CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)/ PREMIER HOSPITAL QUALITY INCENTIVE DEMONSTRATION PROJECT

Project Findings from Year Two

MAY, 2007

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CITATION

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EXECUTIVE SUMMARY

Data from the first year of the the Centers for Medicare & Medicaid Services (CMS)/Premier healthcare alliance Hospital Quality Incentive Demonstration (HQID) suggested that pay-for-performance programs have the potential to increase clinical quality and save lives. Analysis of the second year of official data, summarized in this report, substantiate these findings.

On January 26, 2007, CMS announced second-year incentive payments of $8,690,447 to 115 top-performing hospitals in the project, which is managed by Premier. The demonstration project, which began in October 2003, involves more than 260 hospitals and tracks process and outcome measures in five clinical areas – acute myocardial infarction (AMI/heart attack), heart failure (HF), coronary artery bypass graft (CABG), pneumonia (PN), and hip and knee replacement (Hip/Knee).

Data from the second year of the HQID project reflects a significant improvement in the quality of care across five clinical focus areas as measured by 30 nationally standardized and widely accepted quality indicators. The average improvement of the composite quality scores (CQS), an aggregate of all quality measures within each clinical area, in the project's second year was 6.7 percent, for total gains of 11.8 percent over the project's first two years. Improvements in quality of care saved 1,284 AMI patients in that related focus area alone over the project's first two years.

The CQS improved significantly between the inception of the program and the end of Year 2 in all five clinical focus areas:

- From 87.5 percent to 94.4 percent for patients with acute myocardial infarction (heart attack).
- From 64.5 percent to 82.4 percent for patients with heart failure.
- From 69.3 percent to 85.8 percent for patients with community acquired pneumonia.
- From 84.8 percent to 93.8 percent for patients with coronary artery bypass graft.
- From 84.6 percent to 93.4 percent for patients with hip and knee replacement.

In addition, the range of variance among participating hospitals is closing, as those hospitals in the lower deciles continue to improve their quality scores and close the gap between themselves and the demonstration's top performers.

The pay-for-performance model demonstrated in the project includes financial incentives and public recognition for top-performing hospitals, as well as financial penalties for hospitals that do not improve above a pre-defined quality measure threshold by the third year of the project. Additionally, Premier's relationship with participants enabled implementation of effective, collaborative knowledge transfer programs supporting identification and dissemination of best practices of top performers, a key component to the rapid pace of performance improvement.

The financial component of the HQID will reward hospitals performing in the top 10 percent for a given clinical focus with an additional 2 percent bonus on their Medicare DRG payments for patients in that clinical area. Hospitals in the second decile will receive a 1 percent bonus.

Hackensack University Medical Center was a top performer in all five areas for the second year in a row, providing high quality care for 2,853 Medicare patients. Their total award across the five clinical areas will be approximately $744,000.

Charleston Area Medical Center in Charleston, WV, received the second highest incentive award, $701,000, for achieving top performance in four clinical areas. Charleston Area Medical Center also received the highest single award, $432,901, in one clinical area for providing high quality care to 883 Medicare patients who had CABG procedures.

The second largest single award totals $250,775 and will be provided to the Bone and Joint Hospital in Oklahoma City, OK, for exceptionally high quality of care for patients receiving hip and knee replacement procedures.

For complete information about the HQID project and to view those hospitals ranking in the top 50 percent in each focus area, visit www.premierinc.com/qualitydemo.

INTRODUCTION

This report presents key findings from the first and second year[a] of the CMS/ Premier HQID project. The HQID was designed to provide financial rewards and public recognition to hospitals that demonstrate high quality performance in a number of areas of acute care. The purpose of the demonstration, a partnership between the CMS, the federal agency providing health care coverage to approximately 40 million Americans[b], and Premier Inc., a nationwide organization of not-for-profit hospitals, is to facilitate improvement in the quality and efficiency of patient care by providing economic incentives. The three-year demonstration uses a nationally standardized set of quality measures to evaluate individual hospital performance. Results from the first and second year show significant improvement in the quality of care in all measured clinical areas and provide support for the positive influence of financial incentives on facilitating healthcare quality improvement.

Appendix A provides more information on the project design and methodology.

KEY FINDINGS FROM HQID YEAR TWO

PARTICIPATING HOSPITALS

The HQID project utilizes the Medicare provider number (MPN) to identify project participants. It is possible for more than one hospital to share a MPN. A total of 253 Medicare providers were included in the analysis of HQID year two data representing 266 acute care hospitals. For reading ease, the term "hospital" is used in the subsequent discussions rather than "Medicare providers".

The participating hospitals were located in 37 states across the United States with the majority located in urban geographic areas. For year two, the largest number of hospitals were located New York with 21 (8.3%) hospitals, closely followed by North Carolina and Texas, with 20 (7.9%) hospitals in each state. California and Florida had 19 (7.5%) hospitals in each state and 16 (6.3%) hospitals were located in Virginia.

Descriptive statistics of selected characteristics, including number of licensed beds, core based statistical area (CBSA) where the hospital was located, the urban/rural status of the hospital's location, and teaching status, are summarized in Table 1. Hospital characteristic data was obtained and verified using multiple sources, including the FY2004 American Hospital Association survey, CMS Impact File updated June 2006, and the Hospital Compare database, after matching to Premier's hospital identifiers. As noted, there were several instances when more than one hospital had the same MPN. In these instances, the Medicare provider was assigned as urban if any of the hospitals were urban and the beds were combined across all facilities. The CBSA and teaching status were identified at the aggregated level in the source data.

[a] The report is based on analyses conducted by Premier staff using the final data from the two years of the HQID project.
[b] http://www.cms.hhs.gov/medicare/ accessed November 22, 2005.

TABLE 1: Selected Hospital Characteristics for Year Two HQID Hospitals

CHARACTERISTICS	GROUPINGS	NUMBER (PERCENT)*	COMPARE TO 2005 AHA NATIONAL DATA1
Bed Size – Number of Staffed Beds			
	< 100 beds	39 (15%)	2512 (49%)
	100 to 199 beds	51 (20%)	1144 (22%)
	200 to 299 beds	62 (25%)	646 (13%)
	300 to 499 beds	66 (26%)	561 (11%)
	>= 500 beds	35 (14%)	267 (5%)
Urban/Rural Status			
	Rural	44 (17%)	1206(24%)
	Urban	209 (83%)	3924 (76%)
Core Based Statistical Area (CBSA) Type			
	Division	55 (22%)	779 (15%)
	Metro	152 (60%)	2260 (44%)
	Micro	33 (13%)	885 (17%)
	Rural	12 (5%)	1206 (24%)
Teaching Status (Council of Teaching Hospital Member)			
	Yes	36 (14%)	367 (7%)
	No	217 (86%)	4763 (93%)

** Numbers and percentages may not add up to total sample or 100% due to missing data or rounding.*

Table 2 presents data on the number of providers and case volume by each of the five clinical areas for the first two years of the project.

TABLE 2: Number of Hospitals and Case Volume by Clinical Area

CLINICAL AREA	NUMBER OF HOSPITALS FOR YEAR 1	NUMBER OF PATIENTS FOR YEAR 1	NUMBER OF HOSPITALS FOR YEAR 2	NUMBER OF PATIENTS FOR YEAR 2
AMI	243	82,853	231	74,760
CABG	134	38,327	127	32,508
PN	261	134,828	252	134,728
HF	259	118,914	250	111,955
Hip/Knee	214	41,453	208	42,706
Total Participating Hospitals	**262**	**416,375**	**253**	**396,657**

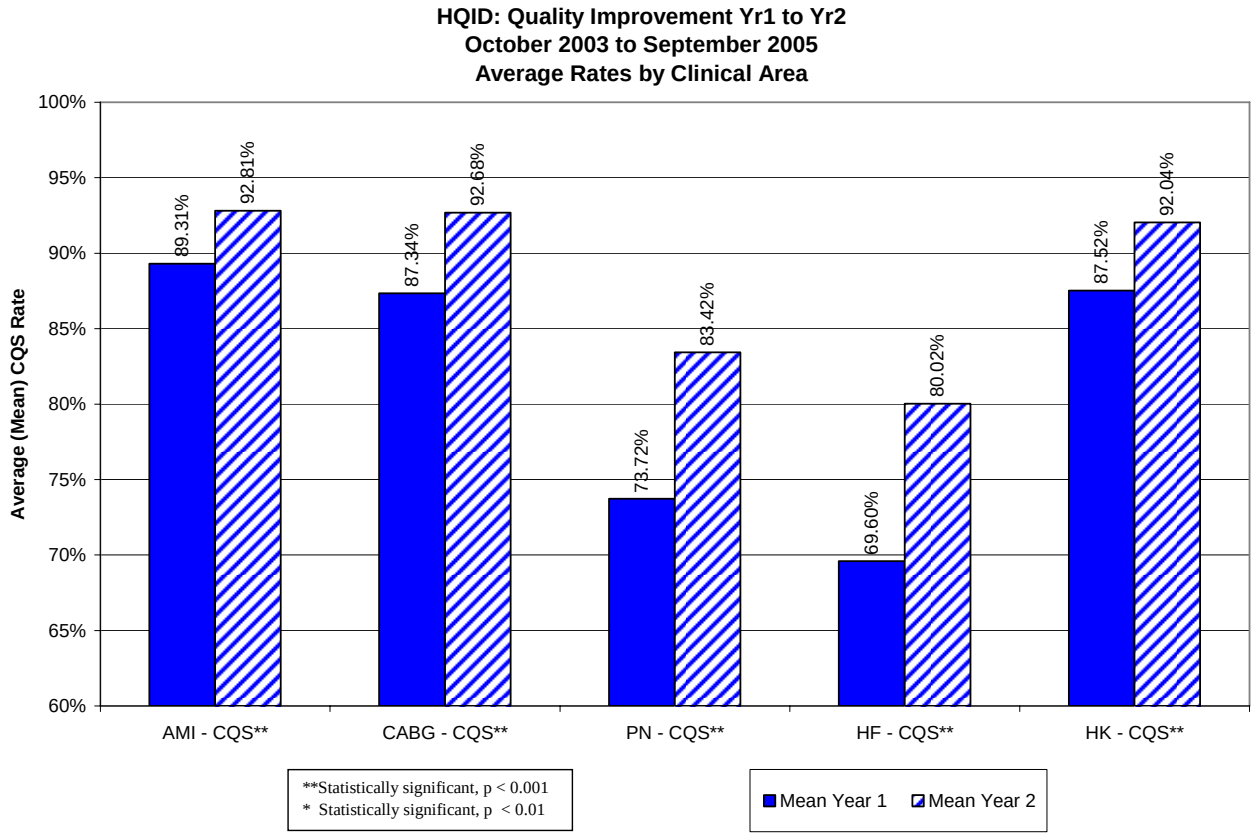
OVERALL QUALITY IMPROVEMENT

The quality of care provided by HQID participating hospitals continued to significantly improve for each of the five clinical areas. The average Composite Quality Score (CQS) from the first year of the project (October 1, 2003 – September 30, 2004) was compared to the second year of the project (October 1, 2004 – September 30, 2005) for all hospitals within each clinical area. In each case, the average overall CQS rate from year two was significantly higher than the first year of the project ($p < 0.001$; based on paired t-test of means).

The greatest improvement was in heart failure, where the overall average CQS rate increased 10.42 percentage points from 69.60% to 80.02%. This was followed by pneumonia with an increase of 9.7 percentage points (from 73.72% to 83.42%) and CABG with an increase of 5.34 percentage points (from 87.34% to 92.68%). Significant increases were also identified in hip and knee replacement (4.52 percentage points, from 87.52% to 92.04%) and in AMI (3.50 percentage points, from 89.31% to 92.81%).

Figure 1 presents the trend of improvement in overall CQS average rates between the first and second year of the project.

