimated number of hospitalizations for a particular HMO plan's clinical condition, based on age and sex distributions

e is a constant (i.e., the natural base: approximately 2.71828…)

Again, the p-value is calculated as the sum of the probabilities of the observed value and all values more extreme.

Calculation of Hospitalization Rate

The average/expected rate of hospitalization for a single HMO plan is determined as:

$$(\text{Expected Rate}) = \frac{\sum_{\text{Age*Sex Cell}} \left(\frac{\text{Number Of Hosp. Members For All MCOs}}{\text{Number Of Enrollees For All MCOs}} \right) (\text{Number Of Enrollees For Plan})}{(\text{Total Number Of Enrollees For Plan})}$$

And the observed rate of the plan will be:

$$(\text{Observed Rate}) = \frac{(\text{Total Number of Hospitalized Members})}{(\text{Total Number of Enrollees})}$$

Statistical Rating. A statistical rating is assigned to each HMO if the difference between what was observed and what was expected (the statewide average) in a particular clinical condition is statistically significant. The p-value, calculated in terms of a "two-tailed" test is compared to the level of significance.

For example, in the calculation of in-hospital complication rate for each HMO,

- If the calculated p-value is greater than 0.05, then the conclusion is made that the difference between what was expected and what was observed is *not* statistically significant. It *cannot be concluded* that the in-hospital complication rate for that particular clinical condition in that particular HMO is different from the total statewide population under age 65.

- If the calculated p-value is less than or equal to 0.05, then the conclusion is made that the difference between what was expected and what was observed *is* statistically significant.

  - If the observed in-hospital complication rate is less than expected, which is based on the statewide in-hospital complication rate, the HMO is assigned the symbol "○" (as shown in the Managed Care Performance Report) to indicate the complication rate was significantly less than expected for a particular clinical condition.

  - If the observed in-hospital complication rate is higher than expected, which is based on the statewide in-hospital complication rate, the HMO is assigned the symbol "●" (as shown in the Managed Care Performance Report) to indicate the complication rate was significantly greater than expected for a particular clinical condition.

Statistical ratings (using a level of significance of 0.05) are reported for the hospitalization rate and in-hospital complication rate. In the *Managed Care Performance Report*, statistical ratings are shown for HMO plans that have sufficient records. When the number of records for analysis is less than 10, a statistical rating is not reported and the symbol "NR" appears in the *Managed Care Performance Report*.

Table 3 summarizes the outcome measures, the tests of significance, and the corresponding risk adjustor variables for each of the clinical conditions studied in the *Managed Care Performance Report.*

Table 3. *CY99 Managed Care Performance Report:* RISK ADJUSTMENT APPROACH – Preventable Hospitalizations[1]

PREVENTABLE HOSPITALIZATIONS		
Pediatric Ear, Nose & Throat	Adult Ear, Nose & Throat	Gastrointestinal Infections
Hospitalization Rate • Approach: Indirect standardization • Age cohort[2]- and sex- adjusted • Significance test: Binomial • Confidence level: 95%	Hospitalization Rate • Approach: Indirect standardization • Age cohort[3]- and sex- adjusted • Significance test: Binomial • Confidence level: 95%	Hospitalization Rate • Approach: Indirect standardization • Age cohort[4]- and sex- adjusted • Significance test: Binomial • Confidence level: 95%

PREVENTABLE HOSPITALIZATIONS		
Kidney & Urinary Tract Infections	Hypertension (Adults)	COPD (Adults)
Hospitalization Rate • Approach: Indirect standardization • Age cohort[4]- and sex- adjusted • Significance test: Binomial • Confidence level: 95%	Hospitalization Rate • Approach: Indirect standardization • Age cohort[3]- and sex-adjusted • Significance test: Binomial • Confidence level: 95%	Hospitalization Rate • Approach: Indirect standardization • Age cohort[3]- and sex-adjusted • Significance test: Binomial • Confidence level: 95%

[1] Age and sex adjustment was used in the calculation of the hospitalization rate. The age groups used in the numerator (an inpatient hospitalization) match the age groups used in the denominator (age and sex enrollment cohorts).
[2] Age cohorts for pediatric members is defined as: 28 days – 4 yr; 5 yr – 17 yr
[3] Age cohorts for adult members is defined as: 18 yr – 44 yr; 45 yr – 64 yr
[4] Age cohorts are defined as 28 days – 4 yr; 5 yr – 17 yr; 18 yr – 44 yr; 45 yr – 64 yr

Table 3 continued. *CY99 Managed Care Performance Report:* RISK ADJUSTMENT APPROACH[1] – Diabetes

Diabetes
Hospitalization Rate • Approach: Indirect standardization • Age cohort[2]- and sex-adjusted • Significance test: Binomial • Confidence level: 95%
Length of Stay • Approach: Risk index adjustment • Risk adjustors (ranked): #1 Surgical DRG/Renal failure #2 PLOS[3] #3 ASG[4] • Significance test: none
Rehospitalization Rate (for diabetes) – 6 months • Approach: Indirect standardization • Risk adjustors (ranked): #1 Surgical DRG/Renal failure #2 Diabetes complication level #3 Age cohort[5] • Significance test: none

[1] The *"step-wise"* statistical method was used to determine the best risk adjustor factors for diabetes cases in the LOS and rehospitalization analyses.
[2] Age cohorts for members with diabetes defined as: 18 yr - 25yr; 26yr – 35yr; 36yr – 45 yr; 46 yr – 55 yr; 56 yr – 65 yr; 66 yr – 75 yr
[3] *Atlas Outcomes*® Predicted Length of Stay
[4] *Atlas Outcomes*® Admission Severity Group
[5] Age cohorts: 18 yr – 35 yr; 36 yr – 55 yr; 56 yr – 75 yr

Table 3 continued. *CY99 Managed Care Performance Report:* RISK ADJUSTMENT APPROACH[1] – Acute Care Procedures

ACUTE CARE PROCEDURES	
Breast Cancer Procedures – Female Only	Neck and Back Procedures
Procedure Rate (Inpatient and Ambulatory) • Approach: Indirect standardization • Age cohort[2]-adjusted • Significance test: Poisson • Confidence level: 95%	Hospitalization Rate • Approach: Indirect standardization • Age cohort[2]- and sex-adjusted • Significance test: Poisson • Confidence level: 95%
In-Hospital Complication Rate (Inpatient only) • Approach: Indirect standardization • Risk adjustors (ranked): #1 Reconstruction #2 PLOS[3] #3 Breast cancer type[4] • Significance test: Binomial • Confidence level: 95%	In-Hospital Complication Rate • Approach: Indirect standardization • Risk adjustors (ranked): #1 Fusion location[6] #2 Diagnosis type[7] #3 Age cohort[8] • Significance test: Binomial
Length of Stay (Inpatient only) • Approach: Risk index adjustment • Risk adjustors (ranked): #1 Procedure type[5] #2 PLOS[3] #3 Race • Significance test: none	Length of Stay • Approach: Risk index adjustment • Risk adjustors (ranked): #1 Fusion location #2 Diagnosis type[7] #3 Race • Significance test: none

[1] The *"step-wise"* statistical method was used to determine the best risk adjustor factors for in-hospital complication rate and LOS analyses.
[2] Age cohorts: 18 yr – 44 yr; 45 yr – 64 yr
[3] *Atlas Outcomes®* Predicted Length of Stay
[4] In situ, malignant neoplasm, metastasized
[5] Lumpectomy/subtotal mastectomy, mastectomy (radical and simple) w/o reconstruction, mastectomy (radical and simple) w/ reconstruction
[6] Cervical/atlas axis/fusion not specified, lumbar/lumbosacral, dorsal/dorsolumbar, no fusion
[7] Disc displacement, disc degeneration and narrowing of spinal canal, other disorders/back pain
[8] Age cohorts: 18 yr – 39 yr; 40 yr – 49 yr; 50 yr – 64 yr

DESCRIPTION OF MISSING INPATIENT DATA

The outcome data presented in this report are derived from the PHC4 database. Table 4A lists the number and percent of acute care facilities that submitted incomplete data. Table 4B lists specific acute care facilities that did not submit data based on time period. It should be noted that all analyses of data presented in these tables (4A-4B) below are based on *all* inpatient discharges - before exclusions and before payor verification of the data. Tables 4C and 4D summarize the number of hospitalizations (following the removal of clinical exclusions) with missing ASG scores for acute care hospitals and HMO plans, respectively.

Table 4A. Records Submitted by Facilities by Quarter

Time Period	*N,* Total Facilities[1]	*N,* Facilities Not Reporting[2]	% Facilities Not Reporting
Quarter 1, 1999	197	2	1.0
Quarter 2, 1999	196	4	2.0
Quarter 3, 1999	195	2	1.0
Quarter 4, 1999	195	2	1.0

[1] The total number of facilities is shown as changing over time due to circumstances in which a facility changed status (e.g., changed from acute care status) or underwent a merger.
[2] Four facilities did not report data (see Table 4B below)

Table 4B. Facilities that Submitted Incomplete Data during Study Period

Facility Name	*N*[1], Quarter 1, 1999	*N*[1], Quarter 2, 1999	*N*[1], Quarter 3, 1999	*N*[1], Quarter 4, 1999	Total *N*[1]
• Ashland Regional Medical Center	747	0	631	646	2,024
• Lock Haven Hospital	715	0	668	626	2,009
• Charles Cole Memorial Hospital	0	614	491	457	1,562
• Tyrone Hospital	0	0	0	0	0

[1] Refers to the number of records submitted

Table 4C. Hospitals Submitting Records[1] with Missing ASG Scores

Hospital	Diabetes[2] *N*	Diabetes[2] %	Breast Cancer[3] *N*	Breast Cancer[3] %
All Facilities	**70**	**4.5**	**32**	**2.9**
Wills Eye	17	100.0	0	0.0
PA Hosp Univ PA Health System	9	75.0	6	42.9
Mercy of Scranton	8	80.0	5	100.0
Magee Womens	0	0.0	5	4.4
Temple University	3	14.3	2	22.2
Bloomsburg	1	33.3	2	50.0
City Avenue	3	27.3	0	0.0
Community Medical Center Scranton	2	9.5	1	9.1
Hospital of University of PA	0	0.0	3	7.0
JFK Memorial	3	18.8	0	0.0
Jefferson	1	5.9	2	50.0
Abington Memorial	1	4.0	1	2.2
Germantwn Hsp & Com Hlth Serv	2	50.0	0	0.0
Presbyterian Medical Ctr U of PA	2	13.3	0	0.0
Saint Francis Medical Center	2	11.1	0	0.0
Temple Lower Bucks	2	25.0	0	0.0
WVHCS	0	0.0	2	10.0
Allegheny General	0	0.0	1	4.3
Altoona	1	16.7	0	0.0
Elkins Park	1	11.1	0	0.0
Episcopal	1	33.3	0	0.0
Fox Chase Cancer	0	0.0	1	2.1
Jeannette District Memorial	1	20.0	0	0.0
MCMC Mercy of Philadelphia	1	11.1	0	0.0
Mercy Suburban	1	50.0	0	0.0
Methodist	1	7.7	0	0.0
Mercy of Pittsburgh	1	11.1	0	0.0
Phoenixville/Univ of PA	0	0.0	1	14.3
Saint Vincent	1	10.0	0	0.0
Southern Chester County	1	50.0	0	0.0
St. Luke's/Bethlehem	1	5.6	0	0.0
Tyler Memorial	1	33.3	0	0.0
Warren General	1	50.0	0	0.0
Western Pennsylvania	1	1.7	0	0.0

[1] Includes only those hospitalizations that remain following the removal of excluded hospitalizations (i.e., hospitalizations meeting the exclusion criteria).
[2] Based on HMO members hospitalized for diabetes
[3] Based on statewide inpatient hospitalizations for breast cancer procedures

Table 4D. HMO Hospitalizations Excluded due to Missing ASG Scores: A Reflection of Network Hospitals Submitting Records[1] with Missing ASG Scores

	Diabetes[2]		Breast Cancer[3]	
HMO Plan	*N*	%	*N*	%
Aetna U.S. Healthcare	38	6.0	12	3.2
CIGNA	1	7.1	0	0.0
First Priority Health	4	6.8	3	6.3
Geisinger	1	2.8	2	5.3
HealthAmerica HMO	1	1.1	0	0.0
HealthAmerica POS	0	0.0	0	0.0
HealthGuard	0	0.0	0	0.0
KHP Central	0	0.0	0	0.0
KHP East	12	6.9	7	3.3
KHP West	6	1.8	6	2.3
New Alliance	1	4.5	0	0.0
PHS Health Plans	5	14.7	1	5.6
UPMC Health Plan	1	2.4	1	6.7
HMO	70	4.5	32	2.9
TRADITIONAL FEE-FOR-SERVICE	NA	NA	24	3.0
OTHER	NA	NA	51	3.5
STATEWIDE	NA	NA	107	3.2

[1] Includes only those hospitalizations that remain following the removal of excluded hospitalizations (i.e., hospitalizations meeting the exclusion criteria).
[2] Based on HMO members hospitalized for diabetes
[3] Based on statewide inpatient hospitalizations for breast cancer procedures
NA: not applicable

SECTION 1 – TREATMENT MEASURES CALCULATED BY PHC4

PREVENTABLE HOSPITALIZATIONS

The hospitalization rate for the six categories of preventable hospitalizations (pediatric and adult ear, nose and throat infections; gastroenteritis infections; kidney/urinary tract infections; hypertension and COPD) is based upon individual members that were hospitalized for a given condition. These admissions, based upon the number of HMO members hospitalized, are referred to as "index hospitalizations." Non-index hospitalizations are those records that are linked to an index hospitalization for a single member. Non-index cases are excluded so that a single member is counted in the hospitalization rate analysis rather than individual hospitalizations. Therefore, if a person is hospitalized several times during the study period, only the first or index hospitalization is counted. In this way, the number of members hospitalized is the basis of the hospitalization rate, not the number of hospitalizations.

Pediatric Ear, Nose and Throat Infections

Inclusion Criteria

Pediatric and adult cases of ear, nose and throat infections are analyzed separately. Cases are included in the data analysis if they include diagnosis/treatment codes for ear, nose and throat infections as defined by one of the ICD.9.CM codes for this condition listed in Appendix A. One of these codes must serve as the principal diagnosis for inclusion in this analysis. A total of 735 admissions, after exclusions, matched these criteria.

Data Analyzed

For pediatric ear, nose and throat infections, only a single hospitalization per member is included in the analysis. Only index hospitalizations are used to determine *hospitalization rates* for pediatric patients. Thus, the hospitalization rate is the proportion of members hospitalized.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of pediatric index hospitalizations per 10,000 pediatric members. Pediatric cases included those where patient age was 28 days old to 17 years old. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual pediatric ear, nose and throat infections *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of pediatric members for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for members under the age of 18 and over the age of 27 days, pooled). This benchmark is used to determine each HMO plan's expected hospitalization rate.

Of the 775 hospitalizations (for pediatric ear, nose and throat infections) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, no records were identified as duplicates. As a result, of the 775 HMO records (prior to the removal of excluded records) identified for study, 735 were included in the analysis after the exclusion of 40 records. These 40 hospitalizations were excluded from the *hospitalization rate* analysis because they were

considered to be clinically complex, were non-index hospitalizations, etc. for this condition and are listed in Table 5A.

Table 5A: Exclusions from "Hospitalization Rate" Analysis for Pediatric Ear, Nose and Throat Infections

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	775	100.0
Exclusions:		
❖ Neonates (age < 28 days)	17	2.2
❖ Clinical exclusions†	17	2.2
❖ Non-index hospitalizations	6	0.8
Total exclusions	40	5.2
Total members remaining in analysis	735	94.8

† Includes cases involving metastatic cancer; cancer of ear, nose or throat; lung cancer; HIV infection; extensive OR procedures unrelated to principal diagnosis; mechanical ventilator; tracheotomy; cleft lip and palate repair; and non-extensive OR procedures unrelated to principal diagnosis and tracheitis

Adult Ear, Nose and Throat Infections

Inclusion Criteria

Cases are included in the data analysis if they include diagnosis/treatment codes for the ear, nose and throat infections as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization for inclusion in this analysis. A total of 510 admissions, after exclusions, matched these criteria.

Data Analyzed

For adult ear, nose and throat infections, only a single hospitalization is included in the analysis. Only index hospitalizations are used to determine *hospitalization rates* for adult patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of adult index hospitalizations per 10,000 adult members. An adult HMO member is defined as 18 years old to 64 years old. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual adult ear, nose and throat infections *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of adult members for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations under the age of 64 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 532 hospitalizations (for adult ear, nose and throat infections) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 1 record was identified as a duplicate. As a result, 531 HMO records (prior to the removal of excluded records) met the selection criteria

and 510 records were included in the analysis after exclusion of 21 records. Hospitalizations that are excluded from the *hospitalization rate* analysis for this condition are listed in Table 5B.

Table 5B: Exclusions from "Hospitalization Rate" Analysis for Adult Ear, Nose and Throat Infections

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	531	100.0
Exclusions:		
❖ Clinical exclusions[†]	17	3.2
❖ Non-index hospitalizations	4	0.8
Total exclusions	21	4.0
Total members remaining in analysis	510	96.0

[†] Includes cases involving metastatic cancer, cancer of ear, nose or throat, lung cancer, HIV infection, extensive OR procedures unrelated to principal diagnosis, mechanical ventilator, tracheostomy, cleft lip and palate repair, non-extensive OR procedures unrelated to principal diagnosis and tracheitis

Gastrointestinal Infections

Inclusion Criteria

Cases are included in the data analysis for gastrointestinal infections if they include diagnosis/treatment codes for this condition as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization for inclusion in this analysis. A total of 1,053 admissions, after exclusions, matched these criteria.

Data Analyzed

For gastrointestinal infections, only a single hospitalization is included in the analysis. Index hospitalizations only are used to determine *hospitalization rates* for HMO patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of index hospitalizations per 10,000 members. Cases included in this analysis were aged 28 days to 64 years. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual gastrointestinal infections *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of HMO enrollees for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for member under the age of 65 and over the age of 27 days, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 1,093 hospitalizations for gastrointestinal infections submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 2 records were identified as duplicates. The two duplicate records were removed from the database, as were 38 exclusions. As a result, 1,053 records remained for analysis. Hospitalizations that were excluded from the *hospitalization rate* analysis for gastrointestinal infections are listed in Table 5C.

Table 5C: Exclusions from "Hospitalization Rate" Analysis for Gastrointestinal Infections

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	1,091	100.0
Exclusions:		
❖ Neonates (age < 28 days)	4	0.4
❖ Clinical exclusions†	27	2.5
❖ Non-index hospitalizations	7	0.6
Total exclusions	38	3.5
Total members remaining in analysis	1,053	96.5

† Includes cases involving GI cancer, metastatic cancer, HIV infection, extensive OR procedures unrelated to principal diagnosis, major large and small bowel procedures, and other digestive system OR procedures with complications

Kidney/Urinary Tract Infections

Inclusion Criteria

Cases are included in the data analysis for kidney/urinary tract infections if they include diagnosis/treatment codes for this condition as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis (for a hospitalization) to be included in this analysis. A total of 1,313 records, after exclusions, matched these criteria.

Data Analyzed

For kidney/urinary infections, only a single hospitalization is included in the analysis. Only index hospitalizations are used to determine *hospitalization rates* for HMO patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of index hospitalizations per 10,000 members. Cases included in this analysis were aged 28 days to 64 years. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual gastrointestinal infections *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of HMO members for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for member under the age of 65 and over the age of 27 days, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 1,429 hospitalizations for kidney/urinary tract infections submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 2 records were identified as duplicates. As a result, 1,427 HMO records (prior to the removal of excluded records) were studied in this report. After exclusions, 1,313 records were included in the analysis. Hospitalizations that were excluded from the *hospitalization rate* analysis for kidney/urinary tract infections are listed in Table 5D.

Table 5D: Exclusions from "Hospitalization Rate" Analysis for Kidney/Urinary Tract Infection

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	1,427	100.0
Exclusions:		
❖ Neonates (age < 28 days)	10	0.7
❖ Clinical exclusions†	66	4.6
❖ Non-index hospitalizations	38	2.7
Total exclusions	114	8.0
Total members remaining in analysis	1,313	92.0

† Includes cases involving metastatic cancer, kidney/urinary tract cancer, HIV infection, chronic renal failure, renal dialysis, extensive OR procedures unrelated to principal diagnosis, and kidney, ureter and major bladder procedures

Hypertension

Inclusion Criteria

Only adult HMO members are included in this analysis. Cases are included in the data analysis for hypertension if they include diagnosis/treatment codes for the condition of hypertension as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization for inclusion in this analysis. A total of 447 admissions, after exclusions, matched these criteria.

Data Analyzed

For hypertension treatment, only a single hospitalization is included in the analysis. Index hospitalizations only are used to determine *hospitalization rates* for HMO patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of index hospitalizations per 10,000 members. HMO members included in this analysis were aged 18 years to 64 years. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual hypertension *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of HMO members for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for member under the age of 65 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 489 hospitalizations for hypertension submitted to PHC4 for inclusion in the *Managed Care Performance Report*, no records were identified as duplicates. As a result, 489 HMO records (prior to the removal of excluded records) were studied in this report. After exclusions, 447 records were included in the analysis. Hospitalizations that were excluded from the *hospitalization rate* analysis for hypertension treatment are listed in Table 5E.

Table 5E. Exclusions from "Hospitalization Rate" Analysis for Hypertension – *Adult Only*

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	489	100.0
Exclusions:		
❖ Age < 18 years	9	1.8
❖ Problematic records	1	0.2
❖ Clinical exclusions†	14	2.9
❖ Non-index hospitalizations	18	3.7
Total exclusions	42	8.6
Total members remaining in analysis	447	91.4

† Includes cases involving metastatic cancer, HIV infection, renal dialysis, open-heart surgery, extensive OR procedures unrelated to principal diagnosis, coronary bypass/stenting, and mechanical ventilator use

Chronic Obstructive Pulmonary Disease (COPD)

Inclusion Criteria

Only adult HMO members are included in this analysis. Cases are included in the data analysis for COPD if they include diagnosis/treatment codes for this condition as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization to be included in this analysis. A total of 1,277 admissions, after exclusions, matched these criteria.

Data Analyzed

For COPD treatment, only a single hospitalization is included in the analysis. Index hospitalizations only are used to determine *hospitalization rates* for HMO patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted). The *hospitalization rate* is shown for each HMO using the total number of index hospitalizations per 10,000 members. HMO members included in this analysis were aged 18 years to 64 years. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual COPD *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of HMO members for the plan in the denominator. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for member under the age of 65 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 1,589 hospitalizations (for COPD) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 1 record was identified as a duplicate. As a result, 1,588 HMO records (prior to the removal of excluded records) were available for study and 1,277 records were included in the analysis after exclusion of 311 records. Hospitalizations that were excluded from the *hospitalization rate* analysis for COPD treatment are listed in Table 5F.

