Introduction

The Pennsylvania Health Care Quality Alliance (PHCQA) has published hospital performance data on its website, www.PAHealthCareQuality.org, since 2007. Website visitors can compare the quality of care at all hospitals in Pennsylvania using indicators such as infection rates, readmission rates, mortality rates, process measures, patient experience measures, and emergency department data. Each year, PHCQA publishes its *State of the State* report to showcase quality improvement in Pennsylvania and how quality of care in Pennsylvania compares to national benchmarks.

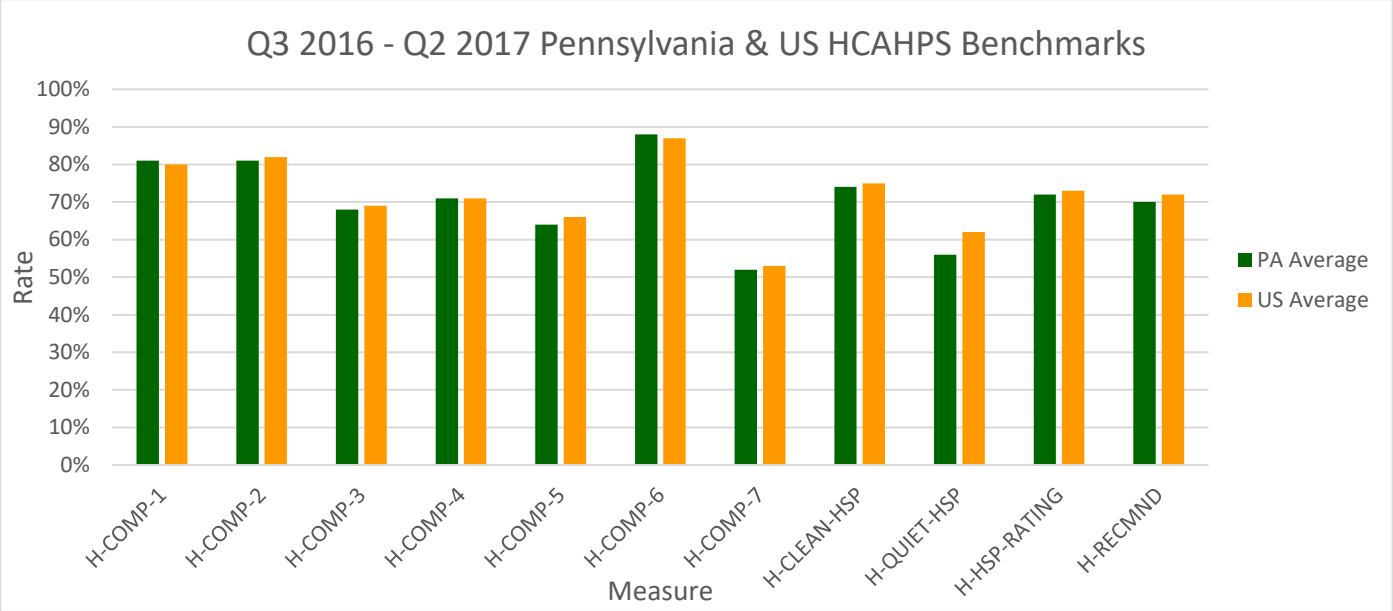
This year's *State of the State* analyzes multi-year performance trends for HCAHPS patient experience measures, cancer care process measures, emergency department measures, infection rates, readmission rates, and mortality rates. New to this year's report are emergency department measures, infection data, and five mortality and readmission measures, including COPD readmission and mortality, hip and/or knee surgery readmission, heart bypass surgery readmission, and hospital-wide readmission measures. The *State of the State* is just a small snapshot, not a complete picture, of health care quality in Pennsylvania. All measures included in this report have been debated and recommended for publication by the Measures & Methods Committee, a multi-stakeholder workgroup comprised of experts in quality measurement. Ultimately, this report aims to identify opportunities for improvement and specific measures indicating that performance has improved over time.

HCAHPS Patient Experience Measures

The HCAHPS Hospital Survey, which comprises of 32 questions, is completed by a random sample of discharged patients that were admitted in the medical, surgical, and maternity care service lines. The Centers for Medicare & Medicaid Services (CMS) utilizes patient responses to the 32 questions to evaluate hospital performance on 11 measures as perceived by the patient receiving care. The 11 measures are:

H-COMP-1: Nurse Communication
H-COMP-2: Doctor Communication
H-COMP-3: Responsiveness of Hospital Staff
H-COMP-4: Pain Well Controlled
H-COMP-5: Medicine Explained by Staff
H-COMP-6: Discharge Information
H-COMP-7: Understanding Discharge Instructions
H-CLEAN-HSP: Room and Bathroom Kept Clean
H-QUIET-HSP: Room Quiet at Night
H-HSP-RATING: Hospital Rating
H-RECMND: Hospital Recommendation

PHCQA compared Pennsylvania's performance on each of the above measures to the national benchmark in order to determine aspects of patient experience in which Pennsylvania hospitals are excelling or lagging behind. Patient experience measures are evaluated by CMS on a rolling four quarter period.