FIGURE 1: Trend of Average (Mean) CQS Rates by Year

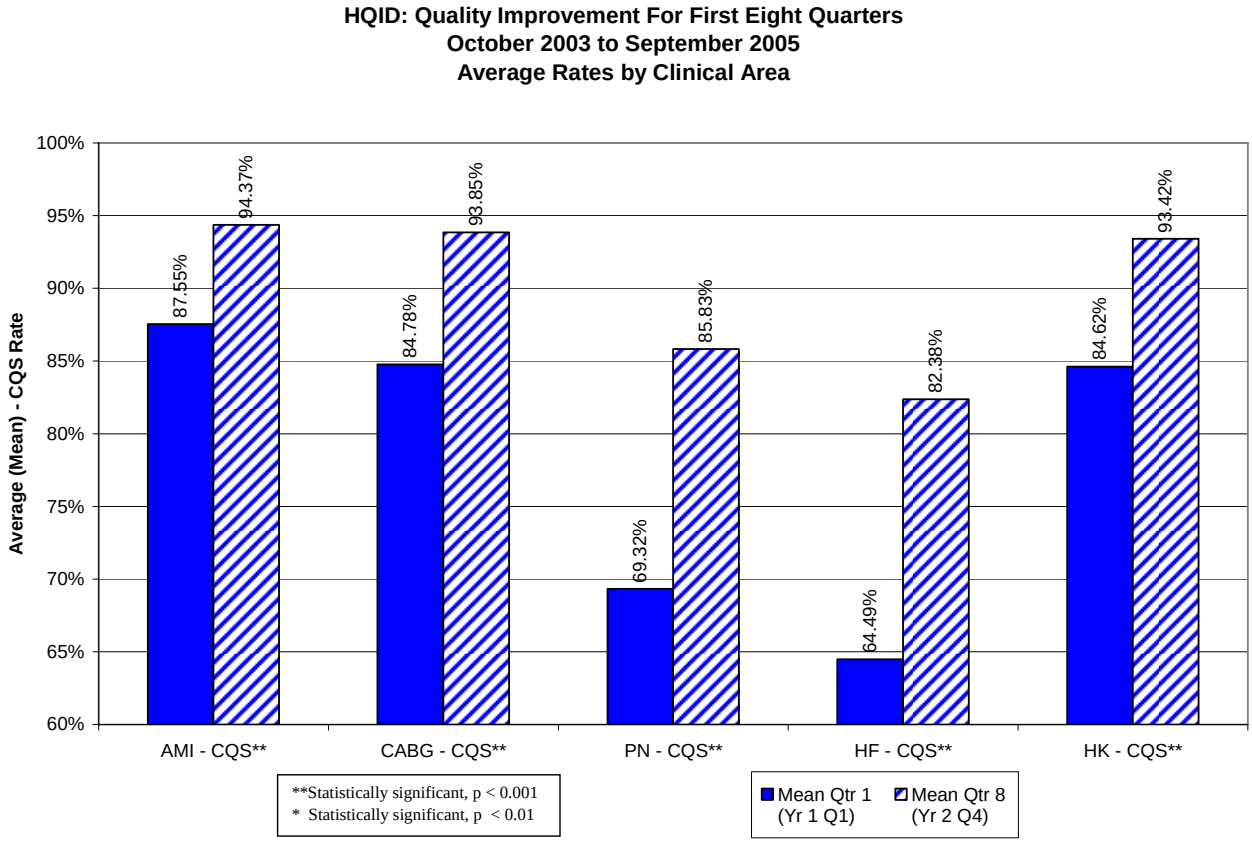


In addition the average CQS from the first quarter of the project (Q4-03) was compared to the last quarter of the second year, or the eighth quarter of the project (Q3-05), for all hospitals within each clinical area. In each case, the average overall CQS rate from the eighth quarter was significantly higher than the first quarter of the project ($p < 0.001$; based on paired t-test of means).

The greatest improvement was in heart failure, where the overall average CQS rate increased 17.90 percentage points from 64.49% to 82.38%. This was followed by pneumonia with an increase of 16.51 percentage points (from 69.32% to 85.83%) and CABG with an increase of 9.07 percentage points (from 84.78% to 93.85%). In hip and knee replacement, the increase was 8.80 percentage points (from 84.62% to 93.42%) and 6.82 percentage points in AMI (from 87.55% to 94.37%).

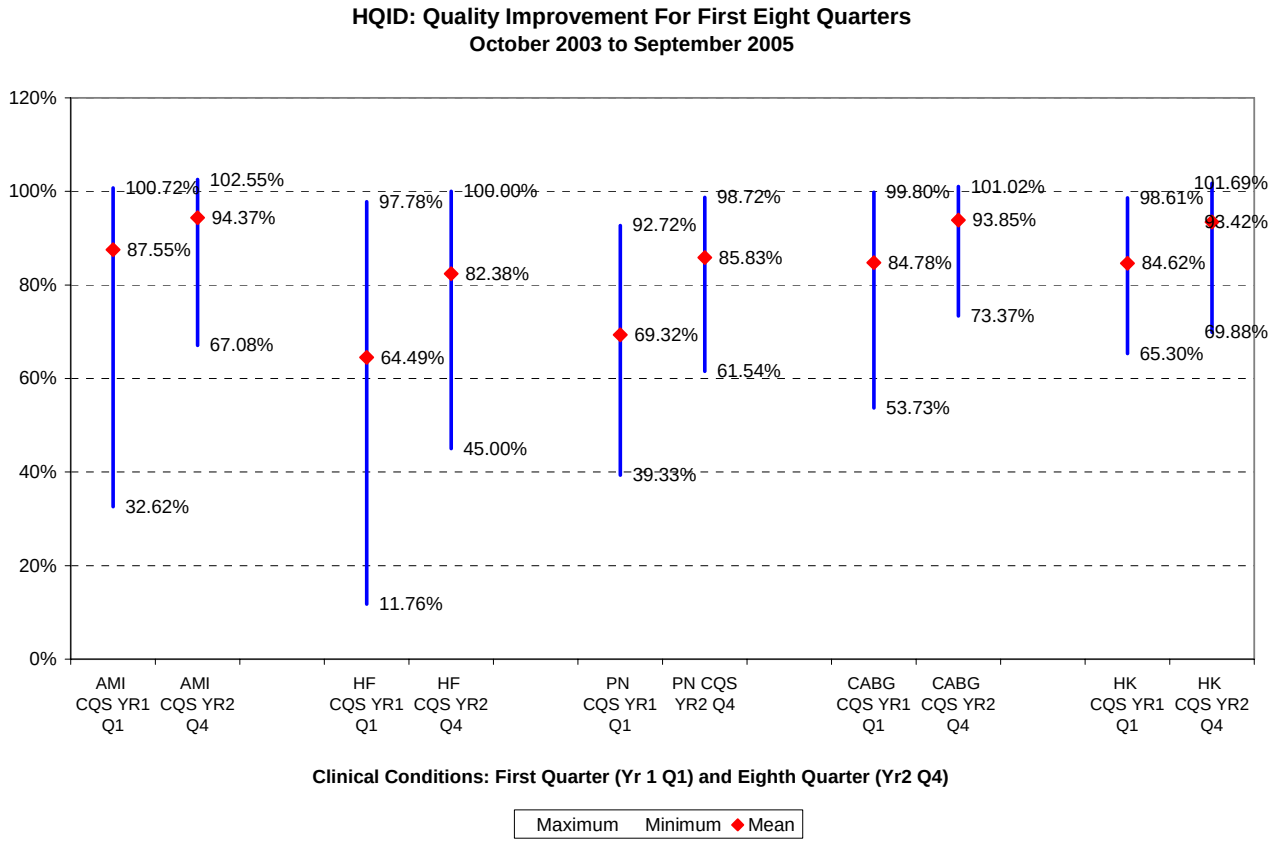
Figure 2 presents the trend of improvement in overall CQS average rates for the first quarter of year 1 and the last quarter of year 2, i.e., the first and eighth quarter of the project.

FIGURE 2: Trend of Average (Mean) CQS Rates by Quarter



In addition to the increase in the average CQS score across all clinical areas, the range of scores was also examined. In each of the five clinical areas, the lowest score of any individual hospital increased from the first quarter to the eighth quarter of the project. The highest score of any individual hospital also increased across this timeframe. Figure 3 presents this data graphically.

FIGURE 3: Comparison of Average, Minimum, and Maximum CQS Scores



IMPROVEMENT IN QUALITY MEASURES

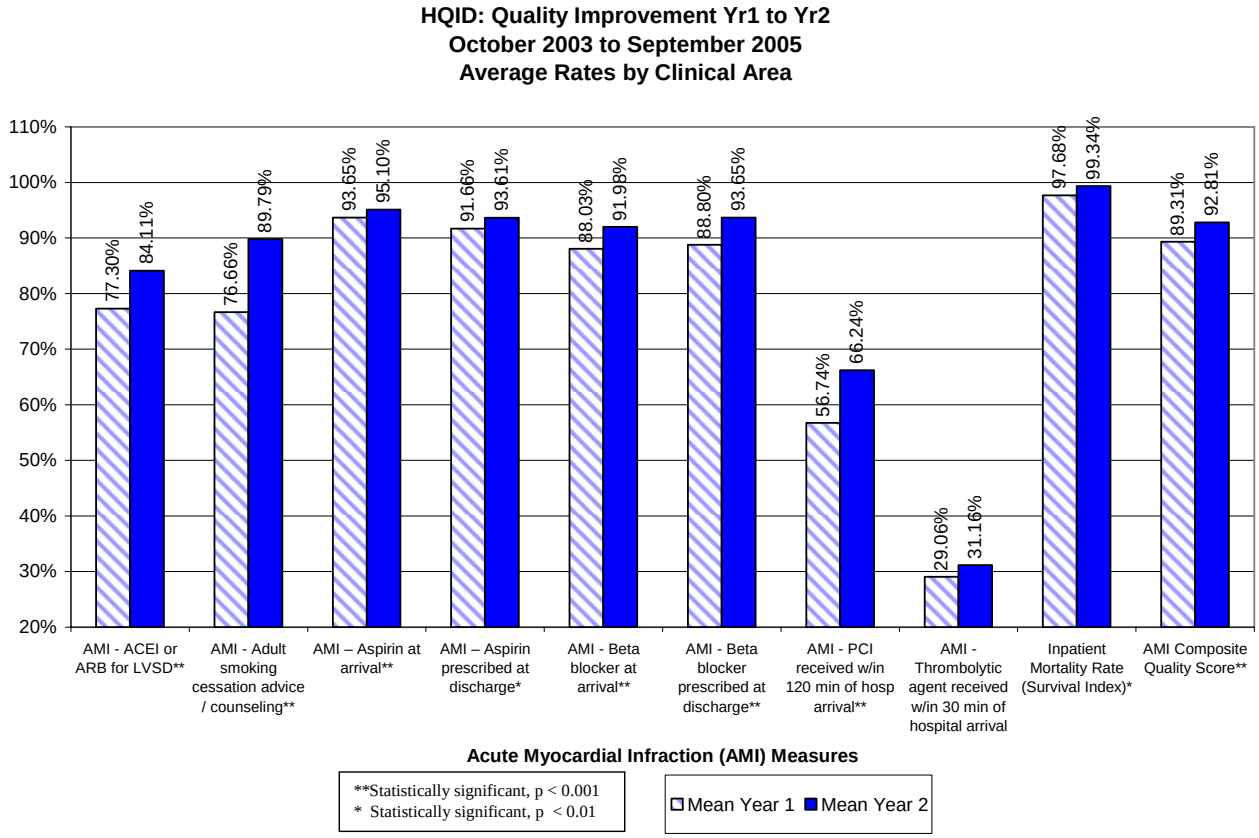
Maintaining alignment with the national quality initiatives, three measures were suppressed for the second year of the project. The measure suppression included the prophylactic antibiotic selection measure for both the CABG and hip and knee replacement populations. The measure was suppressed due to changes in clinical evidence as well as a shortage of recommended antibiotics. The measure is being modified to address these issues and will be unsuppressed at that time. In addition, the influenza vaccination for pneumonia measure was suppressed for the second year due to the vaccine shortage during the 2004-2005 flu season. Of the 30 quality measures applied in year two, 23 measures improved significantly (based on paired t-test of means 21 measures improved at a significance level of $p < 0.001$ and two measures at $p < 0.01$), from year 1 to year 2 of the project. From the first quarter of year one to the fourth quarter of year two 23 measures improved significantly (based on paired t-test of means all 23 measures improved at a significance level of $p<.0001$). Following are details on measures within each clinical area.