Table 5F: Exclusions from "Hospitalization Rate" Analysis for COPD – *Adult Only*

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	1,588	100.0
Exclusions:		
❖ Age < 18 years	5	0.3
❖ Problematic records	1	<0.1
❖ Clinical exclusions[†]	122	7.7
❖ Non-index hospitalizations	183	11.5
Total exclusions	311	19.6
Total members remaining in analysis	1,277	80.4

[†] Includes all diagnosis groups except COPD (DRG 088) and cases involving metastatic cancer, lung cancer, HIV infection, and mechanical ventilator use

MANAGEMENT OF ON-GOING ILLNESSES

Diabetes

Inclusion Criteria

Hospitalization records are included in this analysis only for HMO members with diabetes. The diagnosis of diabetes is taken from the HEDIS measures defined by NCQA. The continuous enrollment requirement and other conditions set by NCQA are also incorporated into the definition of diabetes for this analysis. Plans were asked to delete records that did not meet these criteria. Cases are included in the data analysis for diabetes if they included diagnosis/treatment codes for diabetes as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization for inclusion in this analysis. A total of 1,570 admissions for HMO members with diabetes, after exclusions, matched these criteria.

Data Analyzed

For diabetes treatment, only a single hospitalization is included in the analysis. These hospitalizations are for HMO members with diabetes between the ages of 18 years and 75 years. Note that this age interval is different from the other clinical treatments/conditions included in the report. Index hospitalizations only are used to determine outcome measures for HMO patients.

Outcome Measures and Exclusion Criteria

Hospitalization Rate (age- and sex-adjusted) The *hospitalization rate* is shown for each HMO using the total number of index hospitalizations per 10,000 members. HMO members included in this analysis were aged 18 years to 75 years. Only the index hospitalization is counted in the hospitalization rate.

Calculation of the actual diabetes *hospitalization rate* for an individual HMO plan incorporates the total number of index/single hospitalizations by the plan in the numerator and the total number of HMO members with diabetes for the plan in the denominator. This number was provided by each HMO and followed standard NCQA definitions. HMO benchmark rates for each age/sex combination (cell) are determined from all data combined (that is, HMO hospitalizations for member under the age of 76 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 1,935 hospitalizations (for diabetes) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 2 records were identified as duplicates and one problematic record was found. As a result, 1,932 HMO records (prior to the removal of excluded records) were available for analysis. After identification of 362 exclusions, 1,570 records were included in the analysis. Hospitalizations that were excluded from the *hospitalization rate* analysis for diabetes treatment are listed in Table 5G.

Table 5G: Exclusions from "Hospitalization Rate" Analysis for Diabetes

	HMO Total Hospitalizations	
	N	*% of Total*
Total hospitalizations *before* exclusions	1,932	100.0
Exclusions:		
❖ Clinical exclusions†	70	3.6
❖ Non-index hospitalizations	292	15.1
Total exclusions	362	18.7
Total members remaining in analysis	1,570	81.3

Note that those age < 18 years or > 76 years were excluded through the data verification efforts with the health plans (in order to be consistent with the HEDIS definition).

† Includes cases involving major organ transplants, metastatic cancer, HIV infection and other "clinically complex" cases that have been defined by DRG:

004 - Spinal procedures
106 - Coronary bypass with PTCA
107 - Coronary bypass with cardiac catheterization
110 - Major cardiovascular procedures with complications and comorbidities
116 - Other permanent cardiac pacemaker implant or PTCA with coronary artery stent implant
288 - OR procedures for obesity
304 - Kidney, ureter and major bladder procedures for nonneoplasms with complications and comorbidities
305 - Kidney, ureter and major bladder procedures for nonneoplasms without complications and comorbidities
310 - Transurethral procedures with complications and comorbidities
468 - Extensive OR procedure unrelated to principal diagnosis
476 - Prostatic OR procedure unrelated to principal diagnosis

Length of Stay (risk-adjusted) The inpatient length of stay outcome measure is a valuable indicator of the time spent under a provider's care. It is calculated from the index hospitalization (for which diabetes was the principal diagnosis) only, beginning with the date of admission and ending with the date of discharge of the index hospitalization. Therefore, for length of stay a single/index hospitalization is used. Hospitalizations that are excluded from the risk-adjusted length of stay analysis for diabetes are listed in Table 5H.

Table 5H: Exclusions from "Length of Stay" (LOS) Analysis for Diabetes

	HMO Total Hospitalizations		LOS
	N	*% of Total*	*Avg.*
Total members hospitalized *before* exclusions	1,570	100.0	4.5
Exclusions:			
❖ Death in hospital†	7	0.4	19.9
❖ Missing *Atlas Outcomes*® PLOS	70	4.5	4.6
❖ Outliers (LOS > 30 days)	3	0.2	40.3
Total exclusions	80	5.1	7.3
Total members remaining in analysis	1,490	94.9	4.4

† Refers to a death occurring in a diabetes hospitalization within the episode

Percent of Admissions for Short-term Complications of Diabetes These hospitalizations may be an immediate reflection of how well members are managing their diabetes. Short-term

complications of diabetes are acute, life-threatening events related to blood sugar control. The codes used to identify short-term complications are taken from the HEDIS Manual.

Rehospitalization Rate (risk-adjusted). For the *rehospitalization rate*, any member that is readmitted to the hospital (where diabetes is the principal diagnosis) within six months of the initial hospitalization serves as the numerator for this rate. The denominator is the number of index/single hospitalizations.

Calculation of the *rehospitalization rate* is the percent of members with diabetes who were rehospitalized within six months of the initial hospital stay. The number of members with diabetes that are rehospitalized at least once becomes the numerator and the number of single/index hospitalizations of members with diabetes in the HMO plan is the denominator. In the *Managed Care Performance Report* the rehospitalization rate is reported as a percent. Exclusion criteria for the *rehospitalization rate* are listed in Table 5I.

Table 5I: Exclusions from "Rehospitalization Rate" Analysis for Diabetes

	HMO Total Hospitalizations	
	N	*% of Total*
Total members hospitalized *before* exclusions	1,570	100.0
Exclusions:		
❖ Length of stay exclusions *plus*:	80	5.1
❖ Invalid social security number	29	1.8
❖ Inconsistent gender/social security number/date of birth	13	0.8
Total exclusions	122	7.8
Total members remaining in analysis	1,448	92.2

ACUTE CARE MEASURES

Breast Cancer Procedures

Inclusion Criteria

The analysis of breast cancer outcomes is based upon the total number of procedures (8,531 statewide and 2,821 for HMOs) reported in calendar year 1999. These records include procedures for only adult females. Cases are included in the data analysis for breast cancer procedures if they had a diagnosis of breast cancer and had a procedure code present in the record for this condition as defined by one of the ICD.9.CM codes listed in Appendix A. A total of 2,757 (HMO) and 8,277 (statewide) admissions, after exclusions, matched these criteria.

Data Analyzed

For breast cancer, procedure rates are based upon the *total number* of breast cancer procedures, not the number of patients receiving a breast cancer procedure. Procedures were performed during an inpatient hospitalization or in an ambulatory care setting.

Outcome Measures and Exclusion Criteria

Procedure Rate (age-adjusted). The *procedure rate* is shown for each HMO using the total number of procedures (lumpectomies and mastectomies) per 10,000 female members. Only adult HMO members are included in this analysis. When two procedures were performed at the same time (e.g., lumpectomy and mastectomy) only the most invasive procedure (mastectomy) was included in the analysis.

Calculation of the actual *breast cancer procedure rate* for an individual HMO plan incorporates the total number of breast cancer procedures by HMO in the numerator and the total number of HMO adult (aged 18 to 64 years) female plan members in the denominator. HMO benchmark rates for each age category (cell) were determined from all data combined (that is, HMO breast cancer procedures for female members under the age of 65 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans.

Of the 2,823 breast cancer procedures (HMO) and 8,572 procedures (statewide) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 2 duplicate HMO records and 41 duplicate statewide records were identified. As a result, 2,757 HMO records (after removal of excluded records) and 8,277 statewide records were analyzed. Procedures excluded from the *procedure rate* analysis for breast cancer procedures are listed in Table 5J.

Table 5J: Exclusions from "Procedure Rate" Analysis for Breast Cancer Procedures – *Inpatient and Ambulatory*

	HMO		STATEWIDE	
	Total Procedures		Total Procedures	
	N	*% of Total*	*N*	*% of Total*
Total procedures† *before* exclusions	2,821	100.0	8,531	100.0
Exclusions:				
❖ Age < 18 years	2	<0.1	4	<0.1
❖ BRCA diagnosis not principal	62	2.2	249	2.9
❖ HIV infection	0	0.0	1	<0.1
Total exclusions	64	2.3	254	3.0
Total procedures remaining in analysis	2,757	97.7	8,277	97.0

† Refers to patient encounters; for example, if a patient had both a lumpectomy and a mastectomy in the same medical encounter, only the more invasive procedure was counted as a single encounter.

In-Hospital Complication Rate (risk-adjusted). This measure is reported separately for lumpectomy and mastectomy procedures and is calculated for each HMO. In-hospital complications are any one of a particular set of ICD.9.CM codes in any secondary diagnosis or any procedure (principal or secondary) in a discharge record associated with the breast cancer hospitalization. Calculation of the actual *complication rate* for an individual HMO incorporates the total number of complications for a breast cancer procedure by each HMO in the numerator and the total number of procedures for the plan in the denominator. In the *Managed Care Performance Report* the *in-hospital complication rate* is reported as a percent. Refer to Appendix D: Definition of In-Hospital Complications for Breast Cancer Procedures for a detailed description of the complications associated with breast cancer procedures. The exclusions to the *complication rate* analysis are found in Table 5K. Statewide benchmark rates were used to risk adjust each HMO plan's in-hospital complication rate.

Table 5K: Exclusions from "In-Hospital Complication Rate" Analysis for Breast Cancer Procedures – *Inpatient Only*

	HMO		STATEWIDE	
	Procedures		Procedures	
	N	*% of Total*	*N*	*% of Total*
Total procedures *before* exclusions	2,821	100.0	8,531	10.0
Exclusions:				
❖ Procedure rate exclusions	64	2.3	254	3.0
❖ Ambulatory procedures†	1,637	58.0	4,897	57.4
❖ Missing *Atlas Outcomes*® PLOS	32	1.1	107	1.3
Total exclusions	1,733	61.4	5,258	61.6
Total procedures remaining in analysis	1,088	38.6	3,273	38.4

† 4,897 statewide records (1,637 HMO records) related to ambulatory care were not analyzed in the in-hospital complication rate since this rate is derived from inpatient cases only. Therefore, 3,380 (i.e., 8,277 – 4,897) inpatient records (statewide) and 1,120 (i.e., 2,757 – 1,637) inpatient records (HMO) were analyzed for the in-hospital complication rate.

In-Hospital Length of Stay (risk-adjusted) analyses are conducted separately for lumpectomy and mastectomy procedures. Only *inpatient* hospitalizations are included in the

length of stay outcome measure. The inpatient *length of stay* outcome measure is a valuable indicator of the time spent under a provider's care. It is calculated from a single hospitalization only, beginning with the date of admission and ending with the date of discharge. Hospitalizations that are excluded from the risk-adjusted *length of stay* analysis for inpatient breast cancer procedures are listed in Table 5L. Statewide benchmark rates were used to risk adjust each HMO plan's length of stay.

Table 5L: Exclusions from "Length of Stay" (LOS) Analysis for Breast Cancer Procedures – *Inpatient Only*

	HMO			STATEWIDE		
	Procedures		LOS	Procedures		LOS
	N	*% of Total*	*Avg.*	*N*	*% of Total*	*Avg.*
Total procedures *before* exclusions	2,821	100.0	2.0	8,531	100.0	2.1
Exclusions:						
❖ In-Hospital Complication Rate exclusions	1,733	61.4	2.5	5,258	61.6	3.6
❖ Death in hospital	0	0.0	-	1	<0.1	11.0
❖ Outliers (LOS > 30 days)	0	0.0	-	1	<0.1	40.0
Total exclusions	1,733	61.4	2.5	5,260	61.7	3.8
Total procedures remaining in analysis	1,088	38.6	2.0	3,271	38.3	2.0

Neck and Back Procedures

Inclusion Criteria

The analysis of neck and back procedure outcomes is based upon the total number of procedures reported in calendar year 1999 for adult (ages 18 years to 64 years). Cases are included in the data analysis for neck and back procedures if they include procedure or diagnosis/treatment codes for the condition as defined by one of the ICD.9.CM codes listed in Appendix A. One of these codes must serve as the principal diagnosis for a hospitalization for inclusion in this analysis. A total of 4,581 HMO admissions, after exclusions, matched these criteria.

Data Analyzed

For neck and back procedures, hospitalization rates are based upon the actual number of adult HMO members under age 65 years who underwent an elective neck or back procedure during calendar year 1999. In addition, procedures were divided into two groups: those with spinal fusion and those without spinal fusion. Approximately 33 percent of the neck and back procedures also included spinal fusion.

Outcome Measures and Exclusion Criteria

Procedure Rate (age- and sex-adjusted). The *procedure rate* is shown for each HMO and is based upon the actual number of adult members who underwent a neck and back procedure divided by the total number of HMO members in calendar year 1999. This rate is reported per 10,000 members.

HMO benchmark rates for each age and sex category (cell) was determined from all data combined (that is, HMO members under age 65 and over the age of 17 years, pooled). This benchmark serves as a comparison for each of the HMO plans. Procedures excluded from the *procedure rate* analysis for neck and back procedures are listed in Table 5M.

Of the 4,631 neck and back procedures (HMO) and 17,198 procedures (statewide) submitted to PHC4 for inclusion in the *Managed Care Performance Report*, 2 duplicate HMO records and 41 duplicate statewide records were identified. As a result, 4,581 HMO records (after to the removal of excluded records) and 16,930 statewide records were analyzed.

Table 5M: Exclusions from "Hospitalization Rate" Analysis for Neck and Back Procedures

	HMO		**STATEWIDE**	
	Total Hospitalizations		Total Hospitalizations	
	N	*% of Total*	*N*	*% of Total*
Total hospitalizations *before* exclusions	4,629	100.0	17,157	100.0
Exclusions:				
❖ Age < 18 years	18	0.4	57	0.3
❖ Refusion (in any position)	12	0.3	90	0.5
❖ Pathological spinal fractures	7	0.2	17	0.1
❖ Spinal nerve root injury	1	<0.1	14	0.1
❖ Paraplegia	0	0.0	5	<0.1
❖ Unspecified paralysis	2	<0.1	6	<0.1
❖ Spinal fracture	1	<0.1	9	0.1
❖ HIV infection	1	<0.1	3	<0.1
❖ Quadriplegia	2	<0.1	20	0.1
❖ Hemiplegia	4	0.1	5	<0.1
❖ Infantile cerebral palsy	0	0.0	1	<0.1
Total exclusions	48	1.0	227	1.3
Total hospitalizations remaining in analysis	4,581	99.0	16,930	98.7

In-Hospital Complication Rate (risk-adjusted). This measure is reported separately for with fusion and without fusion procedures and is calculated for each HMO. In-hospital complications are any one of a particular set of ICD.9.CM codes in any secondary diagnosis or procedure (except for tracheotomy) in a discharge record associated with the neck/back procedure hospitalization. Calculation of the actual *complication rate* for an individual HMO plan incorporates the total number of complications for a neck/back procedure by each HMO in the numerator and the total number of procedures for the plan in the denominator. In the *Managed Care Performance Report* the *in-hospital complication rate* is reported as a percent. Refer to Appendix D: Definition of In-Hospital Complications for Neck and Back Procedures for a detailed description of the complications associated with these procedures. The exclusions to the *complication rate* analysis are found in Table 5N. Statewide benchmark rates were used to risk adjust each HMO plan's in-hospital complication rate.

Table 5N: Exclusions from "In-Hospital Complication Rate" Analysis for Neck and Back Procedures

	HMO		STATEWIDE	
	Total Hospitalizations		Total Hospitalizations	
	N	*% of Total*	*N*	*% of Total*
Total hospitalizations *before* exclusions	4,629	100	17,157	100
Exclusions:				
❖ Hospitalization rate exclusions	48	1.0	227	1.3
Total exclusions	48	1.0	227	1.3
Total hospitalizations remaining in analysis	4,581	99.0	16,930	98.7

Length of Stay (risk-adjusted) analyses are conducted separately for with fusion and without fusion procedures. The inpatient *length of stay* outcome measure is calculated from a single hospitalization only, beginning with the date of admission and ending with the date of discharge of the hospitalization. Hospitalizations that are excluded from the risk-adjusted *length of stay* analysis for neck/back procedures are listed in Table 5O. Statewide benchmark rates were used to risk adjust each HMO plan's length of stay.

Table 5O: Exclusions from "Length of Stay" (LOS) Analysis for Neck and Back Procedures

	HMO			STATEWIDE		
	Total Hospitalizations		LOS	Total Hospitalizations		LOS
	N	*% of Total*	*Avg.*	*N*	*% of Total*	*Avg.*
Total hospitalizations *before* exclusions	4,629	100.0	1.9	17,157	100.0	2.1
Exclusions:						
❖ In-Hospital Complication Rate exclusions	48	1.0	2.4	227	1.3	4.3
❖ Death in hospital	2	<0.1	5.5	8	<0.1	6.8
❖ Outliers (LOS > 30 days)	1	<0.1	46.0	5	<0.1	43.4
Total exclusions	51	1.1	3.4	240	1.4	5.2
Total hospitalizations remaining in analysis	4,578	98.9	1.9	16,917	98.6	2.0

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SECTION 2 – ACCESS AND SERVICE

HMO Profile

Specific sources of data for the HMO profile include:

- The number of commercial members (as of December 31, 1999) is found in section III.A. columns 1 through 4 of the *Annual Report* (released by the Pennsylvania Department of Health). Enrollment numbers reported in the *Managed Care Performance Report* (identified as the "Number of Commercial Members") reflect the sum of these columns. Only HMO members enrolled in the Pennsylvania operations of HMOs are included in this total. Some HMOs operate health care plans regionally or nationally; however, only those members are counted that belong to an HMO licensed to operate in Pennsylvania.

  The same procedure is followed for the December 31, 1998 *Annual Report*. The 1998 totals are then subtracted from the 1999 totals and the percent change is reported (identified as the "Change in Commercial Enrollment" variable in the *Managed Care Performance Report*).

- The "Number of Primary Care Physicians" reported in the *Managed Care Performance Report* is the sum of the four PCP categories (Family Practice/Group Practice, Pediatric, General Internal Medicine, and Other) found in section IV.C., item number 1 of the *Annual Report*. This total is divided by the "Number of Commercial Members" and multiplied by 1,000 (identified as the "Number of PCPs per 1,000 Commercial Members"). The "Number of Specialists in the Network" is found in section IV.C., item number 2. This number is also divided by the "Number of Commercial Members" and multiplied by 1,000 (identified as the "Number of Specialists per 1,000 Commercial Members" in the *Managed Care Performance Report*).

- The "Number of General Acute Care (GAC) Hospitals in the Network" reported in the *Managed Care Performance Report* is taken from each HMO's most recent Provider Directory filed with the Department of Health. PHC4 tallies the number of GAC hospitals in those counties where, according to the Department of Health's *Annual Report*, each HMO is licensed to do business. The "Number of GAC Hospitals in the Network" is then divided by the total number of GAC hospitals within these counties and is reported as the "Percentage of all GAC Hospitals in the Plan's Service Area". In addition, the number of GAC hospitals in the Provider Directory located outside the HMO's service area is determined and reported as "Additional GAC Hospitals in Network".

- The "NCQA Accreditation Status" variable is obtained from the NCQA Web site and is current as of June 1, 2001.

Satisfaction Measures

The following CAHPS Survey Questions are included in the *Managed Care Performance Report* for calendar year 1999 :

- Question 10 "In the last 12 months, how much of a problem, if any, was it to get a referral to a specialist that you needed to see?"
- Question 16 "In the last 12 months, did you make any appointments with a doctor or other health provider for regular or routine health care?"

- Question 18 "In the last 12 months, how many days did you usually have to wait between making an appointment for regular or routine care and actually seeing a provider?"
- Question 21 "In the last 12 months, how long did you usually have to wait between trying to get care and actually seeing a provider for an illness or injury?"
- Question 24 "In the last 12 months, how much of a problem, if any, was it to get the care you or a doctor believed necessary?"
- Question 25 "In the last 12 months, how much of a problem, if any, were delays in health care while you waited for approval from your health plan?"
- Question 41 "In the last 12 months, how much of a problem, if any, was it to get the help you needed when you called your health plan's customer service?"
- Question 42 "In the last 12 months, have you called or written your health plan with a complaint or problem?"
- Question 44 "Was your complaint or problem settled to your satisfaction?"
- Question 47 "How would you rate your health plan now?"

In this year's report, PHC4 has added an additional column to the CAHPS graphs, entitled "Other Response". This category is a catchall for survey responses including multiple answers to one question (where a respondent provided more than one answer to the question), missing responses (where the respondent did not provide an answer), and responses indicating that the question was not applicable to the respondent (for example, a response of "I did not see a specialist in the last 12 months" to Question 10 "Was it a problem to get a referral to a specialist that you needed to see"). PHC4 summed the percentages of these responses to arrive at the total for the "Other Response" category.

All reported CAHPS measures include averages for the group of Pennsylvania HMOs and for the group of HMO/POS combined plans. These have been calculated by PHC4. Also included, when available from NCQA are national benchmarks. The National benchmarks (provided by the NCQA Quality Compass database) include all lines of business across all reporting managed care organizations in the United States.

SECTION 3 – FINANCIAL INDICATORS

Only dollar amounts specific to *commercial HMO membership* are included in the *Managed Care Performance Report* (no government-contracted HMO members are included). All figures listed in the financial section of the report were submitted by HMOs as part of the 1999 *Annual Statement* to the Pennsylvania Insurance Department. The following table outlines the locations of the data elements in the Annual Statement used to develop the Financial Indicators.

Data Element	**Source of Data**
Total HMO Revenue	Report #2, Line 7
Premium Revenue	Report #2, Line 1
Commercial Premium Revenue	Analysis of Operations by Lines of Business (Page 7) Line 1, Columns 2 & 8
Commercial Member Months	Report #4, Lines 1 & 6
Commercial Medical Care Expenses	Analysis of Operations by Lines of Business (Page 7) Line 21, Columns 2 & 8
Commercial Administrative Expenses	Analysis of Operations by Lines of Business (Page 7) Line 22, Columns 2 & 8
Commercial Federal Taxes	Analysis of Operations by Lines of Business (Page 7) Line 26, Columns 2 & 8
Commercial (after-tax) Income	Analysis of Operations by Lines of Business (Page 7) Line 27, Columns 2 & 8
Total Commercial Revenue	Analysis of Operations by Lines of Business (Page 7) Line 7, Columns 2 & 8
Total HMO (after-tax) Income	Report #2, Line 27
Current Assets	Report #1 – Part A, Line 8
Current Liabilities	Report #1 – Part B, Line 9
Net Worth	Report #1 – Part B, Line 24.
Total Liabilities	Report #1 – Part B, Line 15

Definitions and formulas for the specific financial indicators are listed below:

Total HMO Revenue includes all revenue received by the licensed corporation including premium, risk and "other" revenue and investment income. During calendar year 1999 (CY99), premium and risk revenue generated 98.9 percent of all revenues received by the licensed HMOs. None of the HMOs reported any fee-for-service revenue.