While the Pennsylvania average exceeds the national average for only two measures, nurse communication (H-COMP-1) and discharge information (H-COMP-6), these are only 1% above the U.S. average. Additionally, 10 of 11 patient experience measures are within 2% of the national average. Of particular note, the percentage of people in Pennsylvania responding that their room is always quiet at night (H-QUIET-HSP) is only 56%, which is less than the 62% national average. H-COMP-7, which evaluates the percentage of people who strongly agree that they understood their care when discharged, has historically had low response rates because the second tier response option is nearly identical to the top response category, except that the patients "agree" instead of "strongly agree" that they understand their care. As a result, response rates for these two options are often within a few percentage points.

In order to evaluate improvements in patient experience over time, PHCQA examined the rates for each patient experience measure since the Q3 2009 – Q2 2010 reporting period.

8-Year Pennsylvania HCAHPS Patient Experience Performance Improvement

Measure	Q3 2009 – Q2 2010	Q3 2010 – Q2 2011	Q3 2011 – Q2 2012	Q3 2012 – Q2 2013	Q3 2013 – Q2 2014	Q3 2014 – Q2 2015	Q3 3015 – Q2 2016	Q3 2016 – Q2 2017	Improvement
H-COMP-1	76%	76%	78%	79%	80%	80%	81%	81%	6.6%
H-COMP-2	79%	78%	79%	80%	80%	80%	80%	81%	2.5%
H-COMP-3	63%	63%	66%	67%	68%	67%	68%	68%	7.9%
H-COMP-4	69%	69%	70%	70%	70%	71%	71%	71%	2.9%
H-COMP-5	59%	59%	62%	62%	63%	63%	64%	64%	8.5%
H-COMP-6	82%	83%	84%	86%	86%	87%	88%	88%	7.3%
H-COMP-7	N/A	N/A	N/A	N/A	51%	51%	52%	52%	3.9%
H-CLEAN-HSP	70%	70%	71%	73%	74%	73%	74%	74%	5.7%
H-QUIET-HSP	50%	51%	53%	54%	55%	55%	56%	56%	12.0%
H-HSP-RATING	65%	65%	67%	69%	69%	70%	71%	72%	10.8%
H-RECMND	67%	67%	68%	69%	70%	69%	70%	70%	4.5%

Over the last eight years, Pennsylvania hospital performance across all patient experience measures has improved. In general, patient experience scores have increased steadily, but modestly, each reporting period. During the past several years, patient experience measures have become more prominently featured in pay-for-performance programs, such as Value-Based Purchasing, and incorporated in the methodologies of consumer facing hospital ratings, including CMS 5-Star Quality Rating System, Consumer Reports Hospital Ratings, Leapfrog Hospital Safety Grade, and U.S. News & World Report hospital rankings. In an effort to maximize payment reimbursement and hospital rating scores, many hospitals have redesigned the way in which they care for patients, varying from improving communication to offering amenities often found in exclusive hotels. Although these efforts do not appear to have significantly increased patient experience scores, they provide one potential explanation of the steadily improving results depicted in the above table.

In an effort to determine which experiences have the greatest impact on patient ratings, PHCQA performed correlation analyses across each HCAHPS patient experience measure. The results of the analyses are presented in the table below.

Patient Experience Correlation Analyses (Data Timeframe: Q3 2016 – Q2 2017)

	H-COMP-1	H-COMP-2	H-COMP-3	H-COMP-4	H-COMP-5	H-COMP-6	H-COMP-7	H-CLEAN-HSP	H-QUIET-HSP	H-HSP-RATING	H-RECMND
H-COMP-1	1								Correlation Key		
H-COMP-2	0.780	1							= Perfect Correlation (1.0)		
H-COMP-3	0.857	0.750	1						= Very Strong Correlation (0.7 - 0.999)		
H-COMP-4	0.846	0.703	0.787	1					= Strong Correlation (0.5 - 0.699)		
H-COMP-5	0.840	0.811	0.834	0.776	1				= Medium Correlation (0.3 - 0.499)		
H-COMP-6	0.476	0.357	0.478	0.430	0.483	1					
H-COMP-7	0.820	0.707	0.756	0.802	0.771	0.533	1				
H-CLEAN-HSP	0.711	0.622	0.756	0.651	0.689	0.421	0.548	1			
H-QUIET-HSP	0.648	0.542	0.638	0.653	0.688	0.422	0.683	0.615	1		
H-HSP-RATING	0.837	0.650	0.732	0.772	0.748	0.553	0.872	0.546	0.664	1	
H-RECMND	0.732	0.573	0.583	0.691	0.626	0.440	0.818	0.360	0.578	0.931	1

Hospital rating is very strongly correlated with nurse communication (H-COMP-1), hospital staff responsiveness (H-COMP-3), pain management (H-COMP-4), explanation of medicines (H-COMP-5), and understanding discharge instructions (H-COMP-7). Among these, nurse communication and ensuring that patients understand their discharge instructions are particularly important to ensure a high hospital rating. Comfort factors, such as cleanliness (H-CLEAN-HSP) and noise (H-QUIET-HSP), are not as much of a priority