Acute Myocardial Infarction (AMI)

The average rate of each individual quality measure within AMI improved from the first to the second year of the project (see Figure 4). The largest improvement was in the measure adult smoking cessation advice / counseling which increased from 76.66% to 89.79% ($p < 0.001$), followed by PCI received within 120 minutes of hospital arrival which increased from 56.74% to 66.24% ($p < 0.001$). The largest opportunity for improvement remains within the measure thrombolytic received within 30 minutes of hospital arrival where the rate in year one was 29.06% and in year 2 was 31.16%. The outcome measure AMI mortality is expressed as a survival index by

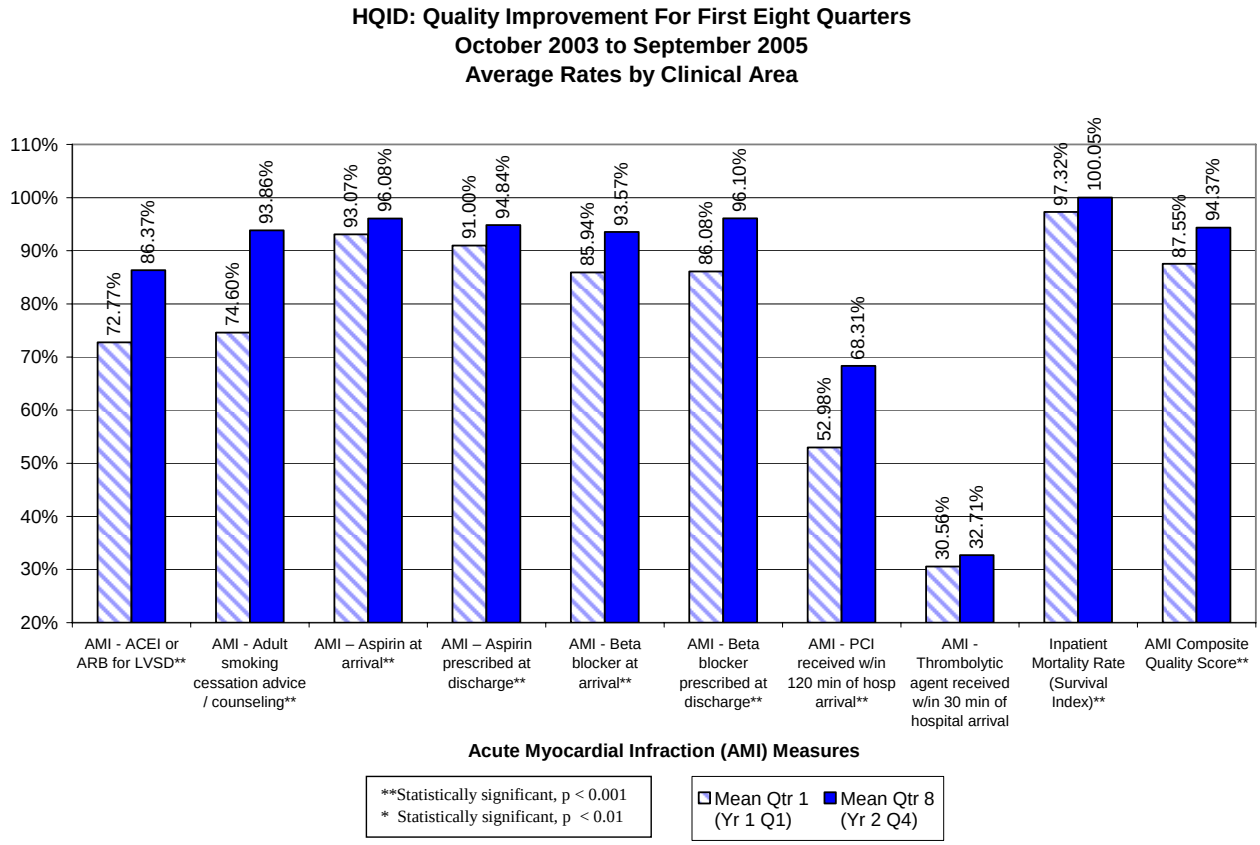
converting the actual and expected mortality rates to represent the percentage of patients who survived (100 - actual mortality rate / 100 - expected or risk-adjusted mortality rate). The survival index improved from 98.13% in the year one to 99.51% in year two.

FIGURE 4: Acute Myocardial Infarction Measures Year 1 to Year 2



The average rate of each individual quality measure within AMI also improved from the first quarter of year one to the fourth quarter of year two (see Figure 5). The largest improvement was again in the adult smoking cessation advice / counseling measure which increased from 74.60% to 93.86% ($p < 0.001$), followed by PCI received within 120 minutes of hospital arrival which increased from 52.98% to 68.31% ($p < 0.001$). The largest opportunity for improvement also remains within the measure thrombolytic received within 30 minutes of hospital arrival. The rate in the first quarter was initially 30.56% and remained below 33% as of the fourth quarter of year two. The outcome measure AMI survival index improved from 97.54% in the first quarter of year one to 100.24% in the fourth quarter of year two.

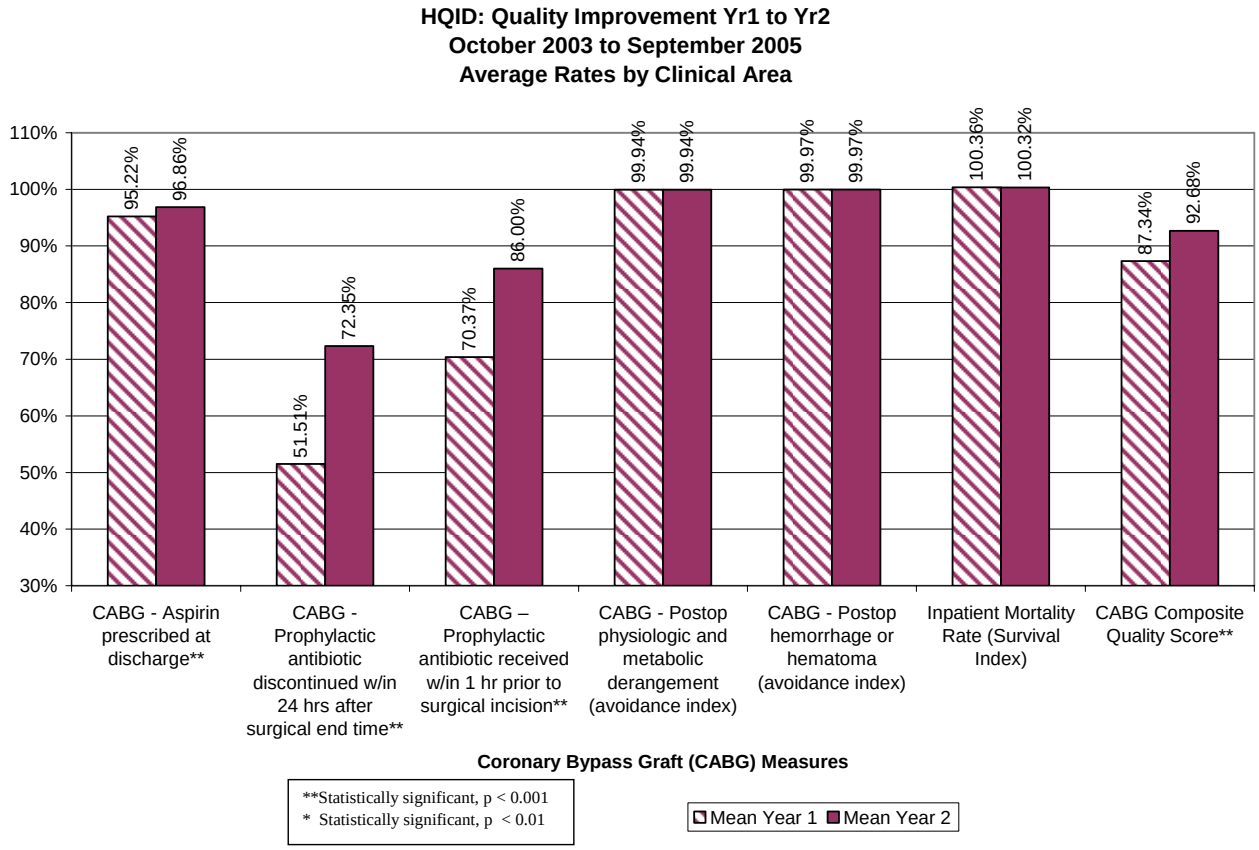
FIGURE 5: Acute Myocardial Infarction Measures Year 1 Quarter 1 to Year 2 Quarter 4



Coronary Artery Bypass Graft (CABG)

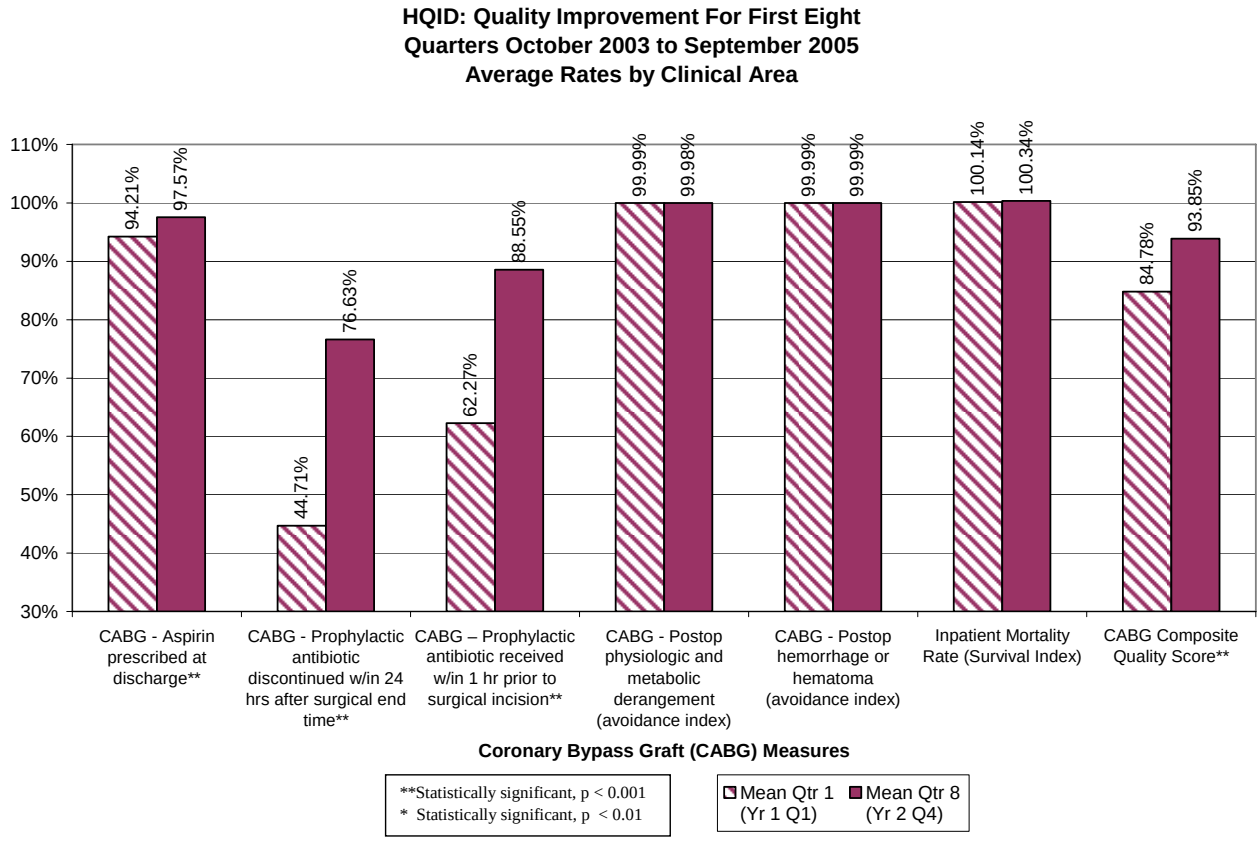
The average rate for each of the process measures within CABG improved from year one to year two of the project (see Figure 6). The largest improvement was in prophylactic antibiotic discontinued within 24 hours after surgery end time – this measure increased over 20 percentage points from 51.51% to 72.35% ($p < 0.001$). The second largest improvement was seen in another antibiotic measure, the use of prophylactic antibiotics within one hour prior to surgical incision, increasing from 70.37% to 86.00% ($p < 0.001$). There was virtually no change in the patient safety indicators (PSIs). These outcome measures are expressed as avoidance indices (observed events/expected events). The postoperative physiologic and metabolic derangement avoidance index was 99.940% in year one and was 99.943% in year two. The avoidance index of postoperative hemorrhage or hematoma was 99.971% in year one and 99.973% in year two. Similar to AMI, the mortality measure used in CABG is expressed as a survival index. The CABG mortality survival index likewise had no significant change from year one (100.433%) to year two (100.352%).

FIGURE 6: Coronary Artery Bypass Graft Measures Year 1 to Year 2



The average rate for each of the process measures within CABG also improved from the first quarter of year one to the fourth quarter of year two (see Figure 7). The largest improvement was again in prophylactic antibiotic discontinued within 24 hours after surgery end time, which increased from 44.71% to 76.63% ($p < 0.001$) across the two year time span. The second largest improvement for this timeframe was again in the use of prophylactic antibiotics within one hour prior to surgical incision, increasing from 62.27% to 88.55% ($p < 0.001$). As in the yearly comparisons, there was no significant change for the patient safety indicators across the two year time span. The postoperative physiologic and metabolic derangement avoidance index was 99.986% in the first quarter of year one and 99.979% in the fourth quarter of year two. The avoidance index of postoperative hemorrhage or hematoma improved slightly from 99.989% to 99.991%. There was also no significant change in the CABG mortality survival index, which was 100.288% for the first quarter of year one and 100.482% for the fourth quarter of year two.