3-year Change in Total Revenue reflects the change in annual total revenues from the end of CY96 to the end of CY99. This measure reflects the extent to which the corporation's managed care line of business is growing or declining.

$$\frac{\text{Total Revenue}_{99} - \text{Total Revenue}_{96}}{\text{Total Revenue}_{96}}$$

Total Premium Revenue as a Percent of Total Revenue indicates that almost all HMO revenue is derived from commercial premiums and Medicare and/or Medical Assistance risk revenue. The majority of non-premium revenue is investment income.

$$\frac{\text{Premium Revenue}_{99}}{\text{Total Revenue}_{99}}$$

Commercial Premium Revenue as a Percent of Total Premium Revenue reflects the commercial portion of the HMO's total line of business. For those HMOs where commercial revenue is less than 100 percent of total revenue, the balance of premium revenue is derived from Medicare and/or Medical Assistance risk revenue.

$$\frac{\text{Commercial Premium Revenue}_{99}}{\text{Total Premium Revenue}_{99}}$$

Commercial Premium Revenue PMPM is the average monthly premium revenue the HMO received for each member enrolled in a commercial plan during CY99.

$$\frac{\text{Commercial Premium Revenue}_{99}}{\text{Commercial Member Months}_{99}}$$

Medical Loss and Administrative Expense Ratios reflect the portion of each commercial premium dollar spent on health care and administration during CY99. If an HMO has a Medical Loss Ratio above 100 percent, it is spending more for healthcare services than it receives in commercial premiums.

$$\frac{\text{Commercial Healthcare Expenses}_{99}}{\text{Commercial Premium Revenue}_{99}}$$

$$\frac{\text{Commercial Administrative Expenses}_{99}}{\text{Commercial Premium Revenue}_{99}}$$

Federal Tax Rate shows what portion of Total Commercial Revenue (including investment and "other" income) is required to pay federal income taxes. Negative tax rates indicate that the HMO has booked a tax credit for CY99. Non-profit (NP) HMOs have no income tax obligations.

$$\frac{\text{Commercial Federal Taxes}_{99}}{\text{Total Commercial Revenue}_{99}}$$

Commercial Net (after-tax) Margin shows the portion of Total Commercial Revenue that remained as income or profit after all commercial-related expenses had been paid. A negative margin indicates that revenues were not sufficient to cover expenses and the HMO's commercial line of business operated at a loss for the calendar year.

$$\frac{\text{Commercial (after-tax) Income}_{99}}{\text{Total Commercial Revenue}_{99}}$$

Total HMO Net (after-tax) Margin shows the portion of Total HMO Revenue that remained as income or profit after all expenses had been paid. A negative margin indicates that revenues were not sufficient to cover expenses and the HMO operated at a loss. Consequently, a portion of expenses had to be paid out of the HMO's assets.

$$\frac{\text{Total HMO (after-tax) Income}_{99}}{\text{Total HMO Revenue}_{99}}$$

3-year Average Net Margin reflects the average income over the past three calendar years (CY97 – CY99) for the Total HMO.

$$\frac{\Sigma_{97,98,99}\ \text{Total HMO Net Income}}{\Sigma_{97,98,99}\ \text{Total HMO Revenues}}$$

Current Ratio is the ratio of current assets to current liabilities at the end of CY99. This ratio reflects the HMO's ability to pay expected short-term obligations from expected revenues and liquid assets.

$$\frac{\text{Current Assets}_{\ 99}}{\text{Current Liabilities}_{\ 99}}$$

Net Assets to Total Liabilities – The largest liability of each HMO is claims payable, the amount due to healthcare providers for care rendered. In the event premium revenue is not sufficient to completely pay claims, the HMO would have to draw from its Net Assets or Net Worth. This ratio reveals what portion of its Liabilities at the end of CY99 could have been paid from its Net Worth.

$$\frac{\text{Net Worth}_{\ 99}}{\text{Total Liabilities}_{\ 99}}$$

APPENDIX A: DESCRIPTION OF STUDY POPULATION BY ICD.9.CM CODE

Includes codes that were later removed as clinical exclusions

Ear, Nose, Throat Infection

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
017.4x x = 0 - 6	Tuberculosis of ear
034.0	Streptococcal sore throat
055.2	Postmeasles otitis media
112.82	Candidal otitis externa
380.10	Infective otitis externa, unspecified
380.11	Acute infection of pinna
380.12	Acute swimmers' ear
380.14	Malignant otitis externa
380.16	Other chronic infective otitis externa
381.00	Acute nonsuppurative otitis media, unspecified
381.01	Acute serous otitis media
381.02	Acute mucoid otitis media
381.03	Acute sanguinous otitis media
381.04	Acute allergic serous otitis media
381.05	Acute allergic mucoid otitis media
381.06	Acute allergic sanguinous otitis media
381.10	Chronic serous otitis media, simple or unspecified
381.19	Other chronic serous otitis media
381.20	Chronic mucoid otitis media, simple or unspecified
381.29	Other chronic mucoid otitis media
381.3	Other and unspecified chronic nonsuppurative otitis media
381.4	Nonsuppurative otitis media, not specified as acute or chronic
382.00	Acute suppurative otitis media without spontaneous rupture of ear drum
382.01	Acute suppurative otitis media with spontaneous rupture of ear drum
382.1	Chronic tubotympanic suppurative otitis media
382.2	Chronic atticoantral suppurative otitis media
382.3	Unspecified chronic suppurative otitis media
382.4	Unspecified suppurative otitis media
382.9	Unspecified otitis media
461.0	Acute maxillary sinusitis
461.1	Acute frontal sinusitis
461.2	Acute ethmoidal sinusitis
461.3	Acute sphenoidal sinusitis

Ear, Nose, Throat Infection continued

ICD.9.CM Diagnosis Codes	Description
461.8	Other acute sinusitis
461.9	Acute sinusitis, unspecified
462	Acute pharyngitis
463	Acute tonsillitis
464.0	Acute laryngitis
464.10	Acute tracheitis without mention of obstruction
464.11	Acute tracheitis with obstruction
464.20	Acute laryngotraceheitis without mention of obstruction
464.21	Acute laryngotracheitis with obstruction
464.30	Acute epiglottitis without mention of obstruction
464.31	Acute epiglottitis with obstruction
464.4	Croup
465.0	Acute laryngopharyngitis
465.8	Acute upper respiratory infections of other multiple sites
465.9	Acute upper respiratory infections of unspecified site
472.0	Chronic rhinitis
472.1	Chronic pharyngitis
472.2	Chronic nasopharyngitis
473.0	Chronic maxillary sinusitis
473.1	Chronic frontal sinusitis
473.2	Chronic ethmoidal sinusitis
473.3	Chronic sphenoidal sinusitis
473.8	Other chronic sinusitis
473.9	Unspecified sinusitis (chronic)
474.00	Chronic tonsillitis
474.01	Chronic adenoiditis
474.02	Chronic tonsillitis and adenoiditis
476.0	Chronic laryngitis
476.1	Chronic laryngotracheitis
487.1	Influenza with other respiratory manifestations

Enteritis/Colitis/Gastroenteritis

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
003.0	Salmonella gastroenteritis
006.2	Amebic nondysenteric colitis
009.0	Infectious colitis, enteritis, and gastroenteritis
009.1	Colitis, enteritis, and gastroenteritis of presumed infectious origin
558.2	Toxic gastroenteritis and colitis
558.9	Other and unspecified noninfectious gastroenteritis and colitis

Kidney/Urinary Tract Infection

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
590.00	Chronic pyelonephritis without lesion of renal medullary necrosis
590.01	Chronic pyelonephritis with lesion of renal medullary necrosis
590.10	Acute pyelonephritis without lesion of renal medullary necrosis
590.11	Acute pyelonephritis with lesion of renal medullary necrosis
590.2	Renal and perinephric abscess
590.3	Pyeloureteritis cystica
590.80	Pyelonephritis, unspecified
590.9	Infection of kidney, unspecified
599.0	Urinary tract infection, site not specified

Hypertension

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
401.0	Malignant essential hypertension
401.1	Benign essential hypertension
401.9	Unspecified essential hypertension
402.00	Malignant hypertensive heart disease without congestive heart failure
402.10	Benign hypertensive heart disease without congestive heart failure
402.90	Unspecified hypertensive heart disease without congestive heart failure
403.00	Malignant hypertensive renal disease without mention of renal failure
403.10	Benign hypertensive renal disease without mention of renal failure
403.90	Unspecified hypertensive renal disease without mention of renal failure
404.00	Malignant hypertensive heart and renal disease without mention of congestive heart failure or renal failure
404.10	Benign hypertensive heart and renal disease without mention of congestive heart failure or renal failure
404.90	Unspecified hypertensive heart and renal disease without mention of congestive heart failure or renal failure

Chronic Obstructive Pulmonary Disease

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
491.20	Obstructive chronic bronchitis without mention of acute exacerbation
491.21	Obstructive chronic bronchitis with acute exacerbation
492.0	Emphysematous bleb
492.8	Other emphysema
496	Chronic airway obstruction, not elsewhere classified
506.4	Chronic respiratory conditions due to fumes and vapors

Diabetes

- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Diagnosis Codes	Description
250.00	Uncomplicated – Non-insulin dependent, controlled
250.01	Uncomplicated – Insulin dependent, controlled
250.02	Uncomplicated – Non-insulin dependent, uncontrolled
250.03	Uncomplicated – Insulin dependent, uncontrolled
250.1x	With Ketoacidosis, where x = 0,1,2,3
250.2x	With Hyperosmolarity, where x = 0,1,2,3
250.3x	With Other Coma, where x = 0,1,2,3
250.4x	With Renal Manifestations, where x = 0,1,2,3
250.5x	With Ophthalmic Manifestations, where x = 0,1,2,3
250.6x	With Neurological Manifestations, where x = 0,1,2,3
250.7x	With Peripheral Circulatory Disorders, where x = 0,1,2,3
250.8x	With Other Specified Manifestations, where x = 0,1,2,3
250.9x	With Unspecified Complication, where x = 0,1,2,3

Breast Cancer Procedures

- The procedure codes were included in the analyses when listed as the principal or secondary procedure.
- The diagnosis codes were analyzed when listed as the principal diagnosis.

ICD.9.CM/CPT Procedure Codes	Description
85.20	Excision or destruction of breast tissue, not otherwise specified
85.21	Local excision of lesion of breast
85.22	Resection of quadrant of breast
85.23	Subtotal mastectomy
85.41	Unilateral simple mastectomy
85.42	Bilateral simple mastectomy
85.43	Unilateral extended simple mastectomy
85.44	Bilateral extended simple mastectomy
85.45	Unilateral radical mastectomy
85.46	Bilateral radical mastectomy
85.47	Unilateral extended radical mastectomy
85.48	Bilateral extended radical mastectomy
19112	Excision of lactiferous duct fistula
19120	Excision of cyst, fibroadenoma, or other benign or malignant tumor aberrant breast tissue, duct lesion, nipple or areolar lesion, male or female, one or more lesions
19125	Excision of breast lesion identified by preoperative placement of radiological marker; single lesion
19126	Each additional lesion separately identified by a radiological marker
19160	Mastectomy, partial
19162	Mastectomy, partial with axillary lymphadenectomy
19180	Mastectomy, simple, complete
19200	Mastectomy, radical, including pectoral muscles, axillary lymph nodes
19220	Mastectomy, radical, including pectoral muscles, axillary and internal mammary lymph nodes
19240	Mastectomy, modified radical, including axillary lymph nodes, with or without pectoralis minor muscle, but excluding pectoralis major muscle

ICD.9.CM Diagnosis Codes	Description
174.0	Malignant neoplasm of nipple and areola
174.1	Malignant neoplasm of central portion of female breast
174.2	Malignant neoplasm of upper-inner quadrant of female breast
174.3	Malignant neoplasm of lower-inner quadrant of female breast
174.4	Malignant neoplasm of upper-outer quadrant of female breast
174.5	Malignant neoplasm of lower-outer quadrant of female breast
174.6	Malignant neoplasm of axillary tail of female breast
174.8	Malignant neoplasm of other specified sites of female breast

Breast Cancer Procedures continued

ICD.9.CM/ Diagnosis Codes	Description
174.9	Malignant neoplasm of breast (female), unspecified
196.3	Secondary and unspecified malignant neoplasm of lymph nodes of axilla and upper limb
198.2	Secondary malignant neoplasm of skin (skin of breast listed as example)
198.81	Secondary malignant neoplasm of breast
233.0	Carcinoma in situ of breast
238.3	Neoplasm of uncertain behavior of breast
239.3	Neoplasm of unspecified nature of breast

Neck and Back Procedures

- The procedure codes were included in the analyses when listed as the principal or secondary procedure.
- The diagnosis codes were analyzed only when listed as the principal diagnosis.

ICD.9.CM Procedure Codes	Description
03.09	Other exploration and decompression of spinal canal
80.50	Excision or destruction of intervertebral disc, unspecified
80.51	Excision of intervertebral disc
80.59	Other destruction of intervertebral disc

ICD.9.CM Diagnosis Codes	Description
720.0	Ankylosing spondylitis
721.0	Cervical spondylosis without myelopathy
721.1	Cervical spondylosis with myelopathy
721.2	Thoracic spondylosis without myelopathy
721.3	Lumbosacral spondylosis without myelopathy
721.41	Thoracic region spondylosis with myelopathy
721.42	Lumbar region spondylosis with myelopathy
721.90	Spondylosis of unspecified site without mention of myelopathy
721.91	Spondylosis of unspecified site with myelopathy
722.0	Displacement of cervical intervertebral disc without myelopathy
722.10	Displacement of lumbar intervertebral disc without myelopathy
722.11	Displacement of thoracic intervertebral disc without myelopathy
722.2	Displacement of intervertebral disc, site unspecified, without myelopathy
722.4	Degeneration of cervical intervertebral disc
722.51	Degeneration of thoracic or thoracolumbar intervertebral disc

Neck and Back Procedures continued

ICD.9.CM Diagnosis Codes	Description
722.52	Degeneration of lumbar or lumbosacral intervertebral disc
722.6	Degeneration of intervertebral disc, site unspecified
722.70	Intervertebral disc disorder with myelopathy of unspecified region
722.71	Intervertebral disc disorder with myelopathy of cervical region
722.72	Intervertebral disc disorder with myelopathy of thoracic region
722.73	Intervertebral disc disorder with myelopathy of lumbar region
722.90	Other and unspecified disc disorder of unspecified region
722.91	Other and unspecified disc disorder of cervical region
722.92	Other and unspecified disc disorder of thoracic region
722.93	Other and unspecified disc disorder of lumbar region
723.0	Spinal stenosis in cervical region
723.1	Cervicalgia
724.00	Spinal stenosis, unspecified region
724.01	Spinal stenosis, thoracic region
724.02	Spinal stenosis, lumbar region
724.09	Spinal stenosis, other
724.1	Pain in thoracic spine
724.2	Lumbago
724.3	Sciatica
724.5	Backache, unspecified
738.4	Acquired spondylolisthesis
756.11	Spondylolysis, lumbosacral region
756.12	Spondylolisthesis

APPENDIX B: METHODS FOR RESOLVING INCONSISTENT PATIENT IDENTIFIER INFORMATION

In analyzing a series of hospitalizations identified for an adult patient, conflicting sex-birth date combinations (for a single SSN) with the **same** sex value were resolvable if:

1. there were only **two** different birth dates (DOB) that agreed on two of the three DOB components (day, month, year) **and**

2. one of the conflicting DOBs appeared in the database at least two more times than the other (i.e., there were at least two additional occurrences of the more frequent DOB compared to the less frequent DOB) **or** the conflicting DOBs were within 31 days of each other.

The birth date which occurred with greatest frequency (or the more recent birth date if the frequency was the same for both dates) was assigned to all hospitalizations for that SSN.

Multiple sex-birth date combinations (for a single SSN) with the **same** birth date were resolvable if one of the conflicting sex values appeared in the database at least two more times than the other sex value. Thus, the sex value that occurred with the greatest frequency was assigned to all hospitalizations for that SSN as long as there were at least two additional occurrences of the more frequent sex value compared to the other sex value.

APPENDIX C. *ATLAS OUTCOMES* ADMISSION SEVERITY

- DIABETES -

Table C.1a. *Atlas Outcomes* Disease Groups for Diabetes

Hospitalizations for adult asthma in the *Managed Care Performance Report* were scored according to the following *Atlas Outcomes* disease groups:

Atlas Outcomes Disease Group†	*Atlas Outcomes* Disease Group Code	%
Diabetes	(1010)	68.3
Nerve/muscle disroder	(110)	11.9
Miscellaneous circulatory	(590)	9.8
Nephritis/nephrosis	(1143)	4.6
Miscellaneous		5.4
Total		100.0

† Disease groups are based on the principal diagnosis.

Background *Atlas Outcomes* information is shown below (Tables C.1c – C.1e) for the most predominant disease group code (i.e., 1010: Diabetes)

Table C.1b. Diabetes *Atlas Outcomes* Definition: Disease Group 1010†

Diagnosis Code Groups	Description
• 250.00 – 250.03	Diabetes mellitus without mention of complication
• 250.10 – 250.13	Diabetes with ketoacidosis
• 250.20 – 250.23	Diabetes with hyperosmolarity
• 250.30 – 250.33	Diabetes with other coma
• 250.80 – 250.83	Diabetes with other specified manifestations
• 250.90 – 250.93	Diabetes with unspecified complication
• 251.0	Hypoglycemic coma
• 251.1	Other specified hypoglycemia
• 251.2	Hypoglycemia, unspecified
• 251.3	Postsurgical hypoinsulinemia
• 251.4	Abnormality of secretion of glucagon
• 271.0	Glycogenosis
• 271.1	Galactosemia
• 271.4	Renal glycosuria
• 271.8	Other specified disorders of carbohydrate transport and metabolism
• 271.9	Unspecified disorder of carbohydrate transport and metabolism
• 790.2	Abnormal glucose tolerance test

† The diagnosis code groups shown above were taken from the *Atlas Outcomes* disease group 1010 (diabetes)

Table C.1c. *Atlas* Variables Used to Compute Mortality: Diabetes

Variables & KCFs	Variables & KCFs
Age Squared	**Current Med Insulin**
BUN mg/dL	**Effusion**
Chronic Sensory Deficit	**History of Cancer**
Coma or Stupor	**Oral Temp ^{o}F High**
Constant/Intercept	**Permanent Pacemaker**
Culture Combination	**Respirations High**
Blood and Lymph Culture	
GI Culture	
Reproductive Culture	
Respiratory Culture	
Skin Culture	
Spinal Cord Culture	
Urinary Culture	

Table C.1d. *Atlas* Variables Used to Compute Clinical LOS: Diabetes

Variables & KCFs	Variables & KCFs
Admission Period Surgery	**Lesion**
Age Squared	**Malnutrition Group**
Alk Phos U/L	Albumin <3.0 g/dL
Amputation	Severe Malnutrition
Blood or LymphCulture	**Non Sinus Rhythm Group**
BUN mg/dL	Atrial Fibrillation
Central Region Group	Atrial Flutter
Region 4	AV Conduction Disturbance
Region 5	Multifocal Atrial Tachy
Region 6	Pacemaker Malfunction
Region 7	Pulse < 65
Chronic Neuro Combination[1]	Sino Atrial Dysfunction
Constant/Intercept	Ventricular Tachycardia
CPK U/L	**Oral Temp ^{o}F High**
Current Med Immunosup	**Stenosis**
Damage	**Valve Group**
Damage Group	Cardiac Shunt
AST > 80 U/L	Gradient > 50
CPK > 150 U/L	Heart Valve Prosthesis
Damage	Murmur
Tear	Regurgitation
Gender (F=0; M=1)	Valve Area < 1.0
Glucose mg/dL High	**West Region Group**
Hematocrit % Low	Region 8
Inflammation	Region 9

[1] Chronic Aphasia, Chronic Apraxia, Chronic Ataxia, Chronic Cranial Nerve Def, Chronic Flaccid, Chronic Muscle Weakness, Chronic Paresis Chronic Sensory Deficit, Chronic Speech Deficit, Chronic Tremors, Previous Head Trauma, Previous Stroke

Table C.1e. Mortality and LOS *Atlas* Coefficients for Diabetes

Diabetes Variable		Clinical Mortality		Clinical LOS	
	Variable Code #	Significant in Model	Coefficient	Significant in Model	Coefficient
Admission Period Surgery	710			✔	0.58881700
Age Squared	701	✔	0.00027110	✔	0.00028144
Alk Phos U/L	3206			✔	0.00252900
Amputation	814			✔	0.62772500
Blood and Lymph Culture	4005			✔	1.71040400
BUN mg/dL	3260	✔	0.01970000	✔	0.01726200
Central Region Group[1]	2613			✔	-0.47744400
Chronic Neuro Combination[2]	601			✔	0.30839400
Chronic Sensory Deficit	2112	✔	1.45650000		
Coma or Stupor	2010	✔	1.53820000		
Constant/Intercept	0	✔	-41.05780000	✔	-40.26329200
CPK U/L	3060			✔	0.00048126
Culture Combination[3]	630	✔	0.64560000		
Current Med Immunosup	892			✔	0.64676000
Current Med Insulin	894	✔	-0.51340000		
Damage	1361			✔	1.34541900
Damage Group[4]	672			✔	0.30647800
Effusion	1321	✔	1.80340000		
Gender (f+0 ; m=1)	278			✔	-0.36383000
Glucose mg/dL High	3172			✔	0.00119400
Hematocrit % Low	3561			✔	-0.03201400
History of Cancer	810	✔	1.49930000		
Inflammation	1400			✔	2.60377900
Lesion	1001			✔	0.70339700
Malnutrition Group[5]	686			✔	0.84517100
Non Sinus Rhythm Group[6]	651			✔	0.76992200
Oral Temp °F High	5002	✔	0.33550000	✔	0.45079400
Permanent Pacemaker	827	✔	1.14340000		
Respirations High	5032	✔	0.04680000		
Stenosis	1373			✔	0.73451600
Valve Group[7]	698			✔	0.79280800
West Region Group[8]	2614			✔	-1.09447800

[1] This group variable is based on hospital numbers starting with 4 (designated as Region 4 by MediQual Systems, Inc.; code 740), 5 Region 5: code 741), 6 (Region 6; code 742), or 7: (Region 7; code 743). The states included in the Central Region Group include: IL, OH, MI, IN, WI, TN, KY, AL, MS, MN, ND, NE, IA, MO, SD, KS, LA, OK, AR, and TX.

[2] This is a additive group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables. Each individual variable that is present in the record will summed for use in the scoring calculation.

[3] This is a additive group variable based on the presence of any of the individual culture variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables. Each individual variable that is present in the record will summed for use in the scoring calculation.

[4] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[5] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[6] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[7] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[8] This group variable is based on hospital numbers starting with 8 (designated as Region 8 by MediQual Systems, Inc.; code 729) or 9 (designated as Region 9 by CIC/MediQual Systems, Inc.; code 730). The states included in the West Region Group include: CO, AZ, CA, OR, WA, NV, MT, WY, NM, ID, HI, and AK.

