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Financial Impact of Geographic Variation in Hospital Quality Performance in Medicare

3M Clinical and Economic Research

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Executive Summary

Annual healthcare expenditures associated with unneeded services, mistakes, delivery system ineffectiveness, and missed prevention opportunities have been estimated to exceed $350 billion.[1] Most payment system reform efforts have focused on controlling the amount paid (price) per unit of service (hospital admission or outpatient visit). However, total cost is the unit price times the volume of services. Failures in quality typically result in a need for a greater volume of services to correct the quality problem, thereby increasing healthcare cost. This report focuses on the impact of quality on hospital inpatient and outpatient expenditures in the Medicare program.

The quality measures evaluated in this report were selected based on quality outcomes that have a significant financial impact and can be identified from existing administrative data. To the extent possible, the measures evaluated have also been successfully implemented for substantive public policy applications in U.S. states and utilize a method of risk adjustment that allows for the comparison of quality performance across hospitals. Most importantly, the definition of the quality measure had to be limited to the clinical circumstances under which there is a reasonable expectation that the quality measure was potentially preventable and amenable to quality improvement efforts. The overall objective of this report is to provide regulators, payers, and hospital-based organizations with meaningful and actionable information that can promote quality improvement efforts.

The following eight quality measures were evaluated in the report and are referred to as Quality Outcome Performance Measures (QOPMs):

- Inpatient Complications
- Readmissions within 30 days
- Return Emergency Department Visits within 30 days of hospital discharge
- Admission to a Skilled Nursing Facility (SNF) or Rehabilitation Facility within 5 days of hospital discharge
- Hospital Admissions from Emergency Department
- Emergency Department Utilization of Observation Services
- Emergency Department Ancillary Service Utilization
- Hospital Admission or Emergency Department Visit for Complications of Outpatient Surgery within 30 days

The method of risk adjustment for each of the QOPMs was based on clinically credible patient risk categories that allow norms (benchmarks) and expected values for each QOPM to be computed for each risk category. A national Medicare norm and a best practice Medicare norm were created for each QOPM. The best practice norm was computed using the subset of best performing hospitals for each QOPM that constituted 40 percent of the applicable Medicare patients. Using these norms, the level of variation in QOPM performance across geographic regions and across types of hospitals was evaluated and the financial impact of variations in QOPM performance was quantified in terms of the relative impact on Medicare payments.

The report uses the Medicare Fee-For-Service data (FFS) from FY17 plus the first 30 days of FY18. The FY18 data was only used to complete the 30-day post-acute care period for those QOPMs that extend into the post-acute care period. Only inpatient prospective payment system (IPPS) hospitals were included in the analysis. Only facility payments were included and physician payments were excluded.

Geographic variation for each of the QOPMs was evaluated by census region, state, and metropolitan areas identified in the Core Based Statistical Areas (CBSAs) from the Office of Management and Budget. In general, using the national norm, the four western census regions perform better than the six eastern census regions. Western states have better performance on all QOPMs except return Emergency Department (ED) visits and outpatient surgical complications. Some of the differences in performance are substantial. For example, the QOPM for ED admissions is 5.68 percent higher than expected for the eastern states and 14.01 percent lower for the western states. Across the individual census regions there is a very large degree of variation in performance for the ED admission and ED observation QOPMs. For example, the Middle Atlantic states are 29.68 percent higher than expected for ED admissions while the mountain states are 23.62 percent lower than expected for ED admissions.

Using the best practice norm provides a measure of the overall level of performance improvement needed to achieve best practice nationally (i.e., the level of improvement required for hospitals nationwide to on average perform at the current best-practice level). For example, Table 1 shows there would need to be a 35.3 percent improvement in the inpatient complication rate and a 16.1 percent improvement in the readmission rate for hospitals nationwide to on average achieve best practice. The last column in the table quantifies the financial impact of achieving best practice nationally. If hospitals on average were able to achieve best-practice performance across all QOPMs, Medicare FFS payments would be reduced by $8 billion per year.

Table 1: Percent performance improvement required to achieve best practice nationwide with financial impact

	Percent above best practice	Financial Impact in millions
Inpatient Complications	35.3%	$1656.9
Readmissions within 30 days	16.1%	$1389.1
Return Emergency Department Visits within 30 days of hospital discharge	21.1%	$84.8
Admission to a SNF or Rehabilitation Facility within 5 days of hospital discharge	29.68%	$878.3
Hospital Admissions from Emergency Department	53.7%	$2137.7
Emergency Department Utilization of Observation Services	117.4%	$1364.8
Emergency Department Ancillary Service Utilization	23.8%	$427.0
Hospital Admission or Emergency Department Visit for Complications of Outpatient Surgery within 30 days	71.5%	$106.5

While the required levels of improvement to achieve best practice are substantial, based on the experience of several states these levels of improvement appear achievable for many of the QOPMs. In the Maryland all-payer complication payment reform initiative, hospitals in Maryland were able to achieve a 56.6 percent reduction in inpatient complications,[2] and in the all-payer readmission improvement project in Minnesota, hospitals were able to achieve a 20 percent reduction in readmissions.[3] However, the level of improvement necessary to achieve best practice nationwide for the ED Admit QOPM (53.7 percent) and ED Observation QOPM (117.4 percent) is even more significant and indicative of substantial variation in the practice patterns for these QOPMs. In particular, there appears to be little uniformity in the use of observation services in hospitals.

The level of variation in performance across states was also considerable. Maryland is the only state that did better than best practice for complications, which is consistent with the state's highly successful all-payer complication payment reform. Similarly, Minnesota's all-

payer readmission efforts resulted in the state being nearly at best practice for readmissions (1.5 percent above).

The financial impact results are conservative estimates. This report emphasizes the requirement that QOPMs be limited to the clinical circumstances under which there is a reasonable expectation that the QOPM was potentially preventable and amenable to quality improvement efforts. For example, 37.2 percent of readmissions were considered not to be potentially preventable and were excluded in the evaluation of the readmission performance of hospitals. Furthermore, the estimate of Medicare savings is based solely on the difference in performance of the QOPMs. Thus, the underlying rate of QOPMs in the best-practice norm is taken as a baseline level of acceptable quality performance and only the difference from the best-practice norm is viewed as the basis for potential savings. In addition, the savings are net savings because the financial benefit of good QOPM performance is allowed to offset the financial impact of poor QOPM performance. The level of potential Medicare savings is directly related to the level of variation in the QOPMs across hospitals. The greater the variation in a QOPM across hospitals, the greater the opportunity for savings. If there is little variation in a QOPM across hospitals, this analysis concludes there is little opportunity for performance improvement and savings, essentially accepting the best practice status quo as an acceptable level of performance.

Across QOPMs, the correlation between QOPM performance of a state was evaluated with positive correlation, meaning the state's performance on two QOPMs is likely to be similar, and a negative correlation meaning the state's performance on two QOPMs is likely to be opposite. States with poor performance on complications were found likely to have poor performance on readmissions (Pearson correlation (r .5933)). States with good performance on readmission were somewhat more likely to have poor performance on return ED visits (r -.2452).

The QOPM performance for categories of hospitals was examined using the hospital size, location, and Medicare IPPS factors for hospital teaching status and disproportionate share. Using the national norm, the following patterns were observed:

- Large, major teaching and high disproportionate share hospitals have higher than expected complication rates
- Large, urban, and major teaching hospitals have higher than expected admission through the ED and higher rates of use of ED observation
- High disproportionate share hospitals have lower than expected use of ED observation and ED ancillary services, but higher than expected admissions through the ED
- Rural hospitals generally perform consistent with expectations

The QOPM risk adjustment methods control for the clinical condition of the patient and not for socioeconomic factors like poverty. If risk adjustment incorporated factors related to socioeconomic status, performance problems associated with the care given to some socioeconomic groups would essentially be hidden, making poor performance (e.g., higher readmission rates) appear acceptable for some socioeconomic groups. In the context of a QOPM-based payment adjustment, as was done in IPPS, additional payment adjustments for some socioeconomic factors or hospital characteristics (like teaching status) may be necessary and should be accomplished using separate payment adjustments.

In order to examine the application of the QOPMs in an operational payment system, the bipartisan Healthcare Outcomes Act (HOA) (HR 3611) was used as a model.[4] In the HOA, standard applicable payments to a hospital are multiplied by a payment adjustment factor that could increase payments (provide a bonus) or decrease payments (provide a penalty). The payment adjustment factor would be based on the net financial impact across QOPMs. Since

the HOA focuses on hospital inpatient care, the QOPMs included in the HOA simulation were complications, readmissions, return ED visits, post-acute facility admission, and admissions through the ED. The HOA puts limits on the magnitude of the contribution to the payment adjustment factor from any one QOPM and an overall limit on the value of the payment adjustment factor. Using the best practice norm, the five QOPMs in the HOA simulation would reduce Medicare FFS payments by $6.1 billion per year. With all the constraints of the HOA payment system design, that amount would be reduced to $4.6 billion per year.

The QOPMs are practical inpatient and outpatient hospital quality measures with a substantial financial impact. The variability in QOPM performance across hospitals demonstrates there are substantial opportunities for hospital quality improvement. Because the QOPMs apply only to patients for whom the QOPM is potentially preventable and amenable to quality improvement efforts, the performance improvements needed to meet best practice standards should be more readily achievable, as demonstrated by multiple state QOPM-based state quality payment reforms. The design of the QOPMs and associated methods of risk adjustment will allow QOPM-based payment adjustments to be readily integrated into IPPS-type payment systems. While this report focused on Medicare patients, the QOPMs are applicable to other federal programs including Medicaid, Medicare Advantage and the Veterans Administration as well as commercial payers, thereby providing the foundation for a uniform and consistent approach to hospital quality assessment and payment.

Key Findings

- There is a significant variation in quality performance across geographic regions demonstrating that there are substantial opportunities for hospital quality improvement
- The quality performance of the four western census regions is generally better than the six eastern census regions
- If hospitals were on average able to achieve existing best practice quality performance, Medicare fee-for-service payments would be reduced by $8 billion per year
- Quality based payment reforms in some states have already achieved quality performance improvement that meets or exceeds best practice performance
- Across states inpatient complication performance was found to be correlated with readmission performance
- There is little consistency across hospitals in the use of observation services
- Large, urban teaching or high disproportionate share hospitals tend to have poorer quality performance while rural hospitals tend to perform consistent with expectations
- The quality performance measures used in this report are applicable to other federal programs including Medicaid, Medicare Advantage and the Veterans Administration as well as commercial payers

Background

The Institute of Medicine (IOM) in its 2013 study *Best Care at Lower Cost* estimated that $690 billion in annual healthcare expenditures could be avoided without worsening health outcomes.[5] Excluding expenditures related to fraud, the IOM study also estimated more than half of the $690 billion in preventable expenditures were associated with unneeded services, mistakes, delivery system ineffectiveness, and missed prevention opportunities. Other articles have found similar estimates of waste in the U.S. healthcare system.[6] As noted in the IOM study, higher expenditures do not necessarily lead to better outcomes.

One of the prime issues IPPS was intended to address was the wide variation in Medicare payments to hospitals for the same type of patient.

Arguably, the most successful payment policy reform has been the implementation of the Medicare Inpatient Prospective Payment System (IPPS).[7, 8] One of the prime issues IPPS was intended to address was the wide variation in Medicare payments to hospitals for the same type of patient. For example, the Report to Congress proposing IPPS noted a six-fold variation in the amount Medicare paid to individual hospitals for the treatment of an acute myocardial infarction (heart attack).[9] There was no plausible justification for this level of variation other than hospital relative efficiency and practice patterns.

IPPS and subsequently the Medicare outpatient prospective payment (OPPS) sought to control the amount paid (price) per unit of service (hospital admission or outpatient visit). However, since the total cost to Medicare is the unit price times the volume of services, failures in quality typically result in a greater volume of services to correct the quality problem, thereby increasing Medicare payments. For example, a patient discharged too quick, too sick may lead to a readmission, resulting in an additional Medicare payment for the avoidable readmission. Just as the wide variations in Medicare payments led to IPPS, today's wide variation in quality performance across hospitals means that payment policies are needed to address these variations. And like IPPS, effective payment policies to reduce the variation in quality outcomes have the potential to significantly reduce Medicare expenditures.

Research Objectives

This report has five major objectives:

1. To identify quality measures that are clinically credible and actionable
2. To determine the level of variation in quality performance across geographic regions
3. To determine the level of variation in quality performance across hospitals and types of hospitals
4. To quantify the financial impact of quality performance in terms of the relative impact on Medicare payments
5. To simulate hospital payment system reforms based on quality performance

This report will focus on hospital quality performance. Inpatient, outpatient, and post-acute care (PAC) quality performance will be evaluated. The research and analysis detailed in the report provide regulators, payers and hospital-based organizations with meaningful and actionable information that can promote quality improvement efforts.

Quality Measures Used in the Analysis

The inpatient, emergency department, and outpatient surgery department quality measures included in the analysis and are listed in Table 2.

Table 2: Quality measures used in the analysis

Inpatient Measures
Complications
Readmissions within 30 days
Return Emergency Department Visits within 30 days of hospital discharge
Admission to a Skilled Nursing Facility (SNF) or Rehabilitation Facility within 5 days of hospital discharge
Emergency Department (ED) Measures
Hospital Admissions from Emergency Department
Emergency Department Utilization of Observation Services
Emergency Department Ancillary Service Utilization
Outpatient Surgery Department
Hospital Admission or Emergency Department (ED) Visit for Complications of Outpatient Surgery within 30 days

Four of the quality measures analyzed are impacted by patient care during the post-acute care episode following hospital discharge or outpatient surgery. As a result, these quality measures provide insight not only into hospital-based care but also on continuity of care and the services available in the community. In particular, the post-discharge facility admission measure evaluates the rate at which hospitalized patients are discharged to a skilled nursing facility or rehabilitation facility. This measure reflects not only continuity of care and the services available in the community, but also the ability of hospitals to prepare and support patients for home discharge. While the hospital admissions from the ED measure relates to quality concerns that address unnecessary admissions, the ED ancillary services and ED observation services are more closely related to resource use in the ED. However, these three ED measures are interrelated with the use of ancillaries and observation in the ED, potentially directly impacted by the frequency of hospital admissions from the ED. In order to have a more complete picture of the practice patterns in the ED, all three measures were included.

In order for the quality measures in Table 2 to be used in the analysis, they had to be operationalized so that they met requirements found in Figure 1. Quality measures that meet these requirements are referred to as Quality Outcome Performance Measures (QOPMs).

By meeting these requirements, the QOPM data in this report highlight areas of quality that are amenable to quality improvement efforts and allow for the design of payment adjustments for quality that are consistent with key design features foundational to the success of IPPS.

As implemented, IPPS set a performance standard (the DRG price) for clinically credible units of payment (the DRGs) that encompassed the entire organization and provided rewards (profits) and penalties (losses) directly proportional to performance. Similarly, the requirements used to select the QOPMs will allow payment adjustments for quality to be based on performance standards established for clinically credible categories of patients (the risk categories) that encompass the entire organization and provide financial rewards and penalties directly proportional to the impact that quality performance has on Medicare payments.

Figure 1: Requirements for Quality Outcome Performance Measures (QOPMs)

Quality Outcome Performance Measures (QOPMs)

1. **Financial impact:** QOPMs should have a substantial financial impact.
2. **Outcomes based:** According to the IOM, QOPMs should address outcomes that are associated with "unneeded services, mistakes, delivery system ineffectiveness and missed prevention opportunities."[10] QOPMs should not focus on narrowly defined adherence to process of care measures.[11] Outcomes such as complications and readmissions represent an end manifestation of an underlying quality problem that is often the result of deficiencies in coordination and communication and, therefore, provide a broader assessment of quality.
3. **Comprehensive:** Each QOPM should be comprehensive and address all aspects of the quality outcome, not just isolated examples such as inclusion of just a few types of complications. Successful quality improvement efforts require behavior changes that typically mean changes to the culture of the organization. Such cultural changes cannot occur in isolated areas, but must be organization-wide.
4. **Actionable:** Each QOPM should be limited to the circumstances under which there is reasonable likelihood that the QOPM could have been prevented (referred to as the "at-risk" population). For QOPMs to lead to real behavior change, they must be amenable to quality improvement efforts. Achieving behavior change is difficult if quality outcomes over which the organization has no control, such as readmission due to a traffic accident, are included in the performance evaluation of a hospital.
5. **Risk adjusted:** For each QOPM there should be a method of risk adjustment based on clinically credible patient risk categories that allows norms (benchmarks) and the expected value for each QOPM to be computed for each risk category. The risk categories should be composed of clinically credible groups of patients and not be based on an abstract and difficult to understand mathematical formula.
6. **Proportional:** For each QOPM there must be a method of converting the variation in the QOPM to a measure of financial impact that is proportional to the financial impact of the QOPM on Medicare payments.
7. **No additional administrative burden:** The QOPMs, the method of risk adjustment and the determination of the at-risk patient population must be based on current national administrative data.
8. **Scalable:** The QOPMs should be applicable to the entire patient population treated by hospitals, including the Medicaid and commercial insurance populations, providing hospitals with a uniform set of quality measures that can be applied to the entire case mix of a hospital. While this report focuses on the Medicare FFS population, the QOPMs should also be applicable to other federal programs such as Medicaid, Medicare Advantage and the Veterans Administration.
9. **Proven success:** To the extent possible, the methodology for identifying the QOPMs and the methods for risk adjustment should have been successfully implemented for substantive public policy applications such as in payment or comparative reporting systems of major payers. By selecting QOPMs that have substantial regulatory use, many hospital organizations will be familiar with them.
10. **Transparent:** The details of the underlying logic of the methodology for identifying the QOPMs and the methods for risk adjustment should be available for review and comment. Transparency is essential to the clinical credibility necessary for achieving the behavior changes required for for real quality improvement.

Medicare Quality Measures and Risk Adjustment Methods

Medicare hospital payment initiatives based on quality, including the Medicare Inpatient Quality Reporting Program, the Hospital Value-Based Purchasing Program, the Hospital-Acquired Condition Reduction Program, and the Hospital Readmissions Reduction Program incorporate some of the quality measures in Table 2. Unfortunately, the Medicare quality measures are narrow in scope (not comprehensive), lack a payment financial conversion that is proportional to the financial impact of the quality measures and are not limited to potentially preventable outcomes (e.g., all cause readmissions that include readmissions due to traffic accidents over which the hospital has no control).

The Hospital Value-Based Purchasing Program is particularly problematic because it is composed of a mix of process and outcome measures that have undergone significant changes each year since the program was implemented, making focused quality improvement efforts by hospitals difficult. Because of these limitations, the CMS quality measures do not meet the QOPM requirements and were not used in this report.[12] MedPAC has been highly critical of the CMS payment adjustments for quality:

> First, there are too many overlapping hospital quality reporting and payment programs, which creates unneeded complexity. Second, all-condition measures are more appropriate to use in pay-for-performance programs than the condition-specific readmissions and mortality measures currently used. Third, the existing programs include process measures that are not tied to outcomes and measures that are not reported consistently across hospitals. Fourth, some of the programs score hospitals using "tournament models" in which providers are scored relative to one another despite the potential availability of a clear, absolute, and prospectively set system of targets. The Commission asserts that quality measurement should be patient oriented, encourage coordination, and promote delivery system change.[13]

In addition, the CMS 2020 budget proposes to "establish a new consolidated hospital quality payment program that combines and streamlines these four existing programs."[14] The need for such a restructuring of these programs has also been recognized by Congress. The bipartisan Healthcare Outcomes Act (HOA) (HR 3611) also proposes such a restructuring of these programs.[15]

State Quality Outcome Performance Measures and Risk Adjustment Methods

The requirements in the HOA were largely based on the attributes of successful quality performance outcomes payment adjustments and reporting programs implemented by state Medicaid agencies and state departments of health. State regulatory application of quality outcome methodologies in general requires an extensive review and evaluation before implementation and are subject to in-depth provider scrutiny. To the extent possible, this report utilizes methodologies for defining QOPMs and for risk adjustment that are actively being used by states for hospital payment adjustment and comparative performance reporting.

Table 3 summarizes the number of state Medicaid agencies or departments of health that are actively using specific quality measures and risk adjustment methodologies to measure hospital performance for either determining payment or assessing performance.

Table 3: The number of state Medicaid agencies or departments of health using specific quality measures and risk adjustment methodologies

Methodology	Payment	Reporting	Application
Quality Measures			
Potentially Preventable Complications (PPCs)	3	5	Identification of Complications for Inpatients
Potentially Preventable Readmissions (PPRs)	7	12	Identification of Readmissions
Risk Adjustment			
All Patient Refined DRGs (APR DRGs)	30	5	Inpatient Risk Adjustment
Enhanced Ambulatory patient Groups (EAPGs)	16	3	Outpatient Risk Adjustment
Clinical Risk Groups (CRGs)	3	14	Population Risk Adjustment

Medicaid agencies have been very innovative in implementing payment system reforms, including payment adjustments based on quality. The payment system reforms utilizing the quality outcome performance measure methodologies have resulted in significant provider performance improvement and savings. For example, using PPCs the state of Maryland has lowered the all payer inpatient complication rate by over 50 percent.[16] Using PPRs, the all payer readmission rate in Minnesota was reduced by 20 percent.[17]

Beyond state use of the quality measures and risk adjustment methodologies in Table 3, federal agencies like MedPAC and AHRQ are also using these methodologies. In its reports to Congress, MedPAC has utilized APR DRGs[18,19,20,21] and PPRs.[22] In MedPAC's March 2019 Report to Congress on the identification of efficient providers, MedPAC did not utilize the CMS approach to readmissions and instead used PPRs with APR DRGs for risk adjustment.[23] AHRQ assigns APR DRGs to all claims in its H-CUP national database[24] and utilizes APR DRGs in its quality indicator module.[25] The quality measures and risk adjustment methodologies in Table 3 have also been extensively evaluated in the research literature and in policy and applied research reports. Appendix A contains a bibliography of applicable articles and reports.

Both PPCs and PPRs meet all the requirements to be a QOPM and will be used in this analysis as the quality measure for complications and readmissions, respectively. All Patient Refined DRGs (APR DRGs), Enhanced Ambulatory Patient Groups (EAPGs), and Clinical Risk Groups (CRGs) are risk adjustment methods that are based on clinically credible patient risk categories, which allow the expected value for a QOPM to be computed. They meet the requirement for risk adjusting QOPMs.

Description of the QOPMs

The following is a brief description of each of the QOPMs with a more in-depth description contained in Appendix B.

Inpatient QOPMs

Potentially Preventable Complications (PPCs)

Potentially Preventable Complications (PPCs)[26] are harmful events (accidental laceration during a procedure) or negative outcomes (hospital acquired pneumonia) that may result

from the process of care and treatment rather than from a natural progression of underlying disease. There are 57 PPCs that encompass the full range of complications. For each PPC, the patients considered at risk for the PPC and the clinical circumstances under which the PPC could be consider potentially preventable are specified. Any patient who had one or more PPCs during their hospital stay is assigned the PPC QOPM. PPCs are risk adjusted using APR DRGs assigned at the time of admission.

Potentially Preventable Readmissions (PPRs)

Potentially Preventable Readmissions (PPRs)[27] are return hospitalizations within 30 days following a prior hospitalization. PPRs may result from deficiencies in the process of care (readmission for a surgical wound infection) or inadequate post-discharge follow-up (prescription not filled) rather than unrelated events that occur post discharge (broken leg due to trauma). Readmissions may result from actions taken or omitted during the initial hospital stay, such as incomplete treatment or poor care of the underlying problem, or from poor coordination of services at the time of discharge and afterwards, such as incomplete discharge planning or inadequate access to care. The patients considered at risk for a PPR and the clinical circumstances under which the PPR could be considered potentially preventable are specified. The PPR QOPM is assigned to any patient who had at least one PPR during the 30 days following a hospital discharge. PPRs are risk adjusted using APR DRGs assigned at the time of discharge.

Potentially Preventable Return Emergency Room Visits following hospital discharge (PPRED)

Potentially Preventable Return Emergency Room Visits following hospital discharge (PPREDs) are return ED visits within 30 days following a prior hospitalization. PPREDs are identified using a modification of the PPR methodology to determine discharges that are at risk of potentially preventable ED visits. A PPRED QOPM is assigned to any patient who had at least one PPRED during the 30 days following a hospital discharge. The PPREDs are risk adjusted using APR DRGs assigned at the time of discharge.

Post-Discharge Facility Admission

The Post-Discharge Facility Admission QOPM identifies patients who were admitted to a skilled nursing facility or rehabilitation facility within five days following a hospital discharge. Hospital discharges considered at risk are restricted to discharges for which home care may be a viable alternative to care provided in an institution. A modification of the Patient Centered Episodes (PCEs)[28] developed under contract with CMS (HHSM 500-2009-00080C[29]) referred to as Patient Focused Episodes (PFEs) was utilized to identify hospital discharges that have a consistent pattern of post-discharge service use for which home care may be a viable alternative to care provided in an institution. The PFEs are defined based on a modification of the APR DRGs. PCEs have been utilized by MedPAC to analyze post-acute care expenditures.[30, 31] The post-discharge facility admissions are risk adjusted using a combination of the PFE for identifying the severity and reason for hospital admission and CRGs for identifying the chronic illness burden of a patient.

Emergency Department QOPMs

The three ED QOPMs exclude patients who require complex medical care (e.g., extensive third-degree burns), are at high severity of illness (APR DRG severity of illness level 3 or 4), or had a significant procedure performed (i.e., only patients treated medically were included).

Hospital Admissions from the ED

The hospital admissions from the ED QOPM identifies ED visits that result in a low-severity medical hospital admission. This QOPM also excludes admissions that typically have regulated medically necessity standards for admission, such as mental health and substance abuse patients. Hospital admissions from the ED are risk adjusted using the APR DRG assigned at the time of admission.

ED Utilization of Observation Services

The observation services provided in the ED QOPM identifies ED visits in which at least eight hours of observation services were provided. Observation services provided in the ED are risk adjusted using the medical APR DRGs.

ED Ancillary Service Utilization

ED ancillary services include radiology, laboratory, and pharmacy services. Since the ED ancillary utilization QOPM includes these services, the vast majority of ED patients will receive some ancillary services making a simple yes/no rate of occurrence for an ancillary service not useful as a QOPM. Instead, the ED ancillary services QOPM uses a sum of ancillary service relative weights in order to measure the relative frequency and mix of ancillary services provided by a hospital. The ED ancillary service QOPM excludes patients who were admitted to the hospital. ED ancillary services are risk adjusted using the medical APR DRGs.