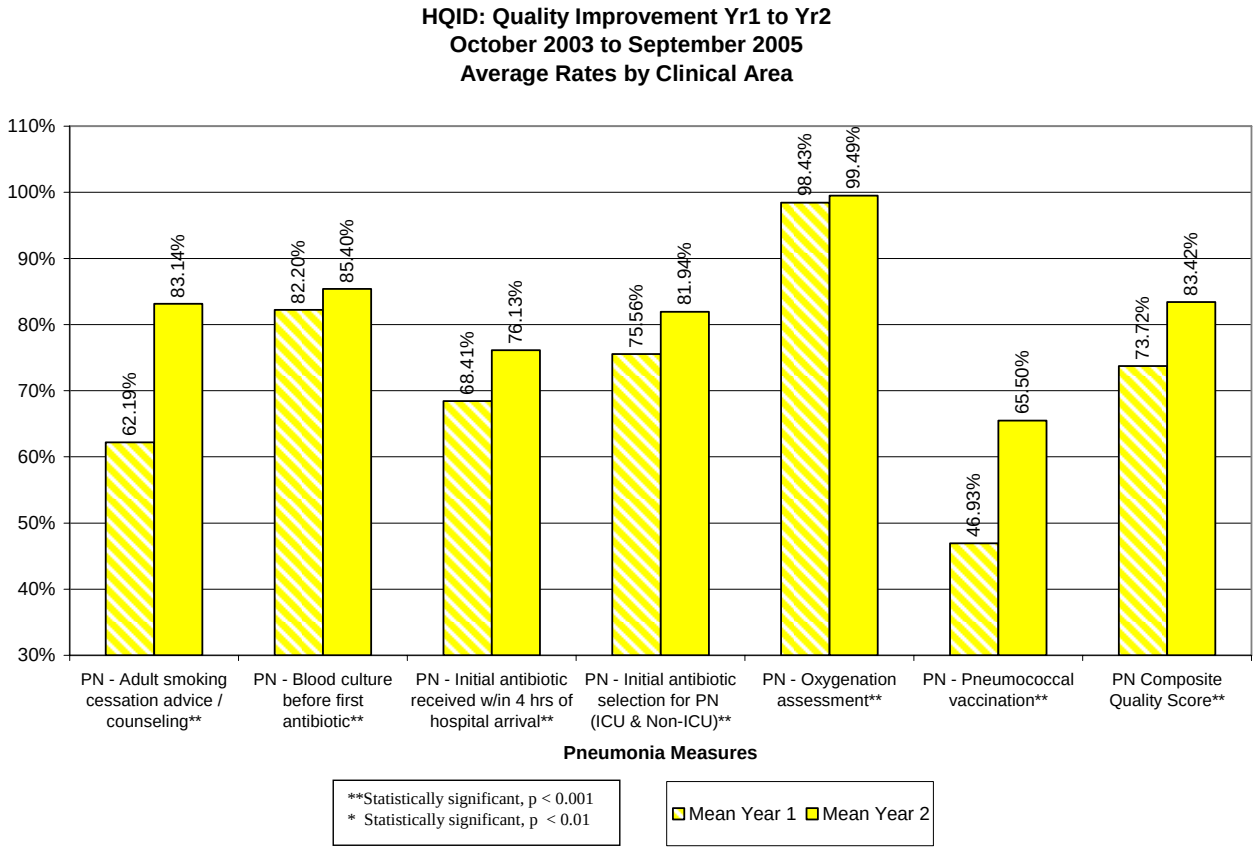
FIGURE 7: Coronary Artery Bypass Graft Measures Year 1 Quarter 1 to Year 2 Quarter 4



Pneumonia (PN)

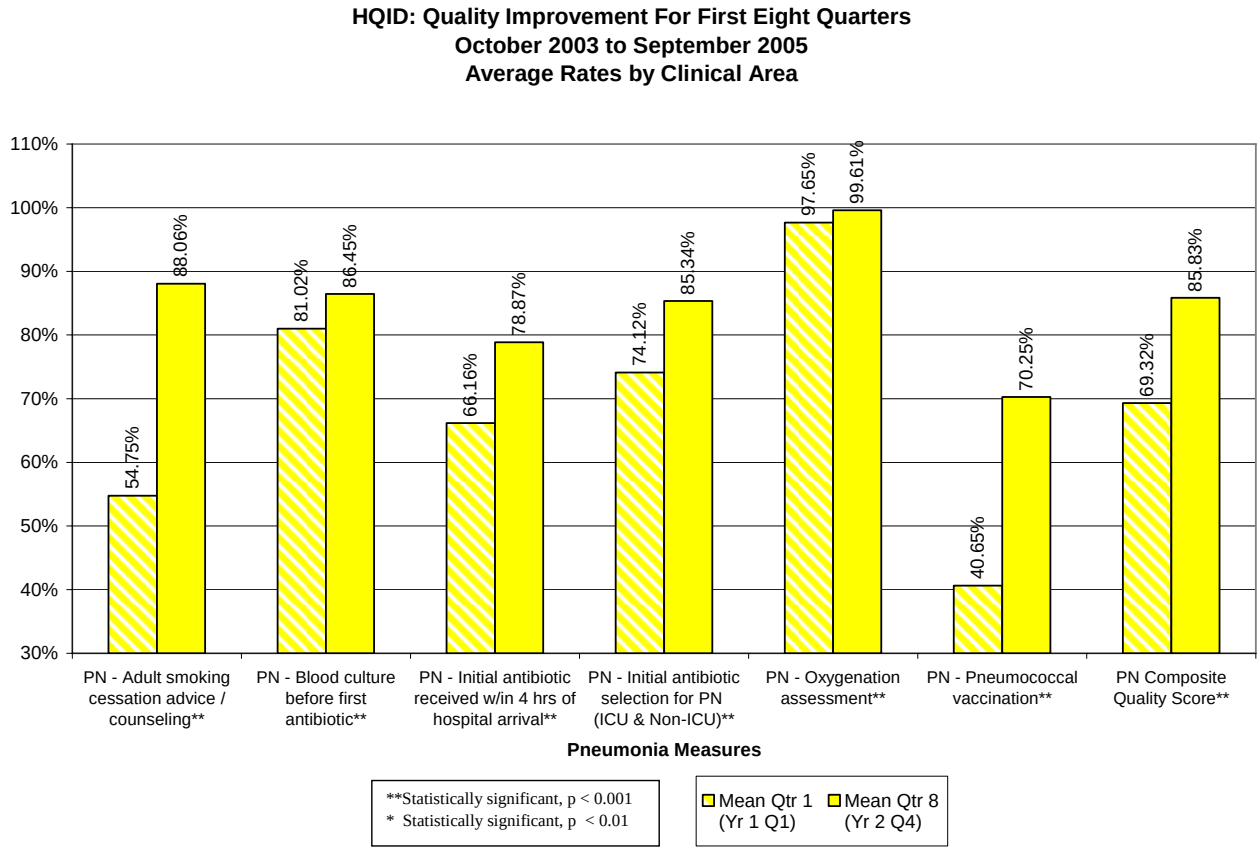
While the average rate of each measure within the pneumonia clinical area showed statistically significant improvement (Figure 8), two measures improved by more than 15 percentage points from year one to year two. Adult smoking cessation advice/counseling increased more than 20 percentage points (from 62.19% to 83.14%, $p < 0.001$) and pneumococcal vaccination increased more than 18 percentage points (from 46.93% to 65.50%, $p < 0.001$).

FIGURE 8: Pneumonia Measures Year 1 to Year 2



The improvement in the pneumonia clinical area also showed statistically significant improvement (Figure 9) from the first quarter of the project to the eighth quarter (the fourth quarter of year two) for all measures. Two measures improved by more than 25 percentage points in that two year timeframe and two more measures improved by more than 10 percent. Adult smoking cessation advice/counseling increased from 54.75% to 88.06%, $p < 0.001$, and pneumococcal vaccination increased from 40.65% to 70.25%, $p < 0.001$. There was also significant improvement in the antibiotic measures with the initial antibiotic received within four hours of arrival improving from 66.16% to 78.87% and the initial antibiotic selection measure improving from 74.12% to 85.34%.

FIGURE 9: Pneumonia Measures Year 1 Quarter 1 to Year 2 Quarter 4

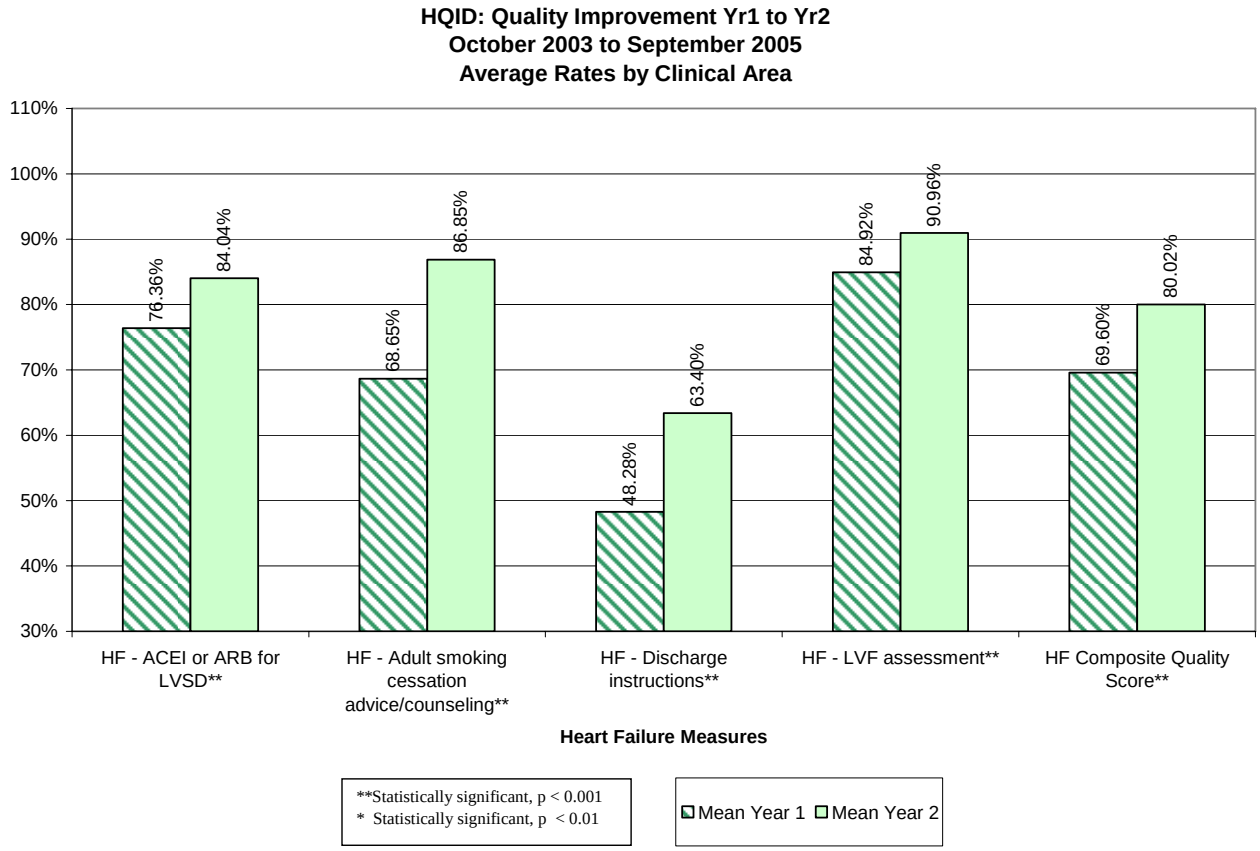


Heart Failure (HF)

The overall average CQS in heart failure improved the most of any condition in the project. Similar to the other clinical areas, each individual measure showed improvement from year one to year two (Figure 10).