- BREAST CANCER PROCEDURES -

Table C.2a. *Atlas Outcomes* Disease Groups for Breast Cancer Surgery

Inpatient hospitalizations for breast cancer surgery in the *Managed Care Performance Report* were scored according to the following *Atlas Outcomes* disease groups:

Atlas Outcomes Disease Group†	*Atlas Outcomes* Disease Group Code	%
Breast disorder	(900)	96.4
Missing		3.2
Miscellaneous		0.4
Total		100.0

† Disease groups are based on the principal diagnosis.

Background *Atlas Outcomes* information is shown below (Tables C.2b – C.2e) for the most predominant disease group code (i.e., 900: Breast Disorder)

Table C.2b. Breast Disorder *Atlas Outcomes* Definition: Disease Group 900†

Diagnosis Code Groups	Description
• 174.0 – 174.9	Malignant neoplasm of female breast
• 175.0, 175.9	Malignant neoplasm of male breast
• 198.81	Secondary malignant neoplasm of breast
• 217	Benign neoplasm of breast
• 233.0	Carcinoma in situ of breast
• 238.3, 239.3	Neoplasm of uncertain behavior or unspecified nature of breast
• 457.0	Postmastectomy lymphedema syndrome
• 610.0 – 610.9	Benign mammary dysplasias
• 611.0 – 611.9	Other disorders of breast
• 757.6	Specified anomalies of breast
• 793.8	Nonspecific abnormal findings on radiological and other examination of breast
• 879.0, 879.1	Open wound of the breast
• 922.0	Contusion of breast
• 996.54	Mechanical complication due to breast prosthesis
• V50.41	Prophylactic breast removal

† The diagnosis code groups shown above were taken from the *Atlas Outcomes* disease group 900 (breast disorder)

Table C.2c. *Atlas Outcomes* Variables Used to Compute Mortality: Breast Disorder

Variables & KCFs	Variables & KCFs
Albumin g/dL	**Malignant Tumor**
Coagulation Defect Group	**Mass Effect Group**
Platelets < 100 10^9/L	Mass
PT > 15.5 sec	Papilledema
PTT > 35.9	**Renal Group**
Constant/Intercept	BUN > 30 mg d/L
COPD Group	Chronic Renal Disease
Chronic Lung Disease	Creatinine > 1.7 mg/dL
FEV1 < 66% predicted	Urine Protein mg/24 hr
Glucose mg/dL High	**Respirations High**
History of Cancer	

Table C.2d. *Atlas Outcomes* used to compute Clinical LOS: Breast Disorder

Variables & KCFs	Variables & KCFs
Admission Period Surgery	**Damage Group**
Age in Years	AST > 80 U/L
Cancer Group	CPK > 150 U/L
Calcium > 11.0 mg/dL	Damage
History of Cancer	Tear
Malignant Tumor	**Effusion**
CHF Group	**Glucose mg/dL High**
CHF	**Hematocrit % Low**
Edema	**Inflammation**
Effusion Respiratory	**Lesion**
Ejection Fraction < 41%	**Malignant Tumor**
History of CHF	**Oral Temp F High**
S3 Gallop	**Valve Group**
Wedge Pressure > 14	Cardiac Shunt
Coagulation Defect Group	Gradient > 50
Platelets < 100 10^9/L	Heart Valve Prosthesis
PT > 15.5 sec	Murmer
PTT > 35.9	Regurgitation
Constant/Intercept	Valve Area < 1.0
Current Med Insulin	**West Region Group**
Damage	Region 8 Hospitals
	Region 9 Hospitals

Table C.2e. Mortality and LOS *Atlas Outcomes* Coefficients for Breast Disorder

Breast Disorder Variable	Variable Code #	Clinical Mortality Significant in Model	Clinical Mortality Coefficient	Clinical LOS Significant in Model	Clinical LOS Coefficient
Admission Period Surgery	(710)			✔	-1.00391500
Age in Years	(277)			✔	0.01204500
Albumin g/dL	(3030)	✔	-1.01890000		
Cancer Group[1]	(655)			✔	0.20291300
CHF Group[2]	(664)			✔	0.26284300
Coagulation Defect Group[3]	(666)	✔	2.50860000	✔	0.88174100
Constant/Intercept	(0)	✔	-6.98320000	✔	-17.48268000
COPD Group[4]	(670)	✔	-1.80520000		
Current Med Insulin	(894)			✔	0.42890600
Damage	(1361)			✔	-1.06377400
Damage Group[5]	(672)			✔	1.17018500
Effusion	(1321)			✔	1.87388000
Glucose mg/dL High	(3172)	✔	0.00730000	✔	0.00444300
Hematocrit % Low	(3561)			✔	-0.05476400
History of Cancer	(810)	✔	2.83750000		
Inflammation	(1400)			✔	1.41985600
Lesion	(1001)			✔	0.62556300
Malignant Tumor	(1813)	✔	-3.97680000	✔	0.31123800
Mass Effect Group[6]	(688)	✔	1.88530000		
Oral Temp ^{o}F High	(5002)			✔	0.22301100
Renal Group[7]	(692)	✔	2.01990000		
Respirations High	(5032)	✔	0.20190000		
Valve Group[8]	(698)			✔	1.13546800
West Region Group[9]	(2614)			✔	-0.32752800

[1] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[2] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[3] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[4] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the groups. Refer to the Variable Groups reference report for a listing of the specific variables.

[5] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[6] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[7] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[8] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[9] This group variable is based on hospital numbers starting with 8 (designated as Region 8 by MediQual Systems, Inc.; code 729) or 9 (designated as Region 9 by CIC/MediQual Systems, Inc.; code 730). The states included in the West Region Group include: CO, AZ, CA, OR, WA, NV, MT, WY, NM, ID, HI, and AK.

- Neck and Back Procedures -

Table C.3a. *Atlas Outcomes* Disease Groups for Neck/Back Surgery

Hospitalizations for neck/back surgery in the *Managed Care Performance Report* were scored according to the following *Atlas* disease groups:

Atlas Outcomes Disease Group†	*Atlas* Outcomes *Disease* Group Code	%
Spinal disorder	(810)	95.4
Missing		2.7
Miscellaneous		1.9
Total		100.0

† Disease groups are based on the principal diagnosis.

Background *Atlas Outcomes* information is shown below (Tables C.3b – C. 3d) for the most predominant disease group code (i.e., 810: Spinal Disorder)

Table C.3b. Spinal Disorder *Atlas* Definition: Disease Group 810†

Diagnosis Code Groups	Description
• 098.53	Infectious spondylitis
• 720.0 – 720.9	Ankylosing spondylitis and other inflammatory spondylopathies
• 721.0 – 721.91	Spondylosis and allied disorders
• 722.0 – 722.93	Intervertebral disc disorders
• 723.0, 723.1, 723.5, 723.7 – 723.9	Other disorders of cervical region
• 724.00 – 724.9	Other and unspecified disorders of back
• 756.10 – 756.16, 756.19	Anomalies of spine
• 756.10 – 756.16, 756.19	Other congenital musculoskeletal anomalies

† The diagnosis code groups shown above were taken from the *Atlas Outcomes* disease group 810 (spinal disorder).

Table C.3c. *Atlas Outcomes* Variables Used to Compute Mortality: Spinal Disorder

Variables & KCFs	Variables & KCFs
Constant/Intercept **Current Med Anticoag** **Current Med Insulin** **History of Cancer**	**Renal Group** BUN >30 mg/dL Chronic Renal Disease Creatinine >1.7 mg/dL Urine Protein mg/24 hr

Table C.3d. *Atlas Outcomes* Variables used to compute Clinical LOS: Spinal Disorder

Variables & KCFs	Variables & KCFs
Acute Neuro Combination	**Damage Group**
Acute Aphasia	AST > 80 U/L
Acute Apraxia	CPK > 150 U/L
Acute Ataxia	Damage
Acute Cranial Nerv Def	Tear
Acute Flaccid	**Diabetes Group**
Acute Muscle Weakness	Current Med Insulin
Acute Paresis	Diabetes
Acute Sensory Deficit	Glucose < 60 > 249 mg/dL
Acute Speech Deficit	**Gender (F=0; M=1)**
Acute Tremors	**Infection Group**[1]
Gait Abnormality	**Mass Effect Group**
Proprioception	Mass
Admission Period Surgery	Papilledema
Age in Years	**Mechanical Vent Any Days**
Age Squared	**Seizure Group**
Anemia Group	Previous Seizures
Chronic Anemia	Seizure
Hematocrit < 40%	**Stenosis**
Hemoglobin < 13.4 g/dL	**West Region Group**
Chronic Paresis	Region 8 Hospitals
Constant/Intercept	Region 9 Hospitals
COPD Group	
Chronic Lung Disease	
FEV1 < 66% Predicted	

[1] Acinetobacter, Bacillus, Bacteroides, Bordetella, Brucella, Campylobacter, Chlamydia, Clostridium, Corynebacterium, E. coli, Enterobacter, Fungus (ex Candida), Haemophilus, Klebsiella, Legionella, Listeria, Mixed Organisms, Neisseria, Other Org (ex Fungi), Proteus, Providencia, Pseudomonas, Salmonella, Serratia, Shigella, Staph. Aureus, Staph. Epidermidis, Streptobacillus, Streptococcus B, Streptococcus ex B, Yersinia

Table C.3e. Mortality and LOS *Atlas Outcomes* Coefficients for Spinal Disorder

Spinal Disorder Variable	Variable Code #	Clinical Mortality: Significant in Model	Clinical Mortality: Coefficient	Clinical LOS: Significant in Model	Clinical LOS: Coefficient
Acute Neuro Combination[1]	(600)			✔	0.44230800
Admission Period Surgery	(710)			✔	-0.55638500
Age in Years	(277)			✔	-0.03765100
Age Squared	(701)			✔	0.00064611
Anemia Group[2]	(650)			✔	0.69151500
Chronic Paresis	(2101)			✔	0.96336800
Constant/Intercept	(0)	✔	-7.34580000	✔	4.36609100
COPD Group[3]	(670)			✔	0.47712000
Current Med Anticoag	(890)	✔	1.97390000		
Current Med Insulin	(894)	✔	1.86290000		
Damage Group[4]	(672)			✔	0.67403700
Diabetes Group[5]	(673)			✔	0.71345300
Gender (F=0; M=1)	(278)			✔	-0.32421200
History of Cancer	(810)	✔	2.19300000		
Infection Group[6]	(682)			✔	1.09240800
Mass Effect Group[7]	(688)			✔	0.55507100
Mechanical Vent Any Days	(5998)			✔	2.73323400
Renal Group[8]	(692)	✔	2.08290000		
Seizure Group[9]	(694)			✔	0.40583400
Stenosis	(1373)			✔	-0.43330000
West Region Group[10]	(2614)			✔	0.57822700

[1] This is a additive group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables. Each individual variable that is present in the record will summed for use in the scoring calculation.

[2] This is a group variable based on the presence of any of the individual history and KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[3] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[4] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[5] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[6] This is a group variable based on the presence of any of the individual organism variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[7] This is a group variable based on the presence of any of the individual KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[8] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[9] This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group. Refer to the Variable Groups reference report for a listing of the specific variables.

[10] This group variable is based on hospital numbers starting with 8 (designated as Region 8 by MediQual Systems, Inc.; code 729) or 9 (designated as Region 9 by CIC/MediQual Systems, Inc.; code 730). The states included in the West Region Group include: CO, AZ, CA, OR, WA, NV, MT, WY, NM, ID, HI, and AK.

Table C.4. *Atlas* Variable Definitions

Variable Description	*Atlas* Code #	Definition	Source Documents
Acute Neuro Combination	600	This is an additive group variable based on the presence of any of the individual KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Admission Period Surgery	710	This variable is based on the presence of a surgical procedure episode in the admission period.	Facility – defined
Age in Years	277	This variable is based on the patient's age in years. For patients under 12 months, 0 is used; for patients 12-23 months 1 is used; for patients > 23 months, the actual age is used.	Facility – defined
Age Squared	701	This variable is based on the patient's age in years squared.	Facility – defined
Albumin g/dL	3030	This variable used the value of an abnormal albumin < 3.0 g/dL for either a preadmission or admission KCF or imputes a normal of 4.4 for scoring. Records with a laboratory test using another unit of measure will have the result converted for scoring.	Laboratory reports
Alkaline Phosphatase U/L	3206	This variable uses the value of an abnormal alkaline phosphatase of > 200 U/L for either a preadmission or admission KCF or imputes a normal value of 58 for scoring. Records with a laboratory test using another unit of measure will have the result converted for scoring.	Laboratory reports
Amputation	814	This variable is based on the presence of the amputation history finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Anemia Group	650	This is a group variable based on the presence of any of the individual history and KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Blood or Lymph Culture	4005	This variable is based on the presence of a positive blood/lymph culture as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
BUN mg/dL (Blood Urea Nitrogen)	3260	This variable uses the value of an abnormal BUN (blood urea nitrogen) of > 30 mg/dL for either a preadmission or admission KCF or imputes a normal value of 12 for scoring. Records with a laboratory test using another unit of measure will have the result converted for scoring.	Laboratory reports
Cancer Group	655	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records

Variable Description	*Atlas* Code #	Definition	Source Documents
Central Region Group	2613	This is a group variable based on the presence of any of the individual region variables that are part of the group. The region is identified by the first chargacter of the facility (hospital) number. This group variable is based on hospital numbers starting with 4 (designated as Region 4 by CIC/MediQual Systems, Inc.; code 740), 5 (Region 5; code 741), 6 (Region 6; code 742), or 7 (Region 7; code 743). The states included in the Central Region Group include IL, OH, MI, IN, WI, TN, KY, AL, MS, MN, ND, NE, IA, MO, SD, KS, LA, OK, AR, and TX.	Facility-defined
Chronic Neuro Combination	601	This is a additive group variable based on the presence of any of the individual KCF variables that are part of the group	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Chronic Paresis	2101	This variable is based on the presence of chronic paresis as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Chronic Sensory Deficit	2112	This variable is based on the presence of chronic sensory deficit as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Coagulation Defect Group	666	This is group variable based on the presence of any of the individual KCF variables that are part of the group.	Laboratory reports
Coma or Stupor	2010	This variable is based on the presence of coma or stupor as either a preadmission or admission KCF	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Congestive Heart Failure (CHF) Group	664	This is a Congestive Heart Failure (CHF) group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records, chest x-rays, cardiac catheterization report, echocardiogram, ICU flow sheets
COPD (Chronic Obstructive Pulmonary Disease) Group	670	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
CPK U/L (Creatine Phosphokinase)	3060	This variable uses the value of CPK > 150 U/L for either a preadmission or admission KCF or imputes a normal value of 102 (ages > 12 yr) or > 110 (ages < 13 yr) for scoring.	Laboratory reports
Culture Combination	630	This is an additive group variable based on the presence of any of the individual culture variables that are part of the group. Each individual variable that is present in the record will be summed for use in the scoring calculation.	Antibody test, antigen test, bacteriology report, CLO test, culture report, cytology report, EIA, ELISA, Helicobacter test, IgG/IgM tests, immunoassay/immuno-logy tests, latex agglutination test, microbiology report, pathology/serology reports, toxin assay virology report

Variable Description	*Atlas* Code #	Definition	Source Documents
Current Med Anticoag	890	This variable is based on the presence of the current medication – anticoagulant finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Current Med Immunosup	892	This variable is based on the presence of the current medication – immunosuppressive history finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Current Med Insulin	894	This variable is based on the presence of the current medication – insulin history finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Damage	1361	This variable is based on the presence of damage of any site as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Damage Group	672	This is a group variable based on the presence of any of the individual KCF variables that are part of the group.	Laboratory reports, procedure reports, pathology reports, imaging reports
Diabetes Group	673	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records, laboratory records
Effusion	1321	This variable is based on the presence of effusion of any site as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records, procedure reports, pathology reports, imaging reports
Gender	278	(F=0; M=1) This variable is based on the patient's gender. Males will use a value of 1 and all other patients will use a value of 0 for scoring.	Facility - defined
Glucose mg/dL High	3172	This variable uses the value of glucose > 249 mg/dL for either a preadmission or admission KCF or imputes a normal value of 80 (for ages 1 month or more) or 45 (for ages 0-30 days) for scoring. Records with a laboratory test using another unit of measure will have the result converted for scoring.	Laboratory reports
Hematocrit % Low	3561	This variable uses the value of hematocrit < 30% for either a preadmission or admission KCF for ages one month or more or imputes a normal value of 45.5 for scoring.. For ages 0-30 days, the variable uses the value of hematocrit < 40 mg/dL or imputes a normal value of 53 for scoring. Records with a laboratory test using another unit of measure will have the result converted for scoring.	Laboratory records

Variable Description	*Atlas* Code #	Definition	Source Documents
History of Cancer	810	This variable is based on the presence of the cancer history finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Infection Group	682	This is a group variable based on the presence of any of the individual organism variables that are part of the group.	Cultures, immunology, serology, pathology reports
Inflammation	1400	This variable is based on the presence of inflammation of any site as either a preadmission or admission KCF.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records, procedure reports, pathology reports, imaging reports
Lesion	1001	This variable is based on the presence of a lesion of any site as either a preadmission or admission KCF.	Procedure reports, pathology reports, imaging reports
Malignant Tumor	1813	This variable is based on the presence of a malignant tumor of any site as either a preadmission or admission KCF.	Procedure reports, pathology reports, imaging reports
Malnutrition Group	686	This is a group variable based on the presence of any of the individual KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records, laboratory reports
Mass Effect Group	688	This is a group variable based on the presence of any of the individual KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records, procedure reports, pathology reports, imaging reports
Mechanical Vent Any Days	5998	This variable is based on the presence of mechanical ventilation treatment.	Facility-defined
Non Sinus Rhythm Group	651	This is a group variable based on the presence of any of the individual KCF variables that are part of the group	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Oral Temp ^{o}F High	5002	This variable uses the value of oral temperature > 100.9 ^{o}F for either a preadmission or admission KCF or imputes a normal value of 98.6 ^{o}F for scoring. Records with another unit of measure will have the result converted for scoring.	ED record, graphic records, ICU flow sheets, transport records
Permanent Pacemaker	827	This variable is based on the presence of the permanent pacemaker history finding.	ED record, H&P, physician admission note, physician consults, physician progress notes, transfer summaries, transport records
Renal Group	692	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physicians progress notes, transfer summaries, transport records, laboratory reports

Variable Description	*Atlas* Code #	Definition	Source Documents
Respirations High	5032	For ages ≥ 1 month, this variable uses the value of respirations > 24 for either a preadmission or admission KCF or imputes a normal value of 18. For ages 0 – 30 days, the value of respirations > 70 is ascribed or a normal value of 35 is imputed for scoring	ED record, graphic records, ICU flow sheets, transport records
Seizure Group	694	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
Stenosis	1373	This variable is based on the presence of stenosis of any site as either a preadmission or admission KCF.	Procedure reports, pathology reports, imaging reports
Valve Group	698	This is a group variable based on the presence of any of the individual history or KCF variables that are part of the group.	ED record, H&P, physician admission note, physician consults, physician progress notes, transport records
West Region Group	2614	This is a group variable based on the presence of any of the individual region variables that are part of the group. The region is identified by the first character of the facility (hospital) number. This group variable is based on hospital numbers starting with 8 (designated as Region 8 by CIC/MediQual Systems, Inc.; code 729) or 9 (designated as Region 9 by CIC/MediQual Systems, Inc.; code 730). The states included in the West Region Group include: CO, AZ, CA, OR, WA, NV, MT, WY, NM, ID, HI, and AK.	Facility-defined

APPENDIX D: DEFINITION OF IN-HOSPITAL COMPLICATIONS FOR BREAST CANCER AND NECK/BACK PROCEDURES

Cases After Exclusions

Breast Cancer Procedure Complications

Type of In-hospital Complication	Total Cases†			Lumpectomy			Mastectomy		
	#	%	Avg LOS	#	%	Avg LOS	#	%	Avg LOS
Procedure/Medical Care Related	40	1.2%	3.6	4	0.4%	2.3	36	1.6%	3.8
Digestive System	43	1.3%	2.1	19	1.8%	1.3	24	1.1%	2.7
Postoperative Pulmonary Compromise	31	0.9%	5.1	3	0.3%	1.0	28	1.3%	5.5
Lymphedema	1	<0.1%	3.0	0	0.0%	-	1	<0.1%	3.0
Postoperative Hemorrhage	34	1.0%	3.1	8	0.8%	1.3	26	1.2%	3.6
Postoperative Infection	11	0.3%	10.4	1	0.1%	2.0	10	0.5%	11.2
Postoperative Pneumonia	3	0.1%	4.7	1	0.1%	5.0	2	0.1%	4.5
Postoperative Cardiac Complications	12	0.4%	3.0	3	0.3%	1.0	9	0.4%	3.7
Postoperative Venous Thrombosis/Pulmonary Embolism	8	0.2%	7.6	0	0.0%	-	8	0.4%	7.6
Hypo/hypertension	11	0.3%	2.2	3	0.3%	0.7	8	0.4%	2.8
Postoperative Stroke/Anoxic Brn. Damage	3	0.1%	9.7	2	0.2%	7.5	1	<0.1%	14.0
Device/Implant/Graft Complications	10	0.3%	2.9	0	0.0%	-	10	0.5%	2.9
Gastric/Intestinal Hemorrhage or Ulcer	0	0.0%	-	0	0.0%	-	0	0.0%	-
In-hospital Death	1	<0.1%	11.0	0	0.0%	-	1	<0.1%	11.0
With any complication above	194	5.9%	3.7	41	3.9%	1.8	153	6.9%	4.3
Without any complication above	3,079	94.1%	1.9	1,018	96.1%	1.2	2,061	93.1%	2.3

† The term “cases” refers to hospitalizations.

APPENDIX D CONTINUED

Neck and Back Procedure Complications

Type of In-hospital Complication	Total Cases†			Without Fusion			With Fusion		
	#	%	Avg. LOS	#	%	Avg. LOS	#	%	Avg. LOS
Procedure/Medical Care Related Event/Infection ...	412	2.5%	3.8	264	2.4%	2.9	148	2.7%	5.3
Digestive System.....	166	1.0%	4.6	64	0.6%	3.7	102	1.9%	5.2
Postoperative Pulmonary Compromise.....	81	0.5%	5.5	26	0.2%	3.3	55	1.0%	6.6
Postoperative Stroke/Anoxic Brain Damage	70	0.4%	5.0	44	0.4%	4.7	26	0.5%	5.7
Postoperative Hemorrhage	63	0.4%	6.4	31	0.3%	4.5	32	0.6%	8.3
Hypo/hypertension	37	0.2%	2.6	20	0.2%	2.0	17	0.3%	3.5
Postoperative Cardiac Complication	37	0.2%	5.8	17	0.2%	5.3	20	0.4%	6.3
Device, Implant or Graft Complication.....	25	0.2%	4.1	6	0.1%	3.0	19	0.4%	4.5
Postoperative Venous Thrombosis/Pulmonary Embolism.....	23	0.1%	8.4	8	0.1%	5.3	15	0.3%	10.1
Postoperative Infection.....	21	0.1%	12.2	9	0.1%	5.9	12	0.2%	17.0
Pneumonia after Surgery (coded by causative organism)	10	0.1%	7.9	1	<0.1%	3.0	9	0.2%	8.4
In-hospital death.....	8	<0.1%	6.8	3	<0.1%	5.0	5	0.1%	7.8
Gastric/Intestinal Hemorrhage or Ulceration	2	<0.1%	6.5	2	<0.1%	6.5	0	0.0%	-
With any complication above.....	854	5.2%	4.3	467	4.2%	3.4	387	7.2%	5.5
Without any complication above	16,076	97.6%	1.9	10,953	98.8%	1.7	5,123	95.1%	2.4

† The term “cases” refers to hospitalizations.