Outpatient Surgery Department QOPM

Potentially Preventable Hospital Admissions and ED Visits for Complications of Outpatient Surgery

The Potentially Preventable Hospital Admissions and ED Visits for Complications of Outpatient Surgery QOPM identifies hospital admissions and ED visits for complications related to an outpatient procedure that occur within 30 days following an outpatient procedure. Complications related to an outpatient procedure are identified using the 21 PPCs related to complications of surgery. Procedures typically done in an outpatient facility such as hernia repairs are identified using a subset of the significant procedure EAPGs. The EAPG subset is used to determine the patients at risk and the risk adjustment. PPC logic is used in conjunction with an ED visit or hospital admission within the 30-day window to identify patients with a complication of care resulting in a potentially avoidable ED visit or admission. It is noted that the data period for this analysis precedes CMS policy changes that shifted many additional surgeries to the outpatient setting. In particular for CY20, total knee arthroplasty (TKA) is being added as a procedure that can be performed in an ambulatory surgery center.[32]

Description of Risk Adjustment Methods

All the QOPMs in the report are risk adjusted using APR DRGs, EAPGs, CRGs or some combination of these three risk adjustment methods, all of which are categorical clinical models. A categorical clinical model is composed of mutually exclusive and exhaustive clinically meaningful risk categories. Each patient can be assigned to only a single risk category. A categorical clinical model allows the rate of occurrence of a QOPM in each risk category to be compared to the rate of occurrence of the QOPM in a reference (norm) such as a national or state database. The most widely used method of risk adjustment in the healthcare industry is Medicare Severity Diagnosis Related Groups (MS-DRGs), a categorical clinical model in which the Medicare price for each MS-DRG serves as the norm value for payment purposes. The APR DRGs were used for risk adjustment rather than MS-DRGs because APR DRGs include a more detailed specification of severity levels that provides greater precision for risk adjusting the QOPMs.

The following is a brief description of each of the risk adjustment methods with a more in-depth description contained in Appendix B.

All Patient Refined DRGs (APR DRGs)

All Patient Refined Diagnosis Related Groups (APR DRGs)[33] are a categorical clinical model that is composed of base DRGs that are subdivided into four severity of illness level based on the extent of physiologic decompensation or organ system loss of function. The underlying clinical principles of APR DRGs are that the severity of illness of a patient is highly dependent on the patient's underlying clinical problems, and that patients with high severity of illness are usually characterized by multiple serious illnesses. The APR DRG is computed at the time of admission and at the time of discharge.

Enhanced Ambulatory Patient Groups (EAPGs)

Enhanced Ambulatory Patient Groups (EAPGs)[34] are a categorical clinical model that categorizes patients according to the amount and type of resources used in an ambulatory visit. These resources include significant procedures, physical therapy, rehabilitation, dental procedures, medical visits, counseling, radiology, laboratory, drugs and biologicals, devices, supplies, ancillary tests, equipment, type of room, and treatment time. Patients in each EAPG have similar clinical characteristics and resource use. EAPGs were developed to encompass the full range of ambulatory settings including same day surgery units, hospital emergency rooms and outpatient clinics.

Clinical Risk Groups (CRGs)

The Clinical Risk Groups (CRGs)[35] are a categorical clinical model that assigns each individual in a population to a single mutually exclusive risk group that relates the clinical and demographic characteristics of an individual to their outcomes and healthcare resource use. CRGs describe the health status and burden of chronic illness of individuals and are subdivided into up to six severity of illness levels. Each CRG and severity subgroup is used to describe the health status of groups of individuals with a similar burden of chronic illness. Individuals with severe chronic disease in multiple organ systems are the patients who are most difficult to treat, experience poorer outcomes, and consume a disproportionate share of health care resources.

Determining At-Risk Admissions and Outpatient Visits

Integral to each QOPM is a specification of the subset of admissions or outpatient visits applicable to each QOPM. These subsets of admissions or outpatient visits are considered "at risk" for the QOPM and are the basis of the denominator for computing QOPM rates. As noted in the requirements for QOPM selection, for a QOPM to be meaningful and actionable, it should be limited to those situations for which there is reasonable likelihood that the QOPM could have been avoided.

For a QOPM to be meaningful and actionable, it should be limited to those situations for which there is reasonable likelihood that the QOPM could have been avoided

For the two quality measures used most often by states (PPCs and PPRs), there is an in-depth specification of the clinical circumstances under which these QOPMs would be considered potentially preventable. Thus, the determination of the patients at risk is an inherent part of the PPC, and PPR systems. For example, a readmission for a complication of a prior surgical hospitalization (a surgical site infection, for example) would be considered a PPR, but a readmission for trauma would not be considered a PPR.

Overall, for readmissions of Medicare patients, 37.2 percent are not considered potentially preventable (not a PPR). For PPCs, the determination of potential preventability is done separately for each PPC. A patient can be at risk for one PPC but not another PPC. The PPCs include some global exclusions for extremely complex cases such as major multiple trauma and major metastatic malignancies for which determination of potential preventability is not possible for any of the PPCs. PPC-specific at-risk criteria are then applied. For example, other than the global exclusions, virtually all patients are at risk for the PPC for an inpatient trauma (81.8 percent of patients at risk). Only surgical patients are considered at risk for the PPC for reopening of a surgical site (21.3 percent of patients at risk). Patients admitted for conditions like seizures and head trauma are excluded for the PPC for aspiration pneumonia (58.9 percent of patients at risk).

Identifying a PPC or PPR as potentially preventable does not mean that it is preventable for a specific patient. It means that *if* there were a systematic pattern of higher than expected occurrence of the PPC or PPR, there would be concerns regarding the quality of care provided to those patients and that those patients would be more likely to have experienced a quality problem that resulted in the PPC or PPR. Essentially, a PPC or PPR is an end manifestation or outcome of an underlying quality problem. Even the best performing hospitals that provide optimal care will have a residual rate of PPCs and PPRs. It is when there is a systematic pattern of higher than expected occurrences of PPCs or PPRs that real quality improvement is likely to be possible.

It is essential that performance comparisons of any of the quality measures designated as a QOPM be limited to clinical situations where real change is possible. Inclusion of patients for whom the hospital has no ability to control or influence the QOPM would be neither credible nor fair and would be detrimental to quality improvement efforts. Furthermore, since QOPMs can often be the result of deficiencies in coordination and communication within healthcare delivery organizations, a higher than expected rate of QOPMs can provide insight into the effectiveness of the overall delivery system.

The quality measure for return emergency department visits (PPRED) QOPM utilizes the core PPR method for identifying at-risk discharges and return ED visits that are potentially preventable. The hospital admission or emergency department visit for complications of outpatient surgery QOPM utilizes EAPGs to identify at-risk outpatient hospital surgical procedures, such as a laparoscopic cholecystectomy or hernia repair, that are routinely done in an outpatient setting and utilizes the core PPC logic to identify the reasons for an ED visit or hospitalization that would be considered potentially preventable.

For the other QOPMs in Table 2 that do not utilize the at-risk determination from either PPCs or PPRs (post discharge facility admission, hospital admissions through the ED, ED observation services and ED ancillary utilization) the identification of the subset of admissions or outpatient visits at risk is accomplished by limiting patients at risk to a specific subpopulation of patients. The admit through the ED QOPM excludes admissions that had surgery (presumably the need for surgery made the admission necessary), were at high severity at admission (admission APR DRG severity level of 3 or 4), died during the hospital stay, required complex care (an example would be significant third degree burns) or that typically had regulated medically necessity standards for admission, such as mental health and substance abuse patients. The admissions through ED that are not excluded are hospital admissions that are potentially discretionary hospital admissions, which make up 19.2 percent of all hospital admissions through the ED. Only the potentially discretionary hospital admissions were used to compute the admit through the ED QOPM. The ED observation services and ED ancillary utilization QOPMs had similar exclusions applied.

For the other QOPMs in Table 1 that do not utilize the at-risk determination from either PPCs or PPRs (post-discharge facility admission, hospital admissions through the ED, ED observation services, and ED ancillary utilization) the identification of the subset of admissions or outpatient visits at risk is accomplished by limiting patients at risk to a specific subpopulation of patients. For example, the admission through the ED QOPMs exclude patients who require complex medical care, are at high severity of illness, had a significant procedure performed, or were an admission that typically had regulated medically necessity standards for admission. After the application of these restrictions, the admissions through ED that are considered potentially discretionary hospital admissions make up 19.2 percent of all hospital admissions through the ED. Only the potentially discretionary hospital admissions were used to compute the admission through the ED QOPM. The ED observation services and ED ancillary utilization QOPMs had similar exclusions applied.

While the determination of at-risk patients for the QOPMs has been based primarily on clinical criteria, the determination of the at-risk patients for the post-discharge facility admission QOPM uses a combination of clinical and statistical criteria. Based on a modification of the APR DRGs, the Patient Focused Episodes (PFEs) identify hospital discharges that have a stable pattern of post-acute resource use during the post-acute care period. The rate of post-discharge facility admission was evaluated for each PFE. If the rate of facility admission was under 20 percent (COPD patients, for example, are rarely admitted to a PAC facility) or over 80 percent (reduction of femur with internal fixation patients are routinely admitted to a PAC facility), the PFE was excluded. The remaining PFEs were considered potentially discretionary post-discharge facility admissions. Only the potentially discretionary post-discharge facility admissions were used to compute the post-discharge facility admission QOPM.

Comparing QOPM Performance

Because the methods of risk adjustment for the QOPMs are based on a categorical clinical model composed of discrete risk categories, QOPM performance can be compared to national and other benchmarks in each risk category. This detailed level of comparison to norms is not possible with other methods of risk adjustment such as a regression based methods. It allows comparisons to be done across any subset of hospitals by summing hospital actual values and benchmark (norm) values across patient risk categories.

Computing QOPM Actual Values

The QOPM frequency can be computed for patients in each risk category. For most QOPMs the actual value (A) for a hospital is the number of at-risk admissions or visits in the hospital that have the QOPM present. An example is PPRs where the PPR actual rate in each risk category is the fraction of at-risk discharges that are followed by a PPR. However, the PPC and ED ancillary utilization QOPMs are composed of multiple discrete subtypes. For example, there are 57 subtypes of complications identified by the different PPCs. Each subtype of complication (i.e., each PPC) has a different clinical significance and a different financial impact (a complication of sepsis has a greater clinical and financial impact than a complication of a UTI.) Thus, for a QOPM with subtypes, both the frequency of occurrence of the QOPM and the mix of QOPM subtypes must be taken into account. For example, poor performance for the PPC QOPM can be the result of an excess total number of PPCs or that the mix of PPCs is more serious (costly).

In order to reflect the mix of subtypes of a QOPM, relative weights were developed for each QOPM subtype based on its relative financial impact. For PPCs, the relative weights for each PPC subtype were based on the marginal cost of each PPC.[36] To determine the financial impact of a QOPM with subtypes, the product of the number of excess occurrences of each subtype and the relative weight for the subtype was summed over all subtypes before multiplying by financial conversion factor for the QOPM (discussed below).

Similarly, for the ED ancillary service QOPM, relative weights were developed for each ED ancillary service subtype (type of radiology, laboratory test and pharmaceutical) based on the average amount paid for the different types of ED ancillary services. The standardization provided by the relative weights isolates the frequency of use and the mix of ancillary services being used by a hospital from the amount being paid to the hospital and the service specific costs reported by individual hospitals.

Reference Norms and Expected Values

A national norm for each QOPM is calculated by summing the QOPM actual value for each risk category across all Medicare patients who are at risk for the QOPM (referred to as the QOPM norm value) and computing the mean rate per at-risk patient. For each QOPM, the expected value (E) for a hospital is the number of at-risk admissions or visits in the hospital in each risk category times the QOPM norm value for the risk category summed overall risk categories (indirect rate standardization). The difference between the actual value (A) and the expected value (E) represents good performance if (A-E) is negative (A<E) and poor performance if (A-E) is positive (A>E).

The difference between the actual value (A) and the expected value (E) represents good performance if (A-E) is negative (A<E) and poor performance if (A-E) is positive (A>E).

A second reference norm is also used in the analysis. Based on the value of the (A/E) for each hospital, the subset of best performing

hospitals is identified for each QOPM that constituted 40 percent of the at-risk cases for the QOPM. For each QOPM, this subset of hospitals is referred to as the best practice hospitals. For the best practice hospitals, the overall A/E is computed for each QOPM. The A/E ratio for the best practice hospitals will be less than one and is a measure of the level of relative performance achieved by the best practice hospitals. For example, an A/E ratio for the best practice hospitals of 0.8 means that in the best practice hospitals the QOPM performance is 20 percent (1 - 0.8), lower than what would be expected compared to all hospitals. For each QOPM, the value of the QOPM in each risk category in the national norm is multiplied by the A/E ratio for the best practice hospitals to create a best practice norm. Note that the subset of hospitals included in the best practice norm varies across QOPMs.

Financial conversion factors

Specific to each outcome performance measure, a financial conversion factor is computed based on allowed Medicare payments (the amount actually paid by Medicare). The product of the (A-E) difference and the financial conversion factor determines the financial impact of a difference in hospital performance for a QOPM. By expressing the (A-E) in financial terms, the impact of each QOPM can be compared and added together to determine the overall financial impact across all QOPMs. In addition, comparing the financial impact of a QOPM at the level of each clinically meaningful risk category makes it possible to establish a link between the clinical and financial aspects of care, which can facilitate behavior change and performance improvement initiatives.

The PPR methodology identifies chains of clinically similar readmissions, such as repeat behavioral health readmissions during the 30 days following a prior hospital discharge. Although the PPR methodology counts a clinically related chain of readmissions as a single readmission, the financial conversion factor for PPRs reflects the average value of the payments associated with a single admission within the readmission chain.

Using the best practice norm, the product of the (A-E) difference and the financial conversion factor for a QOPM provides an estimate of the savings (lower payments) that Medicare can expect if hospitals are able to perform at the best practice level. The estimate of Medicare savings is conservative because it is based solely on the (A-E) difference. Thus, the underlying rate of QOPMs as measured by E is accepted as a baseline level of underlying quality performance and only the (A-E) difference is viewed as the basis for potential savings. In addition, the savings are net savings because the financial benefit of good QOPM performance is allowed to offset the financial impact of poor QOPM performance.

The magnitude of the (A-E) differences is directly related to the level of variation in a QOPM across hospitals. The greater the variation in a QOPM across hospitals, the greater the opportunity for savings. If there is little variation in a QOPM across hospitals, this analysis will conclude there is little opportunity for performance improvement and savings, essentially acknowledging the status quo as an acceptable level of performance.

Summary of QOPMs

The QOPMs are summarized in Table 4. Appendix B contains a detailed description of the specifications for identifying each QOPM, the identification of the at-risk population for each QOPM and the method of risk adjusting each QOPM. Appendix C provides a detailed description of how the financial conversion factor was determined for each QOPM.

The method of identifying a QOPM, determining the at-risk population, and method of risk adjustment for the QOPMs provide the necessary components for evaluating hospital QOPM performance.

Table 4: Summary of Inpatient and Outpatient QOPMs

Inpatient QOPMs	Identification of QOPM	Identification of "At Risk" Population	Risk Categories	Financial Conversion
Inpatient Complications	One or more PPCs during admission	Potentially preventable logic in PPCs	Admission APR DRG	Marginal PPC cost increase expressed in payment dollars
Readmissions	PPR within 30 days of hospital discharge	Potentially preventable logic in PPRs	Discharge APR DRG	Average payment for an admission
Return ED Visits	PPRED within 30 days of hospital discharge	Modification of potentially preventable logic in PPRs	Discharge APR DRG	Average payment for an ED visit
Post-discharge Facility Admission	Admission to a post-acute facility within 5 days of hospital discharge	Modification of APR DRGs to identify discharges for which home care may be a viable alternative to care provided in an institution	Discharge APR DRG and CRG	Marginal payment increase for a SNF or rehab stay vs discharge to home with/without home health services
Outpatient QOPMs	**Identification of QOPM**	**Identification of "At Risk" Population**	**Discharge**	**Financial Conversion**
Hospital Admissions from ED	Low severity admission through ED	Low severity medical encounters in the ED	Admission APR DRG	Average payment for low severity admissions less average payment for ED observation and ancillaries
ED Observation	8 or more hours of observation in ED	Low severity medical encounters in the ED	Admission APR DRG	Average payment for 8+ hours of ED observation
ED Ancillary Utilization	Provision of ancillary services in ED	Low severity medical encounters in the ED not admitted	Admission APR DRG	Average payment for ED ancillaries adjusted for mix of ancillaries
Hospital Admission or ED Visits for Complications of Outpatient Surgery	Admission or ED visit within 30 days after outpatient surgery presenting with surgical PPCs	Outpatient surgery EAPGs	EAPGs	Average payment for an ED visit or hospital admission

QOPM Based Hospital Payment Simulation

The HOA legislation specified that four quality measures were to be used as the basis of a single hospital payment adjustment for quality (complications, readmission, return ED visits and PAC expenditures). The HOA would replace the quality payment adjustment programs mandated by the Affordable Care Act (ACA). The quality measures in the HOA were required to meet criteria consistent with the QOPM requirements. With the exception of PAC expenditures, the QOPMs encompass the quality measures in the HOA. However, PAC expenditures are largely determined by readmissions, return ED visits and PAC facility usage during the 30-day PAC episode. The QOPMs for readmissions, return ED visits and post-discharge facility admissions therefore encompass the large majority of PAC expenditures and provide more actionable detail than aggregate PAC expenditures.

The quality measures in the HOA were required to meet criteria consistent with the QOPM requirements.

Although the QOPMs expand the quality measures to encompass quality issues in the ED and outpatient surgery, the HOA payment adjustment only applies to inpatient care so the ED and outpatient surgery QOPMs were not included in the HOA payment simulation. The HOA specified the following general approach to the determination of the single hospital payment adjustment for quality:

- There should be both payment bonuses and penalties
- The payment impact of a quality measure should be directly proportional to its impact on Medicare payments
- Good performance on a quality measure should be allowed to offset poor performance on other quality measures
- The contribution to the payment adjustment for quality from any one quality measure should not exceed a specified percentage of total Medicare payments to the hospital
- The hospital payment adjustment for quality should be capped not to exceed an upper and lower bound

Based on the payment system design in the HOA, a QOPM hospital payment simulation was performed.

Data

The Medicare Fee-For-Service data (FFS) from FY17 plus the first 30 days of FY18 were used in the analysis. The FY18 data was only used to complete the 30-day post-acute care period for those QOPMs that extend into the post-acute care period. Only IPPS hospitals were included in the analysis. Only facility payments are included (Medicare payments made using the UB claim form) and physician payments are excluded. Table 5 summarizes the data volume.

Table 5: Summary of data volume

IPPS Hospitals	**3,279**
Volume	
Hospital Admissions	9,917,887
Emergency Department Visits	14,078,572
Allowed Payments	
Hospital Admissions	127.7B
ED Visits	9.7B

The financial conversion factors used to determine the financial impact of A-E differences are contained in Table 6. Note that for the PPC and ED ancillary QOPMs, the financial conversion factor is adjusted for the actual mix of PPCs and ED ancillaries.

Table 6: Financial conversion factors

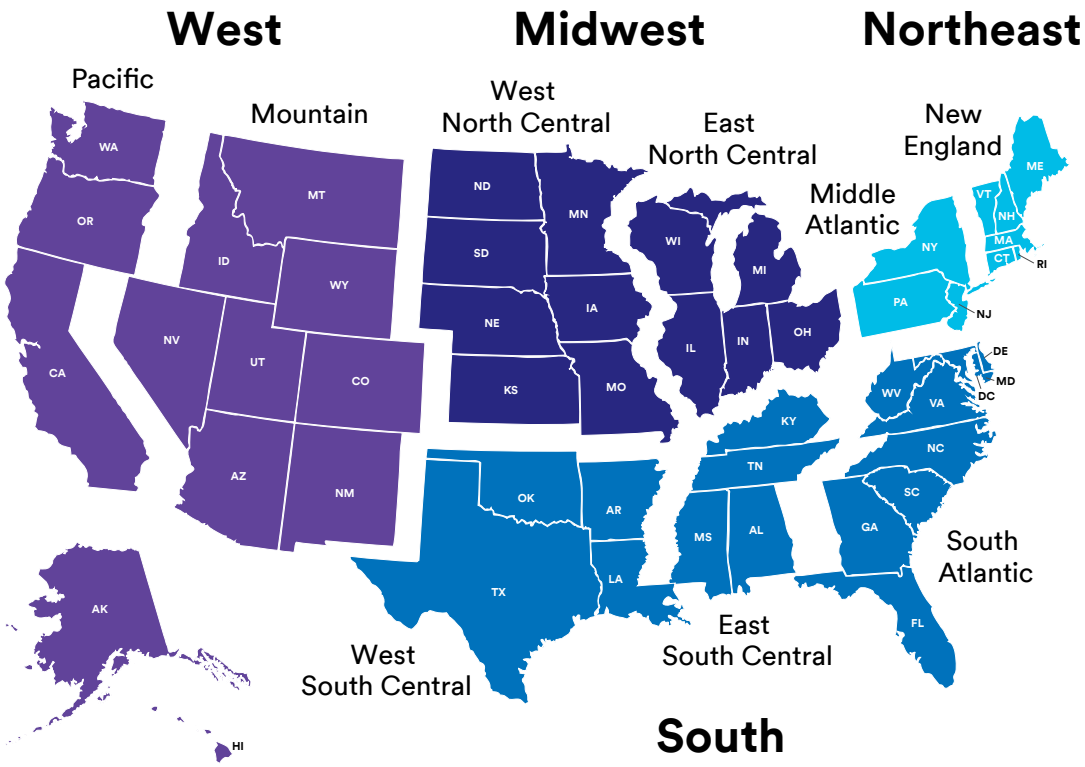
QOPM	Financial conversion Factor ($)
Inpatient Complications	12,196
Readmissions	12,196
Return Emergency Department Visits	693
Post-discharge Facility Admissions	6,880
Hospital Admissions from ED	3,233
ED Observation	1,939
ED Ancillary Utilization	705
Hospital Admission for Complications of Outpatient Surgery	12,196
ED Visit for Complications of Outpatient Surgery	693

Results

Geographic Variation in QOPM Performance

Figure 2 contains a map of the states in each Census region.[37]

Figure 2: States in each Census region



In each census region the actual values (A) and expected values (E) for each QOPM were summed across all hospitals in the census region using the national norm to compute the expected values. The ratio of the difference between the actual value and the expected value (A-E) to the expected value expressed as a percent is a measure of the amount by which the actual performance is above (+) or below (-) expected performance.

Table 7 contains the %(A-E)/E for each QOPM for each census region based on the national norm.

Table 7: %(A-E)/E by census region for national norm

	New England	Middle Atlantic	South Atlantic	E N Central	E S Central	W S Central	W N Central	Mount	Pacific
Hospitals	133	363	571	500	298	528	258	229	399
Admissions	554,167	1,323,505	2,228,747	1,594,708	764,251	1,115,872	751,341	526,122	1,059,174
PPC	6.16	5.46	-0.84	1.03	3.61	-4.13	-2.84	-7.23	-3.00
PPR	1.40	4.66	2.21	-0.66	4.26	1.89	-8.06	-12.87	-3.33
PPRED	2.25	-11.36	1.93	-1.24	4.68	4.66	-6.55	4.04	6.29
PAC Facility Admission	19.27	13.95	-4.39	7.61	-3.82	-17.21	0.53	-15.28	-1.94
Admission from ED	8.64	29.68	1.88	-1.81	-6.89	-6.54	-9.37	-23.62	-11.93
ED Observation	18.53	3.97	6.85	21.02	-11.23	-4.17	-1.71	2.02	-38.24
ED Ancillary	-5.27	3.35	3.64	1.19	-0.60	-1.82	-2.37	5.09	-8.17
Outpatient Surgical PPC	-13.91	-5.83	1.56	1.14	1.11	7.96	-0.37	3.96	0.11

In general, the four western census regions perform better than the six eastern census regions. For example, the New England states are 6.16 percent higher than expected for PPCs while the mountain states are 7.23 percent lower than expected for PPCs. There is a very large degree of variation in performance for the ED admission and ED observation QOPMs. For example, the Middle Atlantic states are 29.68 percent higher than expected for ED admissions while the mountain states are 23.62 percent lower than expected for ED admissions.

Table 8 contains the %(A-E)/E for the census regions aggregated into the five eastern regions and four western regions.

Table 8: %(A-E)/E by Eastern and Western census regions for national norm

	5 Eastern Census Regions	4 Western Census Regions
Hospitals	1,865	1,414
Admissions	6,465,378	3,452,509
PPC	2.02	-3.98
PPR	2.15	-4.13
PPRED	-1.18	2.59
PAC Facility Adm	4.48	-7.90
ED Admit	5.68	-11.38
ED Obs	8.36	-14.01
ED Anc	1.63	-2.80

As shown in Table 8 the western states have better performance on all QOPMs except return ED visits and outpatient surgical complications. Some of the differences in performance are substantial. For example, the QOPM for ED admissions is 5.68 percent higher than expected for the eastern states and 11.38 percent lower for the western states.

Table 9 is similar to table 7 but the best practice norm is used to compute the expected values instead of the national norms.

Table 9: %(A-E)/E by census region for best practice norm

	New England	Middle Atlantic	South Atlantic	E N Central	E S Central	W S Central	W N Central	Mount	Pacific	Nation
Hospitals	133	363	571	500	298	528	258	229	399	3329
Admissions	554,167	1,323,505	2,228,747	1,594,708	764,251	1,115,872	751,341	526,122	1,059,174	9,917,887
PPC	43.61	42.67	34.14	36.67	40.16	29.70	31.44	25.50	31.22	35.3
PPR	17.73	21.52	18.68	15.33	21.03	18.31	6.75	1.16	12.23	16.1
PPRED	23.87	7.38	23.48	19.64	26.81	26.79	13.21	26.04	28.77	21.1
PAC Facility Admssion	54.67	47.76	23.98	39.55	24.73	7.36	30.36	9.87	27.16	29.68
Admission from ED	67.02	99.35	56.62	50.94	43.14	43.68	39.32	17.42	35.39	53.7
ED Observation	157.68	126.04	132.29	163.09	92.99	108.35	113.69	121.80	34.26	117.4
ED Ancillary	17.24	27.91	28.27	25.25	23.02	21.52	20.84	30.07	13.66	23.8
Outpatient Surgical PPC	47.56	61.52	74.27	73.33	73.38	85.26	70.86	78.59	71.83	71.5

As expected, the %(A-E)/E values in Table 9 are much greater than Table 7. For example, the %(A-E)/E for New England for PPCs with the national norm increases from 6.16 percent higher than expected to 43.61 percent higher than expected with the best practice norm. The last column in Table 9 labeled "Nation" is the measure of the overall level of performance improvement needed to achieve best practice nationwide (i.e., the level of improvement required for hospitals nationwide to be performing on average at the current best practice level. For example, it would require a 35.3 percent improvement in PPCs and a 16.1 percent improvement in PPRs for hospitals nationwide to achieve best practice. In Maryland, however, all payer PPC payment reform resulted in the state's hospitals achieving a 56.6 percent reduction in PPCs[38] and the all payer readmission improvement project in Minnesota was able to achieve a 20 percent reduction in PPRs. Thus, the best practice improvement targets appear to be reasonable and readily achievable[39].