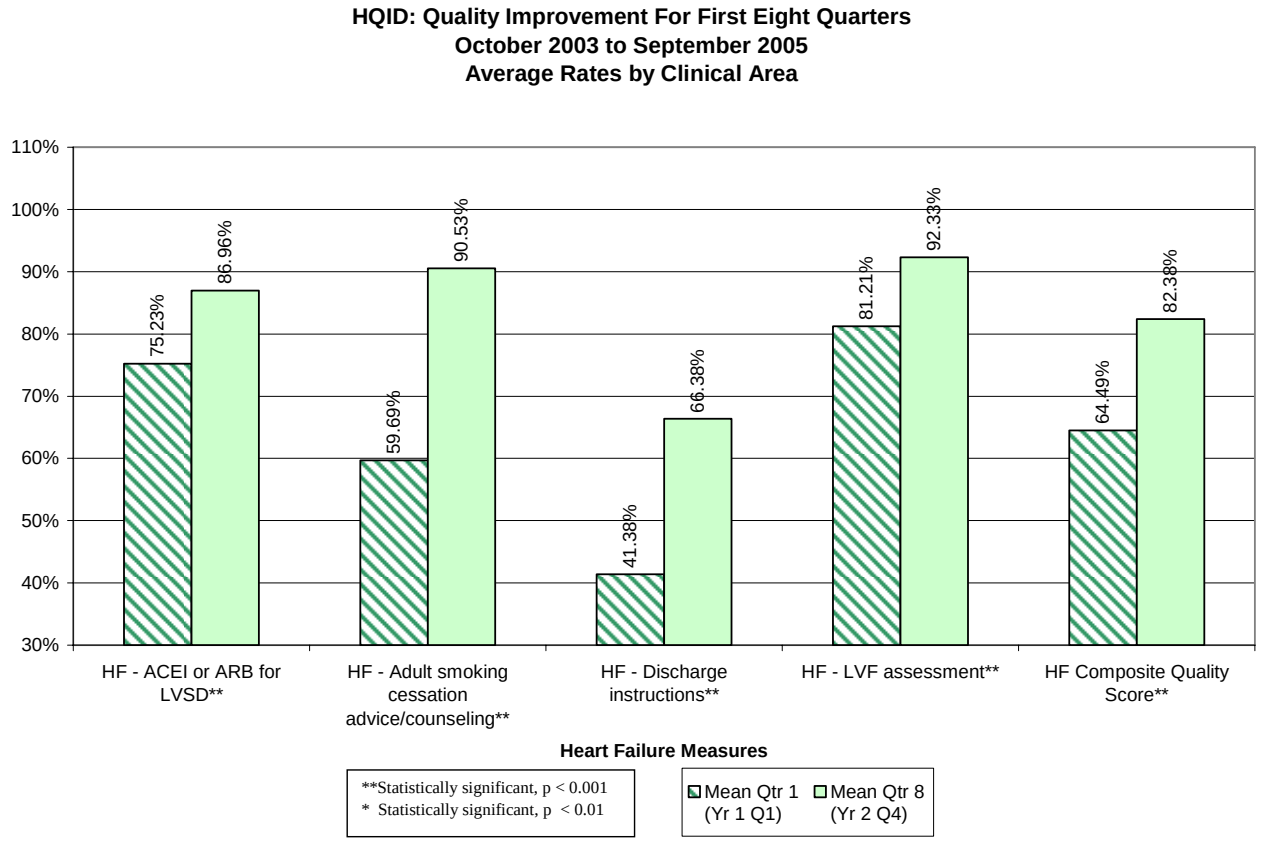
For HF, all improvements were statistically significant. The largest improvement was in adult smoking cessation advice/counseling, an increase of almost 20 percentage points (from 68.65% to 86.85%, $p < 0.001$), followed by discharge instructions which increased just over 15 percentage points (from 48.28% to 63.40%, $p < 0.001$).

FIGURE 10: Heart Failure Measures Year 1 to Year 2



The heart failure condition also showed significant improvement from the first quarter of year one to the fourth quarter of year two for all measures (Figure 11). Two measures achieved improvement greater than 25 percentage points, with adult smoking cessation advice/counseling measure increasing from 59.69% to 90.53%, ($p < 0.001$), and discharge instructions from 41.38% to 66.38% ($p < 0.001$). The other two measures increased more than 10 percentage points across the two year time span, with the ACEI or ARB for LVSD measure improving from 75.23% to 86.96% ($p<0.001$), and LVF assessment improving from 81.21% to 92.33% ($p <0.001$).

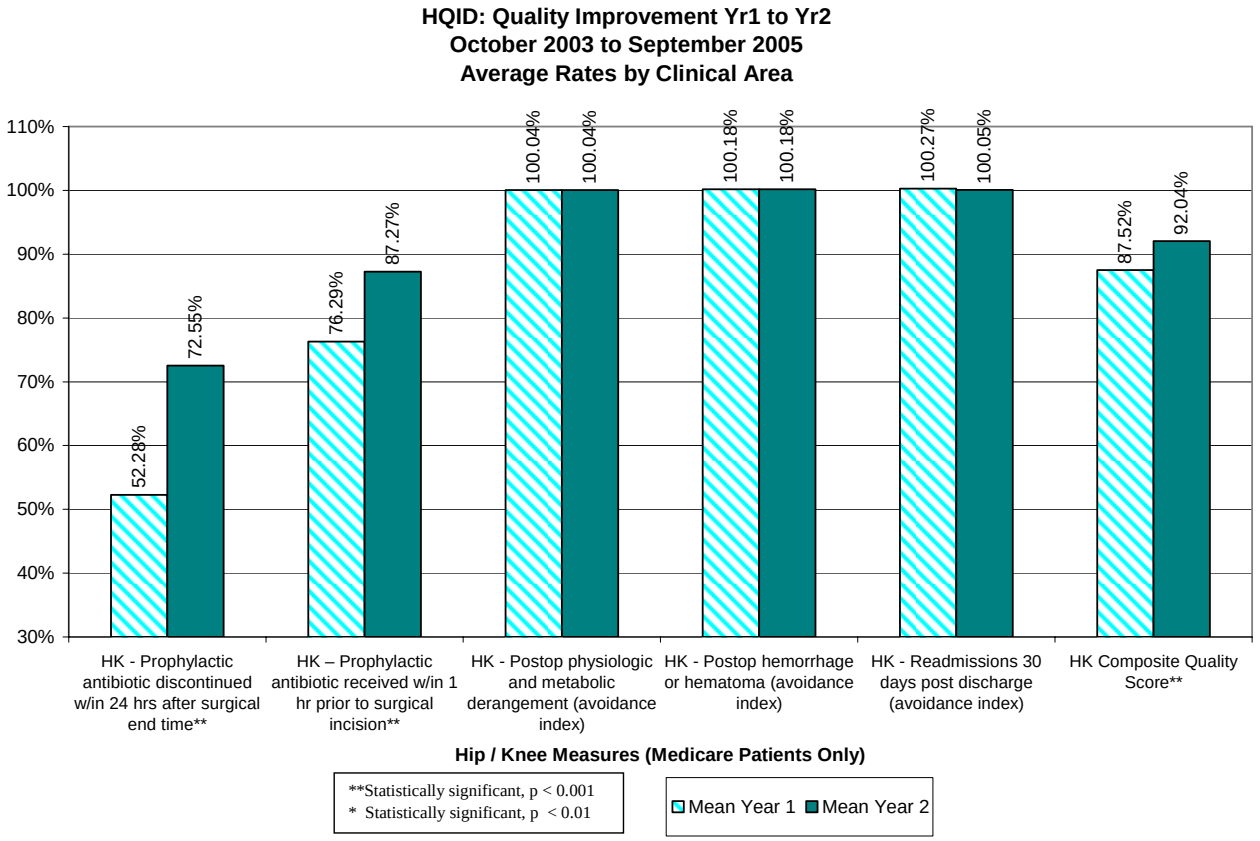
FIGURE 11: Heart Failure Measures Year 1 Quarter 1 to Year 2 Quarter 4



Hip and Knee Replacement (Hip/Knee)

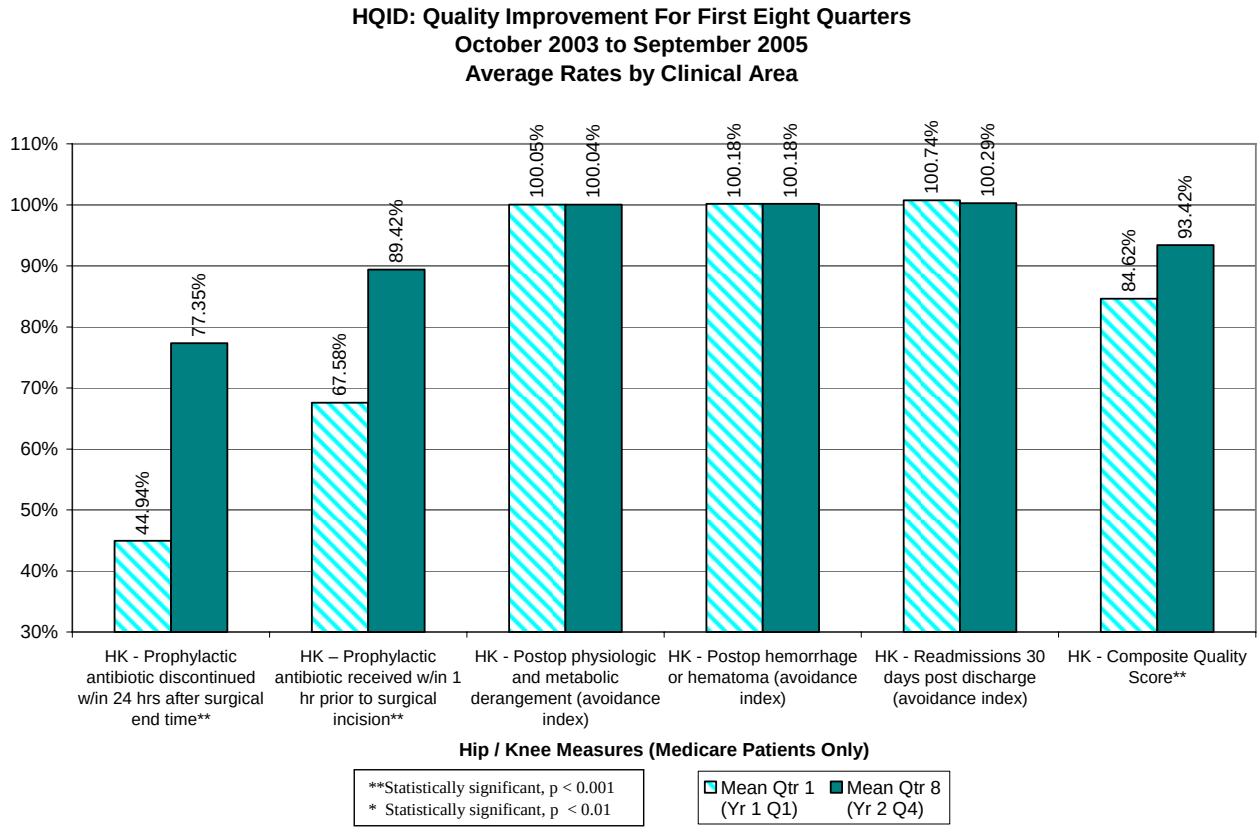
The improvement picture from Hip/Knee looks similar to that of CABG. The average rate of each individual process measure improved from year one to year two, but there was minimal change in the outcome measures (Figure 12). Both process measures improved more than 10 percentage points. The greatest improvement was in the provision of prophylactic antibiotics discontinued within 24 hours after surgery end time, an increase of more than 20 percentage points (from 52.28% to 72.55%, $p < 0.001$), followed by a greater than 10 percentage points increase in prophylactic antibiotics within one hour prior to surgical incision (from 76.29% to 87.27%, $p < 0.001$). There was negligible change in the PSI avoidance indices and the readmission avoidance index. The hip and knee clinical area was limited to Medicare patients only. The readmission data was provided by CMS based on their calculation of a readmission (for any reason) to any acute care facility within 30 days after discharge from a hip or knee surgical procedure episode of care.

FIGURE 12: Hip and Knee Measures Year 1 to Year 2



The improvement picture from the first quarter of year one to the fourth quarter of year two for Hip/Knee looks similar to that of the year to year comparison. The improvement for the two process measures was more than 20 percentage points. The prophylactic antibiotics within one hour prior to surgical incision measure improved from 67.58% to 89.42% ($p < 0.001$), and the prophylactic antibiotics discontinued within 24 hours after surgery end time measure improved from 44.94% to 77.35% ($p < 0.001$). There was negligible change in the PSI avoidance indices and the readmission avoidance index.

FIGURE 13: Hip and Knee Measures Year 1 Quarter 1 to Year 2 Quarter 4



LESSONS LEARNED FROM TOP PERFORMERS

To gather information on top performers, a Premier team with expertise in informatics, clinical and leadership issues conducted site visits at several participating hospitals. These hospitals were chosen because they attained top decile performance in several of the HQID clinical conditions, and they were willing and available to be interviewed.

During site visits, team members asked a variety of hospital executives, physician leaders, champions for clinical performance improvement, and other staff members about their HQID performance improvement activities. The Baldrige Criteria formed the foundation of the site visit interviews.

Based on these in depth interviews, the hospitals' willingness to be "transparent" about the lessons learned and the interest in efficiently enabling "knowledge transfer" a series of six printed handbooks "Premier's Rapid Improvement Guides" were developed. One for each of the five clinical conditions assessed in the HQID: acute myocardial infarction, coronary artery bypass graft surgery, heart failure, pneumonia and hip and knee replacement surgery and one entitled "Leadership and Performance Improvement Infrastructure." A set of the guides was delivered to each hospital participating in the project.

Premier is currently undertaking another round of interviews and site visits to glean lessons learned in the project. The final set will be produced entirely electronically and housed in Premier's Performance Improvement Portal – a Web-enabled, searchable repository, thus making knowledge transfer even more efficient and effective.

HQID YEAR TWO – FINAL DECILE THRESHOLDS

Decile Calculations

The performance of hospitals was measured by the composite quality score (CQS) within each of the five clinical areas. To be eligible for the quality incentive payment, a hospital had to be in the top 20% of providers within any of the five clinical areas. To determine eligibility for payment (top 20%) and public acknowledgement (top 50%), hospitals were divided into ten groups or deciles based on their CQS, as well as the number of providers within each clinical area. Appendix B provides detailed decile calculation information.