APPENDIX D CONTINUED

Definition of In-Hospital Complication for Mastectomy/Lumpectomy

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
Procedure/Medical Care Related Events	
ABO incompatibility reaction	999.6
accidental puncture or laceration during a procedure	998.2
acute reaction to foreign substance accidentally left during a procedure	998.7
disruption of operation wound	998.3
foreign body accidentally left during a procedure	998.4
malignant hyperthermia (e.g. due to anesthesia)	995.86
non-healing surgical wound	998.83
other and unspecified complications of medical care, not elsewhere classified	999.9
other specified adverse effects, not elsewhere classified (e.g. hypothermia due to anesthesia)	995.89
other specified complications of procedures	998.89
other transfusion reaction	999.8
other vascular complications (e.g. following infusion, perfusion, or transfusion)	999.2
persistent postoperative fistula	998.6
postoperative shock	998.0
Rh incompatibility reaction	999.7
shock due to anesthesia	995.4
unspecified complication of procedure, not elsewhere classified	998.9
Digestive System Complications	
digestive system complications (e.g. hepatic failure, intestinal obstruction)	997.4
Postoperative Pulmonary Compromise	
acute and chronic respiratory failure	518.84
acute edema of lung, unspecified	518.4
acute respiratory failure	518.81
allergic bronchopulmonary aspergillosis	518.6
emphysema (subcutaneous) (surgical) resulting from a procedure	998.81
iatrogenic pneumothorax	512.1
other permanent tracheostomy	31.29 (procedure)
other pulmonary insufficiency, not elsewhere classified	518.82
mediastinal tracheostomy	31.21 (procedure)
pulmonary congestion and hypostasis	514
pulmonary insufficiency following trauma & surgery	518.5
respiratory complications (e.g. aspiration pneumonia, Mendelson's syndrome)	997.3
temporary tracheostomy	31.1 (procedure)
Lymphedema	
postmastectomy lymphedema syndrome	457.0
Postoperative Hemorrhage	
control of hemorrhage, not otherwise specified	39.98 (procedure)
hemorrhage complicating a procedure	998.11
hematoma complicating a procedure	998.12
seroma complicating a procedure	998.13

Definition of In-Hospital Complication for Mastectomy/Lumpectomy continued

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
In-Hospital Death	
discharge status of 20 (expired)	NA
Postoperative Infection	
infected postoperative seroma	998.51
infection and inflammatory reaction due to indwelling urinary catheter	996.64
infection and inflammatory reaction due to unspecified device, implant and graft	996.60
infection and inflammatory reaction due to vascular device, implant and graft	996.62
infection due to other internal prosthetic device, implant and graft	996.69
other infection	999.3
other postoperative infection	998.59
septicemia	038.0–038.9
Postoperative Pneumonia (coded by causative organism)	
anaerobes	482.81
bacterial pneumonia unspecified	482.9
bronchopneumonia, organism unspecified	485
Chlamydia	483.1
Escherichia coli	482.82
Hemophilus influenzae	482.2
Klebsiella pneumoniae	482.0
Legionnaires' disease	482.84
Mycoplasma pneumoniae	483.0
other gram-negative bacteria	482.83
other specified bacteria	482.89
other specified organism	483.8
pneumonia, organism unspecified	486
Pneumococcal pneumonia (Streptococcus pneumoniae pneumonia)	481
Pseudomonas	482.1
Staphylococcus (aureus, unspecified, other)	482.40-482.49
Streptococcus (Group A, Group B, unspecified, other)	482.30-482.39
Postoperative Cardiac Complications	
acute myocardial infarction after surgery – initial episode of care only	410.x1, x = 0 - 9
cardiac complications (e.g. cardiac arrest, heart failure)	997.1
Postoperative Venous Thrombosis/Pulmonary Embolism	
air embolism	999.1
iatrogenic pulmonary embolism and infarction	415.11
other pulmonary embolism and infarction	415.19
other venous embolism and thrombosis of other specified veins	453.8
peripheral vascular complications	997.2
phlebitis and thrombophlebitis of femoral vein (deep) (superficial)	451.11
phlebitis and thrombophlebitis of iliac vein	451.81
phlebitis and thrombophlebitis of other deep vessels of lower extremities	451.19

Definition of In-Hospital Complication for Mastectomy/Lumpectomy **continued**

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
Hypo/hypertension	
hypertension, not elsewhere classified	997.91
iatrogenic hypotension	458.2
Postoperative Stroke/Anoxic Brain Damage	
acute, but ill-defined cerebrovascular disease	436
anoxic brain damage	348.1
central nervous system complications (e.g. anoxic brain damage, cerebral hypoxia)	997.01
iatrogenic cerebrovascular infarction or hemorrhage	997.02
intracerebral hemorrhage	431
nervous system complication, unspecified	997.00
occlusion and stenosis of precerebral arteries	433.x1, x = 0-3, 8, 9
occlusion of cerebral arteries	434.x1, x = 0, 1, 9
other and unspecified intracranial hemorrhage	432.0 – 432.9
other nervous system complications	997.09
subarachnoid hemorrhage	430
Device, Implant or Graft Complications	
mechanical complication due to artificial skin graft and decellularized allodermis	996.55
mechanical complication due to breast prosthesis	996.54
mechanical complication due to graft of other tissue, not elsewhere classified	996.52
mechanical complication due to urethral (indwelling) catheter	996.31
other complication due to other internal prosthetic device, implant and graft	996.79
other complication due to unspecified device, implant and graft	996.70
other complication due to vascular device, implant and graft	996.74
Gastric/Intestinal Hemorrhage or Ulceration	
duodenal ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	532.00-532.21
duodenal ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	532.60-532.61
duodenal ulcer chronic or unspecified with hemorrhage with or without obstruction	532.40-532.41
gastric ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	531.00-531.21
gastric ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	531.60-531.61
gastric ulcer chronic or unspecified with hemorrhage with or without obstruction	531.40-531.41
gastrojejunal ulcer acute with hemorrhage, perforation or hemorrhage and perforation with or without obstruction	534.00-534.21
gastrojejunal ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	534.60-534.61
gastrojejunal ulcer chronic or unspecified with hemorrhage with or without obstruction	534.40-534.41
hemorrhage of gastrointestinal tract, unspecified	578.9
peptic ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	533.00-533.21
peptic ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	533.60-533.61
peptic ulcer chronic or unspecified with hemorrhage with or without obstruction	533.40-533.41

Definition of In-Hospital Complication for Neck/Back Procedures

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
Procedure/Medical Care Related Events	
ABO incompatibility reaction	999.6
accidental puncture or laceration during a procedure	998.2
acute reaction to foreign substance accidentally left during a procedure	998.7
disruption of operation wound	998.3
foreign body accidentally left during a procedure	998.4
malignant hyperthermia (e.g. due to anesthesia)	995.86
non-healing surgical wound	998.83
other and unspecified complications of medical care, not elsewhere classified	999.9
other specified adverse effects, not elsewhere classified (e.g. hypothermia due to anesthesia).	995.89
other specified complications of procedures	998.89
other transfusion reaction	999.8
other vascular complications (e.g. following infusion, perfusion, or transfusion)	999.2
persistent postoperative fistula	998.6
postoperative shock	998.0
Rh incompatibility reaction	999.7
shock due to anesthesia	995.4
unspecified complication of procedure, not elsewhere classified	998.9
Digestive System Complications	
digestive system complications (e.g. hepatic failure, intestinal obstruction)	997.4
Postoperative Pulmonary Compromise	
acute and chronic respiratory failure	518.84
acute edema of lung, unspecified	518.4
acute respiratory failure	518.81
allergic bronchopulmonary aspergillosis	518.6
emphysema (subcutaneous) (surgical) resulting from a procedure	998.81
iatrogenic pneumothorax	512.1
other permanent tracheostomy	31.29 (procedure)
other pulmonary insufficiency, not elsewhere classified	518.82
mediastinal tracheostomy	31.21 (procedure)
pulmonary congestion and hypostasis	514
pulmonary insufficiency following trauma & surgery	518.5
respiratory complications (e.g. aspiration pneumonia, Mendelson's syndrome)	997.3
temporary tracheostomy	31.1 (procedure)
Postoperative Hemorrhage	
control of hemorrhage, not otherwise specified	39.98 (procedure)
hemorrhage complicating a procedure	998.11
hematoma complicating a procedure	998.12
seroma complicating a procedure	998.13
In-Hospital Death	
discharge status of 20 (expired)	NA

Definition of In-Hospital Complication for Neck/Back Procedures continued

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
Postoperative Infection	
infected postoperative seroma	998.51
infection and inflammatory reaction due to indwelling urinary catheter	996.64
infection and inflammatory reaction due internal joint prosthesis	996.66
infection and inflammatory reaction due to nervous system device, implant and graft	996.63
infection and inflammatory reaction due to other internal orthopedic device, implant and graft	996.67
infection and inflammatory reaction due to vascular device, implant and graft	996.62
other infection	999.3
other postoperative infection	998.59
septicemia	038.0–038.9
Postoperative Pneumonia (coded by causative organism)	
anaerobes	482.81
bacterial pneumonia unspecified	482.9
bronchopneumonia, organism unspecified	485
Chlamydia	483.1
Escherichia coli	482.82
Hemophilus influenzae	482.2
Klebsiella pneumoniae	482.0
Legionnaires' disease	482.84
Mycoplasma pneumoniae	483.0
other gram-negative bacteria	482.83
other specified bacteria	482.89
other specified organism	483.8
pneumonia, organism unspecified	486
Pneumococcal pneumonia (Streptococcus pneumoniae pneumonia)	481
Pseudomonas	482.1
Staphylococcus (aureus, unspecified, other)	482.40-482.49
Streptococcus (Group A, Group B, unspecified, other)	482.30-482.39
Postoperative Cardiac Complications	
acute myocardial infarction after surgery – initial episode of care only	410.x1, x = 0 - 9
cardiac complications (e.g. cardiac arrest, heart failure)	997.1
Postoperative Venous Thrombosis/Pulmonary Embolism	
air embolism	999.1
iatrogenic pulmonary embolism and infarction	415.11
other pulmonary embolism and infarction	415.19
other venous embolism and thrombosis of other specified veins	453.8
peripheral vascular complications	997.2
phlebitis and thrombophlebitis of femoral vein (deep) (superficial)	451.11
phlebitis and thrombophlebitis of iliac vein	451.81
phlebitis and thrombophlebitis of other deep vessels of lower extremities	451.19

Definition of In-Hospital Complication for Neck/Back Procedures continued

listing of specific ICD.9.CM codes

Type of Complication	ICD.9.CM Code
Hypo/Hypertension	
hypertension, not elsewhere classified	997.91
iatrogenic hypotension	458.2
Postoperative Stroke/Anoxic Brain Damage	
acute, but ill-defined cerebrovascular disease	436
anoxic brain damage	348.1
central nervous system complications (e.g. anoxic brain damage, cerebral hypoxia)	997.01
iatrogenic cerebrovascular infarction or hemorrhage	997.02
intracerebral hemorrhage	431
nervous system complication, unspecified	997.00
occlusion and stenosis of precerebral arteries	433.x1, x = 0-3, 8, 9
occlusion of cerebral arteries	434.x1, x = 0, 1, 9
other and unspecified intracranial hemorrhage	432.0–432.9
other nervous system complications	997.09
subarachnoid hemorrhage	430
Device, Implant or Graft Complications	
mechanical complication due to graft of other tissue, not elsewhere classified	996.52
mechanical complication due to urethral (indwelling) catheter	996.31
mechanical complication of internal orthopedic device, implant and graft	996.4
other complication due to internal joint prosthesis	996.77
other complication due to nervous system device, implant and graft	996.75
other complication due to other internal orthopedic device, implant and graft	996.78
other complication due to vascular device, implant and graft	996.74
Gastric/Intestinal Hemorrhage or Ulceration	
duodenal ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	532.00-532.21
duodenal ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	532.60-532.61
duodenal ulcer chronic or unspecified with hemorrhage with or without obstruction	532.40-532.41
gastric ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	531.00-531.21
gastric ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	531.60-531.61
gastric ulcer chronic or unspecified with hemorrhage with or without obstruction	531.40-531.41
gastrojejunal ulcer acute with hemorrhage, perforation or hemorrhage and perforation with or without obstruction	534.00-534.21
gastrojejunal ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	534.60-534.61
gastrojejunal ulcer chronic or unspecified with hemorrhage with or without obstruction	534.40-534.41
hemorrhage of gastrointestinal tract, unspecified	578.9
peptic ulcer acute with hemorrhage, perforation, or hemorrhage and perforation with or without obstruction	533.00-533.21
peptic ulcer chronic or unspecified with hemorrhage and perforation with or without obstruction	533.60-533.61
peptic ulcer chronic or unspecified with hemorrhage with or without obstruction	533.40-533.41

APPENDIX E: RISK FACTORS CONSIDERED

Preventable Hospitalizations
Ear/Nose/Throat Infection - Pediatric
Cases under age 18

Variable and Codes	HMO *N*=735 Cases * #	Cases * %	Avg. LOS
ENT Study Population (Principal Diagnosis)			
acute laryngitis& tracheitis (464)	291	39.6	1.3
acute upper respiratory infections of multiple or unspecified sites (465)	75	10.2	1.8
acute tonsillitis (463)	60	8.2	1.7
chronic disease of tonsils & adenoids (474)	56	7.6	1.0
suppurative & unspecified otitis media (382)	56	7.6	1.6
nonsuppurative otitis media & eustachian tube disorders (381)	44	6.0	1.9
chronic sinusitis (473)	40	5.4	2.3
streptococcal sore throat & scarlet fever (034)	31	4.2	1.7
acute sinusitis (461)	26	3.5	2.8
influenza (487)	22	3.0	4.0
acute pharyngitis (462)	20	2.7	1.7
disorders of external ear (380)	14	1.9	2.1
Age			
0-4 years	485	66.0	1.7
5-17 years	250	34.0	1.6
mean age: 4.2			
Atlas Outcomes® Admission Severity Group (ASG)			
Note: Facilities are not required to report ASG for ear, nose, mouth, and throat (MDC3) cases.			
0	246	33.5	1.4
1	106	14.4	1.7
2	3	0.4	2.0
3	1	0.1	2.0
4	0	0.0	—
missing	379	51.6	1.8
Diagnosis Related Groups (DRG)			
otitis media & URI, age 0-17 (070)	303	41.2	2.1
laryngotracheitis (071)	289	39.3	1.3
myringotomy with tube insertion, age 0-17 (062)	56	7.6	1.6
tonsillectomy &/or adenoidectomy only, age 0-17. (060)	54	7.3	1.0
sinus & mastoid procedures, age 0-17. (054)	16	2.2	2.7
other ear, nose, mouth& throat diagnoses, age 0-17 (074)	13	1.8	2.1
epiglottitis (067)	2	0.3	2.0
miscellaneous ear, nose, mouth & throat procedures (055)	1	0.1	3.0
tonsillectomy& adenoidectomy procedures except tonsillectomy &/or adenoidectomy only, age 0-17 (058)	1	0.1	1.0

*Cases after exclusions
†Complications and comorbidities
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Ear/Nose/Throat Infection - Pediatric

Cases under age 18

Variable and Codes	HMO *N*=735 Cases * #	%	Avg. LOS
Discharge Status			
home	726	98.8	1.6
acute transfer	6	0.8	1.7
non-acute transfer	2	0.3	2.0
In-hospital mortality	0	0.0	—
left against medical advice	1	0.1	1.0
Invalid	0	0.0	—
Gender			
male	441	60.0	1.7
female	294	40.0	1.6
Major Diagnostic Categories (MDC)			
ear, nose, mouth and throat (03)	735	100.0	1.6
Atlas Outcomes® Disease Groups			
Note: Facilities are not required to report ASG for ear, nose, mouth, and throat (MDC3) cases.			
ear/nose/throat disorder	356	48.4	1.5
missing	379	51.6	1.8
Race			
white	607	82.6	1.6
black	59	8.0	1.8
other/unknown race	69	9.4	1.7

*Cases after exclusions

† Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Ear/Nose/Throat Infection - Adult

Cases age 18 - 64

Variable and Codes	HMO *N*=510 Cases* #	%	Avg. LOS
ENT Study Population (Principal Diagnosis)			
chronic sinusitis (473)	74	14.5	2.3
acute tonsillitis (463)	67	13.1	1.9
acute sinusitis (461)	59	11.6	3.2
acute upper respiratory infections of multiple or unspecified sites (465)	55	10.8	2.2
acute pharyngitis (462)	52	10.2	1.8
influenza (487)	48	9.4	2.6
acute laryngitis & tracheitis (464)	41	8.0	2.2
streptococcal sore throat & scarlet fever (034)	38	7.5	2.4
disorders of external ear (380)	32	6.3	2.8
chronic disease of tonsils & adenoids (474)	23	4.5	1.4
suppurative & unspecified otitis media (382)	15	2.9	1.7
nonsuppurative otitis media & eustachian tube disorders (381)	5	1.0	1.2
chronic pharyngitis & nasopharyngitis (472)	1	0.2	2.0
Age			
18-44	340	66.7	2.2
45-64	170	33.3	2.5
mean age: 38.3			
Atlas Outcomes® Admission Severity Group (ASG)			
Note: Facilities are not required to report ASG for ear, nose, mouth, and throat (MDC3) cases.			
0	254	49.8	2.2
1	25	4.9	2.5
2	19	3.7	3.6
3	2	0.4	4.0
4	0	0.0	—
missing	210	41.2	2.2
Diagnosis Related Groups (DRG)			
otitis media & URI, age greater than 17 with CC† (068)	186	36.5	2.7
otitis media & URI, age greater than 17 w/o CC† (069)	158	31.0	2.1
sinus & mastoid procedures, age greater than 17 (053)	59	11.6	1.8
epiglottitis (067)	30	5.9	2.2
other ear, nose, mouth & throat diagnoses, age greater than 17 (073)	29	5.7	2.7
tonsillectomy &/or adenoidectomy only, age greater than 17 (059)	23	4.5	1.4
myringotomy with tube insertion, age greater than17 (061)	8	1.6	3.4
miscellaneous ear, nose, mouth & throat procedures (055)	6	1.2	1.7
laryngotracheitis (071)	5	1.0	2.4
tonsillectomy & adenoidectomy procedures except tonsillectomy &/or adenoidectomy only, age greater than 17 (057)	4	0.8	1.3

*Cases after exclusions
†Complications and comorbidities
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Ear/Nose/Throat Infection - Adult

Cases age 18 - 64

Variable and Codes	HMO *N*=510 Cases* #	Cases* %	Avg. LOS
Diagnosis Related Groups (DRG) cont.			
mouth procedures without CC† ... (169)	1	0.2	1.0
other ear, nose, mouth & throat OR procedures... (063)	1	0.2	3.0
Discharge Status			
home	506	99.2	2.3
acute transfer	0	0.0	—
non-acute transfer	3	0.6	5.7
In-hospital mortality	0	0.0	—
left against medical advice	1	0.2	1.0
Invalid	0	0.0	—
Gender			
male	214	42.0	2.3
female	296	58.0	2.3
Major Diagnostic Categories (MDC)			
ear, nose, mouth and throat ... (03)	510	100.0	2.3
Atlas Outcomes® Disease Groups			
Note: Facilities are not required to report ASG for ear, nose, mouth, and throat (MDC3) cases.			
ear/nose/throat disease	296	58.0	2.4
miscellaneous hematologic	2	0.4	2.5
non-septic infection	1	0.2	1.0
burns/injuries	1	0.2	1.0
missing	210	41.2	2.2
Race			
white	358	70.2	2.4
black	61	12.0	2.2
other/unknown race	91	17.8	2.1

*Cases after exclusions

†Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Gastrointestinal Infections

Cases under age 65

Variable and Codes	HMO *N*=1,053 Cases * #	%	Avg. LOS
GI Study Population (Principal Diagnosis)			
other & unspecified non- infectious gastroenteritis & colitis (558.9)	932	88.5	2.1
infectious colitis, enteritis, & gastroenteritis (009.0)	55	5.2	2.7
salmonella gastroenteritis (003.0)	35	3.3	3.1
colitis, enteritis, & gastroenteritis of presumed infectious origin (009.1)	26	2.5	3.1
toxic gastroenteritis & colitis (558.2)	5	0.5	4.4
Age			
0-4 years	219	20.8	1.7
5-17 years	130	12.3	1.8
18-44 years	406	38.6	2.2
45-64 years	298	28.3	2.7
mean age: 29.2			
Atlas Outcomes® Admission Severity Group (ASG)			
0	254	24.1	1.8
1	718	68.2	2.2
2	54	5.1	3.7
3	9	0.9	2.3
4	0	0	—
missing	18	1.7	1.9
Discharge Status			
home	1,033	98.1	2.2
acute transfer	10	0.9	3.0
non-acute transfer	6	0.6	4.7
in-hospital mortality	0	0.0	—
left against medical advice	4	0.4	0.8
invalid	0	0.0	—
Diagnosis Related Groups (DRG)			
esophagitis, gastroenteritis & miscellaneous digestive disorders, age greater than 17 with CC† (182)	383	36.4	2.6
esophagitis, gastroenteritis & miscellaneous digestive disorders, age 0-17 (184)	349	33.1	1.7
esophagitis, gastroenteritis & miscellaneous digestive disorders, age greater than 17 without CC† (183)	311	29.5	2.1
other digestive system diagnoses, age greater than 17 with CC† (188)	4	0.4	4.8
appendectomy without complicated principal diagnosis with CC† (166)	2	0.2	1.5
peritoneal adhesiolysis with CC† (150)	2	0.2	10.0

*Cases after exclusions
†Complications and comorbidities
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Gastrointestinal Infections

Cases under age 65

Variable and Codes	HMO *N*=1,053 Cases * #	Cases * %	Avg. LOS
Diagnosis Related Groups (DRG) *cont.*			
appendectomy without complicated principal diagnosis without CC† (167)	1	0.1	2.0
other digestive system diagnoses, age greater than 17 without CC† (189)	1	0.1	3.0
Gender			
male	428	40.6	2.0
female	625	59.4	2.3
Major Diagnostic Categories (MDC)			
digestive system (06)	1,053	100.0	2.2
Atlas Outcomes® Disease Groups			
intestinal disorder	916	87.0	2.1
gastrointestinal infectious disorder	114	10.8	2.9
miscellaneous gastrointestinal	2	0.2	1.0
acid base/electrolyte imbalance	1	0.1	2.0
ear/nose/throat disorder	1	0.1	2.0
hypertensive heart disorder	1	0.1	2.0
missing	18	1.7	1.9
Race			
white	905	85.9	2.2
black	59	5.6	2.3
other/unknown race	89	8.5	2.1

*Cases after exclusions

† Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Kidney/Urinary Tract Infection