> If hospitals on average were able to achieve best practice performance across all QOPMs, Medicare FFS payments would be reduced by $8 billion per year.

The level of improvement necessary to achieve best practice nationwide for the ED Admit QOPM (53.7 percent) and ED observation QOPM (117.4 percent) is substantial. The large level of improvement is indicative of substantial variation in the practice patterns for these

QOPMs. There appears to be little uniformity in the use of observation services in hospitals.

Table 10 converts the %(A-E)/E in Table 9 to the financial impact on Medicare payments if hospitals were able to achieve best practice.

Table 10: $(A-E) in millions (000,000) by census region for best practice norm

	New England	Middle Atlantic	South Atlantic	E N Central	E S Central	W S Central	W N Central	Mount	Pacific	Total
Hospitals	133	363	571	500	298	528	258	229	399	3329
Admissions	554,167	1,323,505	2,228,747	1,594,708	764,251	1,115,872	751,341	526,122	1,059,174	9,917,887
PPC	109.2	265.3	356.4	281.3	144.6	161.3	115.9	65.8	157.0	1,656.9
PPR	85.5	241.3	360.7	218.7	140.8	179.3	44.8	5.3	112.7	1,389.1
PPRED	5.3	3.9	21.0	12.8	8.4	12.1	4.0	5.4	12.0	84.8
PAC Facil Adm	93.0	176.4	155.0	197.2	55.1	22.3	72.3	15.8	91.1	878.3
ED Admit	151.3	486.2	533.2	320.5	141.4	211.8	99.9	37.2	156.1	2,137.7
ED Obs	99.3	170.3	350.5	289.0	89.7	150.2	88.9	79.2	47.6	1,364.8
ED Anc	18.2	56.3	116.5	71.7	33.2	44.9	25.4	32.5	28.2	427.0
Out Surg PPC	5.3	11.7	23.2	20.6	7.7	13.1	9.2	5.7	10.0	106.5
Total	**567.3**	**1,411.4**	**1,916.5**	**1,411.7**	**620.9**	**794.9**	**460.4**	**246.9**	**614.9**	**8,045.0**

For example, if hospitals in New England were able achieve the 43.61 percent improvement required to achieve best practice for PPCs, Medicare payment would be reduced by $109.2 million. The last column in Table 9 labeled “Nation” is the total reduction in Medicare payments for each QOPM if best practice is achieved. If hospitals on average were able to achieve best practice performance across all QOPMs, Medicare FFS payments would be reduced by $8 billion per year.

Table 11 contains the %(A-E)/E for each QOPM for each state based on the best practice norm.

Table 11: %(A-E)/E by state for best practice norm

		Inpatient Measures				Outpatient Measures			
State	**Hosp**	**PPCs**	**PPRs**	**PPREDs**	**PAC Adm**	**Adm ED**	**ED Obs**	**ED Anc**	**Out Surg**
Alabama	84	47.2	19.8	15.5	22.28	56.9	51.9	14.5	82.2
Alaska	8	35.6	-7.9	54.2	-68.30	-19.6	-36.8	-2.1	74.9
Arizona	63	30.9	2.9	27.2	-3.56	9.0	244.0	39.3	69.2
Arkansas	45	28.8	20.4	28.0	6.88	41.8	157.0	19.5	80.7
California	297	28.8	18.1	25.8	34.23	47.1	39.0	14.8	74.8
Colorado	45	21.1	-6.4	30.4	23.23	8.7	93.5	23.8	87.5
Connecticut	30	51.9	18.9	24.9	81.17	62.7	148.1	13.9	32.0
Delaware	6	52.8	13.6	23.1	18.73	62.4	127.0	36.3	84.9
DC	7	92.2	32.2	29.8	30.07	58.9	89.9	-2.1	58.3
Florida	168	31.5	26.0	10.8	36.29	109.5	198.1	41.2	92.4
Georgia	101	43.7	18.3	31.6	5.56	33.8	88.4	22.2	65.4

Table 11: %(A-E)/E by state for best practice norm

		Inpatient Measures				Outpatient Measures			
State	Hosp	PPCs	PPRs	PPREDs	PAC Adm	Adm ED	ED Obs	ED Anc	Out Surg
Hawaii	12	41.1	-1.1	43.5	10.74	3.1	43.2	11.3	76.3
Idaho	14	17.7	-13.7	24.1	14.67	-0.8	-23.8	7.8	92.4
Illinois	125	42.0	20.9	11.8	48.57	67.4	236.7	31.9	79.2
Indiana	85	33.6	7.4	21.9	43.85	37.1	123.5	26.8	71.6
Iowa	34	43.7	5.3	16.0	33.14	39.4	85.2	8.3	37.9
Kansas	51	10.0	6.0	12.1	31.32	48.8	97.0	20.2	71.8
Kentucky	64	37.7	23.3	34.1	28.22	32.5	91.3	28.2	70.6
Louisiana	90	34.2	20.5	41.1	-11.05	34.5	105.3	6.8	60.8
Maine	17	37.0	-2.5	38.4	28.20	12.9	42.2	-4.7	60.7
Maryland	47	-0.9	13.9	17.9	35.90	53.9	230.5	34.6	70.1
Massachusetts	56	41.5	22.7	21.4	51.67	84.4	212.6	23.1	60.3
Michigan	94	35.2	17.8	21.1	29.18	61.3	149.9	21.0	82.8
Minnesota	50	33.7	1.5	13.5	36.99	25.8	99.2	20.1	67.4
Mississippi	60	41.4	23.9	31.8	18.80	37.2	122.3	19.7	73.2
Missouri	72	34.5	16.9	21.4	19.90	41.6	143.2	25.8	104.0
Montana	14	21.3	-11.0	9.1	12.41	11.6	87.4	10.3	89.0
Nebraska	23	27.9	-1.6	-7.6	45.92	51.7	96.9	26.1	56.4
Nevada	22	31.8	28.0	21.7	-0.15	81.3	166.8	38.3	121.3
New Hampshire	13	43.0	9.4	23.3	30.00	48.1	159.0	24.1	23.9
New Jersey	64	37.6	21.5	5.8	74.24	91.4	199.2	32.7	77.6
New Mexico	30	39.9	5.9	34.5	-2.27	4.3	57.4	25.4	61.4
New York	149	54.3	25.7	7.5	43.61	115.7	59.5	21.7	47.7
North Carolina	85	43.0	11.2	32.2	22.28	16.0	88.4	19.7	72.1
North Dakota	8	42.2	-3.6	7.2	23.50	33.9	136.7	17.7	55.7
Ohio	130	36.1	16.5	22.9	41.49	42.9	159.4	27.0	66.3
Oklahoma	84	33.2	14.5	36.9	7.14	21.7	67.9	12.8	92.8
Oregon	34	27.4	-5.3	38.2	5.43	7.6	47.1	5.1	81.5
Pennsylvania	150	31.7	16.5	8.4	33.59	85.4	161.6	31.5	70.0
Rhode Island	11	53.0	19.3	14.9	61.04	78.7	83.0	23.2	97.3
South Carolina	54	33.5	14.2	36.3	13.00	29.0	69.1	18.5	54.7
South Dakota	20	24.7	-5.6	-6.2	27.29	49.6	138.5	24.1	67.6
Tennessee	90	36.2	18.8	27.4	26.85	44.8	110.4	27.8	68.4
Texas	309	28.1	18.3	21.2	11.65	51.4	110.6	27.9	91.8
Utah	31	7.1	-14.3	22.6	37.44	4.2	-45.5	35.2	69.4
Vermont	6	20.3	6.8	36.6	34.95	30.1	21.1	-1.1	-4.2
Virginia	74	33.7	13.9	31.9	19.37	30.2	66.7	20.6	68.4
Washington	48	41.9	-1.7	33.7	17.51	7.1	14.7	14.9	60.0
West Virginia	29	44.8	20.3	36.7	-7.70	34.7	171.0	33.1	75.8
Wisconsin	66	32.1	3.7	26.7	28.51	23.9	96.5	12.4	63.6
Wyoming	10	9.7	-3.5	30.7	20.09	16.6	150.4	29.0	15.9

Maryland is the only state that performed better than best practice for PPCs. This result is consistent with the highly successful all payer PPC payment reform in Maryland. Similarly, the all payer PPR efforts in Minnesota resulted in Minnesota being nearly at best practice for PPRs (1.5 percent above). Appendix D contains the %(A-E)/E for the national norm and the $(A-E) for the best practice norm for each state.

Using the metropolitan areas identified in the Core Based Statistical Areas (CBSAs) from the Office of Management and Budget, Appendix E contains the %(A-E)/E for the national norm, %(A-E)/E for the best practice norm and the $(A-E) for the best practice norm for each of the CBSAs that include more than three hospitals. Appendix E shows there is significant variation in performance for the QOPMs across CBSAs within a state.

Table 12 contains the %(A-E)/E for selected CBSAs in the state of Florida for the ED admit QOPM using the best practice norm.

Table 12: CBSA variation in Florida best practice norm %(A-E)/E

	Hospitals	Admissions	Adm ED
National	3329	9,943,646	53.7
Florida	168	761,456	109.5
Miami-Miami Beach-Kendall, FL	19	56,044	152.72
Tampa-St. Petersburg-Clearwater, FL	30	127,778	131.51
Orlando-Kissimmee-Sanford, FL	17	104,580	105.36
Jacksonville, FL	11	59,910	106.01
Cape Coral-Fort Myers, FL	6	47,922	81.56
Crestview-Fort Walton Beach-Destin, FL	6	19,235	62.35

Nationally, a 53.7 percent improvement is required to achieve best practice for the ED admit QOPM. However, Florida hospitals require a 109.5 percent improvement to achieve best practice, with the Miami and Tampa CBSA well above the state 109.5 percent, the Orlando and Jacksonville CBSA close to the state 109.5 percent and Fort Myers and Crestview well below the state 109.5 percent.

Correlation of QOPM Performance between states

The Pearson correlation was computed between QOPMs for the %(A-E)/E performance of a state. A positive correlation means the performance of a state on two QOPMs is likely to be similar. A negative correlation means the performance of a state on two QOPMs is likely to be opposite.

Table 13 contains correlations between selected QOPMs.

Table 13: State QOPM performance (%(A-E)/E) correlations

QOPM	QOPM	Pearson Correlation
PPRs	PPCs	0.5933
	PPRED	-0.2452
	ED Adm	0.7422
PPCs	PPRED	-0.2520
Admissions from ED	ED Obs	0.1024
	ED Ancillary	0.1028
ED Observation	ED Ancillary	0.6596

As shown in Table 13, states with poor performance on PPCs are likely to have poor performance on PPRs (0.5933). States with good performance on PPRs are likely to have poor performance on PPREDs (-0.2452).

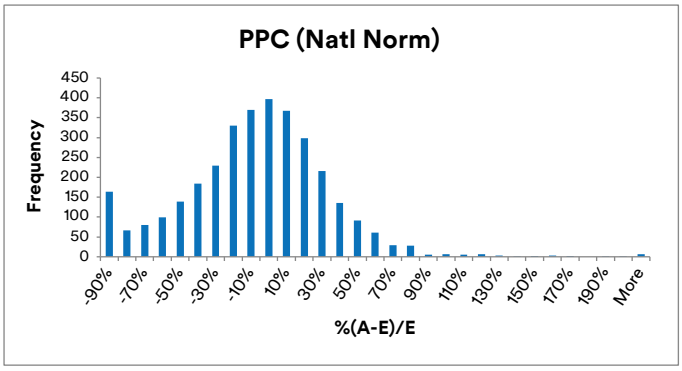
Variation in QOPM Performance by Type of Hospital

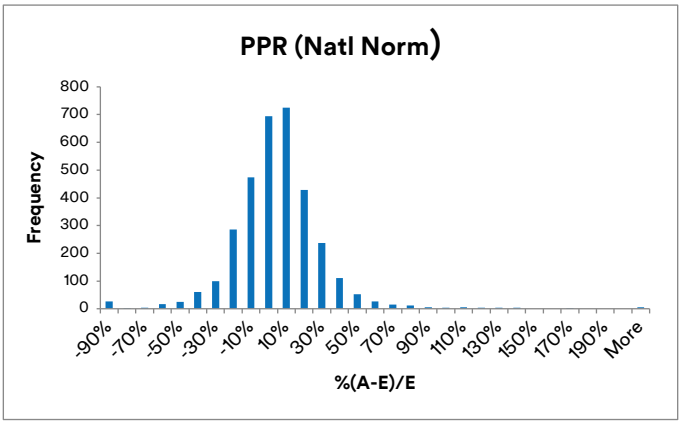
Figure 3 contains a histogram of the distribution of %(A-E)/E across hospitals for each QOPM. The horizontal axis of the histograms displays ranges of values in %(A-E)/E and the vertical axis shows the number of hospitals within each %(A-E)/E range. The histograms would be expected to follow a normal distribution around a central point (zero percent for national norms) with better performing hospitals (A<E) to the left of the central point and poorer performing hospitals (A>E) to the right of the central point.

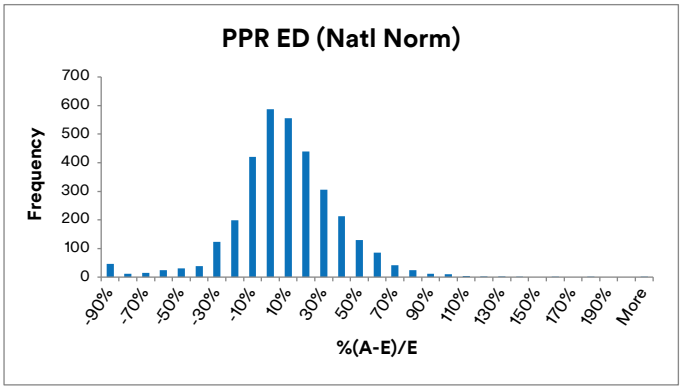
A histogram that is tightly clustered around the central point indicates that the QOPM performance across hospitals is relatively consistent and with limited variability, while a flatter distribution with a longer tail indicates greater variability in QOPM performance across hospitals. For example, the histograms for the QOPMs for ancillary utilization in the ED and the post-acute care facility admissions demonstrate positive kurtosis as they are tightly clustered around the central point, and therefore have less variability in performance across hospitals. Conversely, the QOPMs for OP complications, ED admissions, and ED observation services have elongated tails and are flatter than would generally be expected from a normal distribution, indicating much greater variability in hospital performance.

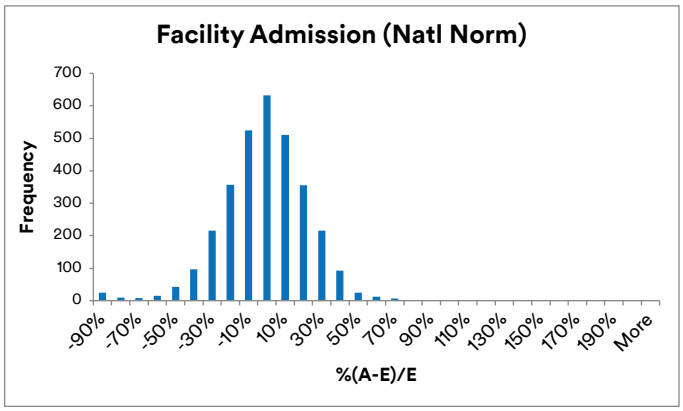
Ideally for the national norm, all QOPMs would have a hospital performance distribution centered around zero with no hospitals in either tail of the distribution (quality outliers). For each QOPM, Appendix F contains histograms of the distribution of %(A-E)/E across hospitals using the best practice norm and histograms of $(A-E) per at-risk admission or visit using the best practice norm.

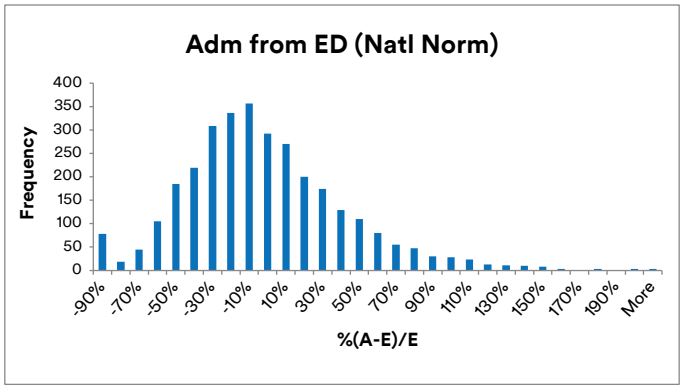
Figure 3: Histogram of %(A-E)/E by hospital with national norm

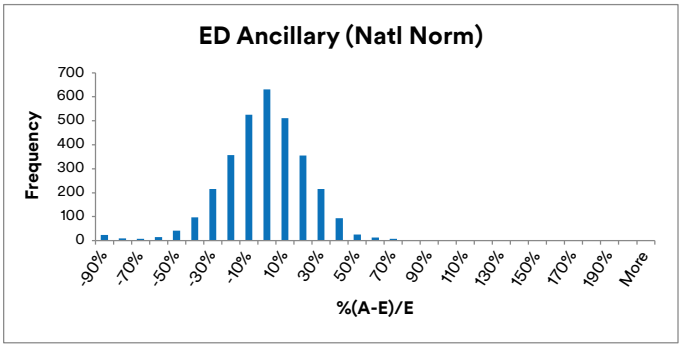


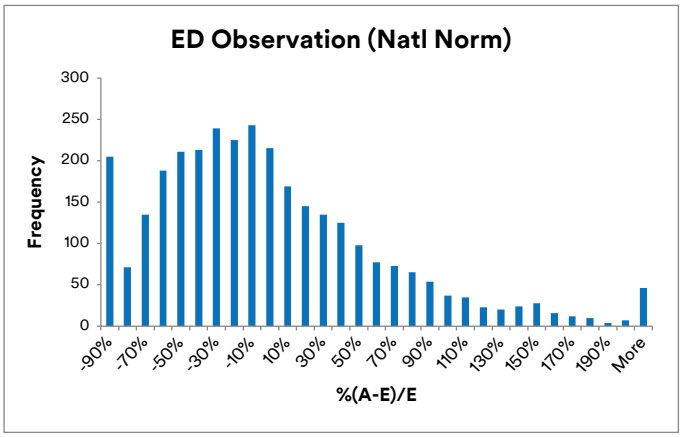


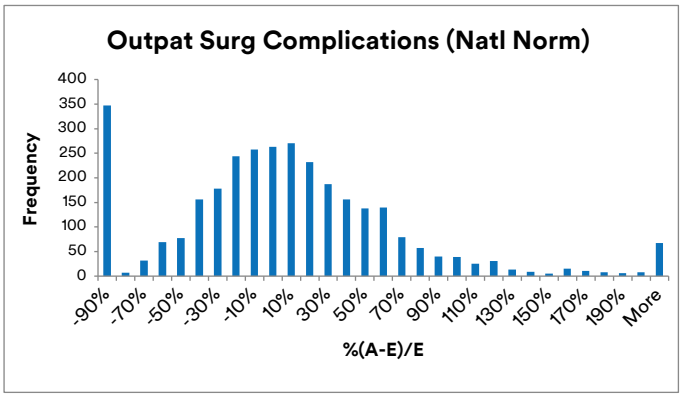












For the national norm, Table 14 contains the %(A-E)/E performance for categories of hospitals based on teaching status [IPPS IME], the IPPS DSH, location and size.

Table 14: %(A-E)/E by type of hospital for national norms

		Hosp	Hosp Adm	PPC	PPR	PPRED	PAC Adm	Adm ED	ED Obs	ED Anc	Out Surg
IME	Top 10%	333	1,939,596	12.0	5.5	-3.2	0.11	17.0	14.6	-1.1	1.6
	All Other	2,996	8,004,050	-3.5	-1.3	0.7	-0.56	-2.8	-2.4	0.2	-5.2
DSH	Top 20%	668	1,813,022	5.8	9.1	4.7	-4.00	4.4	-10.3	-7.2	6.7
	Middle 60%	1,996	6,789,676	-0.4	-1.4	0.3	0.54	-1.8	1.2	1.1	0.2
	Bottom 20%	665	1,340,948	-6.0	-5.1	-8.1	1.96	3.5	7.9	3.8	-8.2
Location	Large Urban	1,353	4,500,715	1.1	2.9	-3.7	3.33	11.4	8.6	3.9	0.4
	Other Urban	953	3,164,581	-2.1	-3.0	2.6	-4.35	-4.6	-6.8	-0.7	0.8
	Rural	1,023	2,278,350	0.8	-1.4	3.6	-0.28	-12.7	-5.0	-5.0	-1.7
Size	Top 10%	333	3,087,770	7.9	1.4	-4.5	1.56	13.6	16.1	6.8	0.9
	All Other	2,996	6,855,876	-4.5	-0.6	2.0	-4.08	-4.1	-4.7	-1.9	-1.8

As shown in Table 14

- Large high IME, DSH hospitals have higher than expected PPC rates
- Large urban, high IME hospitals have higher than expected admission through the ED and high rates of use of ED observation
- High DSH hospitals have lower than expected use of ED observation and ED ancillary services, but higher than expected admissions through the ED
- Rural hospitals generally perform consistent with expectations

Table 14 identifies performance differences that are not explained by the clinical condition of the patient. It is important to recognize the percentages in Table 14 are the percent difference from the QOPM expected value for at-risk patients and not the percent difference in total payments. QOPM risk adjustment controls for the clinical condition of the patient and not for socioeconomic factors like income level or hospital attributes like teaching status. If risk adjustment controlled for factors such as socioeconomic status, performance problems associated with the care given to some socioeconomic groups would essentially be hidden, making poor performance such as higher readmission rates acceptable for some socioeconomic groups.

Such problems need to be highlighted because broad community-wide actions may be needed to address them. In the context of hospital payment adjustments based on QOPM performance, additional payment adjustments for some socioeconomic factors or hospital characteristics (like IME and DSH in IPPS) may be necessary. However, it is important to maintain the QOPM performance problem identification separate from any additional payment adjustments. As a byproduct of such a separation, the payment impact of socioeconomic factors is explicitly quantified, potentially facilitating discussions on actions that can be taken to address the costs to the health care system associated with socioeconomic factors.

Appendix G contains the %(A-E)/E and $(A-E) for the best practice norm by type of hospital.

Payment Simulation

The $(A-E) was computed for the complication, readmission, return ED visits, PAC facility usuage and ED admits QOPM for each hospital. The $(A-E) was summed over all the QOPMs with the contribution of each QOPM constrained not to exceed three percent of total Medicare payments to the hospital as required by the HOA. The ratio (R(h)) of the sum of the $(A-E) across the QOPMs over total Medicare payments to the hospital was computed. The payment adjustment factor (PAF) for a hospital was determined as

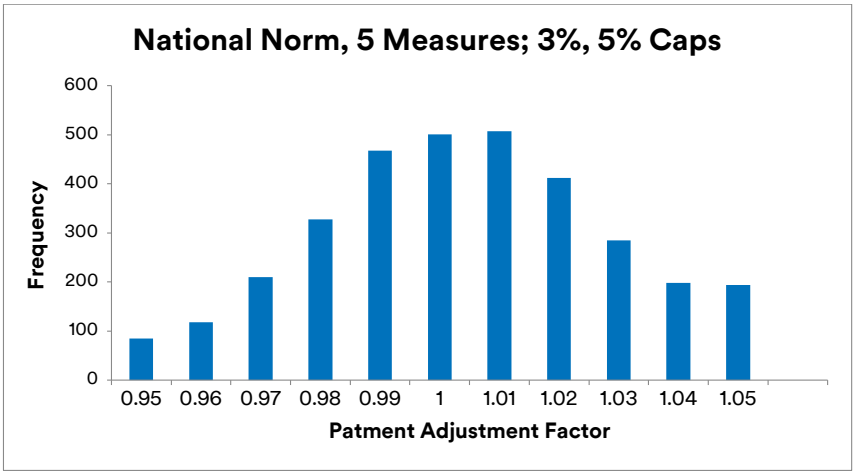
$$PAF(h) = 1.0 - R(h)$$

The payment adjustment factor for a hospital can be below 1.0 (poor performance) or above 1.0 (good performance). In a payment system like the one specified in the HOA, the standard applicable payments to a hospital would be multiplied by the payment adjustment factor, with a payment adjustment factor below 1.0 decreasing payments and a payment adjustment factor above 1.0 increasing payments.

To determine the net impact on Medicare payments, total payments to a hospital were multiplied by the payment adjustment factor and summed over all hospitals, with the constraint that no hospitals would have Medicare payments increased or decreased by more than three percent in total or three percent for any individual QOPM. The HOA also specifies that the total Medicare payment adjustment would be increased to five percent in subsequent years, so the five percent cap was also simulated. Using the national norm, the net impact on overall Medicare payments is approximately zero (good and poor performance offset each other) with a minor difference due to the constraints imposed by the HOA on the contribution from any single measure and the cap on the magnitude of payment penalties and bonuses. To the extent that the caps in the HOA made the HOA adjusted payments non-budget neutral, a budget neutrality factor was applied to ensure bonuses and penalties were equal. The details of these calculations are contained in Appendix H.

The HOA implementation, however, is not budget neutral because it requires that mandated savings being eliminated from the ACA program be maintained. This would be accomplished by reducing the the values in the norms used to compute the expected values so that penalties would exceed bonuses by an amount equal to the ACA mandated savings. To illustrate such a modification of the norm, an HOA simulation using the best practice norm was also done. Using the best practice norm, poor performance as measured by $(A-E) will exceed good performance, yielding a net payment reduction (not budget neutral). Using the best practice norm determines the actual Medicare payment reduction that could be achieved if hospitals attained the best practice standards in the context of an HOA payment system design. Because hospital admissions through the ED is a quality measure that is similar to the four quality measures in the HOA, it was included in the payment simulations.