Placing Hospitals in Deciles. Individual hospitals were sorted in descending order by their CQS score, which was calculated out to the sixth decimal for sorting purposes. Hospitals were then placed in deciles based on count of hospitals determined in the decile calculation process described above. In the AMI area, the 24 hospitals with the highest CQS were placed in decile 1; the 25 hospitals with the next highest CQS were placed in decile 2, and so on. The CQS used to represent the decile threshold became the score of the hospital in the next decile – so the decile threshold is actually the score a hospital had to be above in order to be placed in the decile. In the AMI example, the 25th hospital (when sorted in descending order by CQS) had a score of 95.7993% - the hospital was placed in decile 2 (because only 24 hospitals were allowed in decile 1) and their score became the decile threshold for decile 1. The final decile thresholds from year one and year two are presented in the Figure 14.

FIGURE 14: Final Decile Thresholds – HQID Year One and Year Two

	AMI			HF			Pneumonia			CABG			Hip/Knee		
	Decile	Year 1 Threshold	Year 2 Threshold	Decile	Year 1 Threshold	Year 2 Threshold	Decile	Year 1 Threshold	Year 2 Threshold	Decile	Year 1 Threshold	Year 2 Threshold	Decile	Year 1 Threshold	Year 2 Threshold
Deciles 1 and 2: Receive quality incentive payments	1st			1st			1st			1st			1st		
	2nd	95.7993%	97.6564%	2nd	86.1458%	93.8063%	2nd	83.5178%	90.5395%	2nd	96.2956%	98.7850%	2nd	94.7840%	98.2031%
	3rd	93.9746%	96.7152%	3rd	81.8452%	90.3581%	3rd	80.3158%	88.6792%	3rd	94.4749%	98.0934%	3rd	93.6343%	97.1267%
Deciles 1-5: Receive public recognition	4th	93.0312%	96.0115%	4th	78.5714%	87.7551%	4th	77.8213%	86.4831%	4th	91.9715%	97.6542%	4th	92.1137%	96.2283%
	5th	91.7770%	94.8882%	5th	75.3580%	85.3968%	5th	75.9481%	85.4028%	5th	89.0560%	96.3105%	5th	90.1044%	95.3262%
	6th	90.4151%	93.8202%	6th	69.5991%	81.9178%	6th	74.6145%	85.5366%	6th	87.9009%	94.7883%	6th	88.2607%	93.9114%
	7th	89.2355%	92.6893%	7th	65.6250%	78.7097%	7th	72.1841%	82.3773%	7th	85.5120%	93.1537%	7th	86.1856%	92.2317%
	8th	87.6061%	91.7722%	8th	62.1512%	74.1117%	8th	70.1599%	80.8219%	8th	83.8319%	91.1406%	8th	83.6126%	90.5970%
Deciles 9 and 10: Payments are adjusted in year three	9th	85.1781%	89.4631%	9th	57.8947%	70.1677%	9th	65.8009%	78.5714%	9th	81.4316%	86.7501%	9th	81.7377%	87.1353%
	10th	81.4153%	85.6730%	10th	52.8193%	62.7326%	10th	63.1517%	75.8868%	10th	77.0183%	82.4677%	10th	78.6855%	82.3636%

Quality Incentive Payment Calculations

The top 20% of all hospitals within each clinical area were eligible for a quality incentive payment. If the hospital was in the top decile or the top 10%, the incentive payment would be 2% of their Medicare DRG payment for all Medicare patients cared with that specific clinical condition. For hospitals in the second decile or the next 10% of hospitals, the incentive payment would be 1% of their Medicare DRG payment. Quality incentive payments are from CMS and, as such, are limited to only Medicare patients although the quality scores are based on measures of care for all adults within the clinical areas (with the exception of hip and knee procedures, which were limited to Medicare patients only due to the readmission clinical indicator).

The HQID focuses on quality of care for patients with specific diagnoses and procedures. The eligible patient populations are defined by ICD-9-CM diagnosis codes and/or procedures codes, not by Diagnosis Related

Group (DRG). However, Medicare payments are based on DRGs, so it was necessary to identify the DRGs associated with all the Medicare patients cared for within each of the five clinical areas during the first year of the project. The source data file for year two was the MedPAR data from FY 2005 (October 1, 2004 to September 30, 2005, HQID year one); the analysis to identify eligible patients, as well as payment rates, was performed by CMS. The process used to identify eligible patients or cases was to query the data and select cases based on the patient's principal diagnosis or principal procedure.

For the medically based clinical areas of AMI, PN, and HF, eligible cases were identified by selecting each Medicare patient with a principal diagnosis code matching the ICD-9 codes used in the numerator definition of each clinical area. For the two surgical clinical areas, CABG and Hip/Knee procedures, the cases were identified by selecting each Medicare patient with a primary procedure of CABG or Hip/Knee regardless of principal diagnosis. Cases meeting these ICD-9-CM based definitions could fall into multiple DRGs, not just those typically associated with the clinical condition. For example, patients with PN usually are assigned DRGs 089, simple pneumonia and pleurisy, age greater than 17 with CC or DRG 090, simple pneumonia and pleurisy, age greater than 17 without CC based on pneumonia diagnosis codes.

However, if the patient experienced respiratory distress requiring a tracheotomy and use of a mechanical ventilator, the patient may fall into either DRG 541, tracheostomy with mechanical ventilation 96+ hours or principal diagnosis except face, mouth, and neck diagnosis with major operating room procedure; or DRG 542, tracheostomy with mechanical ventilation 96+ hours or principal diagnosis except face, mouth, and neck diagnosis without major operating room procedure. If this was the case, the payment rate associated with DRGs 541 or 542 would be used instead of the payment rate associated with DRGs 089 or 090.

Since patients are identified as being eligible for payment by using principal diagnosis or procedure, and each patient record has only one principal diagnosis and one principal procedure, there can not be overlap in conditions identified by principal diagnoses and no overlap in conditions identified by principal procedure. However, it is possible that a patient can be in both a condition identified by principal diagnosis and a condition identified by principal procedure. The most common combination is patients in the AMI clinical area with a CABG. All other areas represented less than 0.5% of the population. For instances where a hospital was eligible for payment in both AMI and CABG, patients that fell into both clinical areas were counted for payment in the surgical procedure (CABG) rather than medical diagnosis (AMI) to avoid double payment.

After all eligible Medicare cases were found, the DRG was identified, along with the DRG payment rate specific to the participating hospital (rates were wage-adjusted only). The payment rates for each eligible hospital were then aggregated and multiplied by 1% and 2% to determine the quality incentive payment if the hospital fell into either the top decile or the second decile. After all potential incentive payments were calculated, the top performers in each of the five clinical areas were matched to their applicable payment amounts.

Quality Incentive Payment Amounts

A total of more than $17 million has been distributed during the first two years of the project, with a total incentive payment for year one of $8,851,138 and a total incentive payment for year two of $8,690,447. There were 123 hospitals eligible for payment incentives across the five clinical areas in year one and 115 hospitals eligible for payment incentives in year two. Table 3 presents the number of hospitals, the number of cases, and the total quality incentive payment by clinical area for the first two years.

TABLE 3: Quality Incentive Payment by Clinical Area

CLINICAL AREA	YEAR 1 TOTAL NUMBER OF HOSPITALS	YEAR 1 TOTAL NUMBER OF CASES	YEAR 1 TOTAL QUALITY INCENTIVE PAYMENT	YEAR 2 TOTAL NUMBER OF HOSPITALS	YEAR 2 TOTAL NUMBER OF CASES	YEAR 2 TOTAL QUALITY INCENTIVE PAYMENT
AMI	49	10,029	$1,755,902	46	9,930	$1,706,336
CABG	27	4,650	$2,077,667	27	4,833	$1,877,534
HF	52	18,261	$1,817,574	50	14,857	$1,741,605
PN	52	12,055	$1,139,353	50	12,368	$1,069,370
Hip/Knee	43	14,170	$2,060,639	42	14,476	$2,295,602
Total	123*	59,165	$8,851,138	115*	56,464	$8,690,447

** The total represents the count of individual hospitals receiving payments. Since hospitals were eligible for payment in more than one clinical area the total number of hospitals is lower then the sum of hospitals across the five clinical areas.*

Payment Penalty

The HQID was designed to incorporate a payment penalty for hospitals not achieving specific quality scores by the end of the third year of the project. The 9th and 10th decile thresholds from the first year of the project become the scores that hospitals must exceed by the end of year three to avoid a 1% or 2% penalty on their Medicare DRG payment for patients within the specific clinical area. The payment penalty thresholds for each clinical area are presented below (Table 4).

TABLE 4: Payment Penalty Thresholds for HQID Year Three

PENALTY THRESHOLD	AMI	CABG	HF	PN	HIP/KNEE
9th Decile: - 1% payment	85.1781%	81.4316%	57.8947%	65.8009%	81.7377%
10th Decile: - 2% payment	81.4153%	77.0183%	52.8193%	63.1517%	78.6855%

The decile thresholds are calculated in year one and represent the CQS rate a hospital must be above at the end of year three to avoid a payment penalty (Medicare).Penalties are only possible in year three of the project.

APPENDIX A

HOSPITAL QUALITY INCENTIVE DEMONSTRATION (HQID) PROJECT OVERVIEW

PROJECT DESIGN & IMPLEMENTATION

The HQID project was launched in July 2003. To be eligible, hospitals had to be submitting clinical and administrative data to Premier's Perspective™ database as of March 31, 2003. The criteria permitted timely implementation of the project and ensured all hospital participants were experienced with the collection and submission of quality measures data, and that hospitals were not entering the database just for eligibility in the demonstration project. Recruitment of participating hospitals was completed by March 31, 2003 and 276 hospitals were enrolled. Data collection was initiated with October 1, 2003 data.

Participation is on a voluntary basis and requires hospitals to allow Premier to submit to CMS patient-level data and hospital-level quality data for all discharges from five high-volume clinical conditions for which national measures of quality exist:

- Acute myocardial infarction (AMI)
- Isolated coronary artery bypass graft (CABG)
- Heart failure (HF)
- Community acquired pneumonia[c] (CAP)
- Hip and knee replacement surgery (Hip/Knee)

Hospitals must participate in each of the five clinical areas. If, at the end of each year, there is a clinical area in which the hospital cared for fewer than 30 patients, the hospital is considered ineligible in that area. Its quality data for that clinical area is not used in the comparative evaluation of hospital performance.

Quality Measures

At the beginning of the project, 34 quality measures were identified for implementation (Table 1) and included measures representing process of care (e.g., administration of aspirin for a patient experiencing a heart attack) and patient outcomes (e.g., mortality). To be considered for the HQID, measures had to have gone through extensive testing for validity and reliability by national organizations including CMS and its Quality Improvement Organizations (QIOs), the Joint Commission on Accreditation of Healthcare Organizations (JCAHO), and the Agency for Healthcare Research and Quality (AHRQ). Highest priority was given to measures which had already been evaluated and endorsed by the National Quality Forum (NQF).

[c] The name of this clinical focus area was modified after year one and in subsequent years will be referred to as pneumonia or PN.

TABLE 5: HQID Quality Measures – Initial Set

CLINICAL CONDITIONS	QUALITY MEASURES
Acute Myocardial Infarction (AMI)	1. Aspirin at arrival[1,2,3,4,P] 2. Aspirin prescribed at discharge[1,2,3,4,P] 3. Angiotension converting enzyme inhibitor (ACEI) for left ventricular systolic dysfunction (LVSD)[1,2,3,4,P] 4. Adult smoking cessation advice/counseling[1,2,3,P] 5. Beta blocker prescribed at discharge[1,2,3,4,P] 6. Beta blocker at arrival[1,2,3,4,P] 7. Thrombolytic agent received within 30 minutes of hospital arrival[1,2,10,P] 8. Percutaneous coronary intervention (PCI) received within 120 minutes of hospital arrival[1,5,10,P] 9. Inpatient mortality rate[1,3,6,O]
Coronary Artery Bypass Graft (CABG)	10. Aspirin prescribed at discharge[5,P] 11. CABG using internal mammary artery (IMA)[1,5,P] 12. Prophylactic antibiotic received within one hour prior to surgical incision[1,2,10,11,P] 13. Prophylactic antibiotic selection for surgical patients[1,2,10,11P] 14. Prophylactic antibiotics discontinued within 24 hours after surgery end time[1,2,10,11P] 15. Inpatient mortality rate[7,O] 16. Post operative hemorrhage or hematoma[8,O] 17. Post operative physiologic and metabolic derangement[8,O]
Heart Failure (HF)	18. Left ventricular function (LVF) assessment[1,2,3,4,P] 19. Discharge instructions[1,2,3,P] 20. Angiotension converting enzyme inhibitor (ACEI) for left ventricular systolic dysfunction (LVSD)[1,2,3,4,P] 21. Adult smoking cessation advice/counseling[1,2,3,P]
Community Acquired Pneumonia (PN)	22. Percentage of patients who received an oxygenation assessment within 24 hours prior to or after hospital arrival[1,2,3,4,P] 23. a) Initial antibiotic selection for PN in immunocompetent patients – ICU patients[1,2,10,P] b) Initial antibiotic selection for PN in immunocompetent patients – non-ICU patients[1,2,3,P] 24. Blood culture collected prior to first antibiotic administration[1,2,3,P] 25. Influenza screening/vaccination[1,2,10,P] 26. Pneumococcal screening/vaccination[1,2,3,4,P] 27. Antibiotic timing, percentage of PN patients who received first dose of antibiotics within four hours after hospital arrival[1,2,4,10,P] 28. Adult smoking cessation advice/counseling[1,2,3,P]
Hip and Knee Replacement[9]	29. Prophylactic antibiotic received within one hour prior to surgical incision[1,2,9,10,11,P] 30. Prophylactic antibiotic selection for surgical patients[1,2,9,10,11,P] 31. Prophylactic antibiotics discontinued within 24 hours after surgery end time[1,2,9,10,11P] 32. Postoperative hemorrhage or hematoma[8,9,O] 33. Postoperative physiologic and metabolic derangement[8,9,O] 34. Readmissions 30 days post discharge[9,O]