Cases under age 65

Variable and Codes	HMO *N*=1,313 Cases * #	%	Avg. LOS
Kidney/Urinary Tract Study Population (Principal Diagnosis)			
urinary tract infection, site not specified (599.0)	510	38.8	3.1
acute pyelonephritis without lesion of renal medullary necrosis (590.10)	498	37.9	2.9
pyelonephritis, unspecified (590.80)	292	22.2	2.8
chronic pyelonephritis without lesion of renal medullary necrosis (590.00)	7	0.5	3.1
renal & perinephric abscess (590.2)	6	0.5	5.3
Age			
0-17 years	340	25.9	2.7
18-44 years	517	39.4	2.7
45-64 years	456	34.7	3.5
mean age: 32.6			
Atlas Outcomes® Admission Severity Group (ASG)			
0	533	40.6	2.5
1	684	52.1	3.2
2	50	3.8	4.1
3	11	0.8	5.0
4	1	0.1	2.0
missing	34	2.6	3.0
Discharge Status			
home	1,248	95.0	2.9
acute transfer	9	0.7	2.8
non-acute transfer	48	3.7	6.0
in-hospital mortality	1	0.1	6.0
left against medical advice	7	0.5	2.7
invalid	0	0.0	—
Diagnosis Related Groups (DRG)			
kidney & urinary tract infections, age greater than 17 with CC† (320)	506	38.5	3.5
kidney & urinary tract infections, age greater than 17 without CC† (321)	449	34.2	2.5
kidney & urinary tract infections, age 0-17 (322)	339	25.8	2.7
other kidney & urinary tract OR procedures (315)	8	0.6	7.1
transurethral procedures with CC† (310)	6	0.5	2.5
prostatectomy with CC† (306)	2	0.2	12.5
minor bladder procedures with CC† (308)	1	0.1	9.0
nonextensive OR procedure unrelated to principal diagnosis (477)	1	0.1	2.0
urethral procedures, age greater than 17 with CC† (312)	1	0.1	3.0

*Cases after exclusions
†Complications and comorbidities
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Kidney/Urinary Tract Infection

Cases under age 65

Variable and Codes	HMO *N*=1,313 Cases * #	%	Avg. LOS
Gender			
male	259	19.7	3.3
female	1,054	80.3	2.9
Major Diagnostic Categories (MDC)			
kidney and urinary system (11)	1,313	100.0	3.0
Atlas Outcomes® Disease Groups			
genitourinary infection	1,278	97.3	3.0
miscellaneous gastrointestinal	1	0.1	1.0
missing	34	2.6	3.0
Race			
white	1,012	77.1	2.9
black	144	11.0	3.2
other/unknown race	157	12.0	3.4

*Cases after exclusions

† Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Hypertension

Cases 18 – 64 years of age

Variable and Codes	HMO *N*=447 Cases * #	%	Avg. LOS
Hypertension Study Population (Principal Diagnosis)			
essential hypertension unspecified (401.9)	197	44.1	2.1
essential hypertension malignant (401.0)	178	39.8	2.6
hypertensive heart disease unspecified without congestive heart failure (402.90)	39	8.7	2.3
hypertensive heart disease malignant without congestive heart failure (402.00)	14	3.1	2.9
essential hypertension benign (401.1)	8	1.8	2.9
hypertensive renal disease unspecified without mention of renal failure (403.90)	6	1.3	2.0
hypertensive renal disease malignant without mention of renal failure (403.00)	2	0.4	3.0
hypertensive heart disease benign without congestive heart failure (402.10)	1	0.2	1.0
hypertensive heart & renal disease malignant without mention of congestive heart failure or renal failure (404.00)	1	0.2	6.0
hypertensive heart & renal disease unspecified without mention of congestive heart failure or renal failure (404.90)	1	0.2	1.0
Age			
18-44 years	139	31.1	2.3
45-64 years	308	68.9	2.4
mean age: 48.9			
Atlas Outcomes® Admission Severity Group (ASG)			
0	318	71.1	2.3
1	96	21.5	2.7
2	12	2.7	2.6
3	5	1.1	3.0
4	0	0.0	—
missing	16	3.6	2.1
Discharge Status			
home	429	96.0	2.3
acute transfer	9	2.0	2.7
non-acute transfer	5	1.1	3.8
in-hospital mortality	0	0.0	—
left against medical advice	4	0.9	1.3
invalid	0	0.0	—
Diagnosis Related Groups (DRG)			
hypertension (134)	403	90.2	2.3
circulatory disorders except acute myocardial infarction with cardiac catheterization without complex diagnosis (125)	19	4.3	2.7

*Cases after exclusions

†Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Hypertension

Cases 18 – 64 years of age

Variable and Codes	HMO *N*=447 Cases * #	%	Avg. LOS
Diagnosis Related Groups (DRG) *cont.*			
circulatory disorders except acute myocardial infarction with cardiac catheterization & complex diagnosis (124)	11	2.5	2.8
other kidney & urinary tract diagnoses, age greater than 17 with CC† (331)	4	0.9	2.3
other kidney & urinary tract diagnoses, age greater than 17 without CC† (332)	4	0.9	2.3
nonextensive OR procedure unrelated to principal diagnosis (477)	2	0.4	2.5
other circulatory system OR procedures (120)	2	0.4	4.5
circulatory disorders with acute myocardial infarction & major complications, discharged alive (121)	1	0.2	8.0
other vascular procedures with CC† (478)	1	0.2	1.0
Gender			
male	217	48.5	2.4
female	230	51.5	2.3
Major Diagnostic Categories (MDC)			
circulatory system (05)	439	98.2	2.4
kidney and urinary system (11)	8	1.8	2.3
Atlas Outcomes® Disease Groups			
hypertensive heart disorder	425	95.1	2.4
nephritis/nephrosis	6	1.3	2.7
missing	16	3.6	2.1
Race			
white	262	58.6	2.3
black	136	30.4	2.4
other/unknown race	49	11.0	2.3

*Cases after exclusions

†Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Chronic Obstructive Pulmonary Disease (COPD)

Cases 18 – 64 years of age

Variable and Codes	HMO *N*=1,277 Cases * #	%	Avg. LOS
COPD Study Population (Principal Diagnosis)			
obstructive chronic bronchitis without mention of acute exacerbation (491.21)	1,171	91.7	4.2
chronic airway obstruction, not elsewhere classified (496)	55	4.3	3.3
obstructive chronic bronchitis without mention of acute exacerbation (491.20)	28	2.2	3.6
other emphysema (492.8)	20	1.6	3.9
emphysematous bleb (492.0)	3	0.2	3.0
Age			
18-44 years	122	9.6	3.4
45-64 years	1,155	90.4	4.2
mean age: 54.9			
Atlas Outcomes® Admission Severity Group (ASG)			
0	1	0.1	2.0
1	576	45.1	3.8
2	643	50.4	4.5
3	39	3.1	4.9
4	0	0.0	—
missing	18	1.4	4.0
Discharge Status			
home	1,209	94.7	4.0
acute transfer	10	0.8	7.5
non-acute transfer	46	3.6	7.4
in-hospital mortality	2	0.2	5.5
left against medical advice	9	0.7	1.7
invalid	1	0.1	1.0
Diagnosis Related Groups (DRG)			
chronic obstructive pulmonary disease (088)	1,277	100.0	4.2
Gender			
male	540	42.3	3.9
female	737	57.7	4.3
Major Diagnostic Categories (MDC)			
respiratory system (04)	1,277	100.0	4.2
Atlas Outcomes® Disease Groups			
chronic lung disease	1,253	98.1	4.2
respiratory failure/insufficiency	1	0.1	10.0
other lung infection	1	0.1	1.0
miscellaneous respiratory	1	0.1	2.0

*Cases after exclusions

†Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Preventable Hospitalizations

Chronic Obstructive Pulmonary Disease (COPD)

Cases 18 – 64 years of age

Variable and Codes	HMO *N*=1,277 Cases * #	%	Avg. LOS
Atlas Outcomes® Disease Groups cont.			
hypertensive heart disorder	1	0.1	2.0
angina	1	0.1	3.0
diabetes	1	0.1	5.0
missing	18	1.4	4.0
Race			
white	1,047	82.0	4.2
black	137	10.7	3.9
other/unknown race	93	7.3	4.2

*Cases after exclusions

† Complications and comorbidities

Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Disease Management

Diabetes

Cases age 18 - 75

Variable and Codes		***HMO*** *N*= 1,570			
		Cases*		**Avg.**	**Rehosp.**
		#	**%**	**LOS**	**%**
Age					
18-25 years		102	6.5	2.5	21.4
26-35 years		145	9.2	2.9	16.7
36-45 years		299	19.0	4.0	17.8
46-55 years		426	27.1	4.6	13.3
56-65 years		397	25.3	5.4	15.7
66-75 years		201	12.8	5.7	15.3
mean age:	*49.8 (HMO)*				
Atlas Outcomes® Admission Severity Group (ASG)					
0		298	19.0	2.6	16.2
1		899	57.3	4.4	14.2
2		243	15.5	6.1	20.6
3		57	3.6	8.0	20.0
4		3	0.2	27.7	0.0
missing		70	4.5	4.6	—
Atlas Outcomes® Predicted Length of Stay (PLOS)					
0 – 4.256 days		235	15.0	2.6	14.6
4.257 – 8.826 days		1,019	64.9	4.1	13.5
8.827+ days		246	15.7	7.9	26.6
missing		70	4.5	4.6	—
Cancer					
none		1,527	97.3	4.5	16.1
malignant neoplasm/cancer insitu	*(140.0-208.9, 230.0-234.9)*	18	1.1	4.5	6.7
history of cancer	*(v10.00-v10.90)*	25	1.6	5.1	8.0
Cardiomyopathy					
no		1,539	98.0	4.5	15.9
yes	*(425.3, 425.4, 425.8, 425.9)*	31	2.0	5.4	8.3
Complicated Hypertension					
no		1,467	93.4	4.4	15.3
yes	*(402.x1, 403.x1, 404.x1, 404.x2, 404.x3, 405.x1, 405.x9)*	103	6.6	6.0	23.2
COPD					
no		1,511	96.2	4.4	15.9
yes	*(491.20, 491.21, 492.0, 492.28, 496, 506.4, 518.2)*	59	3.8	6.1	13.0
Diabetes Complications					
none	*(250.00, 250.01)*	49	3.1	2.7	2.1
short-term complications	*(250.02, 250.03, 250.1x – 250.3x)*	664	42.3	3.2	11.4
long-term complications	*(250.4x – 250.9x)*	857	54.6	5.6	20.2

*Cases after exclusions
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Disease Management

Diabetes

Cases age 18 - 75

Variable and Codes	*HMO* *N*= 1,570 Cases* #	Cases* %	Avg. LOS	Rehosp. %
Gender				
female	670	42.7	4.2	16.4
male	900	57.3	4.7	15.4
Heart Failure				
no	1,459	92.9	4.4	15.7
yes *(398.91, 428.0, 428.1, 428.9)*	111	7.1	6.4	17.8
Note: For those cases having one of the above heart failure codes and a hypertension with congestive heart failure code (402.x1, 404.x1, 404.x3) in the same record, only the hypertension code was counted.				
Ischemic Heart Disease (no AMI)				
no	1,353	86.2	4.4	15.6
yes *(411-414)*	217	13.8	5.2	17.2
Lower Extremity Amputation *(non-traumatic)* *(excludes diagnosis codes 895.x, 896.x, 897.x)*				
none	1,385	88.2	3.9	14.8
of toe *(84.11)*	114	7.3	7.9	26.7
through foot *(84.12)*	32	2.0	9.5	26.7
at or below knee *(84.13, 84.14, 84.15, 84.16)*	35	2.2	11.3	12.9
above knee *(84.17)*	4	0.3	9.3	0.0
Obesity				
none	1,487	94.7	4.5	16.3
morbid *(278.01)*	25	1.6	6.2	16.7
unspecified *(278.00)*	58	3.7	4.5	3.7
Patient's Residence				
absolutely urban	278	17.7	4.1	14.3
dominantly urban	629	40.1	4.7	15.9
mostly urban	417	26.6	4.6	18.4
mostly rural	111	7.1	4.9	15.0
dominantly rural	70	4.5	4.3	10.4
absolutely rural	11	0.7	3.1	0.0
out-of-state	54	3.4	4.0	12.2
Peripheral Vascular Disease				
no	1,492	95.0	4.4	15.2
yes *(443.0, 443.1, 443.81, 443.89, 443.9)*	78	5.0	6.3	27.5
Race/Ethnicity				
White, non-Hispanic	1,073	68.3	4.6	17.3
Black, non-Hispanic	314	20.0	3.6	12.6
Hispanic	19	1.2	4.2	29.4
Other/unknown	164	10.4	5.5	9.8

*Cases after exclusions

†Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Disease Management

Diabetes

Cases age 18 - 75

Variable and Codes	***HMO*** *N*= 1,570			
	Cases*		**Avg.**	**Rehosp.**
	#	**%**	**LOS**	**%**
Renal Dialysis				
no	1,500	95.5	4.4	15.3
yes (v45.1, v56.0, v56.8, procedure codes 39.95, 54.98)	70	4.5	6.0	27.7
Renal Failure				
none	1,486	94.6	4.4	15.5
chronic (585)	42	2.7	6.8	21.1
acute (584.5, 584.6, 584.7, 584.8, 584.9)	40	2.5	6.9	22.2
unspecified (586)	2	0.1	8.5	50.0
Surgical DRG / Renal Failure				
surgical DRG w/ renal failure	25	1.6	11.2	23.8
surgical DRG w/o renal failure	378	24.1	7.7	24.9
non-surgical DRG w/ renal failure	59	3.8	5.0	21.8
non-surgical DRG w/o renal failure	1,108	70.6	3.2	12.4
Transfer-In Status				
no	1,555	99.0	4.5	16.0
yes	15	1.0	8.6	0.0

*Cases after exclusions
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide						
	Total Cases N=8,277	Mastectomy N=2,521			Lumpectomy N=5,756		
	total #	# cases	% total	% inpatient	# cases	% total	% inpatient
Statewide	8,277	2,521	30.5	90.4	5,756	69.5	19.1
Procedure Type							
lumpectomy (85.20 – 85.22, 19112, 19120, 19125, 19126)	4,234	NA	NA	NA	4,234	100	15.8
subtotal mastectomy (85.23, 19160, 19162)	1,522	NA	NA	NA	1,522	100	28.5
simple mastectomy (85.41 – 85.44, 19180)	2,361	2,361	100	94.2	NA	NA	NA
radical mastectomy (85.45 – 85.48, 19200, 19220, 19240)	160	160	100	33.8	NA	NA	NA
Breast Cancer Type							
malignant (174.0 – 174.9, 238.3, 239.3)	5,257	1,363	25.9	89.3	3,894	74.1	19.7
in situ (233.0)	1,691	388	22.9	90.5	1,303	77.1	3.8
metastatic (196.3, 198.2, 198.81)	1,329	770	57.9	92.3	559	42.1	50.8
Age							
18 – 29 years	57	15	26.3	86.7	42	73.7	23.8
30 – 39 years	665	249	37.4	93.2	416	62.6	19.7
40 – 49 years	2,743	824	30.0	90.4	1,919	70.0	17.7
50 – 59 years	3,331	994	29.8	90.2	2,337	70.2	19.3
60 – 64 years	1,481	439	29.6	89.3	1,042	70.4	21.0
Atlas Outcomes® Admission Severity Group (ASG)							
0	3,067	2,062	67.2	100	1,005	32.8	100
1	85	59	69.4	100	26	30.6	100
2	102	82	80.4	100	20	19.6	100
3	15	8	53.3	100	7	46.7	100
4	4	3	75.0	100	1	25.0	100
missing (inpatient)	107	65	60.7	100	42	39.3	100
Outpatient	4,897	242	4.9	NA	4,655	95.1	NA
Atlas Outcomes® Disease Groups							
breast disorder	3,257	2,206	67.7	100	1,051	32.3	100
myeloproliferative disorder	13	5	38.5	100	8	61.5	100
msk/soft tissue neoplasm	1	1	100	100	0	0	0
miscellaneous endocrine	1	1	100	100	0	0	0
burns/injuries	1	1	100	100	0	0	0
missing(inpatient)	107	65	60.7	100	42	39.3	100
outpatient	4,897	242	4.9	NA	4,655	95.1	NA

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide						
	Total Cases N=8,277	Mastectomy N=2,521			Lumpectomy N=5,756		
	total #	# cases	% total	% inpatient	# cases	% total	% inpatient
Statewide	8,277	2,521	30.5	90.4	5,756	69.5	19.1
Atlas Outcomes® Predicted Length of Stay Groups							
0 to 2.108 days	71	62	87.3	100	9	12.7	100
2.109 to 2.397 days	397	297	74.8	100	100	25.2	100
2.398 to 3.303 days	2,217	1,458	65.8	100	759	34.2	100
3.304 to 4.430 days	433	287	66.3	100	146	33.7	100
4.431+ days	155	110	71.0	100	45	29.0	100
missing(inpatient)	107	65	60.7	100	42	39.3	100
outpatient	4,897	242	4.9	NA	4,655	95.1	NA
Diabetes							
none	7,980	2,385	29.9	90.0	5,595	70.1	18.6
diabetes w/o complication (250.0x)	290	131	45.2	96.9	159	54.8	38.4
diabetes w/ complication (250.1x – 250.9x)	7	5	71.4	100	2	28.6	50.0
Discharge Status							
home	7,159	2,428	33.9	93.2	4,731	66.1	23.2
acute transfer	19	2	10.5	50.0	17	89.5	5.9
non-acute transfer	36	15	41.7	93.3	21	58.3	19.0
in-hospital mortality	1	1	100	100	0	0	0
left against medical advice	2	1	50.0	100	1	50.0	0
Invalid (ambulatory cases)	1,060	74	7.0	0	986	93.0	0
Family History of Breast Cancer							
yes (v16.3)	182	66	36.3	87.9	116	63.7	19.8
no	8,095	2,455	30.3	90.5	5,640	69.7	19.1
Heart Failure							
yes (398.91, 428.0 – 428.9)	17	3	17.6	100	14	82.4	28.6
no	8,260	2,518	30.5	90.4	5,742	69.5	19.1
History of Breast Cancer							
yes (v10.3)	210	100	47.6	92.0	110	52.4	17.3
no	8,067	2,421	30.0	90.3	5,646	70.0	19.2

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide						
	Total Cases N=8,277	Mastectomy N=2,521			Lumpectomy N=5,756		
	total #	# cases	% total	% inpatient	# cases	% total	% inpatient
Statewide	8,277	2,521	30.5	90.4	5,756	69.5	19.1
MDC							
skin, subcutaneous tissue & breast ..... (09)	3,368	2,275	67.5	100	1,093	32.5	100
myeloproliferative, poorly differentiated neoplasms..... (17)	12	4	33.3	100	8	66.7	100
outpatient.....	4,897	242	4.9	NA	4,655	95.1	NA
Obesity							
yes..... (278.00, 278.01)	99	49	49.5	98.0	50	50.5	60.0
no.....	8,178	2,472	30.2	90.3	5,706	69.8	18.8
Other Cancer (Not Breast)							
none	8,129	2,446	30.1	90.3	5,683	69.9	19.0
primary ..... (140.0-173.9, 175.0-195.8, 200.0-208.9, 230.0-232.9, 233.1-238.2, 238.4-239.2, 239.4-239.9)	52	24	46.2	95.8	28	53.8	7.1
metastatic ..... (196.0 – 196.2, 196.5 – 198.1, 198.3 – 198.7, 198.82, 198.89)	96	51	53.1	94.1	45	46.9	40.0
Race							
white.....	6,061	1,807	29.8	88.8	4,254	70.2	18.8
black	586	184	31.4	94.6	402	68.6	23.4
other/unknown race.....	1,630	530	32.5	94.3	1,100	67.5	18.8
Reconstruction (Concurrent)							
yes ..... (procedures 85.50-85.54, 85.7, 85.82-85.87, 85.93, 85.96)	676	665	98.4	97.7	11	1.6	36.4
no.....	7,601	1,856	24.4	87.8	5,745	75.6	19.1
Hospital Region							
central/northeast.....	1,845	596	32.3	80.7	1,249	67.7	10.6
southeast.....	4,242	1,325	31.2	96.2	2,917	68.8	24.1
west.....	2,190	600	27.4	87.3	1,590	72.6	16.8
Patient Region							
central/northeast.....	1,846	591	32.0	80.9	1,255	68.0	11.2
southeast.....	3,630	1,124	31.0	95.9	2,506	69.0	23.8
west.....	2,113	571	27.0	87.0	1,542	73.0	16.8
out-of-state.....	688	235	34.2	96.2	453	65.8	23.4

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Inpatient and Ambulatory
Cases age 18 - 64*

Variable and Codes	Statewide											
	Total Cases *N=8,277*				Mastectomy Cases *N=2,521*				Lumpectomy Cases *N=5,756*			
	Inpatient		*Ambulatory*		*Inpatient*		*Ambulatory*		*Inpatient*		*Ambulatory*	
	#	%	#	%	#	%	#	%	#	%	#	%
Statewide	3,380	100	4,897	100	2,279	100	242	100	1,101	100	4,655	100
Procedure Type												
lumpectomy (85.20 – 85.22, 19112, 19120, 19125, 19126)	667	19.7	3,567	72.8	NA	NA	NA	NA	667	60.6	3,567	76.6
subtotal mastectomy (85.23, 19160, 19162)	434	12.8	1,088	22.2	NA	NA	NA	NA	434	39.4	1,088	23.4
simple mastectomy (85.41 – 85.44, 19180)	2,225	65.8	136	2.8	2,225	97.6	136	56.2	NA	NA	NA	NA
radical mastectomy (85.45 – 85.48, 19200, 19220, 19240)	54	1.6	106	2.2	54	2.4	106	43.8	NA	NA	NA	NA
Breast Cancer Type												
malignant (174.0 – 174.9, 238.3, 239.3)	1,985	58.7	3,272	66.8	1,217	53.4	146	60.3	768	69.8	3,126	67.2
in situ (233.0)	400	11.8	1,291	26.4	351	15.4	37	15.3	49	4.5	1,254	26.9
metastatic (196.3, 198.2, 198.81)	995	29.4	334	6.8	711	31.2	59	24.4	284	25.8	275	5.9
Age												
18 – 29 years	23	0.7	34	0.7	13	0.6	2	0.8	10	0.9	32	0.7
30 – 39 years	314	9.3	351	7.2	232	10.2	17	7.0	82	7.4	334	7.2
40 – 49 years	1,084	32.1	1,659	33.9	745	32.7	79	32.6	339	30.8	1,580	33.9
50 – 59 years	1,348	39.9	1,983	40.5	897	39.4	97	40.1	451	41.0	1,886	40.5
60 – 64 years	611	18.1	870	17.8	392	17.2	47	19.4	219	19.9	823	17.7
Atlas Outcomes® Admission Severity Group (ASG)												
0	3,067	90.7	NA	NA	2,062	90.5	NA	NA	1,005	91.3	NA	NA
1	85	2.5	NA	NA	59	2.6	NA	NA	26	2.4	NA	NA
2	102	3.0	NA	NA	82	3.6	NA	NA	20	1.8	NA	NA
3	15	0.4	NA	NA	8	0.4	NA	NA	7	0.6	NA	NA
4	4	0.1	NA	NA	3	0.1	NA	NA	1	0.1	NA	NA
Missing (inpatient)	107	3.2	NA	NA	65	2.9	NA	NA	42	3.8	NA	NA
Atlas Outcomes® Disease Groups												
breast disorder	3,257	96.4	NA	NA	2,206	96.8	NA	NA	1,051	95.5	NA	NA
myeloproliferative disorder	13	0.4	NA	NA	5	0.2	NA	NA	8	0.7	NA	NA
msk/soft tissue neoplasm	1	<0.1	NA	NA	1	<0.1	NA	NA	0	0	NA	NA
miscellaneous endocrine	1	<0.1	NA	NA	1	<0.1	NA	NA	0	0	NA	NA
burns/injuries	1	<0.1	NA	NA	1	<0.1	NA	NA	0	0	NA	NA
missing(inpatient)	107	3.2	NA	NA	65	2.9	NA	NA	42	3.8	NA	NA
Atlas Outcomes® Predicted LOS Group ***(definition used adjusting for avg. LOS)***												
0 to 2.108 days	71	2.1	NA	NA	62	2.7	NA	NA	9	0.8	NA	NA
2.109 to 2.397 days	397	11.7	NA	NA	297	13.0	NA	NA	100	9.1	NA	NA
2.398 to 3.303 days	2,217	65.6	NA	NA	1,458	64.0	NA	NA	759	68.9	NA	NA
3.304 to 4.430 days	433	12.8	NA	NA	287	12.6	NA	NA	146	13.3	NA	NA
4.431+ days	155	4.6	NA	NA	110	4.8	NA	NA	45	4.1	NA	NA
missing	107	3.2	NA	NA	65	2.9	NA	NA	42	3.8	NA	NA