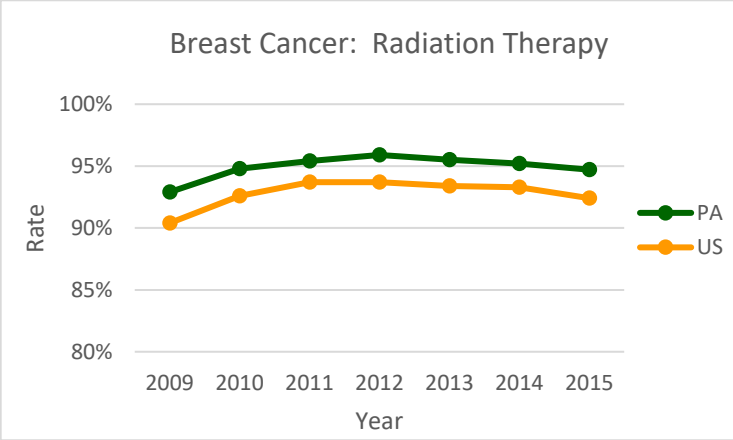
to patients as factors related to direct care when evaluating their experience. Interestingly, nurse communication has a stronger impact on patient evaluations of hospital experience than doctor communication. Additionally, the data suggests that providing discharge instructions (H-COMP-6) is not sufficient protocol for a hospital to maintain its reputation. Rather, hospitals need to devote enough time to ensure patients understand how to care for themselves after they leave the hospital (H-COMP-7).

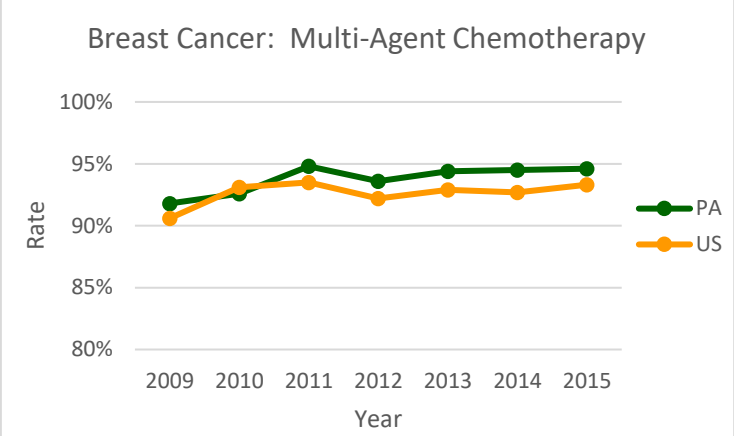
Cancer Care

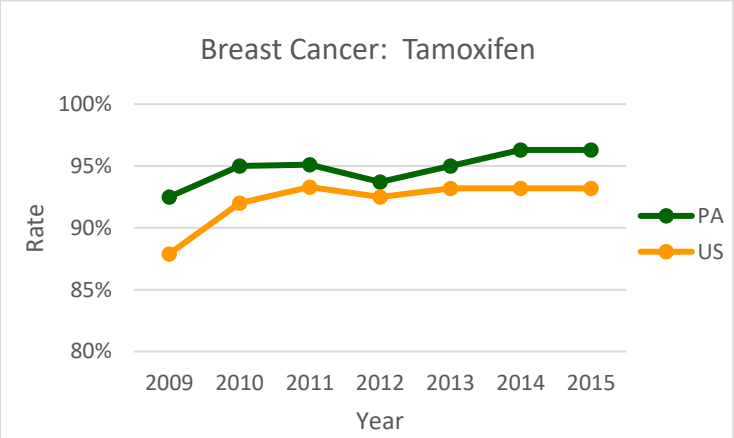
PHCQA has partnered with the American College of Surgeon's Commission on Cancer® (CoC) since 2013 to publicly report data from the national cancer database on the compliance with nationally accepted guidelines for the treatment of breast and colon cancers. PHCQA reports data from 64 of 73 CoC accredited facilities on three breast cancer and two colon cancer process measures. PHCQA publishes the rates of compliance with the guidelines in the following measures:

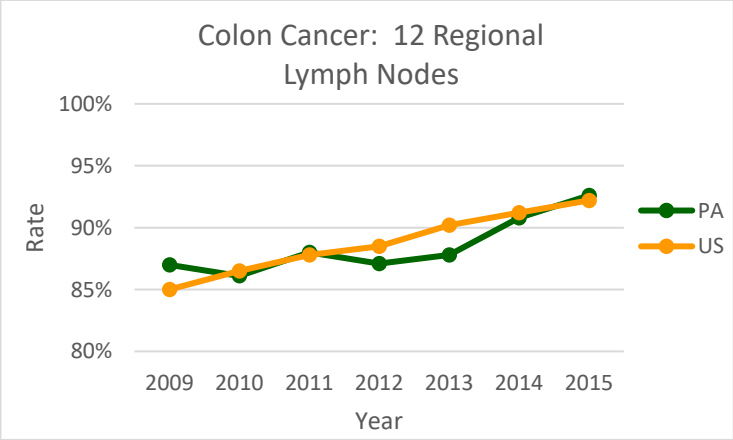
1. **Breast Cancer: Radiation Therapy -** Percentage of female patients, age 18 - 69, who have their first diagnosis of breast cancer (epithelial malignancy) at AJCC state I, II, or III, receiving breast conserving surgery who receive radiation therapy within 1 year (365 days) of diagnosis.
2. **Breast Cancer: Multi-Agent Chemotherapy** - Percentage of female patients, over the age of 18 at diagnosis, who have their first diagnosis of breast cancer (epithelial malignancy) at AJCC state T1c, or Stage II or III, whose primary tumor is progesterone and estrogen receptor negative recommended for multi-agent chemotherapy (considered or administered) within 4 months (120 days) of diagnosis.
3. **Breast Cancer: Tamoxifen** - Percentage of female patients, over the age of 18 at diagnosis, who have their first diagnosis of breast cancer (epithelial malignancy) at AJCC stage I, II, or III, whose primary tumor is progesterone or estrogen receptor positive recommended for tamoxifen or third generation aromatase inhibitor (considered or administered) within 1 year (365 days) of diagnosis.
4. **Colon Cancer: 12 Regional Lymph Nodes** - Percentage of patients, over the age of 18, who have primary colon tumors (epithelial malignancies only), experiencing their first diagnosis at AJCC stage I, II, or III who have at least 12 regional lymph nodes removed and pathologically examined for resected colon cancer.
5. **Colon Cancer: Adjuvant Chemotherapy** - Percentage of patients age 18-79, experiencing their first diagnosis at AJCC III (lymph node positive) colon cancer for whom adjuvant chemotherapy is considered or administered within 4 months (120 days) of diagnosis.