Figure 4: HOA payment adjustment factor for five measures with 3% individual QOPM cap and 5% total cap for national and best practice norms



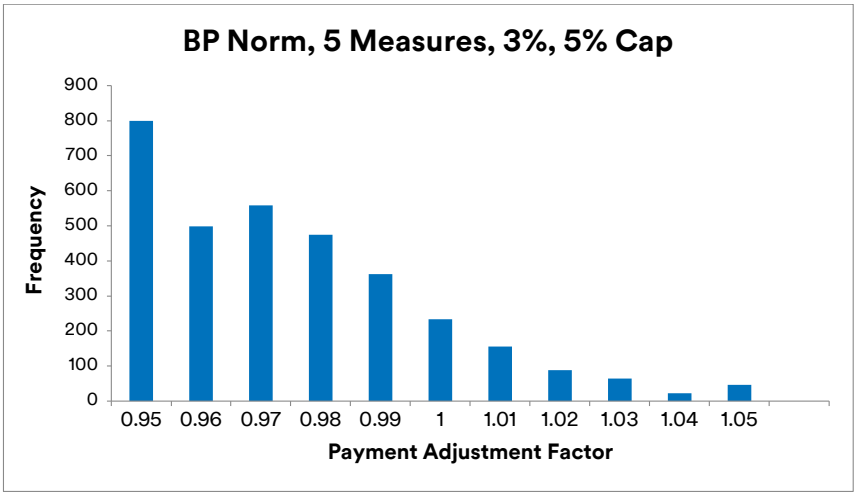


Figure 4 contains a histogram of the distribution of hospitals by the HOA payment adjustment factor with the five QOPMs, a three percent individual QOPM cap and a five percent overall cap for the national and best practice norm. For the national norm the distribution is a normal type distribution centered at 1.0. For the best practice norm the distribution has a substantial number of hospitals hitting the five percent low-end cap.

Table 15: Bonuses and penalties by HOA payment system configurations

			Cnt	QOPM	Cap	Cnt	TotCap	Hosps	With	Pay	Impact	$M
Total Cap	Budget Neutral	Norm	Upper Bonus	Lower Penalty	Both	Upper Bonus	Lower Penalty	Bonus	Penalty	Bonus	Penalty	Net
3%	Yes	Nation	1,013	554	209	1,001	485	1,964	1,340	1,137.6	-1,137.6	$0
5%	Yes	Nation	1,013	554	209	475	176	1,964	1,340	1,361.8	-1,361.8	$0
3%	No	BP	335	1,391	154	174	2,018	561	2,743	80.8	-3,268.5	-3,187.7
5%	No	BP	335	1,391	154	70	1,355	561	2,743	89.6	-4,692.2	-4,602.5

Table 15 contains the HOA payment simulation results for different cap percentages and norms. Even though the national norm is budget neutral, the number of hospitals with a penalty exceed the number of hospitals with a bonus. As expected, with the best practice norm the number of hospitals with a penalty is much higher than the number of hospitals with a bonus. With the best practice norm, many hospital have the lower penalty cap for individual QOPMs and total payment cap invoked. With a five percent total cap and the best practice norm, penalties would exceed bonuses by $4.6 billion per year. From Table 10, the $(A-E) for best practice for the five QOPMs was 6.1 billion per year. Thus, the individual QOPM cap and total cap in the HOA reduced the annual payment penalties by 1.5 billion.

Discussion

The potential Medicare savings discussed in this report assume that payment incentives based on QOPMs or public reporting based on QOPMs will provide hospitals with the financial incentive and information necessary to successfully implement substantive quality improvement efforts that would ultimately lead to lower Medicare payments. The basis of the estimated level of potential savings assumes that hospitals on average will be able to achieve QOPM performance levels consistent with the current best practice hospitals. The experience of multiple state Medicaid agencies supports that such performances levels are achieveable. In particular, the all-payer projects in Maryland (PPCs) and Minnesota (PPRs) have resulted in those states being at or below the best practice standard.

As previously noted, the Medicare savings estimate is conservative because it is based solely on the (A-E) difference. Thus, the underlying rate of QOPMs as measured by E is accepted as a baseline level of underlying quality performance and only the (A-E) difference is viewed as the basis for potential savings. In addition, the savings are net savings because the financial benefit of good QOPM performance is allowed to offset the financial impact of poor QOPM performance. As was learned in the implementation of the budget neutral DRG based IPPS, the implementation of payment reforms with financial incentives that are clinically credible can result in substantive and sustainable hospital performance improvements.

Except for PPCs, the savings associated with $(A-E) are direct savings to Medicare (e.g., a reduction in readmissions directly reduces Medicare payments). Since Medicare pays hospitals based on MS-DRGs, lower rates of PPCs do not necessarily lead to MS-DRG assignments that result in lower payments. While some patients will have lower MS-DRG payments due to fewer PPCs, that number will be relatively small. The real benefits from lower rates of PPCs are the cost savings that result from providing hospital care to patients who do not develop an in-hospital complication, and the improved patient experience. From the Medicare Provider Reimbursement Manual:

> Implicit in the intention that actual costs be paid to the extent they are reasonable is the expectation that the provider seeks to minimize its costs and that its actual costs do not exceed what a prudent and cost-conscious buyer pays for a given item or service… If costs are determined to exceed the level that such buyers incur, in the absence of clear evidence that the higher costs were unavoidable, the excess costs are not reimbursable under the program.[40]

As a basic principle, Medicare seeks to pay hospitals for costs that are necessary and not reimburse hospitals for excess costs that are avoidable. The financial impact of PPCs has been included in the overall analysis of potential Medicare savings if best practice is achieved. Ultimately, lower rates of PPCs will lower hospital costs and lower the magnitude of future inflation adjustments to Medicare hospital payments.

The QOPMs encompass aspects of care in the ED and in hospital-based outpatient surgery departments. As care increasingly shifts from the inpatient setting to an outpatient setting, any evaluation of the quality performance of hospitals needs to encompass both inpatient and outpatient care. Post-acute care represents a critical transition period for patients that can be impacted by poor coordination of services at the time of discharge, such as incomplete discharge planning or inadequate arrangements for access to care during the post-acute care period. While some payment systems such as the Medicare Hospital Value-Based Purchasing Program have included total post-acute care expenditures as a performance measure, such a broad measure provides little actionable information. Savings accruing to accountable care organizations under the shared savings program have originated primarily reductions in post-acute facility admission.The QOPMs for readmissions, return ED visits and post-acute admission to facility provide a more precise and actionable description of performance issues during the post-acute care period.

Performance for the QOPMs that encompass a PAC period of time may be impacted by socioeconomic factors associated with the patients being served. When reporting outcomes measures affected by characteristics of the patients served it is anticipated that person level adjustments would be made to results that fairly account for the effects of socioeconomic factors impacting the measurement of relative performance. Adjustments would be independent of the clinical model so as to promote transparency. Additionally, in IPPS the role of the hospital (teaching) and the non-clinical characteristics of the population being served were recognized by the Medicare Indirect Medical Education (IME) and Medicaid Disproportionate Share Hospital (DSH) payment adjustments to the base MS-DRG payment amounts. In order to maintain these payment adjustments for the role of the hospital and the non-clinical characteristics of the population being served, the QOPM payment adjustment factor is intended to only be applied to the base MS-DRG payment amount in keeping with the provisions of the HOA and the existing value-based purchasing (VBP) regulations.[41] The payment simulation in this report applied the QOPM payment adjustment factor payment to the total IPPS payment because the IME and DSH payment adjustments for each patient were not available. In the HOA payment simulation, if the QOPM payment adjustment was applied to the base MS-DRG payment amount, the payment impact report in the HOA simulation would likely be slightly lower.

One approach to adjustments for socioeconomic factors is to replicate the approach taken by the 20th Century Cures Act. The HOA suggests hospital peer groups could be used to adjust for performance difference that may be associated with the characteristics of the population being served. There are significant problems with the use of peer groups[42] and separate person-centric adjustments are preferable approaches to addressing variations in outcomes resulting from variability in the socioeconomic status of enrollees. Performance for the QOPMs that encompass a PAC period of time are most reasonably considered to be those impacted by patient level socioeconomic factors in the communities being served. Developing person-centric adjustments for socioeconomic status with application to individual QOPMs, while recognized as potentially necessary, are beyond the scope of this report.

The QOPMs used in this report place much emphasis on requiring that QOPMs be limited to the clinical circumstances under which there is a reasonable expectation that the QOPM was potentially preventable and amenable to quality improvement efforts. For example, 37.2 percent of readmissions were found not to be potentially preventable and excluded in the evaluation of the readmission performance of hospitals. It is counter-productive for achieving behavior change if quality outcomes over which the organization has no control are included in the performance evaluation of a hospital.

The 3M™ Performance Matrix, a data analytics and performance management solution[43] was used to produce the analysis for this report. 3M Performance Matrix automates the creation of the norms, assignment of the QOPMs, determination of QOPM risk adjustment performance differences and quantifying the financial impact of QOPM performance differences. It also can perform in-depth analysis to identify root cause of QOPM performance differences (e.g., identifying that poor readmission performance is associated with patients discharged with an unusually short length of stay or discharged to certain SNFs that have a high readmission rate).

Conclusion

The QOPMs are practical inpatient and outpatient hospital quality measures with a substantial financial impact. The variability in QOPM performance across hospitals demonstrates there are significant opportunities for hospital quality improvement. Because the QOPMs apply only to patients for whom the QOPM is potentially preventable and amenable to quality improvement efforts, the performance improvements needed to meet best practice standards should be more readily achievable as demonstrated by multiple state QOPM-based quality payment reforms. The design of the QOPMs and associated methods of risk adjustment will allow QOPM-based payment adjustments to be integrated into IPPS type payment systems. While this report focused on Medicare patients, the QOPMs are applicable to other federal programs including Medicaid, Medicare Advantage and the Veterans Administration as well as commercial payers, thereby providing the foundation for a uniform and consistent approach to hospital quality assessment and payment.

The variability in QOPM performance across hospitals demonstrates that there are substantial opportunities for hospital quality improvement.

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Appendix A: Bibliography of Publicly Available Articles and Reports

PPCs, PPRs, APR DRGs, EAPGs, CRGs

All articles and reports are publicly available and are listed in chronological order. The opinions and conclusions in these articles and reports are solely those of the authors.

Potentially Preventable Complications (PPCs)

Articles, Reports, and Book Chapters

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Overview of the 3M patient classification methodologies, with a link to a separate PPC sub-page.

New York Department of Health
https://health.data.ny.gov/
Consumer information website with charts and data sets showing PPC performance by hospital for multiple years

Texas Department of State Health Services
https://www.dshs.texas.gov/thcic/hospitals/Potentially-Preventable-Complications-Reports/
Reports on statewide all-payer PPC incidence

Texas Health and Human Services Commission
www.thlcportal.com
Interactive webpage on PPC performance by hospital, by service delivery plan, and by managed care plan, with data for multiple years

Potentially Preventable Readmissions (PPRs)

Articles, Reports, and Book Chapters

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Ohio Department of Medicaid
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Texas Department of State Health Services
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California Department of Health Care Services
https://www.dhcs.ca.gov/provgovpart/Pages/DRG.aspx
Information, including pricing calculator, about the California Medicaid inpatient payment method (based on APR DRGs)

Florida Agency for Health Care Administration
www.floridahealthfinder.gov
Consumer information website showing utilization, charges and risk-adjusted mortality by hospital by APR DRG

Illinois Department of Healthcare and Family Services
www.illinois.gov/hfs/MedicalProviders/MedicaidReimbursement/Pages/DRGHICalcuWorksheet.aspx
Information, including pricing calculator, about the Illinois Medicaid inpatient payment method (based on APR DRGs)

Mississippi Division of Medicaid
https://medicaid.ms.gov/providers/reimbursement/
Information, including pricing calculator, about the Mississippi Medicaid inpatient payment method (based on APR DRGs)
New York Department of Health

https://www.health.ny.gov/facilities/hospital/reimbursement/apr-drg/
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New York Department of Health
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Consumer information website with charts and data sets showing utilization, charges, and costs by hospital by APR DRG

Enhanced Ambulatory Patient Groups (EAPGs)

Articles, Reports, and Book Chapters

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Websites

3M Health Information Systems
www.3m.com/his/methodologies
Overview of the 3M patient classification methodologies, with a link to a separate EAPG sub-page.

District of Columbia Department of Health Care Finance
www.dc-medicaid.com/dcwebportal/providerSpecificInformation/providerInformation
Information about the D.C. Medicaid outpatient payment method (based on EAPGs)

New York Department of Health
https://www.health.ny.gov/health_care/medicaid/rates/apg/index.htm
Information about the New York Medicaid outpatient payment method (based on EAPGs)

Florida Agency for Health Care Administration
www.floridahealthfinder.gov
Consumer information website showing utilization and charges by hospital by EAPG

Florida Agency for Health Care Administration
http://www.ahca.myflorida.com/medicaid/Finance/finance/institutional/hoppps.shtml
Information, including pricing calculator, about the Florida Medicaid outpatient payment method (based on EAPGs)

Clinical Risk Groups (CRGs)

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Appendix B: Specifications for Quality Outcome Performance Measures (QOPMs)

QOPM Methodologies

- **QOPM for Potentially Preventable Complications (PPCs)**

  https://apps.3mhis.com/docs/Groupers/PPCs/methodology_overview/grp381_ppc_def_methovr_v37.pdf

- **QOPMs for PotentiallyPreventable Readmissions (PPRs) and Potentially Preventable Return Emergency Department Visits (PPREDs) QOPMs**

  https://multimedia.3m.com/mws/media/1684594O/3m-potentially-preventable-readmissions-methodology-overview.pdf

- **QOPM for Admission to a Skilled Nursing Facility (SNF) or Rehabilitation Facility within 5 Days of Hospital Discharge QOPM**

  For admission to a SNF or Rehabilitation Facility within 5 days of hospital discharge, at-risk admissions are identified using population-focused episodes (PFE) and Clinical Risk Groups (CRGs) and linked to subsequent facility utilization.

  Discharges with a return hospitalization within 30 days or in which the patient died are excluded. Assignment to the QOPM is based upon the first facility encounter (SNF or Rehab) in the 5-day window post discharge. For each at-risk-PFE episode, the denominator is the number of eligible (at risk) patients within each PFE. The numerator is the number of patients admitted to a SNF or Rehabilitation facility within the 5 day window. Only those PFE episodes with have at least 100 discharges and that have a range of facility admission between 20% and 80% (i.e. typically exhibit alternative practice patterns) are included.

- **QOPM for Hospital Admissions from Emergency Department**

  For hospital admissions from Emergency Department, we assign an APR DRG and SOI to all emergency department encounters and hospital admissions. An overview of the APR DRG methodology is given at the link below. We exclude patients that died, were admitted for surgical procedures or were admitted for an array of conditions that are considered high risk/severity medical encounters (e.g. SOI levels of 3 and 4 or AMI encounters) or those extensively covered by medical necessity considerations (e.g. behavioral health). For the eligible ED visits the denominator is the sum of inpatient admissions from the ED and ED encounters (without admission) within a base APR DRG. The numerator for the measure is the ED encounters that were admitted within a base APR DRG.

- **QOPM for Emergency Department Utilization of Observation Services**

  For Emergency Department Utilization of Observation Services, all emergency department encounters and hospital admissions were assigned an APR DRG and SOI. An overview of the APR DRG methodology is given at the link below. We exclude patients that died, were admitted for surgical procedures or were admitted for an array of conditions that are considered high risk / severity medical encounters (e.g. SOI levels of 3 and 4 or AMI encounters) or those extensively covered by medical necessity considerations (e.g. behavioral health). For the eligible encounters the denominator is the sum of inpatient admissions from the ED and ED encounters (without admission) within a base APR DRG. The numerator for the measure is the sum ED encounters (without admission) with a minimum of 8 hours observation services within a base APR DRG.

- **QOPM for Emergency Department Ancillary Service Utilization**

  For Emergency Department Utilization of Ancillary Services all emergency department encounters are assigned an APR DRG and SOI. An overview of the APR DRG methodology is given at the link below. We exclude patients that died, were admitted, whose encounter indicated a condition considered high risk / severity medical encounters (e.g. SOI levels of 3 and 4 or AMI encounters) or those extensively covered by medical necessity considerations (e.g. behavioral health). For the eligible encounters the denominator is the sum of ED encounters (without admission) within a base APR DRG. The numerator for the measure is the sum of weighted ancillary services considered "significant" identified by Enhanced Ambulatory Patient Groups (EAPG). The types of ancillary service can be broadly categorized as radiology, laboratory and infused drugs. Each service is assigned its own weight and summed within the base APR DRG category. Details of the EAPG logic can be found at the link below.

- **QOPM for Hospital Admission or Emergency Department Visit for Complications of Outpatient Surgery within 30 days**

  For Hospital Admission or Emergency Department (ED) Visit for Complications of Outpatient Surgery within 30 days we assign each outpatient surgical encounter to a single surgical EAPG. Details of the EAPG logic can be found under Risk Adjustment Methodologies below.

  For a subset of surgical EAPGs, the denominator is the number of surgeries performed in the outpatient setting. For each surgery we review the subsequent 30-day period and:
  - If a surgery results in a subsequent hospital admission; and
  - The admission is flagged as having a specified PPC at the time of admission; then
  - The admission is counted in the numerator of the hospital admission following outpatient surgery QOPM

  For each surgery we review the subsequent 30-day period and:

  - If a surgery results in a subsequent ED encounter (without admission); and
  - The ED encounter is flagged as having a specified PPC; then
  - The encounter is counted in the numerator of the ED visit following outpatient surgery QOPM

Details of the PPC logic (PPC list) is given at the link below.

Risk Adjustment Methodologies

- **All Patient Refined Diagnosis Related Groups (APR DRGs)**

  https://apps.3mhis.com/docs/Groupers/All_Patient_Refined_DRG/Methodology_overview_GRP041/grp041_aprdrg_meth_overview_v37.pdf

- **Enhanced Ambulatory Patient Groups (EAPGs)**

  https://apps.3mhis.com/docs/Groupers/Enhanced_Ambulatory_Patient_Grouping_EAPGS/methodology_overview/grp403_eapg_meth_overview.pdf

- **Clinical Risk Groups (CRGs)**

  https://apps.3mhis.com/docs/Groupers/Clinical_Risk_Grouping_CRG/methodology_overview/grp401_crg_v2.1_meth_overview_Feb2019.pdf

Appendix C: Determination of Financial Conversion Factors

The eight QOPMs are measured in terms of risk-adjusted rates with expected frequencies. Six of the measures—PPR; PPR ED; OP Complications; ED Admissions to Observation; ED Admissions to Inpatient; PAC Facility Admission—are measured as rates of discrete binary events: They happened or not (Y/N).

Two of the measures—PPC; ED Ancillary Use—are composites of weighted events that represent underlying intensity of variable services or outcomes. Put simply, where a patient can have one event (e.g. a readmission) it is treated as a rate. Where a patient has a variable amount (e.g. multiple complications of care during an inpatient admission or an array of ancillary services in the ED) individual qualifying outcomes and services are weighted and summed.

Whether weighted or event based the QOPM is converted into relative dollars using a standardized conversion factor. The conversion factor is constructed based upon the estimated payment made for the event (or in the case of PPCs the estimated cost of the event). A summary of the measures and an overview of the conversion factor creation is given below.

Summary of QOPM Financial Conversion Factors

Measure Description	Base Conversion Rate ($)	Weight Adjusted
PPR	12,196	NO
OP Comp IP	12,196	NO
PPC	12,196	YES
PPR ED	693	NO
OP Comp ED	693	NO
ED Admission to OBS	1,939	NO
ED Ancillary Use	705	YES
ED Admission to Inpatient	3,233	NO
PAC Facility Admission	6,880	NO

PPR: Readmission chains are converted to estimated dollars using the calculated average payment per weighted admission. Each admission is classified to an APR DRG / SOI and assigned a relative weight derived from an exogenous data set. The APR DRG weights are published annually and available upon request. Total allowed amounts for all claims are divided by the sum of the relative weights for all claims to yield a conversion rate of $12,196, the anticipated total payment for the average admission.

PPR ED: ED encounters subsequent to prior admissions are converted to estimated dollars using the calculated average payment per ED encounter. The sum of allowed amounts for ED encounters is divided by the number of ED encounters to derive a simple mean estimated amount of $693.

Outpatient Complications: Outpatient Complications that result in an inpatient admission are assigned the conversion rate of $12,196, the anticipated total payment for the average admission, as with PPR. Outpatient Complications that result in an ED encounter are assigned the conversion rate of $693, the anticipated average payment for an ED encounter as with PPR ED.

Outpatient complication event rates are calculated for IP and ED events separately, converted to dollars using their respective conversion factors and subsequently summed to single total.

ED Admission to Observation: ED admissions are differentiated between those with and those without observation. The average total allowed amount for those without observation is deducted from the average total allowed amount for those with observation yielding a $1,939 incremental payment of observation for the ED encounter.

ED Admission to Inpatient: To estimate the incremental payment for an inpatient admission from the ED the average anticipated payment of low severity cases that are admitted was computed and as an offset to the average payment for the most likely alternative (an ED encounter with observation) was deducted. Summing the relative weights for the cases that are eligible within the ED admission measure we determine the average weight for low severity cases (0.4663) which is then converted to dollars using the average payment rate for cases with a relative weight of 1.0 ($12,196) to give an estimated low severity case payment of $5,687. The payment for an ED case with observation is estimated as $2,453 giving an anticipated incremental payment of inpatient admission of $3,233.

PAC Facility Admission: The incremental payment for a PAC facility admission is calculated as the average difference between the payment fora PAC facility admission (limited to 30 days) and a similar case treated at home with/without home health support (limited to 30 days). PAC episodes are standardized by using Patient Focused Episodes (PFE) software to match similar case types for which the weighted average of payment differences is computed. After matching case types the average payment difference for a facility based episode compared to a home based episode is $6,880 for the 30 day service window.

PPC: Individual complications of care are assigned weights based upon their relative costliness imputed from regression-based analysis of the additional cost of complications that develop after admission. The assigned weights are developed on an exogenous data set and established to be of similar scale to the APR DRG weights used in developing the PPR conversion factor. PPC cost is therefore estimated by multiplying the sum of PPC weights by $12,196, the anticipated total payment for the average admission with a relative weight of 1.0. The PPC weights are published annually and available upon request.

ED Ancillary: ED Ancillary services are classified using Enhanced Ambulatory Patient Groups (EAPG) and assigned a standardized weight for the individual service. Weights for EAPGs were derived exogenously from OPPS data for CY 2017. The conversion factor for the weights is established at $705. The EAPG weights are published annually and available upon request.

Appendix D:

%(A-E)/E for the National Norm for each State

			Inpatient Measures			Outpatient Measures				
State	Count Of Hospital	Sum Of Discharges	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Alabama	84	191,576	8.8	3.2	-4.6	-5.7	2.0	-30.1	-7.5	6.3
Alaska	8	13,562	0.3	-20.7	27.3	-75.6	-47.7	-70.9	-20.9	1.8
Arizona	63	163,729	-3.2	-11.4	5.0	-25.6	-29.1	58.2	12.6	-1.6
Arkansas	45	122,294	-4.8	3.7	5.7	-17.6	-7.7	18.2	-3.5	5.4
California	297	769,090	-4.8	1.8	3.9	3.5	-4.3	-36.1	-7.3	1.8
Colorado	45	109,204	-10.5	-19.4	7.6	-5.0	-29.3	-11.0	0.0	9.3
Connecticut	30	126,390	12.3	2.5	3.1	39.7	5.8	14.1	-8.0	-23.0
Delaware	6	42,835	12.9	-2.2	1.6	-8.4	5.6	4.4	10.1	7.7
District of Columbia	7	36,117	42.1	13.9	7.1	0.3	3.3	-12.7	-20.9	-7.5
Florida	168	761,456	-2.8	8.5	-8.5	5.1	36.3	37.1	14.1	12.0
Georgia	101	274,277	6.2	1.9	8.6	-18.6	-12.9	-13.4	-1.3	-3.6
Hawaii	12	21,769	4.3	-14.8	18.4	-14.6	-33.0	-34.2	-10.1	2.6
Idaho	14	34,953	-13.0	-25.7	2.4	-11.6	-35.4	-64.9	-12.9	11.9
Illinois	125	435,565	5.0	4.2	-7.7	14.6	8.9	54.9	6.6	4.5
Indiana	85	242,140	-1.3	-7.5	0.6	10.9	-10.8	2.8	2.5	0.2
Iowa	34	100,903	6.2	-9.3	-4.3	2.7	-9.3	-14.8	-12.5	-19.6
Kansas	51	103,256	-18.7	-8.8	-7.5	1.3	-3.2	-9.4	-2.9	0.2
Kentucky	64	186,566	1.8	6.2	10.7	-1.1	-13.8	-12.0	3.6	-0.4
Louisiana	90	157,068	-0.8	3.8	16.5	-31.4	-12.5	-5.6	-13.7	-6.2
Maine	17	45,328	1.3	-16.1	14.2	-1.1	-26.5	-34.6	-23.0	-6.2
Maryland	47	238,725	-26.8	-2.0	-2.7	4.8	0.1	52.0	8.7	-0.8
Massachusetts	56	281,749	4.6	5.7	0.2	17.0	20.0	43.8	-0.6	-6.6
Michigan	94	375,028	-0.1	1.4	0.0	-0.4	4.9	15.0	-2.2	6.6
Minnesota	50	176,977	-1.1	-12.6	-6.3	5.6	-18.2	-8.4	-3.0	-2.4
Mississippi	60	132,717	4.5	6.7	8.8	-8.4	-10.8	2.3	-3.3	1.0
Missouri	72	237,724	-0.6	0.7	0.2	-7.5	-7.9	11.9	1.6	18.9
Montana	14	30,211	-10.4	-23.4	-9.9	-13.3	-27.4	-13.8	-10.9	9.9
Nebraska	23	65,574	-5.4	-15.2	-23.7	12.5	-1.3	-9.4	1.8	-8.9
Nevada	22	79,048	-2.5	10.3	0.5	-23.0	18.0	22.7	11.7	28.7
New Hampshire	13	50,201	5.7	-5.8	1.8	0.2	-3.7	19.1	0.3	-27.6
New Jersey	64	318,746	1.7	4.6	-12.6	34.4	24.5	37.6	7.2	3.5
New Mexico	30	45,364	3.4	-8.8	11.0	-24.6	-32.2	-27.6	1.3	-6.0
New York	149	561,058	14.1	8.3	-11.3	10.7	40.3	-26.6	-1.7	-13.9
North Carolina	85	332,563	5.7	-4.3	9.1	-5.7	-24.6	-13.3	-3.3	0.3
North Dakota	8	30,196	5.1	-17.0	-11.5	-4.8	-12.9	8.9	-4.9	-9.1
Ohio	130	389,624	0.6	0.3	1.4	9.1	-7.1	19.3	2.6	-2.9
Oklahoma	84	146,725	-1.5	-1.5	13.0	-17.4	-20.8	-22.8	-8.9	12.3
Oregon	34	80,088	-5.9	-18.5	14.1	-18.7	-30.0	-32.3	-15.1	5.7
Pennsylvania	150	443,701	-2.6	0.4	-10.5	3.0	20.6	20.3	6.2	-0.9
Rhode Island	11	32,453	13.1	2.7	-5.1	24.2	16.2	-15.8	-0.5	15.0
South Carolina	54	172,271	-1.3	-1.6	12.6	-12.9	-16.1	-22.2	-4.3	-9.9
South Dakota	20	36,711	-7.8	-18.7	-22.6	-1.8	-2.7	9.7	0.2	-2.1
Tennessee	90	253,392	0.7	2.3	5.2	-2.2	-5.8	-3.2	3.3	-1.9
Texas	309	689,785	-5.3	1.9	0.0	-13.9	-1.5	-3.1	3.4	11.7
Utah	31	50,506	-20.8	-26.2	1.2	6.0	-32.3	-74.9	9.3	-1.4
Vermont	6	18,046	-11.1	-8.1	12.7	4.1	-15.4	-44.3	-20.1	-44.0
Virginia	74	287,591	-1.1	-1.9	8.9	-7.9	-15.3	-23.3	-2.5	-1.8
Washington	48	174,665	4.9	-15.3	10.3	-9.4	-30.4	-47.2	-7.2	-6.7
West Virginia	29	82,912	7.1	3.6	12.9	-28.8	-12.4	24.6	7.5	2.7
Wisconsin	66	152,351	-2.4	-10.7	4.5	-0.9	-19.4	-9.6	-9.2	-4.5
Wyoming	10	13,107	-18.9	-16.9	7.9	-7.4	-24.2	15.2	4.2	-32.6