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Inpatient and Ambulatory
Cases age 18 - 64*

Variable and Codes	Statewide											
	Total Cases *N=8,277*				Mastectomy Cases *N=2,521*				Lumpectomy Cases *N=5,756*			
	Inpatient		*Ambulatory*		*Inpatient*		*Ambulatory*		*Inpatient*		*Ambulatory*	
	#	%	#	%	#	%	#	%	#	%	#	%
Statewide	3,380	100	4,897	100	2,279	100	242	100	1,101	100	4,655	100
Diabetes												
none	3,186	94.3	4,794	97.9	2,147	94.2	238	98.3	1,039	94.4	4,556	97.9
diabetes w/o complication (250.0x)	188	5.6	102	2.1	127	5.6	4	1.7	61	5.5	98	2.1
diabetes w/ complication (250.1x – 250.9x)	6	0.2	1	<0.1	5	0.2	0	0	1	0.1	1	<0.1
Discharge Status												
home	3,358	99.3	3,801	77.6	2,262	99.3	166	68.6	1,096	99.5	3,635	78.1
acute transfer	2	0.1	17	0.3	1	<0.1	1	0.4	1	0.1	16	0.3
non-acute transfer	18	0.5	18	0.4	14	0.6	1	0.4	4	0.4	17	0.4
in-hospital mortality	1	<0.1	0	0	1	<0.1	0	0	0	0	0	0
left against medical advice	1	<0.1	1	<0.1	1	<0.1	0	0	0	0	1	<0.1
invalid	0	0	1,060	21.6	0	0	74	30.6	0	0	986	21.2
Family History of Breast Cancer												
yes (v16.3)	81	2.4	101	2.1	58	2.5	8	3.3	23	2.1	93	2.0
no	3,299	97.6	4,796	97.9	2,221	97.5	234	96.7	1,078	97.9	4,562	98.0
Heart Failure												
yes (398.91, 428.0 – 428.9)	7	0.2	10	0.2	3	0.1	0	0	4	0.4	10	0.2
no	3,373	99.8	4,887	99.8	2,276	99.9	242	100	1,097	99.6	4,645	99.8
History of Breast Cancer												
yes (v10.3)	111	3.3	99	2.0	92	4.0	8	3.3	19	1.7	91	2.0
no	3,269	96.7	4,798	98.0	2,187	96.0	234	96.7	1,082	98.3	4,564	98.0
MDC												
skin, subcutaneous tissue & breast (09)	3,368	99.6	NA	NA	2,275	99.8	NA	NA	1,093	99.3	NA	NA
myeloproliferative, poorly differentiated neoplasms (17)	12	0.4	NA	NA	4	0.2	NA	NA	8	0.7	NA	NA
Obesity												
yes (278.00, 278.01)	78	2.3	21	0.4	48	2.1	1	0.4	30	2.7	20	0.4
no	3,302	97.7	4,876	99.6	2,231	97.9	241	99.6	1,071	97.3	4,635	99.6
Other Cancer (Not Breast)												
none	3,289	97.3	4,840	98.8	2,208	96.9	238	98.3	1,081	98.2	4,602	98.9
primary (140.0-173.9, 175.0-195.8, 200.0-208.9, 230.0-232.9, 233.1-238.2, 238.4-239.2, 239.4-239.9)	25	0.7	27	0.6	23	1.0	1	0.4	2	0.2	26	0.6
metastasis (196.0 – 196.2, 196.5 – 198.1, 198.3 – 198.7, 198.82, 198.89)	66	2.0	30	0.6	48	2.1	3	1.2	18	1.6	27	0.6

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NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Inpatient and Ambulatory
Cases age 18 - 64*

Variable and Codes	Statewide											
	Total Cases *N=8,277*				Mastectomy Cases *N=2,521*				Lumpectomy Cases *N=5,756*			
	Inpatient		*Ambulatory*		*Inpatient*		*Ambulatory*		*Inpatient*		*Ambulatory*	
	#	%	#	%	#	%	#	%	#	%	#	%
Statewide	3,380	100	4,897	100	2,279	100	242	100	1,101	100	4,655	100
Race												
white	2,405	71.2	3,656	74.7	1,605	70.4	202	83.5	800	72.7	3,454	74.2
black	268	7.9	318	6.5	174	7.6	10	4.1	94	8.5	308	6.6
other/unknown race	707	20.9	923	18.8	500	21.9	30	12.4	207	18.8	893	19.2
Reconstruction (Concurrent)												
yes *(procedures 85.50-85.54, 85.7, 85.82-85.87, 85.93, 85.96)*	654	19.3	22	0.4	650	28.5	15	6.2	4	0.4	7	0.2
no	2,726	80.7	4,875	99.6	1,629	71.5	227	93.8	1,097	99.6	4,648	99.8
Hospital Region												
central/northeast	613	18.1	1,232	25.2	481	21.1	115	47.5	132	12.0	1,117	24.0
southeast	1,976	58.5	2,266	46.3	1,274	55.9	51	21.1	702	63.8	2,215	47.6
west	791	23.4	1,399	28.6	524	23.0	76	31.4	267	24.3	1,323	28.4
Patient Region												
central/northeast	618	18.3	1,228	25.1	478	21.0	113	46.7	140	12.7	1,115	24.0
southeast	1,674	49.5	1,956	39.9	1,078	47.3	46	19.0	596	54.1	1,910	41.0
west	756	22.4	1,357	27.7	497	21.8	74	30.6	259	23.5	1,283	27.6
out-of-state	332	9.8	356	7.3	226	9.9	9	3.7	106	9.6	347	7.5

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges and ambulatory surgical encounters

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Complications (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,273*		Mastectomy Cases *N=2,214*		Lumpectomy Cases *N=1,059*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Statewide	3,273	5.9	2,214	6.9	1,059	3.9
Procedure Type (Description #1)						
lumpectomy (85.20 – 85.22)	649	3.7	NA	NA	649	3.7
subtotal mastectomy (85.23)	410	4.1	NA	NA	410	4.1
simple mastectomy (85.41 – 85.44)	2,160	6.9	2,160	6.9	NA	NA
radical mastectomy (85.45 – 85.48)	54	9.3	54	9.3	NA	NA
Procedure Type (Description #2)						
Lumpectomy	1,059	3.9	NA	NA	1,059	3.9
lumpectomy (85.20 – 85.22)	649	3.7	NA	NA	649	3.7
subtotal mastectomy (85.23)	410	4.1	NA	NA	410	4.1
Mastectomy	2,214	6.9	2,214	6.9	NA	NA
simple (85.41 – 85.44)	2,160	6.9	2,160	6.9	NA	NA
unilateral (85.41, 85.43)	2,030	6.4	2,030	6.4	NA	NA
bilateral (85.42, 85.44)	130	13.8	130	13.8	NA	NA
radical (85.45 – 85.48)	54	9.3	54	9.3	NA	NA
unilateral (85.45, 85.47)	50	8.0	50	8.0	NA	NA
bilateral (85.46, 85.48)	4	25.0	4	25.0	NA	NA
Procedure Type (Description #3)						
Lumpectomy/Subtotal Mastectomy	1,059	3.9	NA	NA	1,059	3.9
Mastectomy without Reconstruction	1,587	5.0	1,587	5.0	NA	NA
Mastectomy with Reconstruction	627	11.6	627	11.6	NA	NA
Breast Cancer Type						
malignant (174.0 – 174.9, 238.3, 239.3)	1,919	6.2	1,182	7.3	737	4.5
in situ (233.0)	390	8.2	343	8.7	47	4.3
metastatic (196.3, 198.2, 198.81)	964	4.5	689	5.4	275	2.2
Age						
18 – 29 years	23	4.3	13	7.7	10	0
30 – 39 years	298	5.4	221	6.3	77	2.6
40 – 49 years	1,051	5.7	723	7.2	328	2.4
50 – 59 years	1,309	6.1	878	6.8	431	4.6
60 – 64 years	592	6.3	379	6.9	213	5.2
Atlas Outcomes® Admission Severity Group (ASG)						
0	3,067	5.6	2,062	6.5	1,005	3.9
1	85	9.4	59	11.9	26	3.8
2	102	10.8	82	12.2	20	5.0
3	15	13.3	8	25.0	7	0
4	4	0	3	0	1	0

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Complications (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,273*		Mastectomy Cases *N=2,214*		Lumpectomy Cases *N=1,059*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Statewide	3,273	5.9	2,214	6.9	1,059	3.9
Atlas Outcomes® Disease Groups						
breast disorder	3,257	5.9	2,206	6.9	1,051	3.9
myeloproliferative disorder	13	7.7	5	20.0	8	0
msk/soft tissue neoplasm	1	0	1	0	0	0
miscellaneous endocrine	1	0	1	0	0	0
burns/injuries	1	0	1	0	0	0
Atlas Outcomes® Predicted LOS Group						
0 to 2.108 days	71	5.6	62	6.5	9	0.0
2.109 to 2.397 days	397	7.8	297	9.4	100	3.0
2.398 to 3.303 days	2,217	5.4	1,458	6.3	759	3.6
3.304 to 4.430 days	433	5.3	287	5.2	146	5.5
4.431+ days	155	11.0	110	12.7	45	6.7
Diabetes						
none	3,085	6.0	2,085	7.1	1,000	3.8
diabetes w/o complication (250.0x)	182	4.9	124	4.8	58	5.2
diabetes w/ complication (250.1x – 250.9x)	6	0	5	0	1	0
Discharge Status						
home	3,251	5.8	2,197	6.8	1,054	3.7
acute transfer	2	100	1	100	1	100
non-acute transfer	18	11.1	14	7.1	4	25.0
in-hospital mortality	1	100	1	100	0	0
left against medical advice	1	100	1	100	0	0
Family History of Breast Cancer						
yes (v16.3)	80	3.8	57	3.5	23	4.3
no	3,193	6.0	2,157	7.0	1,036	3.9
Heart Failure						
yes (398.91, 428.0 – 428.9)	7	0	3	0	4	0
no	3,266	5.9	2,211	6.9	1,055	3.9
History of Breast Cancer						
yes (v10.3)	107	2.8	89	3.4	18	0
no	3,166	6.0	2,125	7.1	1,041	3.9
MDC						
skin, subcutaneous tissue & breast (09)	3,261	5.9	2,210	6.9	1,051	3.9
myeloproliferative, poorly differentiated neoplasms (17)	12	8.3	4	25.0	8	0

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Complications (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,273*		Mastectomy Cases *N=2,214*		Lumpectomy Cases *N=1,059*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Statewide	3,273	5.9	2,214	6.9	1,059	3.9
Obesity						
yes *(278.00, 278.01)*	74	2.7	44	0	30	6.7
no	3,199	6.0	2,170	7.1	1,029	3.8
Other Cancer (Not Breast)						
none	3,186	5.7	2,145	6.8	1,041	3.6
primary *(140.0-173.9, 175.0-195.8, 200.0-208.9, 230.0-232.9, 233.1-238.2, 238.4-239.2, 239.4-239.9)*	24	8.3	22	9.1	2	0
metastasis *(196.0 – 196.2, 196.5 – 198.1, 198.3 – 198.7, 198.82, 198.89)*	63	14.3	47	10.6	16	25.0
Race						
white	2,376	5.6	1,590	6.2	786	4.2
black	259	7.7	168	10.1	91	3.3
other/unknown race	638	6.6	456	8.1	182	2.7
Reconstruction (Concurrent)						
yes *(procedures 85.50-85.54, 85.7, 85.82-85.87, 85.93, 85.96)*	631	11.6	627	11.6	4	0
no	2,642	4.6	1,587	5.0	1,055	3.9
Hospital Region						
Central/northeast	578	5.4	455	5.7	123	4.1
southeast	1,917	5.7	1,244	6.9	673	3.4
West	778	6.9	515	8.0	263	4.9
Patient Region						
central/northeast	584	5.1	453	5.7	131	3.1
southeast	1,629	5.9	1,056	7.1	573	3.7
west	742	6.9	487	7.8	255	5.1
out-of-state	318	5.3	218	6.4	100	3.0

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Average Length of Stay (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,271*		Mastectomy Cases *N=2,212*		Lumpectomy Cases *N=1,059*	
	#	Avg. LOS	#	Avg. LOS	#	Avg. LOS
Statewide	3,271	2.0	2,212	2.4	1,059	1.2
Procedure Type (Description #1)						
lumpectomy (85.20 – 85.22)	649	1.2	NA	NA	649	1.2
subtotal mastectomy (85.23)	410	1.2	NA	NA	410	1.2
simple mastectomy (85.41 – 85.44)	2,158	2.4	2,158	2.4	NA	NA
radical mastectomy (85.45 – 85.48)	54	3.2	54	3.2	NA	NA
Procedure Type (Description #2)						
Lumpectomy	1,059	1.2	NA	NA	1,059	1.2
lumpectomy (85.20 – 85.22)	649	1.2	NA	NA	649	1.2
subtotal mastectomy (85.23)	410	1.2	NA	NA	410	1.2
Mastectomy	2,212	2.4	2,212	2.4	NA	NA
simple (85.41 – 85.44)	2,158	2.4	2,158	2.4	NA	NA
unilateral (85.41, 85.43)	2,029	2.4	2,029	2.4	NA	NA
bilateral (85.42, 85.44)	129	3.1	129	3.1	NA	NA
radical (85.45 – 85.48)	54	3.2	54	3.2	NA	NA
unilateral (85.45, 85.47)	50	3.3	50	3.3	NA	NA
bilateral (85.46, 85.48)	4	2.8	4	2.8	NA	NA
Procedure Type (Description #3)						
Lumpectomy/Subtotal Mastectomy	1,059	1.2	NA	NA	1,059	1.2
Mastectomy without Reconstruction	1,586	1.8	1,586	1.8	NA	NA
Mastectomy with Reconstruction	626	4.0	626	4.0	NA	NA
Breast Cancer Type						
malignant (174.0 – 174.9, 238.3, 239.3)	1,919	2.0	1,182	2.5	737	1.2
In situ (233.0)	390	2.4	343	2.6	47	1.3
metastatic (196.3, 198.2, 198.81)	962	2.0	687	2.3	275	1.2
Age						
18 – 29 years	23	1.9	13	2.4	10	1.3
30 – 39 years	298	2.2	221	2.5	77	1.2
40 – 49 years	1,051	2.1	723	2.5	328	1.2
50 – 59 years	1,307	2.0	876	2.4	431	1.2
60 – 64 years	592	1.9	379	2.3	213	1.3
Atlas Outcomes® Admission Severity Group (ASG)						
0	3,066	2.0	2,061	2.4	1,005	1.2
1	84	2.6	58	3.0	26	1.7
2	102	2.7	82	2.8	20	2.1
3	15	3.9	8	5.3	7	2.3
4	4	1.3	3	1.3	1	1.0

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Average Length of Stay (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,271*		Mastectomy Cases *N=2,212*		Lumpectomy Cases *N=1,059*	
	#	Avg. LOS	#	Avg. LOS	#	Avg. LOS
Statewide	3,271	2.0	2,212	2.4	1,059	1.2
Atlas Outcomes® Disease Groups						
breast disorder	3,255	2.0	2,204	2.4	1,051	1.2
myeloproliferative disorder	13	1.5	5	2.2	8	1.0
msk/soft tissue neoplasm	1	9.0	1	9.0	0	0
miscellaneous endocrine	1	7.0	1	7.0	0	0
burns/injuries	1	1.0	1	1.0	0	0
Atlas Outcomes® Predicted LOS Group						
0 to 2.108 days	71	2.2	62	2.3	9	1.2
2.109 to 2.397 days	397	2.2	297	2.5	100	1.0
2.398 to 3.303 days	2,216	1.9	1,457	2.4	759	1.2
3.304 to 4.430 days	433	2.0	287	2.4	146	1.2
4.431+ days	154	2.9	109	3.3	45	2.0
Diabetes						
none	3,083	2.0	2,083	2.4	1,000	1.2
diabetes w/o complication (250.0x)	182	2.0	124	2.3	58	1.2
diabetes w/ complication (250.1x – 250.9x)	6	1.7	5	1.8	1	1.0
Discharge Status						
home	3,250	2.0	2,196	2.4	1,054	1.2
acute transfer	2	7.0	1	14.0	1	0
non-acute transfer	18	3.1	14	2.6	4	4.5
left against medical advice	1	6.0	1	6.0	0	0
Family History of Breast Cancer						
yes (v16.3)	80	2.2	57	2.6	23	1.1
no	3,191	2.0	2,155	2.4	1,036	1.2
Heart Failure						
yes (398.91, 428.0 – 428.9)	7	3.7	3	5.0	4	2.8
no	3,264	2.0	2,209	2.4	1,055	1.2
History of Breast Cancer						
yes (v10.3)	107	2.0	89	2.1	18	1.4
no	3,164	2.0	2,123	2.4	1,041	1.2

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Mastectomy/Lumpectomy of Female Breast Cancer
Average Length of Stay (Inpatient Only)
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=3,271*		Mastectomy Cases *N=2,212*		Lumpectomy Cases *N=1,059*	
	#	Avg. LOS	#	Avg. LOS	#	Avg. LOS
Statewide	3,271	2.0	2,212	2.4	1,059	1.2
MDC						
skin, subcutaneous tissue & breast ..... (09)	3,259	2.0	2,208	2.4	1,051	1.2
myeloproliferative, poorly differentiated neoplasms ..... (17)	12	1.5	4	2.5	8	1.0
Obesity						
yes ..... (278.00, 278.01)	74	2.1	44	2.7	30	1.3
no	3,197	2.0	2,168	2.4	1,029	1.2
Other Cancer (Not Breast)						
none	3,185	2.0	2,144	2.4	1,041	1.2
primary (140.0-173.9, 175.0-195.8, 200.0-208.9, 230.0-232.9, 233.1-238.2, 238.4-239.2, 239.4-239.9)	24	2.4	22	2.5	2	1.5
metastasis (196.0 – 196.2, 196.5 – 198.1, 198.3 – 198.7, 198.82, 198.89)	62	3.1	46	3.5	16	2.1
Race						
white	2,374	1.9	1,588	2.3	786	1.2
black	259	2.3	168	2.9	91	1.3
other/unknown race	638	2.3	456	2.7	182	1.2
Reconstruction (Concurrent)						
yes (procedures 85.50-85.54, 85.7, 85.82-85.87, 85.93, 85.96)	630	4.0	626	4.0	4	2.8
no	2,641	1.6	1,586	1.8	1,055	1.2
Hospital Region						
central/northeast	578	2.0	455	2.2	123	1.2
southeast	1,916	2.1	1,243	2.6	673	1.1
west	777	1.9	514	2.2	263	1.3
Patient Region						
central/northeast	584	2.0	453	2.3	131	1.2
southeast	1,628	2.1	1,055	2.5	573	1.2
west	741	1.9	486	2.2	255	1.3
out-of-state	318	2.2	218	2.8	100	1.1

*Cases after length of stay exclusions
NA: Not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	#	%	#	%	#	%
Principal Diagnosis Groupings						
disc displacement ....(722.0, 722.10, 722.11, 722.2)	11,974	70.7	8,965	78.5	3,009	54.6
narrowing of spinal canal ..... (720.0, 721.0 – 721.42, 721.90, 721.91, 723.0, 724.00 – 724.09, 738.4, 756.11, 756.12)	3,520	20.8	2,023	17.7	1,497	27.2
disc degeneration ....(722.4, 722.51, 722.52, 722.6)	730	4.3	131	1.1	599	10.9
other disc disorders/back pain ..... (722.70 – 722.73, 722.90 – 722.93, 723.1, 724.1-724.3, 724.5)	706	4.2	301	2.6	405	7.4
Procedure Groupings						
discectomy..... (80.50, 80.51, 80.59)	13,379	79.0	8,644	75.7	4,735	85.9
laminectomy ..... (03.09)	2,793	16.5	2,176	19.1	617	11.2
discectomy & laminectomy ..... (80.50, 80.51 or 80.59 & 03.09)	758	4.5	600	5.3	158	2.9
Fusion Location						
no fusion	11,420	67.5	11,420	100	NA	NA
cervical/atlas-axis ..... (procedures 81.00, 81.01, 81.02, 81.03)	3,569	21.1	NA	NA	3,569	64.8
dorsal and dorsolumbar..... (81.04, 81.05)	48	0.3	NA	NA	48	0.9
lumbar and lumbosacral..... (81.06, 81.07, 81.08)	1,893	11.2	NA	NA	1,893	34.4
Fusion Technique						
no fusion	11,420	67.5	11,420	100	NA	NA
anterior ..... (procedures 81.00, 81.01, 81.02, 81.04, 81.06)	3,996	23.6	NA	NA	3,996	72.5
Posterior/lateral ..... (81.03, 81.05, 81.07, 81.08)	1,404	8.3	NA	NA	1,404	25.5
multiple..... (2 or more codes above)	110	0.6	NA	NA	110	2.0
***Age** (as used for age adjustment)*						
18 – 39 years	5,319	31.4	3,852	33.7	1,467	26.6
40 – 49 years	5,746	33.9	3,542	31.0	2,204	40.0
50 – 64 years	5,865	34.6	4,026	35.3	1,839	33.4
Age						
18 – 29 years	1,128	6.7	926	8.1	202	3.7
30 – 39 years	4,191	24.8	2,926	25.6	1,265	23.0
40 – 49 years	5,746	33.9	3,542	31.0	2,204	40.0
50 – 59 years	4,232	25.0	2,841	24.9	1,391	25.2
60 – 64 years	1,633	9.6	1,185	10.4	448	8.1