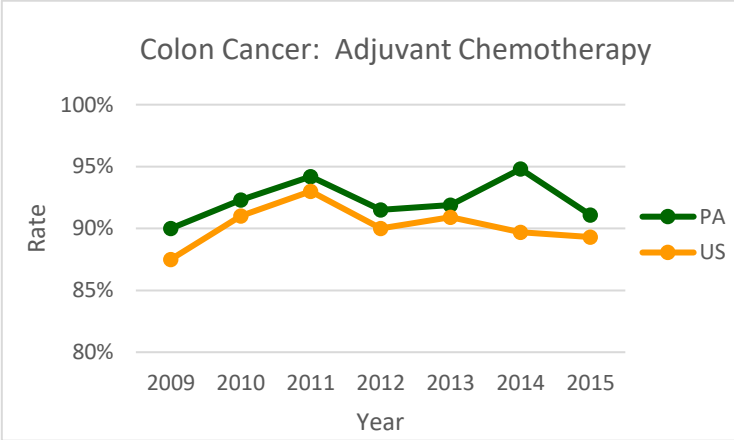
PHCQA compared the Pennsylvania results to national averages for each measure from 2009 to 2015 to determine whether compliance has improved overall and examine Pennsylvania's performance relative to national benchmarks.











Between 2009 and 2015, Pennsylvania's performance on all five cancer measures steadily improved or remained constant. Of particular note, however, between 2014 and 2015, performance on the Colon Cancer Adjuvant Chemotherapy measure decreased to a rate closer to the national average. In recent

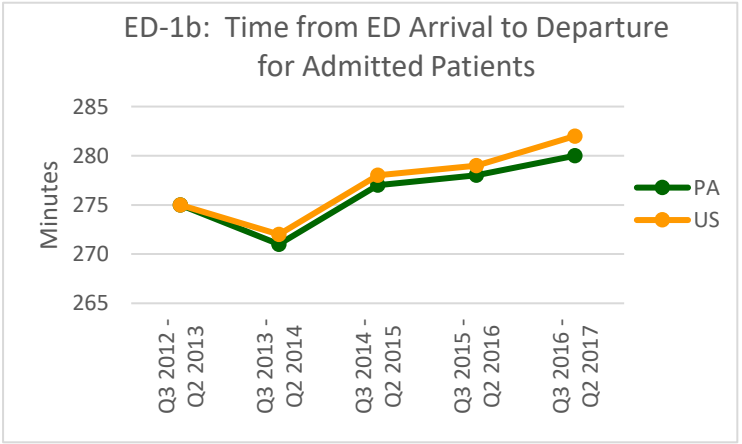
years, the performance in Pennsylvania on all measures, except Colon Cancer: 12 Regional Lymph Nodes, exceeded the national average.

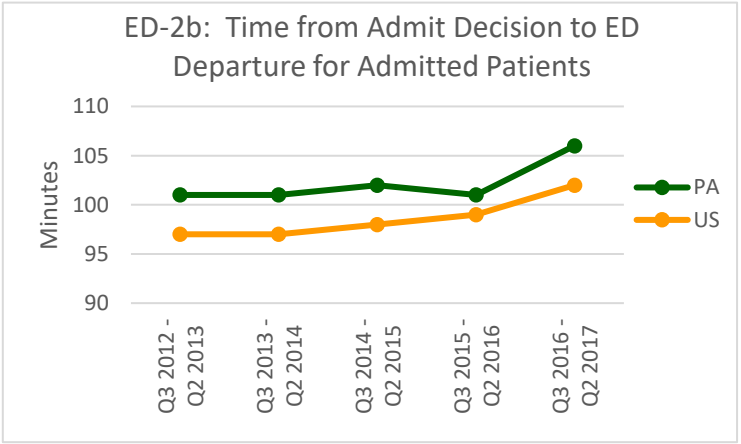
Emergency Department

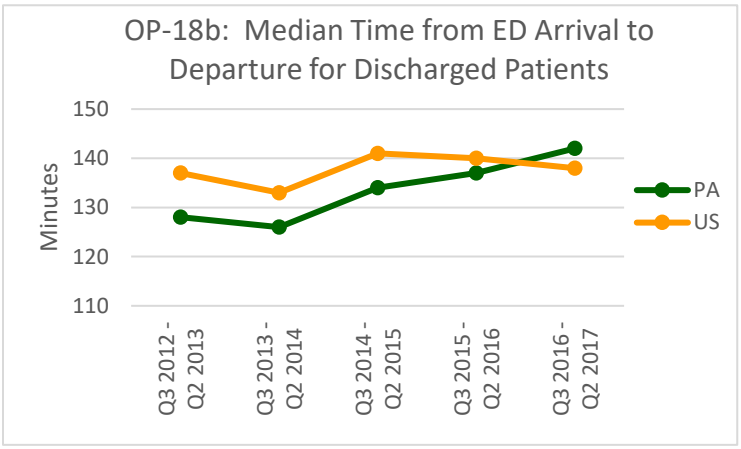
Emergency department (ED) measures evaluate how timely and effectively the care in a hospital's emergency department is delivered. Results are displayed as an average in minutes and may not reflect daily fluctuations in ED care. Lower scores are better, as less time indicates more timely care. PHCQA publishes data on the following 5 measures:

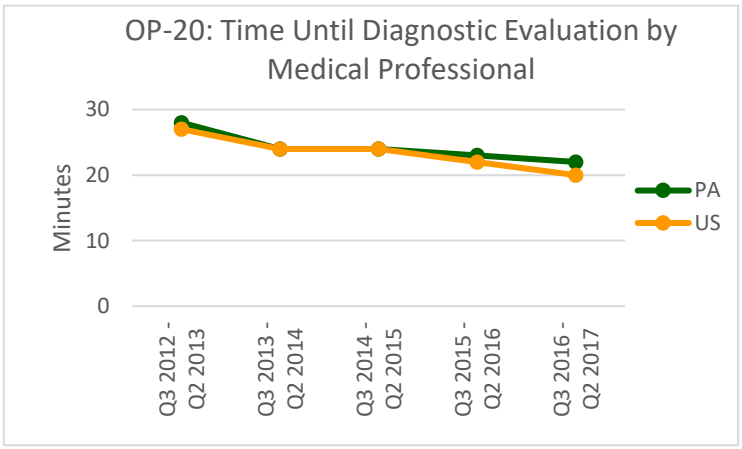
1. **ED-1b:** Median time from ED arrival to time of departure from the emergency room for patients admitted to the hospital.
2. **ED-2b:** Median time from admit decision to time of departure from the ED for patients admitted to the hospital.
3. **OP-18b:** Median time from ED arrival to time of departure from the emergency room for patients discharged from the ED.
4. **OP-20:** The time represented in minutes for the first direct, personal exchange between a patient and a qualified medical professional in the ED.
5. **OP-21:** Median time from ED arrival to time of initial pain medication administration or other regional and local anesthesia pain management for ED patients with a principal diagnosis of long bone fracture.

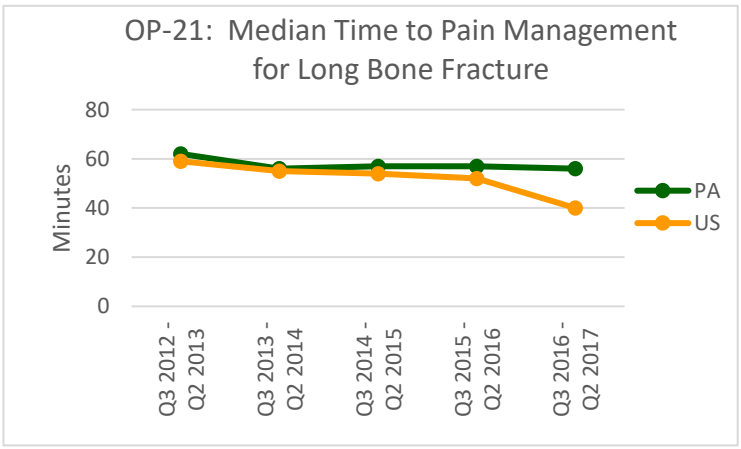
PHCQA compared the Pennsylvania results to national averages for each measure from 2012 to 2017 to determine whether timeliness of ED care has improved overall and examine Pennsylvania's performance relative to national benchmarks.









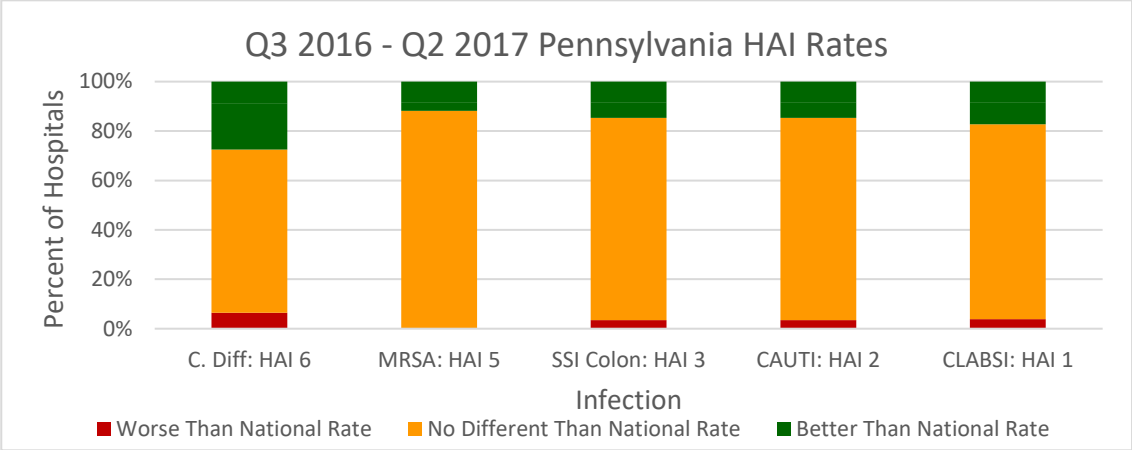


In Pennsylvania, the median times from ED arrival to departure for admitted patients (ED-1b), admit decision to departure for admitted patients (ED-2b), and arrival to departure for discharged patients (OP-18b) have increased over recent years. For OP-18b, the Pennsylvania average has actually surpassed the national average for the first time in the past five years. For the two other measures relating to length of time until evaluation or pain management, the median time is slightly decreasing. While the data suggests that the time spent in the ED even after making the decision to admit the patient to the hospital is increasing, the decreasing trends in time until evaluation or pain management provide evidence of improved efficiency of ED care.