Appendix D:

$(A-E) for the Best Practice Norm for each State in millions (000,000)

			Inpatient Measures			Outpatient Measures				
State	Count Of Hospital	Sum Of Discharges	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Alabama	84	191,576	42.5	32.7	1.2	11.9	45.0	12.7	5.2	2.6
Alaska	8	13,562	2.5	-0.9	0.3	-2.9	-1.3	-0.9	-0.1	0.1
Arizona	63	163,729	25.3	4.1	1.7	-1.7	6.6	48.3	14.0	1.4
Arkansas	45	122,294	16.8	21.3	1.4	2.2	21.0	22.8	4.4	1.5
California	297	769,090	103.2	120.4	7.8	81.3	149.3	38.4	21.6	6.9
Colorado	45	109,204	11.5	-6.2	1.3	8.3	3.7	12.9	5.5	1.5
Connecticut	30	126,390	29.5	21.0	1.3	33.5	33.3	21.5	3.5	1.0
Delaware	6	42,835	10.9	5.1	0.4	2.3	11.3	7.2	3.0	0.7
District of Columbia	7	36,117	20.0	9.6	0.4	2.4	7.3	3.2	-0.1	0.4
Florida	168	761,456	110.5	170.5	3.4	74.1	321.9	148.2	48.5	8.2
Georgia	101	274,277	57.2	44.0	3.5	4.3	41.5	31.6	12.0	2.6
Hawaii	12	21,769	4.2	-0.2	0.4	0.7	0.3	1.4	0.6	0.2
Idaho	14	34,953	3.0	-4.3	0.3	1.8	-0.1	-1.2	0.6	0.5
Illinois	125	435,565	84.3	79.5	2.1	65.2	111.9	100.4	22.5	5.8
Indiana	85	242,140	39.0	16.2	2.2	33.5	35.5	35.4	12.1	3.0
Iowa	34	100,903	20.0	4.7	0.7	11.0	14.3	9.9	1.4	0.9
Kansas	51	103,256	5.0	5.4	0.5	10.2	16.8	10.4	3.5	1.4
Kentucky	64	186,566	33.1	38.6	2.6	15.7	26.6	22.2	10.2	1.8
Louisiana	90	157,068	26.3	28.5	2.6	-4.6	26.5	22.4	2.2	1.6
Maine	17	45,328	8.3	-1.0	0.7	4.3	2.6	2.8	-0.5	0.4
Maryland	47	238,725	-1.0	26.1	1.6	25.5	52.7	59.4	14.3	2.7
Massachusetts	56	281,749	52.0	54.9	2.4	42.3	92.3	61.8	11.6	3.3
Michigan	94	375,028	64.1	60.2	3.2	34.1	90.1	64.2	13.5	5.0
Minnesota	50	176,977	30.8	2.3	1.0	21.9	15.2	18.9	5.8	1.9
Mississippi	60	132,717	24.4	27.6	1.7	7.1	24.1	22.2	5.5	1.0
Missouri	72	237,724	39.8	36.0	2.1	13.9	37.4	36.6	10.6	3.5
Montana	14	30,211	3.2	-3.0	0.1	1.3	1.2	2.9	0.5	0.4
Nebraska	23	65,574	9.2	-0.9	-0.2	9.5	8.9	5.6	2.3	0.7
Nevada	22	79,048	12.0	19.1	0.7	0.0	23.2	13.0	4.6	0.9
New Hampshire	13	50,201	10.6	4.1	0.5	4.8	10.1	9.3	2.4	0.2
New Jersey	64	318,746	56.5	58.2	0.7	67.2	117.2	64.9	16.9	2.7
New Mexico	30	45,364	8.5	2.4	0.6	-0.3	0.9	3.8	2.8	0.5
New York	149	561,058	142.4	119.4	1.6	67.7	231.5	35.2	17.4	3.8
North Carolina	85	332,563	68.8	33.6	4.3	24.3	24.6	41.3	14.4	3.3
North Dakota	8	30,196	6.8	-1.0	0.1	2.5	2.8	3.4	0.7	0.4
Ohio	130	389,624	70.1	57.7	3.6	49.8	68.5	70.8	19.8	4.7
Oklahoma	84	146,725	23.9	18.8	2.2	3.2	14.4	13.8	3.8	2.2
Oregon	34	80,088	11.3	-3.8	1.2	1.5	2.6	5.2	0.8	1.0
Pennsylvania	150	443,701	66.5	63.7	1.5	41.5	137.5	70.2	22.0	5.2
Rhode Island	11	32,453	7.2	5.5	0.2	6.1	10.4	3.2	1.3	0.5
South Carolina	54	172,271	27.1	21.4	2.5	6.4	22.7	16.4	6.9	1.3
South Dakota	20	36,711	4.4	-1.7	-0.1	3.3	4.6	4.0	1.0	0.5
Tennessee	90	253,392	44.6	42.0	2.8	20.3	45.7	32.6	12.4	2.3
Texas	309	689,785	94.3	110.7	5.9	21.6	150.0	91.1	34.5	7.7
Utah	31	50,506	1.8	-6.4	0.4	5.7	0.8	-3.1	3.6	0.5
Vermont	6	18,046	1.6	1.1	0.3	2.1	2.6	0.6	0.0	-0.1
Virginia	74	287,591	45.2	35.2	3.7	17.6	38.6	25.9	12.0	3.1
Washington	48	174,665	35.8	-2.7	2.3	10.5	5.2	3.5	5.3	1.9
West Virginia	29	82,912	17.7	15.0	1.2	-1.8	12.6	17.4	5.4	1.1
Wisconsin	66	152,351	23.8	5.0	1.6	14.6	14.5	18.2	3.8	2.2
Wyoming	10	13,107	0.6	-0.4	0.2	0.9	1.0	2.7	0.9	0.0

Appendix E

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				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Birmingham-Hoover, AL	AL	26	82429	14.995	2.762	-7.179	-9.904	1.649	-32.349	-4.642	12.087
Huntsville, AL	AL	4	26406	11.602	2.294	-3.474	5.944	1.530	-21.730	20.378	-2.485
Mobile, AL	AL	4	17139	31.689	10.623	-16.379	-8.014	47.800	-31.350	-1.531	7.224
Montgomery, AL	AL	6	9505	-4.886	3.475	0.485	-20.518	-0.154	1.792	2.638	-1.853
Tuscaloosa, AL	AL	6	7232	-20.401	-8.203	38.746	22.856	-36.368	-38.483	-17.427	12.272
Phoenix-Mesa-Scottsdale, AZ	AZ	33	80848	-1.904	-11.148	3.963	-27.210	-27.960	84.010	13.741	1.452
Prescott, AZ	AZ	7	32466	-8.120	-9.090	0.261	-17.755	-6.158	35.095	14.403	-0.307
Fayetteville-Springdale-Rogers, AR-MO	AR	11	33697	-3.875	-10.801	5.625	-11.859	-23.692	4.137	7.021	23.416
Hot Springs, AR	AR	4	9065	3.970	4.393	1.759	-17.731	1.404	2.595	-7.211	1.141
Jonesboro, AR	AR	4	9506	-16.517	-1.152	0.983	-13.845	0.956	30.135	4.712	-16.207
Little Rock-North Little Rock-Conway, AR	AR	14	56125	-3.689	9.786	4.059	-18.991	-3.165	25.030	-1.089	8.823
Anaheim-Santa Ana-Irvine, CA	CA	16	33257	2.463	0.305	15.163	12.518	-0.979	-34.286	5.703	8.063
Bakersfield, CA	CA	7	14150	-12.214	10.771	17.610	-23.197	-10.859	-37.399	-4.798	-12.095
Fresno, CA	CA	6	22688	-21.849	10.977	9.900	-15.755	1.140	-36.598	5.382	30.273
Los Angeles-Long Beach-Glendale, CA	CA	103	220366	-11.754	11.519	-12.072	16.298	20.053	-37.876	-3.682	8.474
Modesto, CA	CA	5	15254	17.626	8.331	32.179	-2.334	5.935	-62.333	-21.764	16.733
Oakland-Hayward-Berkeley, CA	CA	24	50762	-0.357	-5.091	14.600	7.848	-25.818	-48.002	-20.626	14.135
Oxnard-Thousand Oaks-Ventura, CA	CA	20	92664	7.823	3.453	-15.197	-13.206	17.893	-11.893	2.493	13.890
Redding, CA	CA	5	15267	-31.810	-15.065	22.215	-11.887	-35.194	-50.312	-21.337	-18.524
Sacramento--Roseville--Arden-Arcade, CA	CA	17	51515	-0.169	-9.818	27.284	-4.654	-29.297	-42.887	-6.263	-1.295
San Diego-Carlsbad, CA	CA	14	49541	-17.199	-8.360	3.670	20.600	-12.666	-15.641	9.269	-2.897
San Francisco-Redwood City-South San Francisco, CA	CA	6	6980	-15.535	-13.239	-3.628	-7.147	-16.515	-57.428	-39.763	-17.407
San Jose-Sunnyvale-Santa Clara, CA	CA	10	31902	-10.379	1.427	2.328	7.340	11.648	3.262	-2.596	-22.161
San Rafael, CA	CA	15	38124	1.711	-10.372	10.676	-6.793	-18.207	-48.882	-20.925	-17.038
Santa Cruz-Watsonville, CA	CA	6	22322	17.373	-3.511	1.383	8.532	3.812	-27.744	-9.270	-13.254
Santa Maria-Santa Barbara, CA	CA	5	14691	-26.084	-13.157	21.292	5.517	-36.707	-57.914	-16.975	-1.792
Stockton-Lodi, CA	CA	6	9092	-11.635	7.161	20.935	5.265	-14.137	-31.516	-10.142	46.026
Vallejo-Fairfield, CA	CA	4	6904	15.271	-4.661	56.737	-5.509	-39.329	-0.562	-5.835	25.263
Visalia-Porterville, CA	CA	4	10407	2.548	4.014	9.820	14.782	0.024	5.440	-1.071	-12.465
Denver-Aurora-Lakewood, CO	CO	24	63127	-10.616	-17.791	7.452	-6.410	-29.054	-6.257	5.766	13.648
Fort Collins, CO	CO	4	11280	-17.923	-23.247	3.195	-9.813	-41.217	-20.675	-2.082	33.116
Bridgeport-Stamford-Norwalk, CT	CT	7	37982	29.308	1.089	-7.742	34.994	27.159	25.992	-0.572	-29.568
Hartford-West Hartford-East Hartford, CT	CT	7	23891	6.963	4.297	4.751	41.780	2.713	-21.283	-11.557	-4.315
Washington-Arlington-Alexandria, DC-VA-MD-WV	DC	33	138843	13.502	4.048	3.134	-10.190	-8.365	20.818	1.286	4.953
Wilmington, DE-MD-NJ	DE	6	37357	13.828	-1.328	0.816	-4.434	8.245	2.616	5.580	9.968
Cape Coral-Fort Myers, FL	FL	6	47922	-8.172	-2.349	-10.880	7.590	18.106	126.052	25.343	1.713
Crestview-Fort Walton Beach-Destin, FL	FL	6	19235	-20.856	3.934	10.484	-2.733	5.605	-23.588	3.626	6.661
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	FL	27	111757	4.393	12.877	-9.130	7.318	45.125	63.398	12.982	6.944
Gainesville, FL	FL	6	44044	-21.984	6.831	-12.023	2.163	42.373	-8.618	16.341	15.074
Jacksonville, FL	FL	11	59910	5.753	10.942	-5.820	-3.708	34.011	-35.092	11.548	5.355
Miami-Miami Beach-Kendall, FL	FL	19	56044	12.341	30.415	-12.173	-16.779	64.396	85.503	13.857	25.670
North Port-Sarasota-Bradenton, FL	FL	11	63955	-2.985	-3.444	-13.651	18.248	23.907	25.840	5.033	-7.260
Orlando-Kissimmee-Sanford, FL	FL	17	104580	-4.662	8.201	-8.474	5.845	33.584	71.148	21.685	18.334

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CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Palm Bay-Melbourne-Titusville, FL	FL	7	24531	8.773	1.400	-4.823	-1.215	22.625	28.028	12.679	21.856
Pensacola-Ferry Pass-Brent, FL	FL	7	26137	-15.087	3.797	7.075	-4.128	19.631	-2.584	1.885	20.079
Port St. Lucie, FL	FL	6	34033	-9.960	14.532	-6.324	-5.226	33.052	30.765	9.654	9.554
Tallahassee, FL	FL	5	21142	-5.413	3.773	3.811	-8.352	7.931	-6.229	-1.637	21.103
Tampa-St. Petersburg-Clearwater, FL	FL	30	127778	0.768	7.116	-10.214	12.927	50.595	42.362	22.182	18.006
Atlanta-Sandy Springs-Roswell, GA	GA	46	154822	1.375	1.733	7.275	-21.562	-13.966	-13.613	0.537	-7.466
Augusta-Richmond County, GA-SC	GA	9	32985	14.291	-0.304	6.312	-10.174	-12.340	-11.105	-2.387	-8.967
Columbus, GA-AL	GA	5	16141	10.517	-7.177	9.581	-28.701	-25.788	-45.290	-18.253	-15.980
Macon-Bibb County, GA	GA	6	20737	-13.556	7.614	14.402	-16.050	-1.196	-29.909	-11.223	20.856
Savannah, GA	GA	6	21361	32.169	1.056	-4.543	-15.273	3.950	-34.884	-2.588	-0.945
Urban Honolulu, HI	HI	7	9502	5.825	-14.756	18.253	-9.279	-41.585	-32.278	-19.763	9.667
Boise City, ID	ID	4	14007	-15.228	-25.635	2.441	-22.883	-34.374	-75.647	-11.025	-1.220
Champaign-Urbana, IL	IL	4	14772	-15.463	6.436	8.312	-14.042	-16.422	10.147	-2.738	29.135
Chicago-Naperville-Arlington Heights, IL	IL	25	96289	-3.106	0.694	-7.052	9.784	12.910	69.238	11.603	-11.802
Elgin, IL	IL	7	19972	1.907	-12.139	-4.339	5.113	-4.432	93.431	9.385	2.336
Lake County-Kenosha County, IL-WI	IL	59	247002	12.610	6.782	-11.631	19.718	23.758	73.871	7.466	2.202
Rockford, IL	IL	4	15394	3.462	2.066	11.086	11.261	-11.382	41.292	4.725	3.869
Evansville, IN-KY	IN	8	32983	-4.074	-3.793	-7.751	-2.467	0.024	44.365	12.518	-6.299
Fort Wayne, IN	IN	8	20120	-10.011	-5.158	-2.154	13.735	1.004	-13.222	-0.755	16.558
Indianapolis-Carmel-Anderson, IN	IN	31	96639	0.037	-8.855	2.795	11.489	-17.833	-22.500	1.596	1.202
South Bend-Mishawaka, IN-MI	IN	6	16719	-2.097	-27.016	-1.785	7.238	-31.696	28.575	1.752	-7.025
Davenport-Moline-Rock Island, IA-IL	IA	8	20837	-4.144	3.765	12.898	4.091	-1.809	-24.401	-10.275	8.933
Des Moines-West Des Moines, IA	IA	6	25641	7.984	-14.842	-17.216	-2.404	-8.902	-45.421	-16.239	-0.501
Iowa City, IA	IA	6	26533	9.638	-10.753	2.145	-5.065	-9.613	34.165	-3.686	-34.936
Wichita, KS	KS	11	31690	-18.464	-16.109	-2.578	-2.436	-15.705	-20.251	-6.240	7.130
Lexington-Fayette, KY	KY	11	38531	10.445	3.435	14.738	-11.071	-23.423	-20.518	9.047	-3.725
Louisville/Jefferson County, KY-IN	KY	11	63328	-5.008	1.004	-3.139	15.437	-1.771	-4.842	9.176	-7.121
Alexandria, LA	LA	7	14658	5.827	6.334	26.953	-36.733	-11.929	-47.086	-8.574	13.307
Baton Rouge, LA	LA	8	15118	3.283	-4.979	20.385	-28.227	-28.923	13.484	-10.644	3.494
Hammond, LA	LA	10	14028	-17.660	12.290	6.625	-47.783	7.812	52.935	-4.893	-9.021
Lafayette, LA	LA	10	19289	-3.472	-2.913	21.000	-44.138	-2.232	-33.017	-13.310	-17.514
Monroe, LA	LA	6	11558	-12.528	3.760	4.095	-8.860	15.999	-13.824	-3.226	24.857
New Orleans-Metairie, LA	LA	16	38178	-0.089	6.997	20.486	-36.900	-23.203	1.345	-15.256	-23.835
Shreveport-Bossier City, LA	LA	9	26514	11.213	-1.760	2.532	-21.100	-10.043	0.513	-14.806	34.468
Portland-South Portland, ME	ME	9	29510	6.229	-18.652	21.260	-1.983	-30.264	-41.674	-20.341	-11.700
Baltimore-Columbia-Towson, MD	MD	23	137509	-26.373	-3.923	-6.598	-1.106	9.859	69.735	11.812	-5.451
Salisbury, MD-DE	MD	4	12529	-43.919	-1.825	35.625	-8.145	-31.949	-46.079	-7.517	-29.208
Silver Spring-Frederick-Rockville, MD	MD	7	39817	-30.974	-2.324	-11.222	23.556	3.718	80.830	15.900	13.461
Boston, MA	MA	39	180540	10.473	5.835	-2.478	15.202	21.477	53.598	-1.608	-7.993
Cambridge-Newton-Framingham, MA	MA	6	24718	-26.736	6.482	3.559	11.548	22.603	33.194	-1.427	-4.953
Springfield, MA	MA	5	10762	-16.804	3.318	19.278	25.202	-10.396	-5.917	-10.118	-20.449
Worcester, MA-CT	MA	4	22901	5.044	4.087	4.120	25.526	26.657	22.002	-2.686	1.363
Ann Arbor, MI	MI	9	49324	6.472	1.790	-2.620	4.644	3.146	45.949	8.867	-7.553
Detroit-Dearborn-Livonia, MI	MI	8	29851	1.381	16.454	-4.616	-0.026	38.639	3.665	-8.231	2.874
Flint, MI	MI	16	95636	2.953	5.570	-9.434	1.536	44.737	40.910	2.429	19.888

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CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Kalamazoo-Portage, MI	MI	4	17354	-13.428	-16.349	13.104	-7.629	-29.371	18.127	0.180	-11.384
Lansing-East Lansing, MI	MI	5	20598	-12.863	-8.736	-2.211	1.956	-15.753	-10.332	11.899	6.047
Muskegon, MI	MI	8	31465	-1.389	-10.163	18.098	-6.693	-31.475	-56.283	-14.359	18.201
Warren-Troy-Farmington Hills, MI	MI	15	71436	-0.122	11.967	1.933	2.488	7.123	56.036	-4.903	8.085
Duluth, MN-WI	MN	4	9917	-4.398	-18.617	-6.934	-17.020	-40.093	-23.118	-10.229	-9.601
Minneapolis-St. Paul-Bloomington, MN-WI	MN	34	140037	-1.108	-11.984	-7.075	8.342	-12.509	8.552	-43.987	-2.768
Rochester, MN	MN	4	26139	0.820	-16.247	-11.285	5.953	-14.584	-65.328	-5.950	12.236
Gulfport-Biloxi-Pascagoula, MS	MS	5	16221	3.598	5.827	21.934	-27.642	-15.953	-49.860	-24.849	-22.176
Jackson, MS	MS	18	59795	15.962	10.077	-1.139	-11.474	-0.034	45.500	8.415	1.418
Jefferson City, MO	MO	7	10727	-20.858	-5.425	12.824	11.418	-30.020	-14.963	-0.938	17.383
Kansas City, MO-KS	MO	33	90091	-21.466	6.110	-7.395	-0.966	24.553	11.553	12.754	9.829
Springfield, MO	MO	5	27954	-0.883	-7.408	7.207	-10.161	-16.663	19.586	6.676	16.374
St. Louis, MO-IL	MO	35	130395	7.101	2.477	-2.084	-10.285	-7.469	18.191	-7.636	19.108
Missoula, MT	MT	4	12633	-11.751	-23.176	-12.260	-13.155	-21.903	-18.065	-13.716	11.321
Lincoln, NE	NE	5	19162	-16.650	-22.126	-38.433	19.032	13.724	10.832	13.727	-6.404
Omaha-Council Bluffs, NE-IA	NE	14	40549	-1.345	-5.698	-13.113	2.340	1.585	-41.867	-7.080	9.791
Las Vegas-Henderson-Paradise, NV	NV	16	54776	6.411	19.007	2.598	-23.954	29.566	34.448	21.353	28.418
Manchester-Nashua, NH	NH	5	22858	14.032	-1.679	-0.081	-0.993	1.417	56.556	1.151	-44.555
Rockingham County-Strafford County, NH	NH	4	11216	-13.698	0.691	13.030	-1.442	7.090	-26.019	0.794	-9.479
Atlantic City-Hammonton, NJ	NJ	4	25397	3.041	7.558	-2.913	12.218	30.501	11.690	2.730	13.266
Camden, NJ	NJ	7	44311	3.275	5.795	-7.128	20.092	18.123	41.434	12.337	22.030
Newark, NJ-PA	NJ	12	57964	0.945	0.265	-11.968	19.552	25.546	8.038	5.799	8.769
Las Cruces, NM	NM	4	11872	-3.528	12.001	8.684	-30.099	24.620	-41.914	8.127	25.666
Santa Fe, NM	NM	9	23898	-3.452	-16.980	1.000	-18.857	-30.369	-36.767	2.816	-8.344
Albany-Schenectady-Troy, NY	NY	9	28211	11.116	6.301	-8.610	-19.188	28.915	-33.589	-4.620	-42.707
Buffalo-Cheektowaga-Niagara Falls, NY	NY	11	37829	18.493	6.049	0.532	14.272	12.472	-4.945	-7.178	0.116
Burlington-South Burlington, VT	NY	4	14735	-2.911	-1.123	20.587	1.369	-15.805	-54.636	-18.747	-46.213
Nassau County-Suffolk County, NY	NY	51	299731	15.156	8.579	-16.176	18.941	55.872	-36.598	2.449	-21.895
New York-Jersey City-White Plains, NY-NJ	NY	76	335731	5.841	6.517	-15.397	29.624	31.190	14.238	2.251	-4.025
Rochester, NY	NY	9	16048	9.196	7.551	9.062	-7.969	16.614	39.849	-10.560	-6.635
Syracuse, NY	NY	9	32876	2.088	4.069	-4.074	11.932	7.519	8.526	2.224	1.786
Charlotte-Concord-Gastonia, NC-SC	NC	24	85392	5.786	-4.834	14.954	-4.160	-23.063	-12.887	0.108	2.629
Durham-Chapel Hill, NC	NC	10	58721	-2.443	-1.770	3.458	-10.552	-19.637	-16.243	-1.053	-2.811
Greenville, NC	NC	4	28883	11.848	1.844	11.896	-21.584	-14.503	3.179	-7.932	19.631
Raleigh, NC	NC	9	55299	12.188	-2.081	8.573	-7.776	-18.435	9.378	-2.442	16.020
Winston-Salem, NC	NC	6	22703	17.438	-5.974	10.874	-14.590	-35.691	-13.437	9.388	16.497
Cincinnati, OH-KY-IN	OH	21	76260	-9.920	0.658	-1.900	4.243	0.349	-24.336	-4.787	-5.884
Cleveland-Elyria, OH	OH	37	135324	7.623	2.549	-5.163	12.855	3.516	33.270	0.717	-13.198
Columbus, OH	OH	25	91983	5.457	-2.963	4.795	0.145	-18.586	70.797	10.195	17.168
Dayton, OH	OH	6	12437	-8.911	13.004	16.147	8.061	-17.545	37.444	11.739	34.865
Lima, OH	OH	6	14606	-23.216	-4.345	1.357	18.701	2.644	-25.726	21.326	40.107
Toledo, OH	OH	10	25694	-14.965	2.008	6.409	18.780	5.518	-18.626	-11.604	1.634
Youngstown-Warren-Boardman, OH-PA	OH	6	10481	-29.778	10.682	-5.643	-2.126	7.007	-43.289	-0.807	-7.790
Enid, OK	OK	4	5570	-31.895	-5.483	22.520	19.175	-39.731	-59.494	-23.445	8.749
Oklahoma City, OK	OK	33	85302	4.445	-2.744	19.465	-19.011	-20.512	-33.754	-9.148	18.773