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		**w/o Spinal Fusion** Cases *N=11,420*		**w/ Spinal Fusion** Cases *N=5,510*	
	#	%	#	%	#	%
Alcohol and Drug Abuse						
none	16,769	99.0	11,303	99.0	5,466	99.2
in remission (303.x3, 304.x3, 305.x3 except 305.13)	39	0.2	27	0.2	12	0.2
not in remission (291.x, 292.0, 292.82, 303.xx except 303.x3, 304.xx except 304.x3, 305.xx except 305.1x, 305.x3, 357.5, 425.5, 535.3x, 571.0 – 571.3, 980.0, 980.9, v11.3)	122	0.7	90	0.8	32	0.6
Atlas Outcomes® Admission Severity Group (ASG)						
0	15,261	90.1	10,388	91.0	4,873	88.4
1	1,149	6.8	663	5.8	486	8.8
2	59	0.3	34	0.3	25	0.5
3	6	<0.1	3	<0.1	3	0.1
4	0	0	0	0	0	0
missing	455	2.7	332	2.9	123	2.2
Atlas Outcomes® Disease Groups						
spinal dis	16,151	95.4	11,055	96.8	5,096	92.5
misc musculoskeletal	317	1.9	30	0.3	287	5.2
fracture	2	<0.1	1	<0.1	1	<0.1
nerve/muscle dis	1	<0.1	1	<0.1	0	0
hypertensive hrt dis	1	<0.1	0	0	1	<0.1
GI infectious dis	1	<0.1	1	<0.1	0	0
arthritic dis	1	<0.1	0	0	1	<0.1
acid base/electrolyte imb	1	<0.1	0	0	1	<0.1
missing	455	2.7	332	2.9	123	2.2
Atlas Outcomes® Predicted LOS Group ***(definition used adjusting for avg LOS)***						
below 2.938 days	359	2.1	248	2.2	111	2.0
2.938 – 3.494 days	2,178	12.9	1,406	12.3	772	14.0
3.495 – 4.754 days	10,965	64.8	7,552	66.1	3,413	61.9
4.755 – 5.412 days	2,179	12.9	1,434	12.6	745	13.5
above 5.412 days	782	4.6	443	3.9	339	6.2
missing	467	2.8	337	3.0	130	2.4
Benign Spinal Tumors						
yes (213.2, 215.7, 225.3, 225.4, 225.8, 225.9)	6	<0.1	5	<0.1	1	<0.1
no	16,924	100	11,415	100	5,509	100
Cancer						
none	16,608	98.1	11,207	98.1	5,401	98.0
malignant/in situ (140.0 – 208.9, 230.0 – 234.9)	28	0.2	20	0.2	8	0.1
history (v10.00 – v10.9)	294	1.7	193	1.7	101	1.8

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	#	%	#	%	#	%
Chronic Obstructive Pulmonary Disease (COPD)						
yes ..... (491.20, 491.21, 492.0, 492.8, 496, 506.4)	398	2.4	236	2.1	162	2.9
no	16,532	97.6	11,184	97.9	5,348	97.1
Congestive Heart Failure						
yes .... (402.x1, 404.x1, 404.x3, 416.x, 425.x, 428.x)	91	0.5	57	0.5	34	0.6
no	16,839	99.5	11,363	99.5	5,476	99.4
Diabetes						
none	15,789	93.3	10,670	93.4	5,119	92.9
diabetes w/o complication ..... (250.0x)	1,050	6.2	692	6.1	358	6.5
diabetes w/ complication..... (250.1x – 250.9x)	91	0.5	58	0.5	33	0.6
Discharge Status						
home	16,491	97.4	11,204	98.1	5,287	96.0
acute transfer	18	0.1	8	0.1	10	0.2
non-acute transfer	404	2.4	200	1.8	204	3.7
left against medical advice	9	0.1	5	<0.1	4	0.1
in-hospital mortality	8	<0.1	3	<0.1	5	0.1
Gender						
male	9,525	56.3	6,694	58.6	2,831	51.4
female	7,405	43.7	4,726	41.4	2,679	48.6
MDC						
musculoskeletal and connective tissue .... (08)	16,930	100	11,420	100	5,510	100
Musculoskeletal Disorders						
yes *(274.xx, 710.0.x, 712.xx, 713.x, 714.xx, 715.xx, 733.0x, v43.6x)*	542	3.2	332	2.9	210	3.8
no	16,388	96.8	11,088	97.1	5,300	96.2
Obesity						
none	16,199	95.7	10,858	95.1	5,341	96.9
unspecified ..... (278.00)	606	3.6	473	4.1	133	2.4
morbid..... (278.01)	125	0.7	89	0.8	36	0.7
Osteoporosis						
yes ..... (733.0x)	61	0.4	33	0.3	28	0.5
no	16,869	99.6	11,387	99.7	5,482	99.5
Psychological Disorders						
yes *(295.xx, 296.xx, 297.x, 298.x, 299.xx, 300.xx, 301.xx, 309.xx, 310.x, 311, 312.xx)*	827	4.9	480	4.2	347	6.3
no	16,103	95.1	10,940	95.8	5,163	93.7

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Percentages by Type of Procedure
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	#	%	#	%	#	%
Race						
white	13,382	79.0	9,005	78.9	4,377	79.4
black	676	4.0	414	3.6	262	4.8
other/unknown race	2,872	17.0	2,001	17.5	871	15.8
Region						
west	5,413	32.0	3,527	30.9	1,886	34.2
southeast	5,134	30.3	3,612	31.6	1,522	27.6
central/northeast	4,687	27.7	3,089	27.0	1,598	29.0
out-of-state	1,696	10.0	1,192	10.4	504	9.1
Smoking						
yes *(305.1,V15.82)*	1,838	10.9	1,180	10.3	658	11.9
no	15,092	89.1	10,240	89.7	4,852	88.1

*Cases after hospitalization rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Complications
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Principal Diagnosis Groupings						
disc displacement ....(722.0, 722.10, 722.11, 722.2)	11,974	3.7	8,965	3.3	3,009	4.7
narrowing of spinal canal ..... (720.0, 721.0 – 721.42, 721.90, 721.91, 723.0, 724.00 – 724.09, 738.4, 756.11, 756.12)	3,520	8.5	2,023	7.1	1,497	10.4
disc degeneration ....(722.4, 722.51, 722.52, 722.6)	730	9.6	131	3.8	599	10.9
other disc disorders/back pain ..... (722.70 – 722.73, 722.90 – 722.93, 723.1, 724.1-724.3, 724.5)	706	6.8	301	7.6	405	6.2
Procedure Groupings						
discectomy..... (procedures 80.50, 80.51, 80.59)	13,379	4.2	8,644	3.4	4,735	5.7
laminectomy ..... (03.09)	2,793	8.4	2,176	6.4	617	15.4
discectomy & laminectomy ..... (80.50, 80.51 or 80.59 & 03.09)	758	7.0	600	5.3	158	13.3
Fusion Location						
no fusion	11,420	4.1	11,420	4.1	NA	NA
cervical/atlas-axis ..... (procedures 81.00, 81.01, 81.02, 81.03)	3,569	3.3	NA	NA	3,569	3.3
dorsal and dorsolumbar..... (81.04, 81.05)	48	25.0	NA	NA	48	25.0
lumbar and lumbosacral..... (81.06, 81.07, 81.08)	1,893	13.7	NA	NA	1,893	13.7
Fusion Technique						
no fusion	11,420	4.1	11,420	4.1	NA	NA
anterior ..... (procedures 81.00, 81.01, 81.02, 81.04, 81.06)	3,996	4.6	NA	NA	3,996	4.6
posterior/lateral..... (81.03, 81.05, 81.07, 81.08)	1,404	13.2	NA	NA	1,404	13.2
multiple..... (2 or more codes above)	110	15.5	NA	NA	110	15.5
***Age** (as used for age adjustment)*						
18 – 39 years	5,319	3.8	3,852	3.1	1,467	5.5
40 – 49 years	5,746	4.2	3,542	3.5	2,204	5.4
50 – 64 years	5,865	7.0	4,026	5.5	1,839	10.2
Age						
18 – 29 years	1,128	4.6	926	3.9	202	7.9
30 – 39 years	4,191	3.5	2,926	2.8	1,265	5.1
40 – 49 years	5,746	4.2	3,542	3.5	2,204	5.4
50 – 59 years	4,232	6.5	2,841	5.4	1,391	8.6
60 – 64 years	1,633	8.4	1,185	5.8	448	15.2

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Complications
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Alcohol and Drug Abuse						
none	16,769	5.0	11,303	4.1	5,466	6.9
in remission (303.x3, 304.x3, 305.x3 except 305.13)	39	12.8	27	7.4	12	25.0
not in remission (291.x, 292.0, 292.82, 303.xx except 303.x3, 304.xx except 304.x3, 305.xx except 305.1x, 305.x3, 357.5, 425.5, 535.3x, 571.0 – 571.3, 980.0, 980.9, v11.3)	122	6.6	90	3.3	32	15.6
Atlas Outcomes® Admission Severity Group (ASG)						
0	15,261	4.8	10,388	4.0	4,873	6.4
1	1,149	9.0	663	5.6	486	13.6
2	59	11.9	34	11.8	25	12.0
3	6	16.7	3	33.3	3	0
4	0	0	0	0	0	0
missing	455	3.3	332	2.4	123	5.7
Atlas Outcomes® Disease Groups						
spinal dis	16,151	4.9	11,055	4.1	5,096	6.6
misc musculoskeletal	317	14.2	30	3.3	287	15.3
fracture	2	0	1	0	1	0
nerve/muscle dis	1	0	1	0	0	0
hypertensive hrt dis	1	0	0	0	1	0
GI infectious dis	1	100	1	100	0	0
arthritic dis	1	0	0	0	1	0
acid base/electrolyte imb	1	0	0	0	1	0
missing	455	3.3	332	2.4	123	5.7
Atlas Outcomes® Predicted LOS Group ***(definition used adjusting for avg LOS)***						
below 2.938 days	359	8.4	248	6.0	111	13.5
2.938 – 3.494 days	2,178	6.2	1,406	5.5	772	7.5
3.495 – 4.754 days	10,965	4.4	7,552	3.7	3,413	5.7
4.755 – 5.412 days	2,179	5.9	1,434	4.4	745	8.9
above 5.412 days	782	7.4	443	4.1	339	11.8
missing	467	5.4	337	3.3	130	10.8
Benign Spinal Tumors						
yes (213.2, 215.7, 225.3, 225.4, 225.8, 225.9)	6	33.3	5	20.0	1	100
no	16,924	5.0	11,415	4.1	5,509	7.0
Cancer						
none	16,608	5.0	11,207	4.0	5,401	6.9
malignant/in situ (140.0 – 208.9, 230.0 – 234.9)	28	17.9	20	15.0	8	25.0
history (v10.00 – v10.9)	294	7.1	193	5.7	101	9.9

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Complications
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Chronic Obstructive Pulmonary Disease (COPD)						
yes ..... (491.20, 491.21, 492.0, 492.8, 496, 506.4)	398	5.8	236	5.5	162	6.2
no	16,532	5.0	11,184	4.1	5,348	7.0
Congestive Heart Failure						
yes .... (402.x1, 404.x1, 404.x3, 416.x, 425.x, 428.x)	91	15.4	57	10.5	34	23.5
no	16,839	5.0	11,363	4.1	5,476	6.9
Diabetes						
none	15,789	4.9	10,670	4.0	5,119	6.7
diabetes w/o complication ..... (250.0x)	1,050	7.0	692	5.1	358	10.6
diabetes w/ complication..... (250.1x – 250.9x)	91	11.0	58	8.6	33	15.2
Discharge Status						
home	16,491	4.6	11,204	3.9	5,287	6.2
acute transfer	18	11.1	8	12.5	10	10.0
non-acute transfer	404	20.0	200	14.5	204	25.5
left against medical advice	9	11.1	5	0	4	25.0
in-hospital mortality	8	100	3	100	5	100
Gender						
male	9,525	4.9	6,694	4.2	2,831	6.8
female	7,405	5.2	4,726	4.0	2,679	7.3
MDC						
musculoskeletal and connective tissue .... (08)	16,930	5.0	11,420	4.1	5,510	7.0
Musculoskeletal Disorders						
yes *(274.xx, 71.0.x, 712.xx, 713.x, 714.xx, 715.xx, 733.0x, v43.6x)*	542	5.5	332	4.2	210	7.6
no	16,388	5.0	11,088	4.1	5,300	7.0
Obesity						
none	16,199	4.9	10,858	4.0	5,341	6.9
unspecified (278.00)	606	5.9	473	5.3	133	8.3
morbid (278.01)	125	13.6	89	11.2	36	19.4
Osteoporosis						
yes ..... (733.0x, x=0-3,9)	61	6.6	33	3.0	28	10.7
no	16,869	5.0	11,387	4.1	5,482	7.0

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Complications
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,930*		w/o Spinal Fusion Cases *N=11,420*		w/ Spinal Fusion Cases *N=5,510*	
	# Cases	% Complic.	# Cases	% Complic.	# Cases	% Complic.
Psychological Disorders						
yes	827	7.5	480	5.4	347	10.4
no	16,103	4.9	10,940	4.0	5,163	6.8
(295.xx, 296.xx, 297.x, 298.x, 299.xx, 300.xx, 301.xx, 309.xx, 310.x, 311, 312.xx)						
Race						
white, non-hispanic	13,382	5.3	9,005	4.3	4,377	7.4
black, non-hispanic	676	6.5	414	6.3	262	6.9
other/unknown race	2,872	3.4	2,001	2.6	871	5.1
Region						
west	5,413	6.2	3,527	5.4	1,886	7.6
southeast	5,134	5.0	3,612	3.7	1,522	8.1
central/northeast	4,687	3.8	3,089	2.8	1,598	5.8
out-of-state	1,696	4.8	1,192	4.5	504	5.6
Smoking						
yes *(305.1,V15.82)*	1,838	5.1	1,180	3.5	658	7.9
no	15,092	5.0	10,240	4.2	4,852	6.9

*Cases after complication rate exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Average Length of Stay
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,917*		w/o Spinal Fusion Cases *N=11,414*		w/ Spinal Fusion Cases *N=5,503*	
	#	Avg. LOS	#	Avg. LOS.	#	Avg. LOS
Principal Diagnosis Groupings						
disc displacement ....(722.0, 722.10, 722.11, 722.2)	11,968	1.7	8,962	1.6	3,006	2.1
narrowing of spinal canal ..... (720.0, 721.0 – 721.42, 721.90, 721.91, 723.0, 724.00 – 724.09, 738.4, 756.11, 756.12)	3,514	2.7	2,020	2.3	1,494	3.2
disc degeneration ....(722.4, 722.51, 722.52, 722.6)	730	3.2	131	2.4	599	3.3
other disc disorders/back pain ..... (722.70 – 722.73, 722.90 – 722.93, 723.1, 724.1-724.3, 724.5)	705	2.5	301	2.5	404	2.6
Procedure Groupings						
discectomy..... (80.50, 80.51, 80.59)	13,371	1.9	8,641	1.6	4,730	2.4
laminectomy ..... (03.09)	2,789	2.6	2,173	2.2	616	4.1
discectomy & laminectomy ..... (80.50, 80.51 or 80.59 & 03.09)	757	2.6	600	2.3	157	3.8
Fusion Location						
no fusion	11,414	1.7	11,414	1.7	NA	NA
cervical/atlas-axis ..... (procedures 81.00, 81.01, 81.02, 81.03)	3,565	1.8	NA	NA	3,565	1.8
dorsal and dorsolumbar..... (81.04, 81.05)	48	6.1	NA	NA	48	6.1
lumbar and lumbosacral..... (81.06, 81.07, 81.08)	1,890	4.0	NA	NA	1,890	4.0
Fusion Technique						
no fusion	11,414	1.7	11,414	1.7	NA	NA
anterior ..... (procedures 81.00, 81.01, 81.02, 81.04, 81.06)	3,990	2.0	NA	NA	3,990	2.0
posterior/lateral..... (81.03, 81.05, 81.07, 81.08)	1,403	3.9	NA	NA	1,403	3.9
multiple..... (2 or more codes above)	110	5.5	NA	NA	110	5.5
***Age** (as used for age adjustment)*						
18 – 39 years	5,317	1.7	3,850	1.5	1,467	2.4
40 – 49 years	5,743	1.9	3,541	1.7	2,202	2.4
50 – 64 years	5,857	2.3	4,023	2.0	1,834	3.0
Age						
18 – 29 years	1,128	1.7	926	1.4	202	2.8
30 – 39 years	4,189	1.8	2,924	1.5	1,265	2.3
40 – 49 years	5,743	1.9	3,541	1.7	2,202	2.4
50 – 59 years	4,228	2.2	2,838	1.9	1,390	2.8
60 – 64 years	1,629	2.8	1,185	2.4	444	3.7

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Average Length of Stay
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,917*		w/o Spinal Fusion Cases *N=11,414*		w/ Spinal Fusion Cases *N=5,503*	
	#	Avg. LOS	#	Avg. LOS.	#	Avg. LOS
Alcohol and Drug Abuse						
none	16,757	2.0	11,298	1.7	5,459	2.6
in remission (303.x3, 304.x3, 305.x3 except 305.13)	39	2.7	27	2.6	12	3.0
not in remission (291.x, 292.0, 292.82, 303.xx except 303.x3, 304.xx except 304.x3, 305.xx except 305.1x, 305.x3, 357.5, 425.5, 535.3x, 571.0 – 571.3, 980.0, 980.9, v11.3)	121	3.2	89	2.9	32	4.0
Atlas Outcomes® Admission Severity Group (ASG)						
0	15,251	1.9	10,384	1.7	4,867	2.5
1	1,148	2.9	663	2.4	485	3.6
2	59	4.7	34	3.7	25	6.2
3	5	6.0	2	11.5	3	2.3
4	0	0	0	0	0	0
missing	454	2.0	331	1.7	123	2.8
Atlas Outcomes® Disease Groups						
spinal dis	16,140	2.0	11,050	1.7	5,090	2.5
misc musculoskeletal	316	4.0	30	2.5	286	4.2
fracture	2	2.5	1	1.0	1	4.0
nerve/muscle dis	1	1.0	1	1.0	0	0
hypertensive hrt dis	1	2.0	0	0	1	2.0
GI infectious dis	1	4.0	1	4.0	0	0
arthritic dis	1	3.0	0	0	1	3.0
acid base/electrolyte imb	1	6.0	0	0	1	6.0
missing	454	2.0	331	1.7	123	2.8
Atlas Outcomes® Predicted LOS Group ***(definition used adjusting for avg LOS)***						
below 2.938 days	359	2.3	248	2.0	111	3.2
2.938 – 3.494 days	2,178	2.1	1,406	1.7	772	2.7
3.495 – 4.754 days	10,965	1.9	7,552	1.6	3,413	2.4
4.755 – 5.412 days	2,179	2.3	1,434	2.0	745	2.8
above 5.412 days	782	3.1	443	2.7	339	3.7
missing	454	2.0	331	1.7	123	2.8
Benign Spinal Tumors						
yes (213.2, 215.7, 225.3, 225.4, 225.8, 225.9)	6	2.3	5	2.4	1	2.0
no	16,911	2.0	11,409	1.7	5,502	2.6
Cancer						
none	16,595	2.0	11,201	1.7	5,394	2.6
malignant/in situ (140.0 – 208.9, 230.0 – 234.9)	28	4.4	20	4.1	8	5.3
history (v10.00 – v10.9)	294	2.4	193	2.1	101	3.1

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Average Length of Stay
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,917*		w/o Spinal Fusion Cases *N=11,414*		w/ Spinal Fusion Cases *N=5,503*	
	#	Avg. LOS	#	Avg. LOS.	#	Avg. LOS
Chronic Obstructive Pulmonary Disease (COPD)						
yes ..... (491.20, 491.21, 492.0, 492.8, 496, 506.4)	396	2.5	236	2.1	160	3.1
no	16,521	2.0	11,178	1.7	5,343	2.6
Congestive Heart Failure						
yes .... (402.x1, 404.x1, 404.x3, 416.x, 425.x, 428.x)	91	3.8	57	3.5	34	4.4
no	16,826	2.0	11,357	1.7	5,469	2.6
Diabetes						
none.....	15,776	2.0	10,664	1.7	5,112	2.5
diabetes w/o complication ..... (250.0x)	1,050	2.5	692	2.3	358	2.9
diabetes w/ complication..... (250.1x – 250.9x)	91	4.8	58	4.3	33	5.7
Discharge Status						
home.....	16,489	1.9	11,202	1.7	5,287	2.5
acute transfer.....	18	3.0	8	2.4	10	3.5
non-acute transfer	401	5.7	199	5.7	202	5.7
left against medical advice.....	9	2.8	5	2.8	4	2.8
Gender						
male	9,519	1.9	6,690	1.7	2,829	2.5
female.....	7,398	2.2	4,724	1.9	2,674	2.7
MDC						
musculoskeletal and connective tissue.... (08)	16,917	2.0	11,414	1.7	5,503	2.6
Musculoskeletal Disorders						
yes ..... *(274.xx, 71.0.x, 712.xx, 713.x, 714.xx, 715.xx, 733.0x, v43.6x)*	541	2.8	331	2.4	210	3.4
no.....	16,376	2.0	11,083	1.7	5,293	2.6
Obesity						
none.....	16,187	2.0	10,852	1.7	5,335	2.6
unspecified .....(278.00)	606	2.3	473	2.1	133	3.0
morbid.....(278.01)	124	2.7	89	2.3	35	3.6
Osteoporosis						
yes ..... (733.0x, x=0-3,9)	61	2.6	33	1.6	28	3.8
no.....	16,856	2.0	11,381	1.7	5,475	2.6

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges

Acute Care
Neck & Back Procedures
Average Length of Stay
Cases age 18 - 64*

Variable and Codes	Statewide					
	Total Cases *N=16,917*		w/o Spinal Fusion Cases *N=11,414*		w/ Spinal Fusion Cases *N=5,503*	
	#	Avg. LOS	#	Avg. LOS.	#	Avg. LOS
Psychological Disorders						
yes ..... *(295.xx, 296.xx, 297.x, 298.x, 299.xx, 300.xx, 301.xx, 309.xx, 310.x, 311, 312.xx)*	825	2.8	479	2.4	346	3.4
no.....	16,092	2.0	10,935	1.7	5,157	2.5
Race						
white	13,372	2.0	9,000	1.7	4,372	2.5
black	674	3.0	413	2.8	261	3.3
other/unknown race	2,871	2.0	2,001	1.6	870	2.9
Region						
west	5,409	2.1	3,525	1.9	1,884	2.5
southeast	5,127	2.1	3,609	1.8	1,518	2.8
central/northeast	4,685	2.0	3,088	1.6	1,597	2.5
out-of-state	1,696	1.9	1,192	1.5	504	2.7
Smoking						
yes ..... *(305.1,V15.82)*	1,838	1.9	1,180	1.6	658	2.5
no.....	15,079	2.0	10,234	1.8	4,845	2.6

*Cases after length of stay exclusions
NA: not applicable
Source: PA Health Care Cost Containment Council, January 1 to December 31, 1999 inpatient discharges