CLINICAL CONDITIONS	QUALITY MEASURES

Key:

[1] National Quality Forum measure
[2] CMS 7th Scope of Work measure
[3] JCAHO Core Measure
[4] Hospital Quality Alliance; Improving Care Through Information (HQA)
[5] The Leapfrog Group proposed measure
[6] Risk adjusted using JCAHO methodology
[7] Risk adjusted using 3M™ All Patient Refined DRG (APR-DRG) methodology
[8] AHRQ Patient Safety Indicators; risk adjusted using AHRQ methodology.
[9] Medicare beneficiaries only
[10] CMS and/or JCAHO to align with this measure in 2004
[11] Surgical Infection Prevention (SIP) measure

P Process measure
O Outcomes measure

During each of the three years of the project, the data on individual quality measures within each clinical area will be used to create an aggregate score representing overall quality. This score is referred to as the Composite Quality Score (CQS). Hospitals are sorted in descending order by their CQS and the top 10 percent of all hospitals participating in each clinical area are identified as being in the top decile of performance. The next 10 percent of hospitals are placed in the 2nd decile, the next 10 percent are placed in the 3rd decile and so on until each hospital has been placed into one of the ten deciles. At the end of each year, for each clinical area, hospitals in the top decile receive a 2 percent quality incentive payment on their base Medicare diagnosis-related grouping (DRG) payment for the relevant clinical condition(s), and hospitals in the second decile will receive a one percent quality incentive payment.

At the end of the third year of the project, hospitals who have not achieved a CQS above the 9th decile threshold established in year one in each clinical area will have their Medicare DRG payments reduced by 1 percent, and those who do not achieve a CQS above the 10th decile threshold established in year one will have their payment reduced by 2 percent. The time periods of the project are based on patient discharges as follows:

- Year One – October 1, 2003 through September 30, 2004
- Year Two – October 1, 2004 through September 30, 2005
- Year Three – October 1, 2005 through September 30, 2006

All hospitals in the top 50% of participants within each clinical condition (in the top five deciles) will be publicly acknowledged for their high quality by having their quality measure data published by CMS.

Risk Adjustment

Risk adjustment refers to a process for reducing, removing, or clarifying influences of patient factors that can impact patient outcomes and may differ among comparison groups[2]. Depending on the presence of certain characteristics or risk factors at the time of healthcare encounters, patients may experience different outcomes regardless of the quality of care provided by the health care organization. Comparing patient outcomes across organizations without appropriate risk adjustment can be misleading. By adjusting for patient factors associated with outcomes of interest, risk adjustment facilitates a more fair and accurate comparison. Risk factors include patient demographic and clinical factors which can influence outcomes of care. Some examples of risk factors

include: patient age, sex, and preexisting conditions or comorbidities present prior to admission, such as diabetes or a history of hypertension. Each outcome measure is risk-adjusted. Table 2 provides a summary of the methods used. Additional details on each method are beyond the scope of this document, readers are encouraged to seek out the referenced materials for more information.

TABLE 6: Risk-Adjustment Methods Applied to Outcome Measures

CLINICAL CONDITION	HQID MEASURE	RISK ADJUSTMENT METHODOLOGY
AMI	Inpatient mortality	JCAHO ORYX®[3]
CABG	Inpatient mortality	3M™ APR-DRG™ Risk of Mortality[4]
CABG and Hip/Knee Replacement	Post operative hemorrhage or hematoma	AHRQ Patient Safety Indicators, v2.1, rev 3[5] and 3a[6]
	Post operative physiologic and metabolic derangement	AHRQ Patient Safety Indicators, v2.1, rev 3 and 3a
Hip/Knee Replacement	Readmission as an inpatient, to any acute care facility, within 30 days of discharge	3M™ APR-DRG™ Severity of Illness[i4]

COMPOSITE QUALITY SCORE (CQS) METHODOLOGY

The project is based on the concept of quantifying hospital performance on one aggregated measure of quality – the Composite Quality Score (CQS) - within each of the five clinical areas. The CQS incorporates all applicable process and outcome measures. The development of the CQS required identification of a valid and reliable method by which measurement data could be aggregated and used to provide a comparison of hospitals based on a single quality score. While composite scoring has not been widely used in evaluating healthcare services, research has indicated aggregated measures may improve consumer understanding of often complex performance indicators by combining measures of many dimensions of care into a single score[7]. The HQID CQS is a modification of the opportunity model developed by the Hospital Core Performance Measurement Project (HCPM) for the Rhode Island Public Reporting Program for Health Care Services[7]. After reviewing previous work by Landrum and others who had developed a latent variable model for inpatient AMI care, the HCPM researchers refined the opportunity model to overcome challenges involving individual weighting, missing data, and sensitivity to case volumes[8]. For example, unrealistically low rates occur in situations where a hospital has little or no case volume for a particular dimension of care, yet that measure is equally weighted with others in the composite. The HCPM model is based on the assumption that an opportunity exists whenever a patient meets the criteria to be included in the target patient population for a particular measure. Given that, one patient represents numerous opportunities for evidence-based interventions that may be measured by performance indicators. A composite may be developed for a disease category by dividing the total number of achieved interventions by the total number of opportunities for the same targeted interventions.

The HCPM model produces a composite measure with the following attributes[7]:

- Individual measures are weighted by the volume of opportunities for the associated intervention for a particular hospital e.g., a hospital that frequently has patients with indications for aspirin post-AMI but rarely performs percutaneous coronary intervention (PCI) procedures would be scored in a manner that weights aspirin measures more heavily.
- Missing values for a particular aspect of care provided by an individual hospital do not preclude that hospital from being represented in a public report, nor does the model require imputing missing values.
- The composite measure can be used within a single condition or across multiple conditions.
- The composite measure can be calculated and understood by quality assurance professionals using their own data.
- The composite measure can easily accommodate additional individual measures.

Once individual measurement data is collected, a composite measure for each disease category may be calculated for each provider. Attributes of individual measures used to compute a composite score include:

- Substantiation through rigorous clinical research that indicates a significant relationship between the intervention being measured and quality patient outcomes.
- Individual measure validity and reliability so that the validity of the composite score is not compromised.
- Common directionality within the composite score, i.e. each measure changes in the same numeric direction as more desirable values are realized.
- A single measure for each aspect of care to avoid excessive weighting in the composite score.

The HCPM recommends continuous variable measures, such as time to administer antibiotics for pneumonia patients, be converted to rate-based measures by establishing a threshold (e.g., four hours) and then calculating the number of patients that received care within the established limits. The final composite score is created by summing the numerators of all individual measures to determine a composite numerator, summing the denominators of all individual measures to determine a composite denominator, and then dividing the composite numerator by the composite denominator.

The HQID project includes outcome measures in addition to process of care measures, making it necessary to modify the HCPM Opportunity Model to incorporate these measures as a second component. This created a conflict with the criteria of common directionality as higher scores are desirable for process measures but lower scores are desirable for outcomes, such as mortality or adverse events. The conflict was resolved by transposing outcome measures into indices calculated by dividing the observed rate by the risk-adjusted rate. The HCPM Opportunity Model, modified to accommodate outcome measures, was used to create the CQS used for each of the five clinical conditions in the HQID project.

Calculation of the HQID Composite Quality Score

The Composite Quality Score (CQS) used in the HQID is comprised of two separate components: a composite process score (CPS) and a composite outcome score (COS). Following the concepts of the opportunity model, weighting values are applied to each component to account for their relative contribution, and the HQID scores are based upon the premise of "equal weight for each measure." A composite process rate is derived by summing the numerator and denominator values for each of the process-based indicators then dividing the numerator by denominator to create the CPS for each clinical condition for each hospital. The calculation of the COS begins with each hospital's actual mortality or adverse event rate and the expected mortality or adverse event rate derived from adjusting the actual rate for the presence of various risk factors. The observed and risk-adjusted mortality rates are transposed to create a survival index. The observed and risk-adjusted adverse event rates (AHRQ Patient Safety Indicators (PSIs)) and the observed and risk-adjusted readmission rates are transposed to create an avoidance index. There is a chance a hospital may not have any patients eligible for an outcome measure, particularly the PSIs. If this is the case, that hospital's weights are modified – they are adjusted down by each missing outcome measure. For example, if a hospital has no cases in the CABG Postop Metabolic or Physiologic Derangement PSI, the weights for that hospital will be adjusted down by 1, the process measures will be weighted at 4/6, and the other two outcome measures will be weighted at 1/6 each. After the weights are applied to both the CPS and COS components, a composite score for each of the five clinical conditions is calculated using the formula below:

HQID COMPOSITE QUALITY SCORE = COMPOSITE PROCESS SCORE + COMPOSITE OUTCOME SCORE

The data in Table 3 and subsequent text illustrates calculation of the CQS for AMI. The clinical areas of AMI, CABG, and Hip/Knee include both process and outcome measures. The clinical areas of PN and HF only have process measures. In these instances the CQS is exactly the same as the CPS (there is no outcome component).

TABLE 7: Calculation of the HQID Composite Quality Score

COMPOSITE QUALITY SCORE – AMI EXAMPLE			
COMPOSITE PROCESS SCORE (CPS)			
Process Measures	**Numerator**	**Denominator**	**Weight**
Aspirin at Arrival	60	60	1/9
Aspirin at Discharge	55	58	1/9
ACEI or ARB for LVSD	53	56	1/9
Smoking Cessation Counseling	55	61	1/9
Beta Blocker at Discharge	63	63	1/9
Beta Blocker at Arrival	59	61	1/9
Thrombolytic Received Within 30 Minutes of Arrival	35	48	1/9
PCI Within 120 Minutes of Hospital Arrival	27	31	1/9
Total Process Components	**407**	**438**	8/9 or factor of 0.89
COMPOSITE PROCESS SCORE	407 / 438 = 0.9292 then ((0.9292 x 0.89) x 100) = 82.69%		
Outcome Measure			**Weight**
Inpatient Mortality Rate – Actual	0.0476		
Inpatient Mortality Rate – Expected	0.1161		
Actual Survival Rate = 1 – 0.0476	0.9524		
Expected Survival Rate = 1 – 0.1161	0.8839		1/9 or factor of 0.11
Composite Outcome Score Survival Index = Actual Survival Rate / Expected Survival Rate	0.9524 / 0.8839 = 1.0775 then ((1.0775 x 0.11) x 100) = 11.85%		
Composite Quality Score			
Composite Process Score	82.69%		
Composite Outcome Score	11.85%		
Total	82.69% + 11.85% = 94.54%		
AMI COMPOSITE QUALITY SCORE = 94.54%			

Each hospital's individual measures numerator and denominator values are aggregated following the HCPM Opportunity Model to arrive at a composite process rate. The hospital illustrated in Table 3 achieved a composite process rate of 92.92%, which is then multiplied by the weighting factor of 0.89 times 100 for a composite process score of 82.69%. Since the AMI clinical area includes an outcome measure, the hospital's composite outcome score must be calculated. The hospital's actual mortality rate was 0.0476 and expected mortality rate, risk-adjusted using the JCAHO methodology, was 0.1161. The actual and expected survival rates are calculated by subtracting the actual and expected rates from 1. The survival index is calculated by dividing the actual survival rate by the expected survival rate. In this example, the hospital's survival index is 1.0775. This is then multiplied by the weight factor of 0.11 and then multiplied by 100 to create a COS of 11.85%. The hospital's CQS is the combination of the CPS and the COS or 82.69% plus 11.85% or 94.54%.

This process is completed for each hospital in each of the five clinical areas. For example, if a hospital participates in all five areas, the hospital will have an AMI CQS, a CABG CQS, a HF CQS, a PN CQS and a Hip/Knee CQS calculated. These CQS scores are used to place hospitals in deciles based on performance with the top 10% of the hospitals placed in the top decile, the next 10% of the hospitals placed in the second decile, and so on. Deciles are used to divide the total number of hospitals in each clinical area into 10 equal groups. For example, if there are 200 hospitals in the HQID providing care for AMI patients, 20 hospitals will be placed in each decile. All 200 hospitals

will be sorted in descending order by CQS. The 20 hospitals with the highest CQS will be placed in the top decile; the next 20 hospitals will be placed in the second decile and repeated until the 20 hospitals with the lowest CQS are placed in the bottom decile.