Appendix E

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				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tulsa, OK	OK	19	36148	-14.105	-1.769	-4.131	-26.447	-16.959	9.464	0.893	-4.470
Eugene, OR	OR	5	15432	9.296	-12.989	16.229	-19.664	-13.600	-55.311	-30.681	16.896
Portland-Vancouver-Hillsboro, OR-WA	OR	19	47607	0.236	-19.181	14.483	-13.640	-29.629	-33.663	-11.879	7.542
Allentown-Bethlehem-Easton, PA-NJ	PA	14	38323	-8.285	-0.377	-7.888	15.775	25.858	-13.796	4.393	-20.265
Montgomery County-Bucks County-Chester County, PA	PA	16	47342	-7.714	-2.982	-17.688	9.079	28.703	81.530	16.310	9.598
Philadelphia, PA	PA	29	119778	2.815	3.788	-8.980	4.415	28.003	34.092	-0.829	-0.961
Pittsburgh, PA	PA	35	95850	6.866	8.807	-8.082	-4.418	30.568	17.015	6.829	13.352
York-Hanover, PA	PA	7	19773	-11.566	-12.699	-11.447	-3.177	7.382	19.231	13.022	-19.531
Providence-Warwick, RI-MA	RI	11	47289	1.191	5.938	-0.646	22.598	24.304	13.892	0.710	-9.142
Charleston-North Charleston, SC	SC	9	35881	-12.529	0.615	28.597	-17.269	-20.183	-52.519	-4.225	-13.270
Columbia, SC	SC	6	19754	21.399	-11.343	1.722	-10.345	-32.661	-51.319	-2.805	8.853
Florence, SC	SC	5	16710	-4.124	13.717	18.121	-41.041	7.790	14.085	-3.839	23.227
Greenville-Anderson-Mauldin, SC	SC	14	60136	-2.258	-14.313	-3.948	3.963	-25.416	-10.858	-6.494	-23.029
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	SC	4	17527	-23.108	0.819	19.387	-20.712	-6.900	0.032	-4.567	-10.031
Sioux Falls, SD	SD	4	19586	-9.675	-18.676	-26.542	-7.142	9.572	-14.377	14.117	29.717
Chattanooga, TN-GA	TN	8	32149	1.009	-6.693	-1.106	-5.927	-13.063	-28.180	-3.498	-10.665
Knoxville, TN	TN	10	33842	5.099	-0.809	3.486	-2.857	-14.714	-9.064	10.471	-0.054
Memphis, TN-MS-AR	TN	21	97251	8.174	5.865	15.160	-12.402	-1.051	9.075	8.847	4.099
Nashville-Davidson--Murfreesboro--Franklin, TN	TN	32	98139	-7.990	3.016	-0.410	3.699	1.667	-2.875	12.529	-10.562
Austin-Round Rock, TX	TX	21	55744	-15.686	-3.750	-1.006	-17.323	1.834	2.003	4.677	18.786
Beaumont-Port Arthur, TX	TX	4	10205	-0.536	2.343	32.429	-41.801	-25.850	-34.053	-11.611	-16.384
Brownsville-Harlingen, TX	TX	6	19796	-9.395	9.882	1.095	-25.654	17.169	-34.545	-1.002	37.946
College Station-Bryan, TX	TX	4	3882	-3.122	-10.982	41.868	-32.365	-46.404	-0.023	-5.553	1.451
Corpus Christi, TX	TX	5	15536	-2.054	4.023	2.433	-13.643	2.304	-56.289	-5.238	-7.510
Dallas-Plano-Irving, TX	TX	82	187027	-5.497	2.880	-2.419	-12.544	5.093	-9.218	4.222	9.896
El Paso, TX	TX	6	9934	14.735	13.640	-4.630	-26.947	41.294	-57.918	-7.371	-7.838
Fort Worth-Arlington, TX	TX	8	6894	-16.560	-2.599	11.289	26.510	-26.334	-52.735	-8.443	7.264
Houston-The Woodlands-Sugar Land, TX	TX	60	146355	7.861	8.608	-2.801	-25.967	8.388	61.263	18.684	14.483
Killeen-Temple, TX	TX	5	27928	1.686	-1.527	0.160	-2.278	-2.355	-39.420	3.560	22.380
Longview, TX	TX	10	19697	-7.558	5.835	24.102	5.860	-24.160	23.545	-4.439	9.942
Lubbock, TX	TX	5	19641	-18.709	-6.867	5.698	-10.767	-9.517	25.099	11.032	-7.101
McAllen-Edinburg-Mission, TX	TX	4	10198	-13.207	11.188	-0.162	-42.212	14.394	-43.994	-3.545	-4.513
Odessa, TX	TX	5	9650	14.556	-5.316	10.763	-27.816	-24.271	-15.753	-8.147	-1.548
San Antonio-New Braunfels, TX	TX	16	51394	-14.077	-1.941	-12.505	-4.934	10.815	-37.575	2.323	27.921
Tyler, TX	TX	6	22778	-0.050	-11.434	3.677	-15.435	-24.636	-2.274	4.454	-18.534
Salt Lake City, UT	ut	23	39343	-18.442	-26.960	-1.602	6.198	-34.933	-71.392	10.118	-1.426
Blacksburg-Christiansburg-Radford, VA	VA	4	8895	-6.526	5.515	29.203	-22.065	-23.431	-53.133	-9.672	35.281
Charlottesville, VA	VA	5	39561	-2.276	-6.217	8.252	-5.211	-15.533	-22.852	-11.412	-17.816
Richmond, VA	VA	14	58893	-1.947	-4.673	5.934	-19.422	1.427	-53.671	-0.631	-8.817
Roanoke, VA	VA	6	27533	-13.639	-0.619	6.603	15.221	-14.461	-34.413	-4.090	6.102
Virginia Beach-Norfolk-Newport News, VA-NC	VA	14	62215	5.887	0.352	16.041	2.625	-22.559	-43.930	-5.110	-5.886
Seattle-Bellevue-Everett, WA	WA	19	69969	9.213	-13.274	5.067	-11.639	-18.845	-45.473	-0.002	-13.178
Spokane-Spokane Valley, WA	WA	4	19083	2.678	-19.758	13.838	-2.448	-41.282	-45.695	-8.903	15.854

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				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tacoma-Lakewood, WA	WA	10	44641	5.373	-13.517	7.278	-7.419	-37.181	-53.169	-6.559	-1.110
Charleston, WV	WV	5	21595	8.367	0.129	-0.296	-39.294	11.549	43.658	11.003	-10.024
Huntington-Ashland, WV-KY-OH	WV	10	36088	15.121	13.436	29.668	-25.417	-10.825	21.670	10.879	8.737
Wheeling, WV-OH	WV	4	3060	-21.642	12.844	23.588	8.466	-4.911	18.997	-17.710	-54.045
Appleton, WI	WI	6	11880	-5.153	-16.315	-6.388	11.996	-21.372	-32.182	-20.930	12.186
Madison, WI	WI	9	31185	-6.785	-13.040	1.911	-4.977	-13.661	-6.588	-5.675	-15.715
Milwaukee-Waukesha-West Allis, WI	WI	19	30373	-9.510	-10.894	5.001	-4.508	-18.502	-7.735	-11.803	-11.097

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CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Birmingham-Hoover, AL	AL	26	82429	55.56	19.28	12.45	1.72	56.26	47.07	18.02	92.05
Huntsville, AL	AL	4	26406	50.97	18.76	16.93	-6.17	56.08	70.16	48.99	67.31
Mobile, AL	AL	4	17139	78.15	28.35	1.30	-74.16	127.21	49.24	21.87	83.84
Montgomery, AL	AL	6	9505	28.67	20.12	21.73	59.80	53.49	121.30	27.03	68.44
Tuscaloosa, AL	AL	6	7232	7.68	6.86	68.08	59.31	-2.18	33.74	2.20	92.82
Phoenix-Mesa-Scottsdale, AZ	AZ	33	80848	32.70	3.16	25.94	28.07	10.75	300.04	40.78	74.26
Prescott, AZ	AZ	7	32466	24.29	5.61	21.46	-78.22	44.26	193.70	41.60	71.37
Fayetteville-Springdale-Rogers, AR-MO	AR	11	33697	30.04	3.61	27.96	-7.13	17.31	126.40	32.46	111.99
Hot Springs, AR	AR	4	9065	40.65	21.20	23.27	70.27	55.89	123.04	14.84	73.78
Jonesboro, AR	AR	4	9506	12.94	14.79	22.33	-3.28	55.20	182.92	29.60	43.84
Little Rock-North Little Rock-Conway, AR	AR	14	56125	30.29	27.43	26.06	-26.69	48.86	171.82	22.42	86.47
Anaheim-Santa Ana-Irvine, CA	CA	16	33257	38.61	16.51	39.51	24.32	52.22	42.86	30.83	85.81
Bakersfield, CA	CA	7	14150	18.76	28.51	42.48	-21.90	37.04	36.10	17.83	50.91
Fresno, CA	CA	6	22688	5.72	28.90	33.14	4.18	55.48	37.84	30.43	123.86
Los Angeles-Long Beach-Glendale, CA	CA	103	220366	19.38	29.47	6.52	-39.79	84.56	35.06	19.21	86.24
Modesto, CA	CA	5	15254	59.12	25.71	60.12	-25.06	62.85	-18.11	-3.17	100.38
Oakland-Hayward-Berkeley, CA	CA	24	50762	34.80	10.14	38.83	2.82	14.04	13.05	-1.76	96.25
Oxnard-Thousand Oaks-Ventura, CA	CA	20	92664	45.86	20.10	2.73	18.60	81.24	91.55	26.85	95.66
Redding, CA	CA	5	15267	-7.75	-1.46	48.05	19.59	-0.37	8.02	-2.64	40.25
Sacramento--Roseville--Arden-Arcade, CA	CA	17	51515	35.05	4.70	54.19	44.28	8.69	24.17	16.02	69.20
San Diego-Carlsbad, CA	CA	14	49541	12.01	6.39	25.59	37.71	34.26	83.40	35.24	66.96
San Francisco-Redwood City-South San Francisco, CA	CA	6	6980	14.26	0.79	16.75	29.45	28.34	-7.45	-25.44	42.05
San Jose-Sunnyvale-Santa Clara, CA	CA	10	31902	21.24	17.75	23.96	56.39	71.64	124.49	20.56	33.26
San Rafael, CA	CA	15	38124	37.59	4.12	34.08	39.19	25.74	11.13	-2.13	42.07
Santa Cruz-Watsonville, CA	CA	6	22322	58.78	12.11	22.82	-86.48	59.59	57.09	12.30	49.19
Santa Maria-Santa Barbara, CA	CA	5	14691	-0.01	0.89	46.94	20.87	-2.70	-8.50	2.76	69.02
Stockton-Lodi, CA	CA	6	9092	19.54	24.64	46.50	16.34	32.00	48.89	11.22	150.83
Vallejo-Fairfield, CA	CA	4	6904	55.94	10.69	89.87	22.53	-6.73	116.18	16.55	115.10
Visalia-Porterville, CA	CA	4	10407	38.73	20.69	33.04	48.84	53.77	129.23	22.44	50.33
Denver-Aurora-Lakewood, CO	CO	24	63127	20.92	-4.53	30.17	42.75	9.06	103.80	30.91	94.80
Fort Collins, CO	CO	4	11280	11.03	-10.83	25.01	36.31	-9.63	72.45	21.19	128.67
Bridgeport-Stamford-Norwalk, CT	CT	7	37982	74.93	17.35	11.76	26.86	95.48	173.91	23.06	20.94
Hartford-West Hartford-East Hartford, CT	CT	7	23891	44.70	21.11	26.90	47.90	57.90	71.13	9.47	64.29
Washington-Arlington-Alexandria, DC-VA-MD-WV	DC	33	138843	53.54	20.80	24.94	16.46	40.87	162.66	25.36	80.03
Wilmington, DE-MD-NJ	DE	6	37357	53.98	14.58	22.13	23.93	66.40	123.09	30.68	88.61
Cape Coral-Fort Myers, FL	FL	6	47922	24.22	13.40	7.96	1.06	81.56	391.44	55.14	74.94
Crestview-Fort Walton Beach-Destin, FL	FL	6	19235	7.06	20.66	33.84	22.92	62.35	66.12	28.26	83.04
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	FL	27	111757	41.22	31.06	10.08	84.24	123.10	255.23	39.84	83.70
Gainesville, FL	FL	6	44044	5.54	24.07	6.58	-67.34	118.87	98.67	43.99	97.86
Jacksonville, FL	FL	11	59910	43.06	28.82	14.09	36.25	106.01	41.11	38.06	80.86
Miami-Miami Beach-Kendall, FL	FL	19	56044	51.97	51.42	6.40	8.86	152.72	303.29	40.92	115.83
North Port-Sarasota-Bradenton, FL	FL	11	63955	31.24	12.10	4.60	21.00	90.48	173.58	30.00	59.26
Orlando-Kissimmee-Sanford, FL	FL	17	104580	28.97	25.60	10.88	55.03	105.36	272.08	50.61	103.31

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Palm Bay-Melbourne-Titusville, FL	FL	7	24531	47.15	17.74	15.30	-6.39	88.51	178.33	39.46	109.57
Pensacola-Ferry Pass-Brent, FL	FL	7	26137	14.87	20.55	29.71	5.02	83.91	111.78	26.10	106.44
Port St. Lucie, FL	FL	6	34033	21.80	32.96	13.48	23.95	104.54	184.29	35.72	87.96
Tallahassee, FL	FL	5	21142	27.96	20.59	25.76	45.15	65.92	103.86	21.74	108.14
Tampa-St. Petersburg-Clearwater, FL	FL	30	127778	36.32	24.41	8.77	20.06	131.51	209.50	51.22	102.47
Atlanta-Sandy Springs-Roswell, GA	GA	46	154822	37.14	18.09	29.96	51.19	32.26	87.81	24.43	58.76
Augusta-Richmond County, GA-SC	GA	9	32985	54.61	15.70	28.79	-8.39	34.76	93.26	20.82	56.16
Columbus, GA-AL	GA	5	16141	49.51	7.76	32.75	11.47	14.09	18.94	1.18	44.33
Macon-Bibb County, GA	GA	6	20737	16.94	24.98	38.59	91.85	51.89	52.38	9.88	107.29
Savannah, GA	GA	6	21361	78.80	17.37	15.64	5.22	59.80	41.56	20.57	70.24
Urban Honolulu, HI	HI	7	9502	43.16	-1.22	43.25	17.64	-10.20	47.23	-0.69	88.14
Boise City, ID	ID	4	14007	14.68	-13.64	24.10	21.59	0.89	-47.06	10.12	69.72
Champaign-Urbana, IL	IL	4	14772	14.36	23.56	31.21	47.11	28.48	139.46	20.38	121.40
Chicago-Naperville-Arlington Heights, IL	IL	25	96289	31.08	16.93	12.60	-0.35	73.58	267.93	38.13	51.17
Elgin, IL	IL	7	19972	37.86	2.03	15.89	40.13	46.92	320.52	35.39	75.58
Lake County-Kenosha County, IL-WI	IL	59	247002	52.34	23.99	7.05	19.78	90.25	278.00	33.01	75.18
Rockford, IL	IL	4	15394	39.96	18.43	34.57	49.41	36.23	207.17	29.62	78.37
Evansville, IN-KY	IN	8	32983	29.77	11.69	11.75	14.89	53.77	213.85	39.26	60.22
Fort Wayne, IN	IN	8	20120	21.74	10.16	18.53	54.54	55.27	88.66	22.83	99.81
Indianapolis-Carmel-Anderson, IN	IN	31	96639	35.33	5.84	24.53	-32.29	26.31	68.49	25.74	73.32
South Bend-Mishawaka, IN-MI	IN	6	16719	32.44	-15.31	18.98	-11.72	5.00	179.52	25.94	59.50
Davenport-Moline-Rock Island, IA-IL	IA	8	20837	29.67	20.48	36.77	46.35	50.95	64.35	11.05	87.05
Des Moines-West Des Moines, IA	IA	6	25641	46.08	-1.13	0.29	21.17	40.04	18.66	3.67	71.13
Iowa City, IA	IA	6	26533	48.32	3.61	23.74	15.10	38.95	191.68	19.21	11.37
Wichita, KS	KS	11	31690	10.30	-2.55	18.02	26.52	29.59	73.38	16.05	83.64
Lexington-Fayette, KY	KY	11	38531	49.41	20.05	39.00	45.87	17.72	72.80	34.97	64.94
Louisville/Jefferson County, KY-IN	KY	11	63328	28.50	17.30	17.34	-9.36	51.01	106.87	35.13	59.06
Alexandria, LA	LA	7	14658	43.16	23.32	53.79	53.34	35.39	15.04	13.16	94.47
Baton Rouge, LA	LA	8	15118	39.72	10.40	45.84	16.33	9.27	146.72	10.60	77.35
Hammond, LA	LA	10	14028	11.39	30.37	29.17	34.28	65.74	232.48	17.71	56.03
Lafayette, LA	LA	10	19289	30.58	12.74	46.58	19.34	50.30	45.62	7.30	41.50
Monroe, LA	LA	6	11558	18.33	20.36	26.10	-18.41	78.32	87.35	19.78	114.31
New Orleans-Metairie, LA	LA	16	38178	35.16	24.29	45.96	15.44	18.06	120.33	4.89	30.32
Shreveport-Bossier City, LA	LA	9	26514	50.45	14.08	24.21	14.58	38.29	118.52	5.44	130.46
Portland-South Portland, ME	ME	9	29510	43.71	-5.56	46.90	67.73	7.20	26.80	-1.41	51.28
Baltimore-Columbia-Towson, MD	MD	23	137509	-0.40	11.60	13.15	-17.96	68.89	269.01	38.39	61.97
Salisbury, MD-DE	MD	4	12529	-24.13	13.95	64.30	33.04	4.61	17.23	14.46	21.30
Silver Spring-Frederick-Rockville, MD	MD	7	39817	-6.62	13.39	7.55	45.54	59.45	293.13	43.45	95.10
Boston, MA	MA	39	180540	49.45	22.87	18.14	76.24	86.75	233.92	21.78	57.80
Cambridge-Newton-Framingham, MA	MA	6	24718	-0.89	23.67	25.45	62.91	88.48	189.57	22.00	63.22
Springfield, MA	MA	5	10762	12.55	19.85	44.50	26.50	37.75	104.54	11.25	36.44
Worcester, MA-CT	MA	4	22901	42.10	20.94	26.13	62.78	94.71	165.23	20.44	73.87
Ann Arbor, MI	MI	9	49324	44.03	18.18	17.97	40.85	58.56	217.30	34.74	58.23
Detroit-Dearborn-Livonia, MI	MI	8	29851	37.15	35.29	15.55	16.26	113.13	125.37	13.58	76.01
Flint, MI	MI	16	95636	39.27	22.59	9.71	44.40	122.50	206.34	26.77	105.62

Appendix E

%(A-E)/E for Best Practice Norm by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Kalamazoo-Portage, MI	MI	4	17354	17.11	-2.84	37.02	69.66	8.58	156.81	23.99	52.11
Lansing-East Lansing, MI	MI	5	20598	17.88	6.04	18.46	4.87	29.51	94.94	38.50	81.95
Muskegon, MI	MI	8	31465	33.40	4.30	43.07	40.49	5.34	-4.96	6.00	102.65
Warren-Troy-Farmington Hills, MI	MI	15	71436	35.11	29.96	23.48	32.90	64.68	239.23	17.70	85.12
Duluth, MN-WI	MN	4	9917	29.33	-5.48	12.74	11.98	-7.90	67.14	11.11	54.79
Minneapolis-St. Paul-Bloomington, MN-WI	MN	34	140037	33.78	2.19	12.57	7.49	34.50	135.99	22.13	66.83
Rochester, MN	MN	4	26139	36.39	-2.75	7.47	4.49	31.31	-24.62	16.41	92.45
Gulfport-Biloxi-Pascagoula, MS	MS	5	16221	40.15	22.87	47.71	59.28	29.20	9.00	-6.99	33.44
Jackson, MS	MS	18	59795	56.87	27.83	19.76	42.79	53.68	216.32	34.18	73.91
Jefferson City, MO	MO	7	10727	7.06	9.65	36.68	6.68	7.58	84.87	22.61	101.68
Kansas City, MO-KS	MO	33	90091	6.24	23.25	12.18	44.57	91.47	142.52	39.55	88.32
Springfield, MO	MO	5	27954	34.08	7.49	29.87	34.55	28.11	159.98	32.03	99.91
St. Louis, MO-IL	MO	35	130395	44.89	18.98	18.62	35.47	42.25	156.95	14.32	104.21
Missoula, MT	MT	4	12633	19.38	-10.74	6.29	33.57	20.06	78.13	6.79	91.23
Lincoln, NE	NE	5	19162	12.75	-9.56	-25.42	55.24	74.83	140.95	40.76	60.84
Omaha-Council Bluffs, NE-IA	NE	14	40549	33.46	9.49	5.26	68.09	56.17	26.38	15.01	88.60
Las Vegas-Henderson-Paradise, NV	NV	16	54776	43.95	38.11	24.29	51.92	99.18	192.29	50.20	120.70
Manchester-Nashua, NH	NH	5	22858	54.26	14.13	21.04	54.36	55.91	240.36	25.19	-5.04
Rockingham County-Strafford County, NH	NH	4	11216	16.75	16.90	36.93	37.39	64.63	60.84	24.75	55.15
Atlantic City-Hammonton, NJ	NJ	4	25397	39.39	24.91	17.61	19.42	100.62	142.81	27.15	94.37
Camden, NJ	NJ	7	44311	39.71	22.84	12.51	16.83	81.59	207.48	39.04	109.05
Newark, NJ-PA	NJ	12	57964	36.56	16.40	6.64	50.23	93.00	134.88	30.95	86.67
Las Cruces, NM	NM	4	11872	30.51	30.11	31.66	25.97	91.58	26.28	33.83	115.68
Santa Fe, NM	NM	9	23898	30.61	-3.68	22.35	43.00	7.04	37.47	27.25	57.30
Albany-Schenectady-Troy, NY	NY	9	28211	50.32	23.35	10.71	70.94	98.18	44.38	18.05	-1.70
Buffalo-Cheektowaga-Niagara Falls, NY	NY	11	37829	60.30	23.15	21.79	50.78	72.90	106.65	14.89	71.61
Burlington-South Burlington, VT	NY	4	14735	31.34	14.89	46.08	-23.05	29.43	-1.38	0.57	-8.00
Nassau County-Suffolk County, NY	NY	51	299731	55.78	26.05	1.55	18.19	139.62	37.84	26.80	34.00
New York-Jersey City-White Plains, NY-NJ	NY	76	335731	43.18	23.67	2.49	17.51	101.68	148.36	26.56	64.78
Rochester, NY	NY	9	16048	47.72	24.83	32.12	23.00	79.27	204.03	10.70	60.20
Syracuse, NY	NY	9	32876	38.10	20.89	16.21	36.50	65.29	135.94	26.52	74.62
Charlotte-Concord-Gastonia, NC-SC	NC	24	85392	43.11	10.50	39.26	-3.59	18.28	89.39	23.90	76.16
Durham-Chapel Hill, NC	NC	10	58721	31.97	14.05	25.33	30.21	23.54	82.09	22.47	66.46
Greenville, NC	NC	4	28883	51.31	18.26	35.55	9.25	31.43	124.31	13.95	105.83
Raleigh, NC	NC	9	55299	51.77	13.68	31.53	59.51	25.39	137.79	20.75	99.55
Winston-Salem, NC	NC	6	22703	58.87	9.13	34.32	10.76	-1.14	88.19	35.39	99.73
Cincinnati, OH-KY-IN	OH	21	76260	21.86	16.88	18.84	55.73	54.27	64.50	17.84	61.26
Cleveland-Elyria, OH	OH	37	135324	45.59	19.06	14.89	45.69	59.13	189.73	24.66	48.62
Columbus, OH	OH	25	91983	42.66	12.63	26.95	7.28	25.16	271.32	36.39	101.03
Dayton, OH	OH	6	12437	23.22	31.21	40.70	30.24	26.76	198.80	38.30	131.59
Lima, OH	OH	6	14606	3.87	11.12	22.79	-12.94	57.79	61.47	50.16	140.76
Toledo, OH	OH	10	25694	15.03	18.44	28.91	54.03	62.21	76.91	9.41	74.16
Youngstown-Warren-Boardman, OH-PA	OH	6	10481	-5.01	28.59	14.31	26.92	64.50	23.29	22.77	58.08
Enid, OK	OK	4	5570	-7.87	9.64	48.42	26.56	-7.35	-11.94	-5.25	86.84
Oklahoma City, OK	OK	33	85302	41.29	12.96	44.72	80.03	22.20	44.02	12.45	103.75

