A Comprehensive Review of Development and Testing for National Implementation of Hospital Core Measures

This overview is intended to summarize the challenges and decisions that impacted the development and testing of acute myocardial infarction (AMI) heart failure (HF) and community acquired pneumonia (CAP) hospital core measures, as well as to provide the clinical rationale that supported the measures that were originally contained within the Joint Commission on Accreditation of Healthcare Organization's (Joint Commission) initial core measure sets for hospitals.

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Background

The Joint Commission began development of performance measures with the inception of the Agenda for Change in 1987. Eventually these activities were subsumed into what became called the ORYX[®] initiative. The initial phase of the ORYX initiative offered health care organizations significant flexibility. Organizations could meet accreditation requirements by selecting from among literally hundreds of performance measurement systems and thousands of performance measures that best served their strategic measurement goals. The flexibility made available through the initial phases of the ORYX initiative also presented certain challenges. Most notable was the inability to compare health care organization data across systems and between disparate measures. The next phase of the ORYX initiative was intended to address this challenge through the use of standardized, evidence based measures.

In 1999, the Joint Commission sought input from a variety of stakeholders including clinical professionals, hospitals, consumers, state hospital associations and medical societies about potential focus areas for an initial set of hospital core measures. Once focus areas were identified, advisory panels were convened to identify measures that, when viewed together, permitted a robust assessment of the care provided in a given focus area. The Attributes of Core Performance Measures and Associated Evaluation Criteria were used to evaluate candidate measures for potential use as core measures. Stakeholder engagement was actively sought by posting the potential core measures on the Joint Commission web site. A variety of stakeholders, including clinical professionals, health care provider organizations, health care consumers and performance measurement experts provided over 1,600 comments. These comments helped to mold and shape the specifications for the initial core measure sets prior to pilot testing. They also contributed to the postponement of implementation for the Surgical Procedures and Complications core measure set. Stakeholder comments and additional research indicated that consensus among the major professional organizations and stakeholder groups in this area was lacking in this area. Therefore, development of the Surgical Procedures and Complications core measure set was delayed until consensus could be reached.



The Hospital Core Measure Pilot Project

Once the initial specifications for the first sets of core measure were developed, the Joint Commission initiated a pilot project to test the feasibility, usefulness, and costs associated with the implementation of core measures. Participants were drawn from eleven state hospital associations that expressed an interest in participating in a pilot project. Five were randomly selected to participate (Connecticut, Michigan, Missouri, Georgia and Rhode Island). Each hospital association then identified a single performance measurement system and 7 - 28 participant hospitals. The resulting project was a collaborative effort among the Joint Commission, five state hospitals associations, 5 listed measurement systems, and 83 hospitals in nine states (Connecticut, Michigan, Missouri, Georgia, Rhode Island, Texas, Virginia, California and South Carolina).

The Joint Commission solicited ongoing feedback from participating systems and hospitals to modify core measure specifications throughout the project. Joint Commission staff also visited a random sample of 16 participating hospitals to assess the reliability of core measure data elements.

Participant demographics are presented below:



Participating Hospital Demographics By State

*One participating hospital withdrew from participation in September 2001





Participating Hospital Demographics

*One participating hospital withdrew from participation in September 2001

Participating Hospital Demographics



*One participating hospital withdrew from participation in September 2001



Measure Set Selections AMI 49 Core Measure Set 72 HF CAP 57 0 10 20 30 40 50 60 70 80 Number of Hospitals

Participating Hospital Demographics

*One participating hospital withdrew from participation in September 2001

Objectives of the Pilot Project

- 1. Gain an early base of experience in implementing a limited number of core measures derived largely from the CMS PRO 6th Scope of Work quality indicators as adapted by the Joint Commission;
- 2. Assess the technical aspects of embedding core measures into disparate listed performance measurement systems, including the use of standardized technical specifications and calculation algorithms, the time required for systems to embed the measures, and the Joint Commission's ability to verify that the measures were embedded by the systems correctly;
- 3. Evaluate the training, staffing, and time required for data collection both at the system and health care organization level; Assess issues related to data quality (accuracy and completeness), data sources, data
- 4. elements, data definitions (e.g., problematic, difficult to collect data elements) and costs of data collection/abstraction; track trends and patterns in missing data to observe and understand potential variation across participating systems;
- 5. Assess whether all required data elements can be transmitted to the Joint Commission from the system on a timely basis;
- 6. Assess the level of Joint Commission support that is necessary for performance measurement systems implementing core measures;
- 7. Assess the Joint Commission's ability to handle missing and aberrant data.
- 8. Assess the Joint Commission's ability to produce control and comparison charts for core measure data; and