Healthcare-Associated Infections

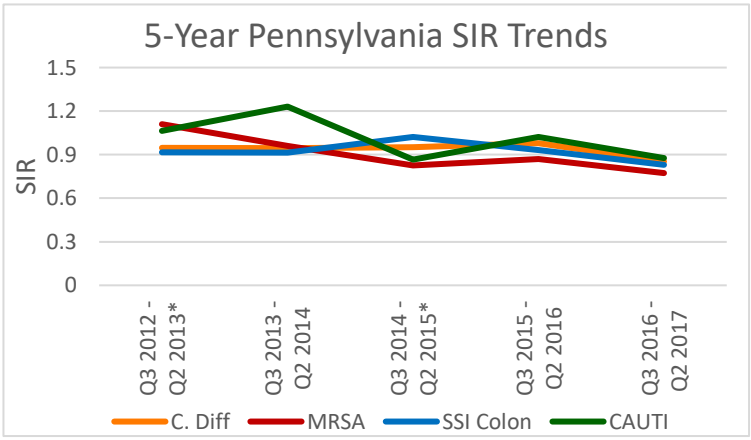
The PHCQA website displays data for five Healthcare-Associated Infection (HAI) measures, including central line-associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), colon surgical site infections (SSI Colon), MRSA bacteremia, and C. difficile. HAIs are infections contracted at a given hospital during medical treatment. These infections can typically be avoided if facilities follow guidelines for safe care.

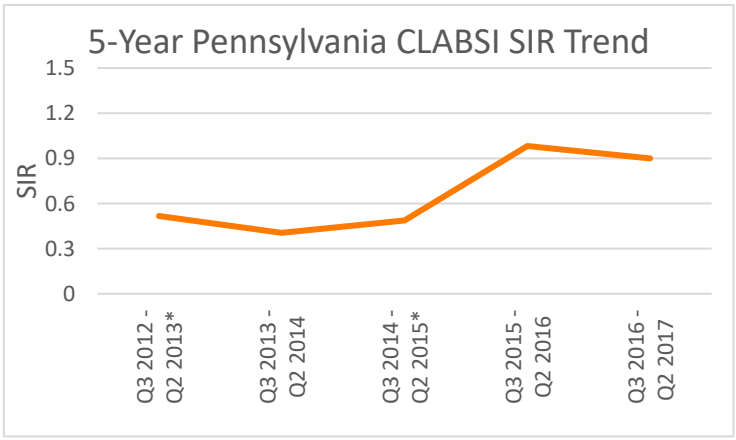
PHCQA displays whether a given hospital has an infection rate higher, lower, or no different than the national rate. A rate below the national rate is better. The first graphic below indicates the percentage of hospitals that fall within these three different categories for the five different infections during the most recent period of data.



Interestingly, for C. diff infections, there are more hospitals in Pennsylvania that are both better than and worse than the national rate compared to the other infections. Many Pennsylvania hospitals have focused on reducing C. diff infection rates in recent years, which may explain the large percentage of hospitals better than the national rate. Hospitals, however, vary in their approaches to reducing C. diff infections. The most effective efforts have targeted restrictions on antibiotic usage in order to decrease the prevalence of resistant strains. The discrepancy in successful interventions may influence the variation in C. diff infection rates in Pennsylvania.

A Standardized Infection Ratio (SIR) is a summary measure that compares the actual number of infections observed to the number predicted, which is risk-standardized to account for differences in hospital and patient characteristics. A score of 1 indicates that the actual number of infections observed is the same as the predicted number of infections. A score greater than 1 means more infections were observed than predicted, whereas a score less than 1 means fewer infections were observed than predicted.





*2012 - 2013 C. Diff and MRSA data and 2014 - 2015 CAUTI and CLABSI data only include data for two of four quarters.

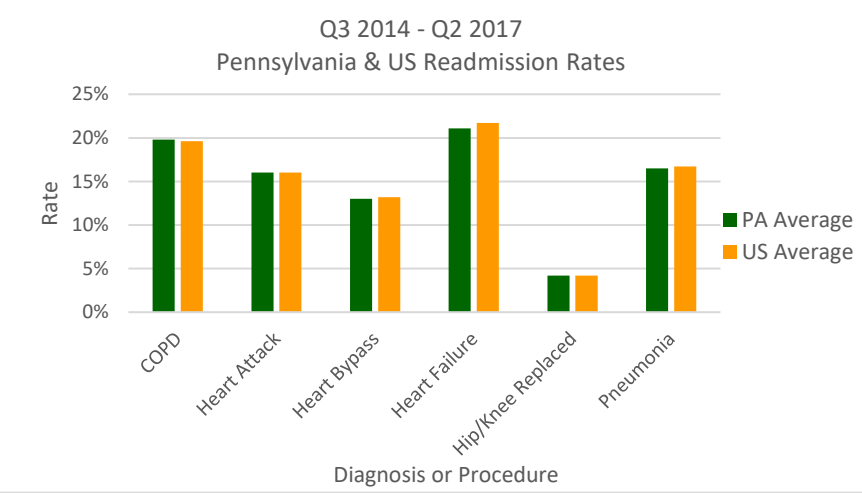
The two graphics above depict the SIRs for the five infection types between 2012 and 2017. The CLABSI graph was separated in order to more clearly visualize changes in performance.