Appendix E

%(A-E)/E for Best Practice Norm by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tulsa, OK	OK	19	36148	16.20	14.10	16.14	-4.62	27.66	137.98	24.87	63.91
Eugene, OR	OR	5	15432	47.85	1.09	40.80	34.23	32.82	-2.85	-14.20	100.79
Portland-Vancouver-Hillsboro, OR-WA	OR	19	47607	35.60	-6.13	38.69	19.87	8.18	44.22	9.07	84.61
Allentown-Bethlehem-Easton, PA-NJ	PA	14	38323	24.07	15.63	11.59	101.10	93.48	87.41	29.21	36.84
Montgomery County-Bucks County-Chester County, PA	PA	16	47342	24.84	12.65	-0.29	13.59	97.85	294.65	43.96	88.17
Philadelphia, PA	PA	29	119778	39.09	20.49	10.26	32.71	96.78	191.52	22.74	69.56
Pittsburgh, PA	PA	35	95850	44.57	26.34	11.35	12.55	100.72	154.39	32.22	94.16
York-Hanover, PA	PA	7	19773	19.63	1.27	7.28	25.56	65.08	159.21	39.89	38.08
Providence-Warwick, RI-MA	RI	11	47289	36.89	23.03	20.36	27.10	91.09	147.60	24.65	55.68
Charleston-North Charleston, SC	SC	9	35881	18.33	16.74	55.79	75.05	22.70	3.22	18.54	48.58
Columbia, SC	SC	6	19754	64.23	3.01	23.23	22.31	3.52	5.83	20.30	87.31
Florence, SC	SC	5	16710	29.70	32.01	43.09	-25.08	65.70	148.02	19.02	111.34
Greenville-Anderson-Mauldin, SC	SC	14	60136	32.22	-0.51	16.36	-14.36	14.66	93.80	15.73	32.18
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	SC	4	17527	4.02	17.07	44.63	12.62	43.12	117.47	18.12	54.47
Sioux Falls, SD	SC	4	19586	22.19	-5.56	-11.01	60.22	68.44	86.15	41.24	121.76
Chattanooga, TN-GA	TN	8	32149	36.64	8.28	19.80	48.18	33.65	56.14	19.44	53.45
Knoxville, TN	TN	10	33842	42.18	15.22	25.36	14.74	31.11	97.70	36.73	71.81
Memphis, TN-MS-AR	TN	21	97251	46.34	22.87	39.51	15.71	52.11	137.13	34.72	78.57
Nashville-Davidson—Murfreesboro—Franklin, TN	TN	32	98139	24.47	19.58	20.65	26.65	56.29	111.15	39.28	53.36
Austin-Round Rock, TX	TX	21	55744	14.06	11.80	19.92	4.79	56.55	121.76	29.56	104.00
Beaumont-Port Arthur, TX	TX	4	10205	34.55	18.93	60.43	-63.76	13.99	43.37	9.40	43.74
Brownsville-Harlingen, TX	TX	6	19796	22.57	27.68	22.47	-24.53	80.12	42.30	22.53	136.34
College Station-Bryan, TX	TX	4	3882	31.06	3.20	71.86	37.38	-17.61	117.35	16.90	74.41
Corpus Christi, TX	TX	5	15536	32.50	20.84	24.09	24.28	57.27	-4.97	17.29	59.02
Dallas-Plano-Irving, TX	TX	82	187027	27.84	19.45	18.21	49.17	61.56	97.36	29.00	88.71
El Paso, TX	TX	6	9934	55.21	31.76	15.53	34.98	117.21	-8.51	14.65	58.11
Fort Worth-Arlington, TX	TX	8	6894	12.88	12.91	34.82	41.14	13.25	2.76	13.32	84.23
Houston-The Woodlands-Sugar Land, TX	TX	60	146355	45.91	26.09	17.75	34.81	66.62	250.59	46.89	96.49
Killeen-Temple, TX	TX	5	27928	37.56	14.35	21.34	29.67	50.11	31.70	28.18	110.29
Longview, TX	TX	10	19697	25.05	22.87	50.34	32.21	16.59	168.59	18.28	88.95
Lubbock, TX	TX	5	19641	9.97	8.19	28.05	-1.39	39.10	171.97	37.42	59.37
McAllen-Edinburg-Mission, TX	TX	4	10198	17.41	29.09	20.95	50.81	75.86	21.76	19.38	63.31
Odessa, TX	TX	5	9650	54.97	9.90	34.18	54.24	16.42	83.15	13.69	69.23
San Antonio-New Braunfels, TX	TX	16	51394	16.24	13.81	5.99	19.11	70.35	35.71	26.64	119.99
Tyler, TX	TX	6	22778	35.21	2.82	25.60	9.66	15.86	112.46	29.28	39.98
Salt Lake City, UT	UT	23	39343	10.33	-15.17	19.20	-29.07	0.03	-37.81	36.29	69.24
Blacksburg-Christiansburg-Radford, VA	VA	4	8895	26.45	22.39	56.52	16.48	17.71	1.89	11.80	132.39
Charlottesville, VA	VA	5	39561	32.20	8.90	31.14	22.17	29.85	67.72	9.64	40.75
Richmond, VA	VA	14	58893	32.64	10.70	28.33	56.07	55.92	0.72	22.99	56.33
Roanoke, VA	VA	6	27533	16.83	15.39	29.14	-2.84	31.50	42.59	18.71	82.11
Virginia Beach-Norfolk-Newport News, VA-NC	VA	14	62215	43.24	16.49	40.57	33.08	19.05	21.90	17.44	61.56
Seattle-Bellevue-Everett, WA	WA	19	69969	47.74	0.66	27.28	15.80	24.76	18.54	23.77	48.70
Spokane-Spokane Valley, WA	WA	4	19083	38.90	-6.86	37.91	39.06	-9.73	18.06	12.75	98.80

Appendix E

%(A-E)/E for Best Practice Norm by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tacoma-Lakewood, WA	WA	10	44641	42.55	0.39	29.96	-24.61	-3.43	1.81	15.65	69.86
Charleston, WV	WV	5	21595	46.60	16.19	20.78	15.55	71.48	212.31	37.39	54.06
Huntington-Ashland, WV-KY-OH	WV	10	36088	55.73	31.66	57.08	-100.00	37.09	164.51	37.23	86.16
Wheeling, WV-OH	WV	4	3060	6.00	31.31	49.72	40.65	46.18	158.70	1.85	-21.19
Appleton, WI	WI	6	11880	28.31	-2.79	13.40	46.44	20.87	47.44	-2.14	92.41
Madison, WI	WI	9	31185	26.10	0.95	23.46	53.93	32.73	103.08	16.75	44.33
Milwaukee-Waukesha-West Allis, WI	WI	19	30373	22.41	3.39	27.20	28.39	25.29	100.58	9.16	52.39

Appendix E

$(A-E) for Best Practice Norm in thousands (000) by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Birmingham-Hoover, AL	AL	26	82429	23,208.6	14,037.6	424.5	783.1	17,405.3	4,544.0	2,437.9	1,415.0
Huntsville, AL	AL	4	26406	6,069.8	4,049.1	177.1	-286.3	5,977.5	2,251.9	2,135.9	209.8
Mobile, AL	AL	4	17139	7,264.0	4,097.9	9.1	-177.7	6,330.8	705.2	369.0	242.4
Montgomery, AL	AL	6	9505	1,187.2	1,683.0	84.0	800.6	2,328.1	1,502.1	530.6	51.4
Tuscaloosa, AL	AL	6	7232	214.3	402.5	191.2	1,331.9	-107.6	564.6	61.3	36.6
Phoenix-Mesa-Scottsdale, AZ	AZ	33	80848	13,382.8	2,183.1	810.9	363.4	3,855.0	28,570.4	7,214.4	829.4
Prescott, AZ	AZ	7	32466	3,975.9	1,585.5	273.5	-370.7	5,867.2	6,965.9	2,462.6	325.1
Fayetteville-Springdale-Rogers, AR-MO	AR	11	33697	5,153.2	1,097.6	388.5	-11.1	2,453.0	5,336.0	2,111.0	563.2
Hot Springs, AR	AR	4	9065	1,613.3	1,683.0	86.9	193.1	2,100.5	1,430.5	250.8	156.9
Jonesboro, AR	AR	4	9506	522.7	1,219.6	86.0	-322.2	2,216.1	2,163.0	555.9	44.8
Little Rock-North Little Rock-Conway, AR	AR	14	56125	8,459.0	12,732.6	587.2	-218.0	9,921.6	9,605.2	1,841.9	683.7
Anaheim-Santa Ana-Irvine, CA	CA	16	33257	5,694.5	4,597.9	512.8	1,827.8	8,347.5	2,165.8	2,307.0	253.0
Bakersfield, CA	CA	7	14150	1,204.8	3,463.7	240.1	-252.7	2,314.9	719.1	530.4	126.5
Fresno, CA	CA	6	22688	604.5	5,305.3	292.0	223.4	4,956.8	957.2	1,085.9	405.3
Los Angeles-Long Beach-Glendale, CA	CA	103	220366	19,521.2	56,430.9	584.8	-245.5	65,801.4	8,532.3	6,441.4	1,661.2
Modesto, CA	CA	5	15254	4,067.5	3,329.5	362.7	-750.1	4,467.7	-406.7	-95.7	119.9
Oakland-Hayward-Berkeley, CA	CA	24	50762	7,895.1	4,585.7	767.5	156.7	3,637.0	1,072.9	-221.5	406.9
Oxnard-Thousand Oaks-Ventura, CA	CA	20	92664	21,607.3	15,671.9	97.0	380.8	23,170.6	7,609.1	3,274.6	1,382.5
Redding, CA	CA	5	15267	-573.2	-207.3	290.2	3,409.5	-29.0	195.3	-98.8	77.9
Sacramento--Roseville--Arden-Arcade, CA	CA	17	51515	8,733.1	2,146.5	1,083.4	2,111.4	2,041.6	1,840.1	1,905.8	515.8
San Diego-Carlsbad, CA	CA	14	49541	2,905.0	2,853.9	514.4	4,459.6	7,010.6	5,293.3	3,396.0	386.0
San Francisco-Redwood City-South San Francisco, CA	CA	6	6980	472.9	48.8	44.4	704.3	810.4	-73.7	-386.0	65.3
San Jose-Sunnyvale-Santa Clara, CA	CA	10	31902	3,555.1	4,561.3	280.4	9,262.8	8,256.5	4,116.0	1,062.4	134.6
San Rafael, CA	CA	15	38124	7,166.5	1,341.6	490.5	3,456.0	3,651.1	522.9	-154.6	264.6
Santa Cruz-Watsonville, CA	CA	6	22322	6,031.7	2,231.9	197.1	-2,332.4	6,040.3	1,661.9	526.5	155.9
Santa Maria-Santa Barbara, CA	CA	5	14691	-0.4	109.8	266.3	2,419.4	-196.3	-206.9	112.2	117.9
Stockton-Lodi, CA	CA	6	9092	607.9	1,902.6	165.4	6,190.4	1,767.5	757.8	278.9	43.3
Vallejo-Fairfield, CA	CA	4	6904	1,618.1	646.4	234.5	540.2	-321.6	1,560.3	364.2	68.3
Visalia-Porterville, CA	CA	4	10407	1,743.3	1,902.6	136.3	1,530.7	2,560.8	1,740.6	493.3	14.3
Denver-Aurora-Lakewood, CO	CO	24	63127	6,940.9	-2,573.4	752.0	923.0	1,938.1	7,320.5	3,729.6	1,201.6
Fort Collins, CO	CO	4	11280	586.9	-1,048.9	110.1	2,439.0	-402.3	1,046.2	499.8	144.4
Bridgeport-Stamford-Norwalk, CT	CT	7	37982	13,352.0	5,598.0	176.2	932.2	13,899.8	6,586.7	1,499.5	116.0
Hartford-West Hartford-East Hartford, CT	CT	7	23891	5,148.3	4,488.1	253.2	483.5	5,532.3	1,926.7	419.3	257.7
Washington-Arlington-Alexandria, DC-VA-MD-WV	DC	33	138843	35,640.3	24,111.5	1,330.0	6,659.3	24,456.2	26,343.9	6,784.9	1,432.8
Wilmington, DE-MD-NJ	DE	6	37357	9,612.7	4,780.8	336.9	2,454.6	10,988.4	6,277.1	2,202.4	609.4
Cape Coral-Fort Myers, FL	FL	6	47922	5,062.8	5,402.8	149.8	31.9	15,949.1	16,895.4	4,476.3	401.6
Crestview-Fort Walton Beach-Destin, FL	FL	6	19235	650.0	3,512.4	271.8	2,967.1	4,632.9	1,454.4	948.2	231.2
Fort Lauderdale-Pompano Beach-Deerfield Beach, FL	FL	27	111757	20,974.3	29,392.4	459.3	569.4	54,232.1	27,125.3	7,065.6	931.4
Gainesville, FL	FL	6	44044	1,181.1	9,025.0	117.9	-297.9	17,680.4	4,094.6	2,536.0	369.2
Jacksonville, FL	FL	11	59910	12,414.7	14,830.3	350.6	875.0	22,762.5	2,592.4	3,210.7	536.1
Miami-Miami Beach-Kendall, FL	FL	19	56044	12,417.3	23,867.6	154.3	435.2	30,830.5	13,592.0	2,788.1	540.9
North Port-Sarasota-Bradenton, FL	FL	11	63955	9,688.4	6,695.6	119.4	2,039.1	22,590.6	11,377.4	3,146.6	549.1
Orlando-Kissimmee-Sanford, FL	FL	17	104580	14,613.4	22,867.5	455.9	8,999.0	40,976.7	26,256.5	8,009.5	1,228.5

Appendix E

$(A-E) for Best Practice Norm in thousands (000) by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Palm Bay-Melbourne-Titusville, FL	FL	7	24531	5,241.0	3,732.0	149.7	-151.3	8,949.7	4,720.8	1,736.6	165.3
Pensacola-Ferry Pass-Brent, FL	FL	7	26137	1,848.5	4,683.3	320.7	1,202.7	8,808.8	3,266.6	1,216.9	498.1
Port St. Lucie, FL	FL	6	34033	3,250.4	9,378.7	187.8	5,545.3	16,418.7	7,214.0	2,200.0	444.7
Tallahassee, FL	FL	5	21142	2,833.5	3,829.5	228.1	4,429.8	5,782.3	2,520.6	767.7	182.9
Tampa-St. Petersburg-Clearwater, FL	FL	30	127778	21,229.4	27,831.3	478.1	3,367.4	60,611.5	24,340.6	9,108.5	1,722.1
Atlanta-Sandy Springs-Roswell, GA	GA	46	154822	27,506.4	24,757.9	1,868.1	379.7	22,357.5	17,690.0	7,334.5	1,315.1
Augusta-Richmond County, GA-SC	GA	9	32985	9,280.2	4,597.9	387.1	-24.6	4,442.0	3,594.8	1,153.9	160.6
Columbus, GA-AL	GA	5	16141	3,958.3	1,109.8	215.1	538.6	938.2	394.7	37.8	31.1
Macon-Bibb County, GA	GA	6	20737	1,770.0	4,610.1	331.3	816.8	4,488.1	1,371.3	393.7	276.0
Savannah, GA	GA	6	21361	8,383.1	3,146.6	133.3	367.7	4,953.9	1,028.9	750.5	277.1
Urban Honolulu, HI	HI	7	9502	1,871.8	-97.6	149.4	555.1	-500.9	731.6	-17.6	87.0
Boise City, ID	ID	4	14007	1,033.4	-1,731.8	141.3	788.0	46.1	-955.0	316.3	171.6
Champaign-Urbana, IL	IL	4	14772	938.9	3,183.2	192.2	883.5	1,726.8	2,313.3	536.5	197.6
Chicago-Naperville-Arlington Heights, IL	IL	25	96289	13,733.3	14,427.9	497.4	-3.5	27,930.2	24,910.4	6,020.7	1,126.0
Elgin, IL	IL	7	19972	3,395.5	365.9	128.5	1,406.7	4,011.5	6,792.5	1,444.5	334.9
Lake County-Kenosha County, IL-WI	IL	59	247002	63,391.7	51,211.0	708.7	1,093.1	75,497.9	58,610.4	11,550.6	3,374.2
Rockford, IL	IL	4	15394	2,760.1	2,524.6	212.0	4,182.0	2,536.0	3,731.9	931.4	129.2
Evansville, IN-KY	IN	8	32983	4,474.5	3,451.5	157.4	240.7	6,462.6	7,346.2	2,099.3	428.8
Fort Wayne, IN	IN	8	20120	2,125.1	1,792.8	152.6	1,065.9	3,739.6	1,904.8	669.5	335.6
Indianapolis-Carmel-Anderson, IN	IN	31	96639	17,350.1	5,219.9	977.2	-1,174.4	9,476.2	8,055.3	4,651.9	1,044.1
South Bend-Mishawaka, IN-MI	IN	6	16719	2,487.9	-2,366.0	129.8	-143.3	376.7	3,714.4	883.3	151.9
Davenport-Moline-Rock Island, IA-IL	IA	8	20837	2,457.7	3,658.8	310.4	19,029.3	4,633.9	1,881.0	487.1	235.1
Des Moines-West Des Moines, IA	IA	6	25641	5,706.0	-256.1	3.0	1,008.6	3,438.5	562.3	140.2	325.0
Iowa City, IA	IA	6	26533	6,455.7	853.7	250.0	141.7	3,220.5	4,660.9	793.0	158.3
Wichita, KS	KS	11	31690	1,701.6	-731.8	232.1	2,683.5	2,813.4	2,339.3	856.6	424.1
Lexington-Fayette, KY	KY	11	38531	10,307.8	7,061.5	601.5	1,309.0	2,448.3	3,028.8	2,164.8	237.9
Louisville/Jefferson County, KY-IN	KY	11	63328	9,288.4	9,756.8	452.8	-260.6	11,172.0	6,895.4	3,377.2	742.5
Alexandria, LA	LA	7	14658	2,971.5	3,049.0	326.5	9,388.3	2,533.1	326.3	397.5	185.3
Baton Rouge, LA	LA	8	15118	2,934.3	1,439.1	284.5	469.5	745.9	3,127.8	373.6	189.6
Hammond, LA	LA	10	14028	774.0	3,707.6	166.5	567.3	3,952.7	3,412.0	414.3	152.1
Lafayette, LA	LA	10	19289	3,270.9	2,097.7	358.5	235.2	4,351.1	1,209.8	271.7	116.3
Monroe, LA	LA	6	11558	1,013.6	2,048.9	121.9	-223.6	3,854.5	1,182.7	374.2	209.3
New Orleans-Metairie, LA	LA	16	38178	6,965.8	8,378.7	708.7	238.3	3,012.7	5,551.2	371.1	170.4
Shreveport-Bossier City, LA	LA	9	26514	6,741.7	3,292.9	258.4	3,215.1	4,686.8	3,975.1	270.6	468.5
Portland-South Portland, ME	ME	9	29510	6,352.6	-1,512.3	575.7	2,433.6	998.7	1,222.9	-102.0	186.9
Baltimore-Columbia-Towson, MD	MD	23	137509	-256.7	12,403.3	653.6	-650.6	34,024.2	33,812.4	7,697.5	1,667.9
Salisbury, MD-DE	MD	4	12529	-1,398.3	1,500.1	305.9	1,025.2	322.9	385.6	491.4	-58.0
Silver Spring-Frederick-Rockville, MD	MD	7	39817	-1,083.0	4,232.0	109.9	129.2	8,825.6	11,402.5	2,821.1	455.4
Boston, MA	MA	39	180540	39,929.4	35,368.4	1,326.9	3,479.0	59,021.9	41,471.1	6,653.0	2,085.0
Cambridge-Newton-Framingham, MA	MA	6	24718	-76.6	4,927.2	261.1	1,774.7	10,619.1	6,069.0	1,162.5	343.9
Springfield, MA	MA	5	10762	465.1	1,914.8	206.4	1,647.4	2,530.6	1,985.4	398.7	97.0
Worcester, MA-CT	MA	4	22901	4,499.4	4,305.2	255.1	4,011.7	8,345.2	4,062.0	724.5	237.3
Ann Arbor, MI	MI	9	49324	12,215.5	8,012.8	356.2	867.9	9,298.5	9,586.9	2,300.2	740.1
Detroit-Dearborn-Livonia, MI	MI	8	29851	4,684.6	9,220.2	191.4	1,026.7	12,834.6	4,203.3	610.0	306.2
Flint, MI	MI	16	95636	17,905.6	19,050.2	380.2	346.9	38,401.6	17,947.8	3,261.9	1,652.6

Appendix E

$(A-E) for Best Practice Norm in thousands (000) by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Kalamazoo-Portage, MI	MI	4	17354	1,518.2	-451.3	261.7	234.5	613.0	3,315.9	773.8	76.8
Lansing-East Lansing, MI	MI	5	20598	1,661.1	1,134.2	158.7	91.4	2,754.9	2,673.1	1,624.1	227.4
Muskegon, MI	MI	8	31465	5,173.6	1,268.4	567.2	18,966.8	704.8	-224.7	425.5	387.8
Warren-Troy-Farmington Hills, MI	MI	15	71436	12,602.8	19,513.6	691.8	6,707.3	18,375.1	18,256.2	2,138.2	861.4
Duluth, MN-WI	MN	4	9917	1,646.8	-500.0	53.2	495.5	-254.8	668.5	175.5	96.6
Minneapolis-St. Paul-Bloomington, MN-WI	MN	34	140037	22,931.3	2,731.9	724.9	9.1	15,744.1	19,756.2	5,048.4	1,398.6
Rochester, MN	MN	4	26139	6,855.0	-609.8	70.1	776.9	1,649.9	-475.8	406.2	516.5
Gulfport-Biloxi-Pascagoula, MS	MS	5	16221	3,027.0	3,244.1	322.8	1,357.0	2,460.8	239.0	-264.0	123.7
Jackson, MS	MS	18	59795	16,243.6	14,379.1	489.9	261.8	13,139.3	12,712.7	3,122.4	410.8
Jefferson City, MO	MO	7	10727	310.7	914.7	159.4	176.3	544.3	1,847.5	778.5	206.4
Kansas City, MO-KS	MO	33	90091	2,657.9	18,355.0	450.4	13,836.1	27,502.7	12,298.8	5,370.4	1,298.2
Springfield, MO	MO	5	27954	4,721.8	1,878.2	344.3	2,213.4	2,938.3	4,856.2	1,604.7	418.9
St. Louis, MO-IL	MO	35	130395	27,876.7	22,367.5	1,005.4	688.1	20,059.3	20,475.4	3,029.1	2,022.5
Missoula, MT	MT	4	12633	1,269.9	-1,207.4	31.7	513.5	804.9	1,066.7	135.8	182.4
Lincoln, NE	NE	5	19162	1,304.6	-1,585.5	-188.0	39,274.6	2,967.2	1,819.8	916.0	199.8
Omaha-Council Bluffs, NE-IA	NE	14	40549	6,468.3	3,341.7	87.2	64,466.6	6,420.5	1,077.3	868.9	531.5
Las Vegas-Henderson-Paradise, NV	NV	16	54776	11,415.9	17,842.7	538.5	703.1	19,952.1	10,320.8	4,057.6	674.0
Manchester-Nashua, NH	NH	5	22858	5,901.7	2,841.7	194.6	3,200.4	5,271.1	6,030.4	1,119.2	-7.3
Rockingham County-Strafford County, NH	NH	4	11216	778.4	1,634.3	169.9	2,986.6	3,847.4	1,007.2	618.3	78.0
Atlantic City-Hammonton, NJ	NJ	4	25397	4,101.8	5,293.1	180.8	501.2	11,292.0	4,378.0	1,263.9	199.7
Camden, NJ	NJ	7	44311	8,342.6	8,756.7	226.1	3,784.3	16,307.9	10,499.6	3,094.6	479.8
Newark, NJ-PA	NJ	12	57964	10,419.5	8,427.4	155.3	1,269.7	19,186.5	7,428.5	2,570.5	364.3
Las Cruces, NM	NM	4	11872	1,744.1	3,073.4	152.8	2,865.2	3,870.3	327.3	626.1	186.9
Santa Fe, NM	NM	9	23898	3,705.6	-817.1	215.4	610.3	644.2	1,184.6	1,383.2	244.6
Albany-Schenectady-Troy, NY	NY	9	28211	7,447.6	5,488.2	119.9	499.6	8,762.3	1,219.7	691.3	-39.0
Buffalo-Cheektowaga-Niagara Falls, NY	NY	11	37829	11,171.5	7,585.9	338.2	1,058.8	11,055.3	4,442.1	956.0	540.4
Burlington-South Burlington, VT	NY	4	14735	2,226.2	1,902.6	271.1	-451.2	1,909.5	-30.3	17.3	-196.4
Nassau County-Suffolk County, NY	NY	51	299731	79,182.2	64,175.4	180.6	525.1	136,409.2	11,168.5	10,268.3	2,066.7
New York-Jersey City-White Plains, NY-NJ	NY	76	335731	68,501.2	66,797.5	326.2	99.4	127,058.6	49,528.2	13,266.8	2,228.3
Rochester, NY	NY	9	16048	3,352.4	3,585.6	216.2	230.2	5,796.3	4,062.1	342.9	88.8
Syracuse, NY	NY	9	32876	5,957.8	5,744.3	209.2	1,096.5	8,022.1	4,617.2	1,340.9	390.6
Charlotte-Concord-Gastonia, NC-SC	NC	24	85392	16,642.1	8,012.8	1,355.6	-179.7	7,609.6	11,431.1	4,848.2	974.1
Durham-Chapel Hill, NC	NC	10	58721	10,018.2	7,354.2	592.6	635.2	5,035.2	5,412.2	2,243.3	607.2
Greenville, NC	NC	4	28883	7,669.9	4,829.6	419.0	514.1	3,524.8	4,056.4	727.9	281.4
Raleigh, NC	NC	9	55299	13,833.2	6,817.6	711.6	71.9	6,697.8	10,355.0	2,429.5	565.7
Winston-Salem, NC	NC	6	22703	7,314.5	1,853.8	310.2	732.3	-94.4	2,104.9	1,295.9	405.5
Cincinnati, OH-KY-IN	OH	21	76260	7,742.2	11,427.7	582.7	7,048.8	16,141.2	5,787.5	2,392.9	853.3
Cleveland-Elyria, OH	OH	37	135324	32,835.5	23,135.8	814.1	144.6	29,493.1	25,150.7	5,474.9	1,459.2
Columbus, OH	OH	25	91983	20,727.5	10,756.9	1,030.7	646.8	9,101.6	25,678.3	6,085.3	1,014.0
Dayton, OH	OH	6	12437	1,183.1	3,463.7	208.9	568.7	1,803.3	3,555.0	1,191.5	212.0
Lima, OH	OH	6	14606	252.8	1,463.5	137.9	-121.7	3,651.2	1,137.8	1,447.9	354.4
Toledo, OH	OH	10	25694	1,786.7	4,171.0	309.4	3,834.7	6,904.9	2,513.4	476.0	369.1
Youngstown-Warren-Boardman, OH-PA	OH	6	10481	-199.8	2,573.4	58.7	947.0	2,980.7	295.3	472.7	177.5
Enid, OK	OK	4	5570	-171.5	463.4	107.2	2,243.6	-270.6	-134.9	-87.6	118.9
Oklahoma City, OK	OK	33	85302	18,937.4	9,830.0	1,523.5	4,284.8	7,719.5	4,955.8	1,991.8	1,398.6