Measure Revision(s) Impacting CQS Calculations

The initial set of quality measures in the project aligned with definitions used by JCAHO. Subsequently, the JCAHO measures were aligned with those used by CMS in their 7th Scope of Work (SOW). The project is based upon the use of national measures and is committed to maintaining alignment with any and all changes made by JCAHO, CMS or other measure developers. Information on measure changes is available on the Premier website at www.premierinc.com/qualitydemo).

There was one critical measure modification during the first year of the project, specifically suppression of the CABG measure "Use of Internal Mammary Artery (IMA)." After implementation in the project and provision of reports to hospitals on their performance on the CABG measures, Premier received numerous calls from hospitals questioning the IMA data. Upon further investigation, it was discovered that the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes used to identify patients with a history of prior CABG, a key exclusion criteria for the IMA measure, did not include all ICD-9-CM current codes. The impact of missing codes was that 50% to 60% of patients who had a prior CABG were not being excluded from the measure denominator population. The operational definition for the measure had been obtained from NQF documentation[9, 10]. After further discussion with CMS and evaluation of the impact on the CABG CQS, the decision was made in June 2005 to suppress the measure from the CQS calculations for the entire project. The suppression of one process measure for CABG required a re-weighting of all other measures. At the end of year one, the total measures for CABG were reduced from eight to seven and the process measures reduced from five to four. Thus, the CPS weight was modified to 4/7 and each of the three outcome measures received a weight of 1/7 when calculating the CABG CQS. These changes required Premier to reprocess and resubmit the year one data and extended the validation period of year one. Premier will continue to monitor the IMA measure for research and hospital internal quality improvement purposes.

Three measures were suppressed for the second year of the project. The measure suppression included the prophylactic antibiotic selection measure for both the isolated CABG and hip and knee replacement populations as well as the influenza vaccination measure for the pneumonia population.

The prophylactic antibiotic measure was suppressed due to changes in clinical evidence as well as a shortage of recommended antibiotics. The increasing prevalence of both healthcare-associated methicillin resistant staphylococcus aureus (MRSA) and community-acquired MSRA warranted the addition of measure criteria to evaluate MRSA infection as a patient risk factor affecting the decision to use vancomycin. In addition, a need was identified to add antibiotics necessary to inhibit growth of Enterococcus species for use in patients with endocarditis. The measure is being modified to address these issues and will be unsuppressed at that time. In addition, during this timeframe there were periodic shortages or discontinuation of antibiotics commonly recommended for surgical antimicrobial prophylaxis.

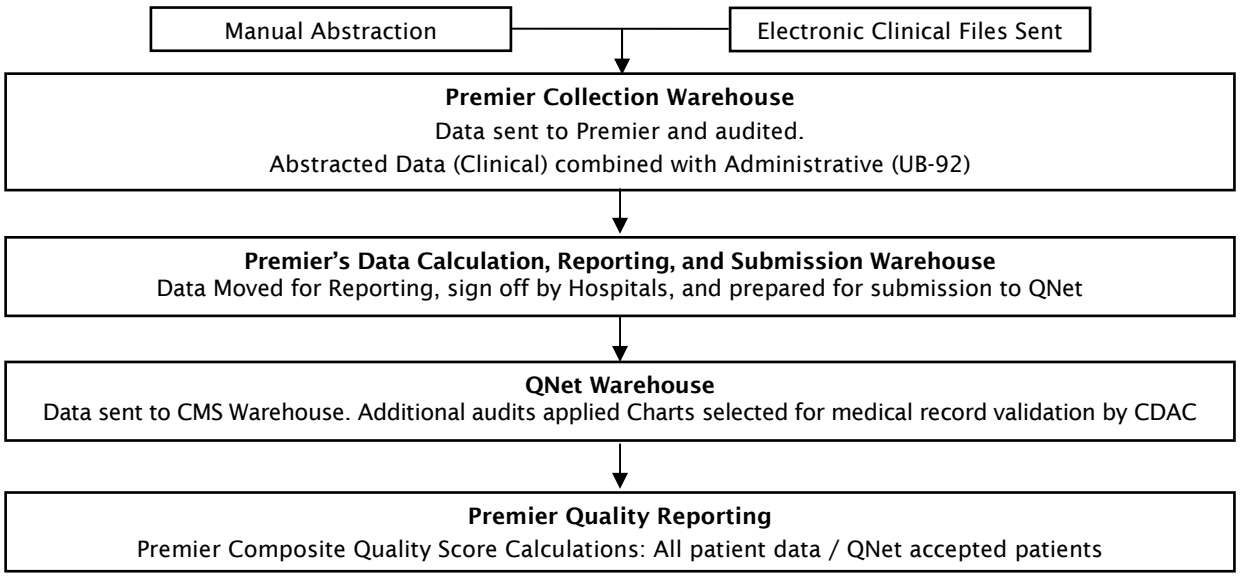
The influenza vaccination for pneumonia measure was also suppressed for the second year due to a vaccine shortage during the 2004-2005 flu season.

OVERVIEW OF DATA PROCESSING

Figure 1 provides a high level overview of HQID data processing. The first step for hospital participants in the data submission process is to send their monthly discharge summary file to Premier. This file includes the patient account number, patient demographic information, physician information, payer information, and all applicable ICD-9-CM diagnosis and procedure codes, which are required to group the patients into clinical conditions. Next, Premier groups the hospital data into the HQID clinical conditions and populates the Premier

Quality Measures Web Tool. Once the patients are grouped to clinical conditions, hospitals can submit the remaining data in one of two mechanisms: 1) manually abstract data from the medical record and key it into Premier's Quality Measures Web Tool or, 2) electronically submit a data file which is imported by Premier. During this process, Premier's tools apply over 200 business rules to audit the quality of the data. Any errors identified through this process are sent to the hospital for correction. Once the error correction process is complete, Premier sends reports to the hospitals, which allow hospitals to review their measure rates and to complete one final data check prior to sending the data to the CMS QNet warehouse.

FIGURE 15: HQID Data Processing Flow



Once data is submitted to the QNet warehouse, sample patients are pulled for the CMS validation process and sent to the Clinical Data Abstract Center (CDAC), where requests are made to the hospital for copies of a sample set of seven charts. Once the charts are received by the CDAC, the medical record data is re-abstracted into a CMS tool and compared to the hospital abstracted data results submitted to the warehouse. Hospitals are required to pass this validation process to be eligible for quality incentive payments.

The demonstration project has a second validation process for rate calculations. After the patient-level data is submitted to the QNet warehouse, CMS and Premier calculate the hospital-level rates and both organizations verify accuracy.

Medicare Provider Number (MPN) changes have required flexibility and careful tracking as hospitals continue to merge and provider numbers change. For reporting and payment purposes, the most recent MPN is referenced and applied to previous data. Provider number changes result in a modification of the number of "participants" in the project as the count of participants is defined by the count of MPNs. The number is also impacted by participants withdrawing from the project. Hospitals were allowed to withdraw from the project until December 14, 2005, which was 30 days after the release of year one data.

Data Validation Process

To determine if a hospital's data is considered valid, threshold levels are determined and then each hospital's validation score is placed within these thresholds to establish whether the hospital passes validation for that quarter of data. For the first year of the demonstration project, the validation thresholds for the project were

also modified to be in line with the national initiatives using the 80% upper bound of the 95% confidence interval covering 3rd quarter calendar year 2004 as a threshold for fiscal year 2004 payment eligibility.

Reasons for the decisions to adjust the validation terms included:

- JCAHO/CMS alignment differences affected the data validation for discharges occurring before July 1, 2004.
- The preliminary chart audit validation results covering the initial three quarters of the demonstration were reviewed by CMS and its contractors, and contained several problems similar to the HQA validation work. These problems include (but are not limited to) JCAHO to CMS differences in treatment of missing data and nested skip patterns.
- Research around the use of the 80% upper bound of the 95% confidence interval in similar instances has been generally embraced by the hospital community in projects such as the Medicare Annual Payment Update (APU) chart audit validation.
- This methodology is generally regarded as sound by other key stakeholders, and also requires less additional processing resources than many other alternatives.

Once all data is submitted to CMS, Premier creates preliminary HQID Composite Reports for all project participants and distributes these to participants using Premier's Clinical Advisor™ clinical benchmarking and analysis product. These reports provide preliminary data for the participants to enable timely identification of opportunities for improvement and monitoring of process modifications. Deciles are calculated by taking all hospitals eligible in the focus area and listing them in order of Composite Quality Score. The total number of hospitals is divided by 10 to determine the number of hospitals in each decile (see HQID Year One – Final Decile Threshold section for detailed information on this process). A decile's lower threshold is set at the highest score of the next lower decile, and hospitals must be above this score to fall in that decile. The reports provide comparative information on the first through fifth decile threshold score for each individual measure and the overall CQS for each clinical area. See example in Figure 2.

FIGURE 16: Calculation of the HQID Composite Quality Score

CONFIDENTIAL
FINAL RESULTS

PREMIER MEMORIAL HOSPITAL
Hospital Quality Incentive Demonstration Project - Year 1
Reporting for the period: October 2003 - September 2004

PREMIER

The Hospital Quality Incentive Demonstration Project report displays the individual numerator, denominator, calculated measure rate, and decile for each measure. The composite process score, survival index (if applicable), and the Composite Score are displayed for each area. The HQI Decile Threshold information displays the lowest score for each decile. This report is for your use and will not be made public by Premier.

		Facility			CQS	HQI Decile Threshold Score				
Area	Measure	Numerator	Denominator	Rate/Index	Decile	1st (Top)	2nd	3rd	4th	5th (Median)
CABG	Aspirin prescribed at discharge	70	70	100.00%		100.00%	99.44%	98.43%	97.88%	96.95%
	Prophylactic abx received within 1 hour prior to surgical incision	29	60	48.33%		92.86%	89.40%	85.98%	79.01%	74.39%
	Prophylactic abx selection for surgical patients	60	60	100.00%		100.00%	100.00%	99.52%	99.20%	98.98%
	Prophylactic abx discontinued within 24 hours after surgery end time	54	57	94.74%		94.40%	88.46%	78.08%	71.62%	54.23%
	Composite Process Component (1)	286	322	88.82%		93.45%	90.15%	86.04%	81.02%	78.93%
	Survival Index (2)	81.00%	83.00%	97.59%						
	Post-op hemorrhage/hematoma avoidance index (4)	100.00%	100.00%	100.00%						
	Post-op phy/metabolic derangement avoidance index (5)	96.56%	100.00%	96.56%						
	Composite Quality Score (6)			92.86%	3	96.30%	94.47%	91.97%	89.06%	87.90%
Heart Failure	Discharge instructions	5	22	22.73%		83.02%	74.68%	66.58%	58.26%	49.77%
	LVF assessment	11	25	44.00%		95.43%	92.71%	91.25%	89.70%	87.73%
	ACEI for LVSD	5	6	83.33%		91.18%	87.32%	84.23%	81.05%	77.94%
	Adult smoking cessation advice/counseling	5	6	83.33%		93.55%	89.47%	83.85%	78.26%	72.06%
	Composite Quality Score (7)	26	59	44.07%	10	86.15%	81.85%	78.57%	75.36%	69.60%

APPENDIX B: DETAILED DECILE CALCULATIONS

The number of hospitals providing services for patients in each of the five clinical areas varied, thus the number of hospitals falling within each decile also varied by clinical area. The following procedure was used to calculate the number of hospitals within each decile of each clinical area.

First the total number of eligible providers was summed, for example 243 hospitals in AMI. The total number was multiplied by 0.1 to determine the number of hospitals in the first decile (e.g., 243 * 0.1 = 24.3). If the number was a fraction, standard rounding procedures were followed – if the fraction was .4 or lower, the number was rounded down to the next whole number; if the fraction was .5 or greater, the number was rounded up to the next whole number.

In this example, 24.3 was rounded down to 24 resulting in 24 hospitals in the first decile of AMI. The total number of hospitals was then multiplied by 0.2 to obtain a number; again rounding was applied if necessary. In AMI, 243 * 0.2 = 48.6, rounded to 49. Then, the total number of hospitals in the first decile was subtracted from the second number to identify the number of hospitals in the second decile (e.g., 49 – 24 = 25 hospitals in the second decile). This process was repeated by taking the total number of hospitals times 0.3 (243 * 0.3 = 72.9), then subtracting the number of hospitals in the first two deciles (24 + 25 = 49; 73 – 49 = 24) to identify the number of hospitals for the third decile (n = 24) and so on until the appropriate number of hospitals were calculated for each of the 10 deciles.

Continuing with the AMI example, the result was 24 hospitals in the first decile; 25 hospitals in the second decile; 24 hospitals in the third and fourth deciles; 25 hospitals in the fifth decile; 24 hospitals in the sixth, seventh, and eighth deciles; 25 hospitals in the ninth decile; and 24 hospitals in the tenth decile.

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