The SIRs of all infection types decreased in Pennsylvania between the last two time periods. Previously, between Q3 2014 and Q2 2016, most infection types experienced a slight increase in SIR, likely due to a "rebaseline" initiative by the Centers for Disease Control and Prevention (CDC), which updated the risk-adjustment models. The CDC predicted this recalculation would cause the SIRs to increase and shift closer to 1. The most significant change in recent years has occurred in central line-associated bloodstream infections (CLABSI) with a large increase in SIR between Q3 2014 - Q2 2015 and Q3 2015 - Q2 2016. In addition to the rebaseline changes, this large shift may also be attributable to a revised CLABSI definition. In December of 2015, the CLABSI definition criteria expanded to include patient care areas outside of intensive care units (ICUs) including long-term acute care hospitals, inpatient rehabilitation facilities, and oncology hospitals.

Readmission and Mortality

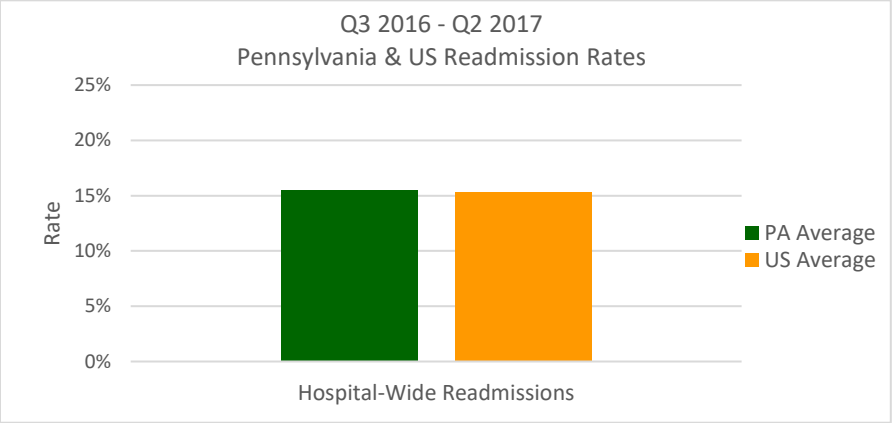
PHCQA analyzed readmission and mortality rate trends over the last five reporting periods. PHCQA sources its outcomes data primarily from CMS, which reports readmissions and mortalities that occur within 30 days of discharge during a three-year rolling period. Lower readmission and mortality rates indicate better performance.

Readmission data were compared to the national rates and analyzed for trends over time. Hospital-wide readmission data are displayed separately because of the different time period used for reporting.



6-Year Pennsylvania Readmission Rate Trends

Measure	Q3 2009 – Q2 2012	Q3 2010 – Q2 2013	Q3 2011 – Q2 2014	Q3 2012 – Q2 2015	Q3 2013 – Q2 2016	Q3 2014 – Q2 2017	Improvement
COPD Readmission	N/A	21.0%	20.5%	20.3%	20.0%	19.8%	5.7%
Heart Attack Readmission	18.3%	17.8%	17.2%	17.0%	16.3%	16.0%	12.6%
Heart Bypass Surgery Readmission	N/A	N/A	14.7%	14.1%	13.2%	13.0%	11.6%
Heart Failure Readmission	23.1%	22.6%	21.9%	21.8%	21.3%	21.1%	8.7%
Hip and/or Knee Surgery Readmission	5.6%	5.4%	5.0%	4.7%	4.4%	4.2%	25.0%
Pneumonia Readmission	17.7%	17.3%	16.9%	17.0%	16.8%	16.5%	6.8%



6-Year Pennsylvania Hospital-Wide Readmission Rate Trend

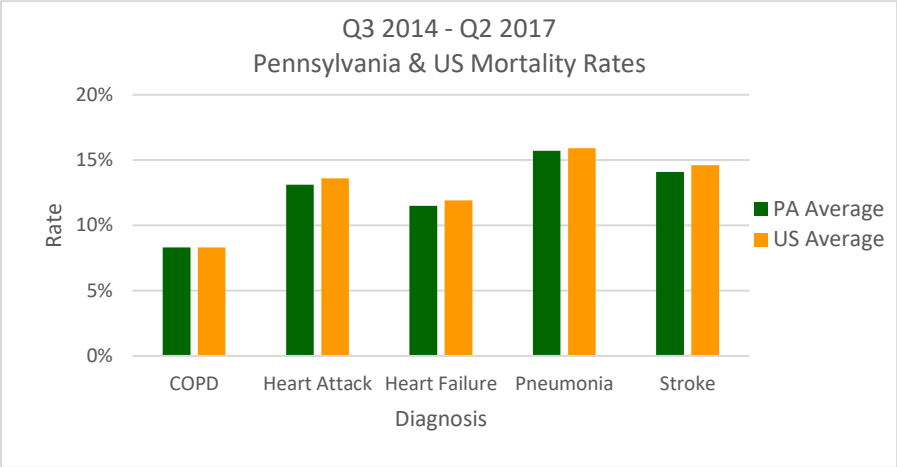
Measure	Q3 2011 – Q2 2012	Q3 2012 – Q2 2013	Q3 2013 – Q2 2014	Q3 2014 – Q2 2015	Q3 2015 – Q2 2016	Q3 2016 – Q2 2017	Improvement
Hospital-Wide Readmission	16.1%	15.8%	15.4%	15.7%	15.4%	15.5%	3.7%