Appendix E

$(A-E) for Best Practice Norm in thousands (000) by CBSA

				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tulsa, OK	OK	19	36148	2,716.3	4,500.3	237.0	-551.2	4,248.1	5,839.4	1,617.1	392.1
Eugene, OR	OR	5	15432	3,436.3	146.4	251.0	43.9	2,151.0	-59.5	-441.5	230.8
Portland-Vancouver-Hillsboro, OR-WA	OR	19	47607	8,982.5	-2,683.1	742.1	409.4	1,559.9	2,751.4	841.4	564.8
Allentown-Bethlehem-Easton, PA-NJ	PA	14	38323	3,993.1	5,280.9	180.0	1,321.2	14,682.0	3,811.9	1,938.4	293.9
Montgomery County-Bucks County-Chester County, PA	PA	16	47342	5,167.3	5,207.7	-5.6	3,517.8	18,091.7	13,078.4	3,302.5	592.1
Philadelphia, PA	PA	29	119778	24,101.4	21,038.1	485.7	4,032.4	36,952.7	19,902.2	3,796.7	2,125.6
Pittsburgh, PA	PA	35	95850	20,906.3	21,404.0	432.5	3,433.0	31,950.9	12,882.9	4,173.7	1,252.9
York-Hanover, PA	PA	7	19773	1,783.5	219.5	57.3	1,621.6	5,097.5	3,456.9	1,425.5	133.3
Providence-Warwick, RI-MA	RI	11	47289	7,482.5	9,695.8	400.3	2,702.4	17,314.0	7,886.1	2,200.4	524.9
Charleston-North Charleston, SC	SC	9	35881	3,195.4	5,110.1	795.6	8,639.7	3,560.1	154.5	1,378.4	515.5
Columbia, SC	SC	6	19754	6,250.4	524.4	180.9	741.5	326.5	185.6	893.2	219.9
Florence, SC	SC	5	16710	2,478.8	4,719.9	292.2	-276.4	3,888.7	2,331.2	497.8	177.1
Greenville-Anderson-Mauldin, SC	SC	14	60136	10,161.1	-280.5	399.8	-124.6	3,310.8	6,507.9	1,664.7	161.8
Myrtle Beach-Conway-North Myrtle Beach, SC-NC	SC	4	17527	295.5	2,573.4	312.6	528.7	3,685.4	2,896.7	833.5	87.5
Sioux Falls, SD	SD	4	19586	2,342.2	-963.5	-87.6	7,933.6	2,301.9	996.3	613.7	348.4
Chattanooga, TN-GA	TN	8	32149	5,979.0	2,390.4	258.8	4,955.0	4,529.4	2,421.0	1,249.6	151.8
Knoxville, TN	TN	10	33842	7,126.1	4,536.9	344.9	127.3	3,603.7	3,343.9	2,060.2	380.7
Memphis, TN-MS-AR	TN	21	97251	22,273.5	19,525.8	1,542.7	884.7	19,983.2	14,953.8	5,545.1	804.4
Nashville-Davidson--Murfreesboro--Franklin, TN	TN	32	98139	11,457.3	16,769.5	818.3	1,027.8	20,018.2	11,355.9	5,994.9	867.7
Austin-Round Rock, TX	TX	21	55744	3,881.0	5,793.1	449.2	330.1	12,204.4	7,374.1	2,979.2	780.0
Beaumont-Port Arthur, TX	TX	4	10205	1,654.5	1,731.8	249.8	-1,319.6	806.8	738.0	241.5	8.6
Brownsville-Harlingen, TX	TX	6	19796	2,026.3	4,817.4	184.5	-744.6	6,378.9	1,014.1	754.3	259.9
College Station-Bryan, TX	TX	4	3882	547.2	109.8	111.3	659.0	-417.4	811.5	171.6	29.2
Corpus Christi, TX	TX	5	15536	2,558.7	2,841.7	150.5	6,878.0	3,385.3	-93.9	463.6	150.2
Dallas-Plano-Irving, TX	TX	82	187027	25,098.9	31,624.2	1,372.7	351.5	48,625.9	21,737.5	9,383.5	1,763.0
El Paso, TX	TX	6	9934	2,555.4	2,622.1	62.1	2,324.9	4,072.4	-85.5	216.8	63.9
Fort Worth-Arlington, TX	TX	8	6894	331.8	768.3	97.4	112.3	660.3	41.3	274.1	121.2
Houston-The Woodlands-Sugar Land, TX	TX	60	146355	35,162.5	33,648.8	1,043.0	6,689.1	37,713.4	34,592.3	10,550.4	1,984.7
Killeen-Temple, TX	TX	5	27928	4,984.4	3,683.2	247.3	393.6	5,562.1	1,108.8	1,246.6	354.1
Longview, TX	TX	10	19697	2,204.1	4,036.9	394.0	2,371.8	1,743.1	4,784.2	882.9	153.7
Lubbock, TX	TX	5	19641	1,104.9	1,451.3	218.7	-176.2	2,323.1	2,895.3	872.4	73.6
McAllen-Edinburg-Mission, TX	TX	4	10198	857.5	2,536.8	86.8	33,598.0	2,599.9	237.7	272.3	199.5
Odessa, TX	TX	5	9650	2,558.9	865.9	131.2	45,223.5	783.8	1,199.3	293.8	34.4
San Antonio-New Braunfels, TX	TX	16	51394	4,094.4	6,110.2	125.9	728.6	12,724.9	1,957.8	2,212.6	755.6
Tyler, TX	TX	6	22778	4,076.9	573.2	236.4	662.4	1,475.0	3,156.7	1,135.8	167.6
Salt Lake City, UT	UT	23	39343	2,096.9	-5,366.2	298.2	-67.7	3.6	-1,843.9	2,701.2	382.1
Blacksburg-Christiansburg-Radford, VA	VA	4	8895	898.9	1,780.6	196.9	1,399.0	867.3	31.4	283.3	171.0
Charlottesville, VA	VA	5	39561	6,374.5	3,207.5	498.7	480.6	4,621.9	3,284.3	700.6	457.5
Richmond, VA	VA	14	58893	9,086.6	5,500.4	669.6	837.9	13,140.5	56.6	2,511.5	604.3
Roanoke, VA	VA	6	27533	2,284.7	3,853.9	328.7	-105.3	3,329.7	1,409.9	875.9	320.3
Virginia Beach-Norfolk-Newport News, VA-NC	VA	14	62215	12,955.6	9,134.8	1,020.7	6,602.8	5,653.2	2,030.3	2,266.6	481.6
Seattle-Bellevue-Everett, WA	WA	19	69969	16,785.8	402.5	742.2	32.8	5,972.2	1,465.6	2,769.4	666.1
Spokane-Spokane Valley, WA	WA	4	19083	4,168.7	-1,158.6	276.6	2,543.2	-693.9	418.6	471.7	346.9

Appendix E

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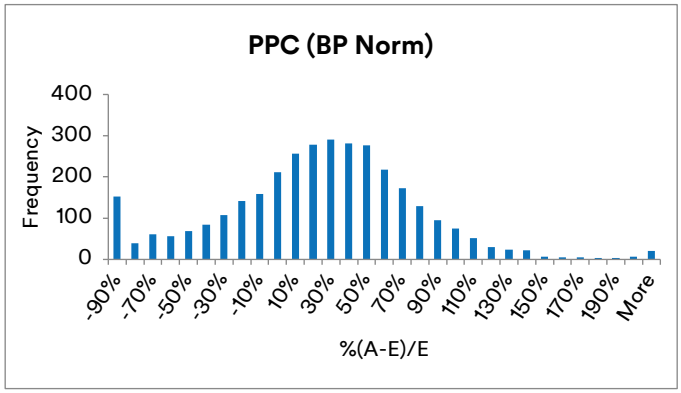
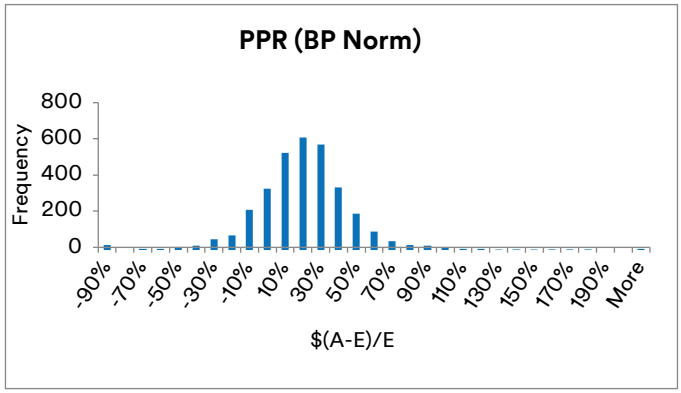
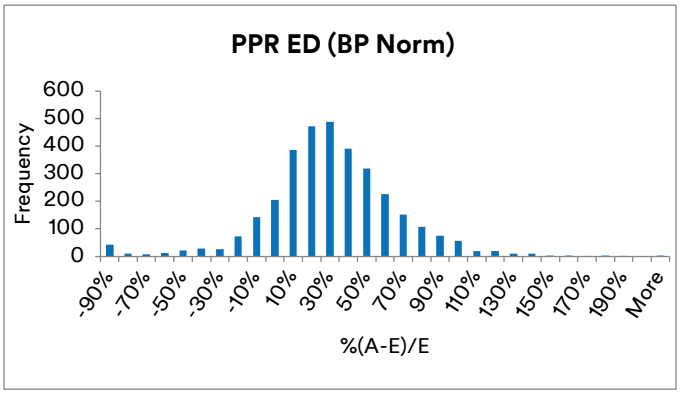
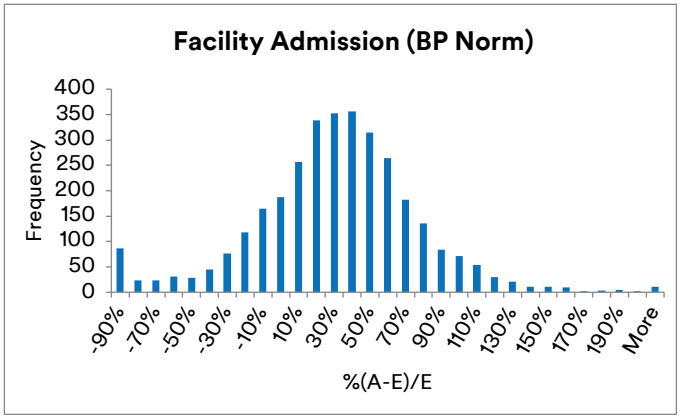
				Inpatient Measures			Outpatient Measures				
CBSA Description	State	Hospitals	Admissions	PPCs	PPRs	PPREDs	Fac Adm	Adm ED	ED Obs	ED Anc	Comp Osurg
Tacoma-Lakewood, WA	WA	10	44641	8,910.6	158.5	524.5	-56.1	-703.0	124.8	1,532.4	532.0
Charleston, WV	WV	5	21595	5,217.5	3,158.8	180.5	177.8	4,961.5	4,180.8	1,144.8	282.5
Huntington-Ashland, WV-KY-OH	WV	10	36088	9,547.1	10,049.5	838.1	-49.9	6,131.4	7,495.5	2,598.3	417.8
Wheeling, WV-OH	WV	4	3060	72.0	817.1	60.1	397.7	662.9	646.0	15.7	-25.9
Appleton, WI	WI	6	11880	1,788.9	-292.7	63.6	16,417.6	756.6	543.5	-40.7	242.8
Madison, WI	WI	9	31185	4,235.9	268.3	289.4	2,398.2	3,711.5	3,681.7	938.6	359.0
Milwaukee-Waukesha-West Allis, WI	WI	19	30373	2,837.5	914.7	334.9	2,046.0	3,450.4	4,117.8	636.9	354.6

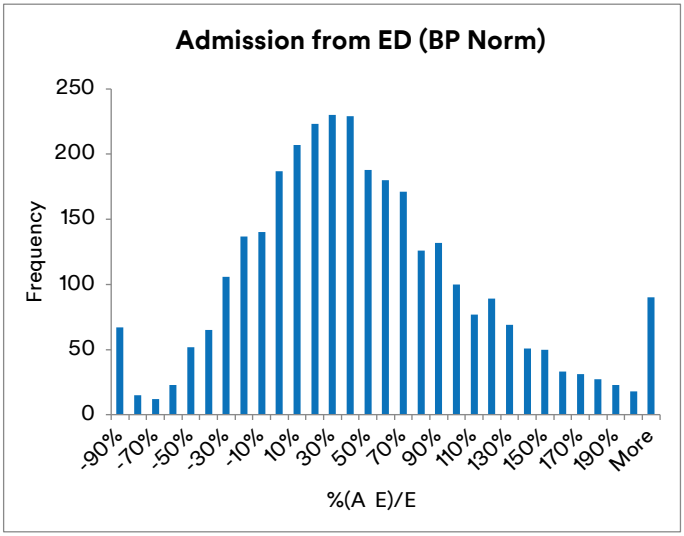
Appendix F: Histograms of %(A-E)/E and $(A-E)/At Risk by Number of Hospitals for the Best Practice Norm

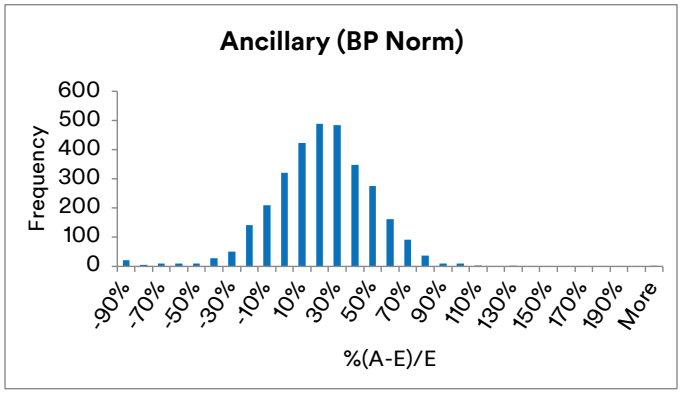












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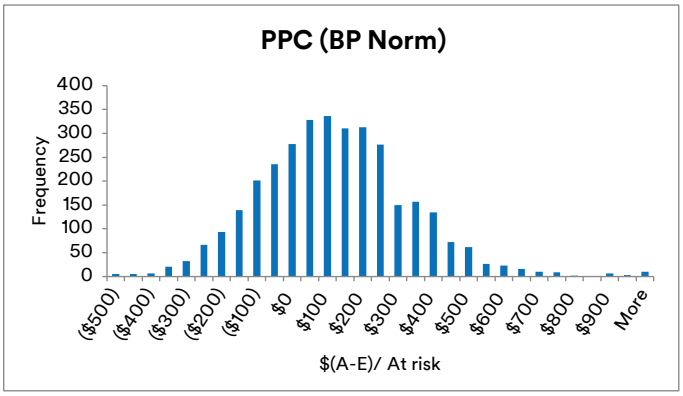

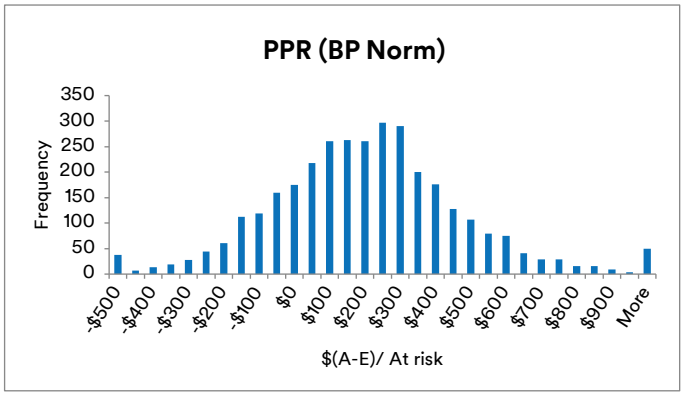

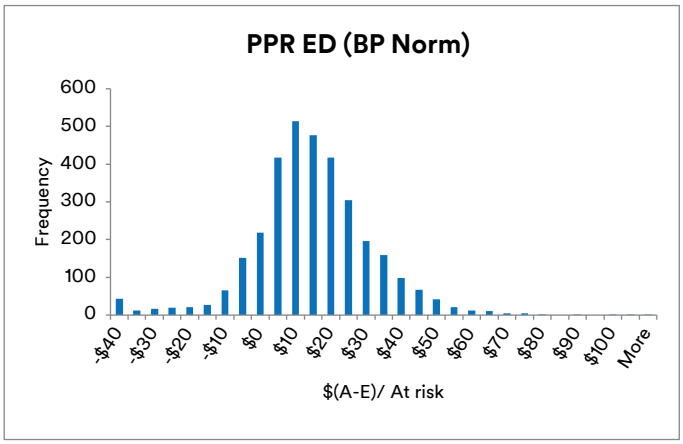

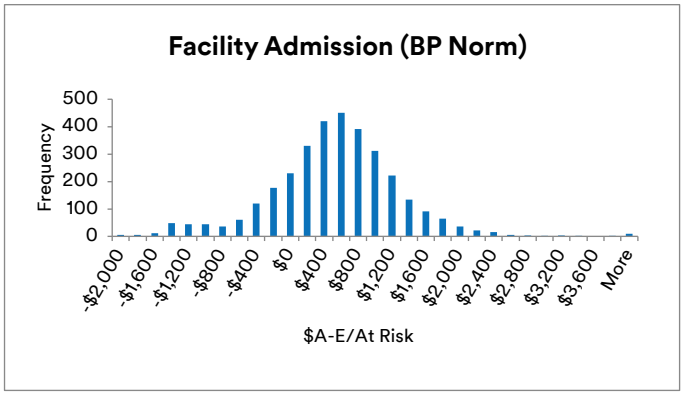

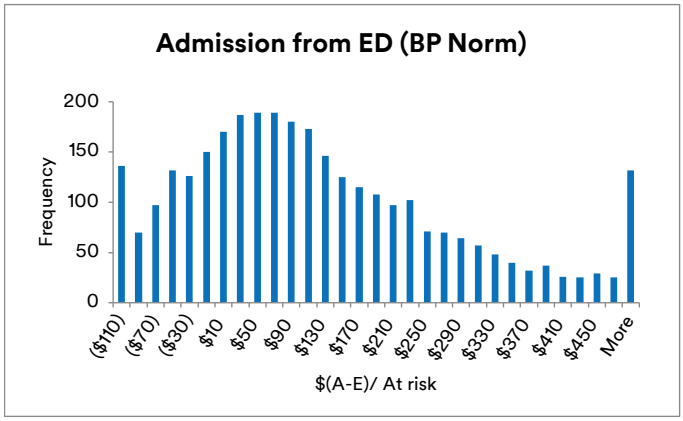

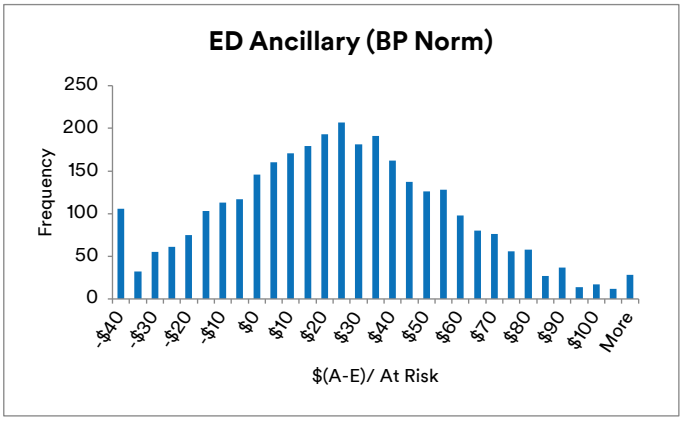

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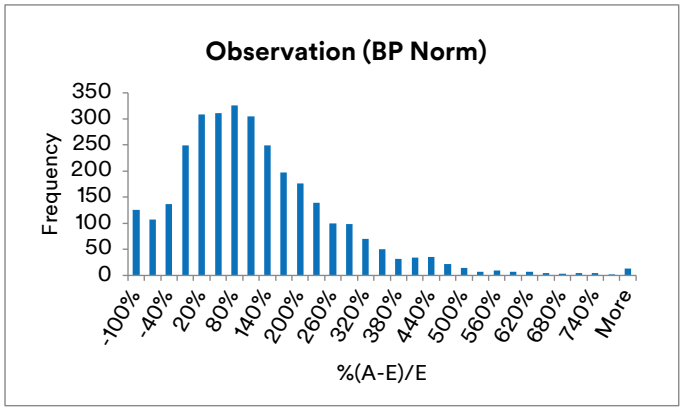

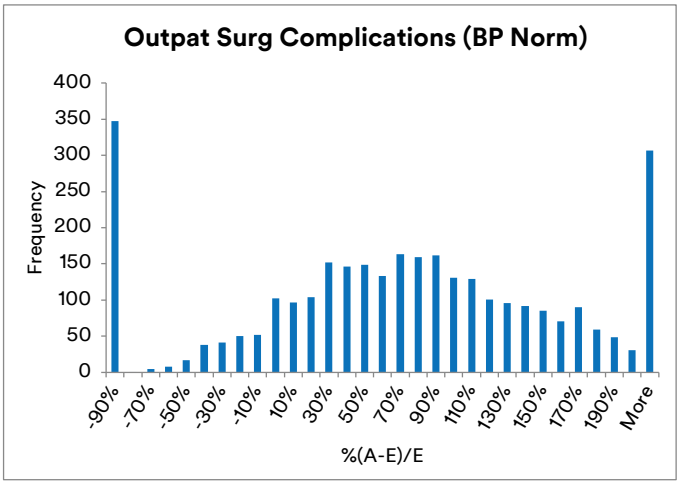

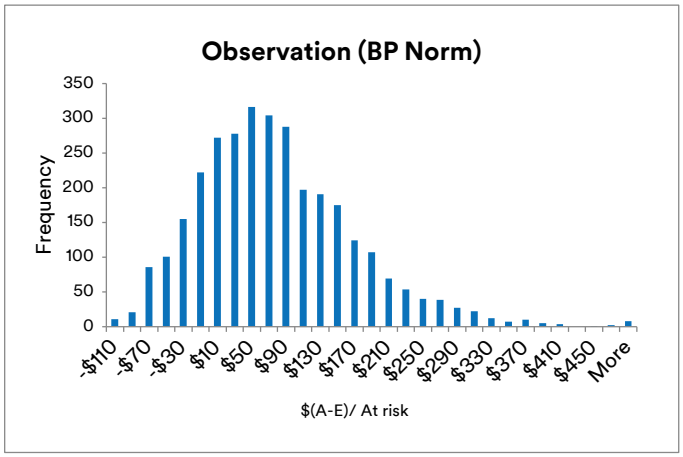

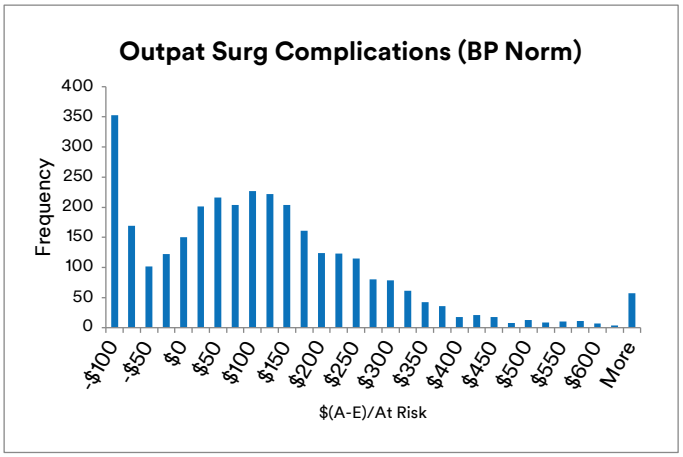

Appendix G: %(A-E)/E and $(A-E) for the Best Practice Norm by Type of Hospital

		Hosps	Hosp Adm	PPCs	PPRs	PPREDs	PAC Adm	Adm ED	ED Obs	ED Anc	Out Surg
IME	Top 10 %	333	1,939,596	51.54	22.55	17.31	29.82	79.85	149.24	22.41	74.32
	All Other	2,996	8,004,050	30.56	14.57	22.04	28.95	49.42	112.26	23.98	62.33
DSH	Top 20%	668	1,813,022	43.06	26.69	26.89	24.48	60.52	94.97	14.80	82.79
	Middle 60%	1,996	6,789,676	34.72	14.44	21.45	30.37	50.94	119.97	25.09	71.93
	Bottom 20%	665	1,340,948	27.20	10.15	11.36	32.22	59.06	134.57	28.46	57.52
Location	Large Urban	1,353	4,500,715	36.80	19.41	16.67	34.00	71.24	136.04	28.54	72.23
	Other Urban	953	3,164,581	32.37	12.65	24.32	24.03	46.62	102.64	22.94	73.01
	Rural	1,023	2,278,350	36.36	14.47	25.52	29.32	34.26	106.48	17.64	68.57
Size	Top 10%	333	3,087,770	46.02	17.78	15.67	31.69	74.65	152.34	32.24	73.08
	All Other	2,996	6,855,876	29.25	15.35	23.56	24.39	47.48	107.25	21.48	68.23

%(A-E)/E by hospital type with best practice norm

		Hosps	Hosp Adm	PPCs	PPRs	PPREDs	PAC Adm	Adm ED	ED Obs	ED Anc	Out Surg
IME	Top 10%	333	1,939,596	548.4	376.0	13.2	731.0	454.9	240.9	54.0	82.5
	All Other	2,996	8,004,050	1,119.7	1,021.0	71.2	143.9	1,703.3	1,121.3	372.8	23.9
DSH	Top 20%	668	1,813,022	375.6	420.2	19.9	118.4	429.9	197.6	46.0	18.9
	Middle 60%	1,996	6,789,676	1,125.5	862.5	58.5	617.1	1,408.5	959.3	311.1	74.7
	Bottom 20%	665	1,340,948	167.0	114.2	6.0	139.4	319.7	205.4	69.8	12.9
Location	Large Urban	1,353	4,500,715	800.7	756.2	30.1	440.4	1,209.4	648.2	209.6	47.6
	Other Urban	953	3,164,581	492.8	351.5	31.0	227.6	582.2	376.7	130.1	34.5
	Rural	1,023	2,278,350	374.5	289.2	23.3	206.9	366.6	337.3	87.1	24.3
Size	Top 10%	333	3,087,770	782.2	479.0	19.2	676.4	689.9	398.1	123.4	69.6
	All Other	2,996	6,855,876	885.8	918.0	65.2	198.4	1,468.3	964.2	303.5	36.8

$(A-E) in millions (000,000) by hospital type with best practice norm

Appendix H: Calculations for HOA Simulations

m = QOPM
h = hospital

C(h,m) = $(A-E) = financial impact of performance difference in hospital. h for QOPM m

Note that for a hospital the value of C(h,m) for QOPM m can be either positive or negative

Z(h) = Total inpatient Medicare payments to hospital h

X = fractional limit of financial impact from any one QOPM (set to 0.03 per HOA)

B(h,m) = adjusted financial impact of QOPM m in hospital h

If C(h)/Z(h) is greater than +/- 0.03 then set
B(h,m) equal to +/- 0.03*Z(h) with the same sign as C(h,m)

R(h) = Total financial impact of QOPM performance in hospital h
R(h) = sum over m B(h,m)

Note that for a hospital good QOPM performance on one QOPM (negative B(h,m)) can offset poor QOPM performance (positive B(h,m)) on another QOPM

Y = fractional limit of total financial impact of QOPM performance for a hospital (set to 0.03 per HOA)

F(h) = Adjusted total financial impact of QOPM performance in hospital h

If F(h)/Z(h) is greater than +/- 0.03 then set
F(h) equal to +/- 0.03*Z(h) with the same sign as R(h)

G(h) = Quality based outcome performance factor for hospital h
G(h) = 1.0 – F(h)/Z(h)

Note that for a hospital G(h) can be greater or less than 1.0

Calculate budget neutrality factor K:

L = sum of QOPM performance adjusted payments
L = Sum over h [G(h) * Z (h)]
P = sum of actual payments
P = sum over h Z (h)

K = Budget neutrality factor
K = P/L

S(h) = Budget neutral financial impact of QOPM performance in hospital h
S(h) = G(h)*Z(h)*K

M = Overall penalty $ = sum over h S(h) for hospitals with G(h)<1.0
J = Overall bonus $ = sum over h S(h) for hospitals with G(h)>=1

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