For the most recent reporting period, Q3 2014 – Q2 2017, Pennsylvania readmission rates are nearly identical to the national readmission rates for each reported measure. During the last six reporting periods, the Pennsylvania readmission rates for each of these diagnoses or procedures have all steadily decreased, resulting in all-time low readmission rates for Q3 2014 – Q2 2017. The hospital-wide readmission rate in Pennsylvania during the most recent reporting period is also nearly identical to the national rate. However, over the past six reporting periods the hospital-wide readmission rate has fluctuated up and down. Although there has been an overall decrease, it has not been a consistent downward trend.

Several factors may explain the decrease in Pennsylvania readmission rates. In 2010, the Health Care Improvement Foundation launched PAVE, an 18-month project focused on reducing readmissions in health

care facilities located in southeastern Pennsylvania. By the end of PAVE, participants adopted and implemented several strategies, including utilizing a screening tool to target patients considered high-risk for readmission, devoting special attention to patient and caregiver education, scheduling follow-up appointments prior to discharge, and calling patients after discharge in order to answer questions and inquire about patient health status. Then, from 2012 to 2016, The Hospital & Healthsystem Association of Pennsylvania managed the HEN and HEN 2.0 projects focused on reducing all-cause readmissions in Pennsylvania hospitals. Additionally, in October 2012, CMS implemented the Hospital Readmission Reduction Program (HRRP), which has included all of the above readmission measures, except hospital-wide readmissions, since implementation. HRRP ties reimbursement to readmission rates, penalizing hospitals for higher readmission rates than expected. This pay-for-performance model incentivizes hospitals to create innovative strategies to prevent readmissions.

Mortality statistics for heart attack, heart failure, pneumonia, stroke, and COPD patients were also compared to national rates and tracked for improvement over time. Pennsylvania mortality rates for heart failure, heart attack, pneumonia, stroke, and COPD diagnoses are all either equal to or just below the national average, but by no more than one half of a percent.



6-Year Pennsylvania Mortality Rate Trends

Measure	Q3 2009 – Q2 2012	Q3 2010 – Q2 2013	Q3 2011 – Q2 2014	Q3 2012 – Q2 2015	Q3 2013 – Q2 2016	Q3 2014 – Q2 2017	Improvement
COPD Mortality	N/A	7.7%	7.6%	8.0%	8.0%	8.3%	-7.8%
Heart Attack Mortality	14.3%	14.3%	13.7%	13.7%	13.1%	12.7%	11.2%
Heart Failure Mortality	11.2%	11.4%	11.3%	11.7%	11.5%	11.4%	-1.8%
Pneumonia Mortality	11.5%	11.5%	11.1%	16.1%	15.7%	15.6%	-35.7%
Stroke Mortality	N/A	14.8%	14.3%	14.4%	14.1%	14.0%	5.4%

Over the last six reporting periods, mortality rates have slowly, but steadily, decreased for heart attack and stroke patients. In contrast, mortality rates have slightly increased for heart failure and COPD patients and significantly increased for pneumonia patients. The 5% increase in pneumonia mortality from Q3 2012 to Q2 2015 can be explained by an expansion of the measure cohort to include patients with a primary diagnosis of aspiration pneumonia and patients with either sepsis or respiratory failure as a primary diagnosis accompanying a secondary diagnosis of pneumonia present on admission. All the mortality measures analyzed in this report, except stroke and COPD, are included in Value-Based Purchasing, a pay-for-performance program that financially rewards hospitals for providing high quality care to Medicare beneficiaries.

Summary

In summary, PHCQA reached the following conclusions:

1. In general, Pennsylvania performance for patient experience, readmission, and mortality measures are comparable to the national average.
2. Nurse communication and ensuring patients understand their discharge instructions have the greatest impact on hospital ratings and recommendations. Pain management, effective explanation of medicines, and staff responsiveness are also very strongly correlated with a high hospital rating.
3. Commission on Cancer accredited facilities in Pennsylvania have improved their compliance with all five cancer process measures reported on PHCQA since 2009. Pennsylvania's average has exceeded the national average on four of the five cancer measures since 2011.
4. The time spent in the Emergency Department in Pennsylvania appears to be increasing, even after the decision is made to admit the patient to the hospital. The time until evaluation or pain management, however, has been decreasing in Pennsylvania, showing an improvement in timeliness.
5. The Standardized Infection Ratios (SIR) of the five infection types reported by PHCQA decreased during the most recent time period following increases due to CMS's rebaseline initiative between the Q3 2014 – Q2 2015 and Q3 2015 – Q2 2016 reporting periods.
6. Heart attack, heart failure, pneumonia, hip and/or knee surgery, heart bypass surgery, and COPD readmission rates have all steadily decreased over the last six years. Hospital-wide readmission rates have also decreased overall, but have experienced more fluctuation. Heart attack and stroke mortality rates have decreased during the same time period while heart failure and COPD mortality rates have slightly increased. Pneumonia mortality rates have decreased since the Q3 2012 – Q2 2015 reporting period.