9. Study the use of core measures in hospital performance improvement efforts.

Data Collection Effort:

Each month, hospitals participating in the core measure pilot project submitted an activity log created by the Joint Commission that summarized the hospital's core measure activity during the previous month. Each activity log identified the type of activity (e.g., case identification, case abstraction), profession of the person(s) engaged in that activity, and the number of hours spent during the month. This initial analysis includes data from January – December 2001. The graphs presented below display a breakdown of the average time spent on core measure data collection effort by participating hospitals.

Figure 1illustrates the median (50th percentile) amount of time participating hospitals spent on core measure activities. Since case volume tends to be the most significant predictor of activity time, the graph includes a break down by hospital bed size (small hospitals -- 100 or fewer beds, and larger hospitals – greater than 100 beds).









Figure 2 Average Core Measure Activity Hours (excluding hospitals collecting all 3 core measure sets) Breakdown by 100 Hospital Beds

Figure 3 illustrates the differences in the average amount of time participating hospitals spent on core measure activities depending upon the measure sets they selected (including hospitals that selected all three core measure sets). Note that the increases in activity hours for the hospitals collecting three core measure sets are likely due to additional data collection activities that were not a requirement of the core measure pilot project (i.e., retrospectively collecting multiple months of data during the specified time period).



Estimating Core Measure Activity Time:

In an independent study of the data collection effort, one of the participating measurement systems (the Qualidigm Quality Partnership) measured actual time spent abstracting data per case for the 10 Rhode Island hospitals participating with their system. Each hospital collected data for the three core measure sets (AMI, HF, and CAP) for a period of 12 months, beginning in October 2000.

To measure activity time per record, Qualidigm used a modified version of the CMS MedQuest data collection tool, which records the actual time spent abstracting each chart. Median time per hospital, per measure set, per chart was then calculated:

AMI	=	15.6 minutes (0.26 hours/case)
HF	=	12 minutes (0.20 hours/case)
CAP	=	12.6 minutes (0.21 hours/case)

Qualidigm also experimented with adjusting the "actual" time to provide a better estimate of total time and money per core measure set selected. The actual times were adjusted to account for time spent identifying records (i.e., locating and gathering records for data abstraction) and for productivity limitations (i.e., confounding activities that preclude absolutely efficient data abstraction). Therefore, 0.1 hours were added to the median to account for time spent identifying and retrieving charts. This new figure was then divided by 0.80 (as an estimate of actual productivity).

The results, as adjusted, were:

AMI	=	27 minutes (0.45 hours/case)
HF	=	22.2 minutes (0.37 hours/case)
CAP	=	23.4 minutes (0.39 hours/case)

Using these figures, it is possible to achieve a rough estimate of the resources required per measure set for a given time period. To estimate core measure activity time, simply multiply the median abstraction time per case (i.e., 0.45 hours for AMI, 0.37 hours for HF) by the hospital's expected case volume for a given time period (i.e., 28 AMI cases per month, 40 HF cases per month). For example:

AMI: $0.45 \times 28 = 12.6$ hours per month

HF: 0.37 * 40 = 14.8 hours per month

Total = 27.4 hours per month



Note: Although these calculations were also supported by the Joint Commission's activity log data, individual results will vary significantly depending upon the skill of the abstractor, the quality of documentation in the medical record, the efficiency of the data collection tool, and a number of related factors. These figures should therefore be considered estimates, and the results should be interpreted with caution.

National Comparison Group Data from the Core Measure Pilot Project

The following graphs are based on the national comparison group data gathered during the course of the pilot project. Where possible, a comparison to the CMS 6^{th} Scope of Work results is provided.¹



Numerator: The upper portion of a fraction used to calculate a rate, proportion, or ratio. It is the proportion of the denominator which satisfies the conditions of the performance measure to be an indicator event. **Denominator:** The lower part of a fraction used to calculate a rate, proportion, or ratio. It is the population for a rate based measure.





Numerator: All AMI patients who received aspirin within 24 hours before or after arrival Denominator: AMI Patients without aspirin contraindications



Numerator: AMI patients who are prescribed aspirin at hospital discharge Denominator: AMI Patients without aspirin contraindications





Numerator: AMI patients who are prescribed ACEI at hospital discharge Denominator: AMI patients with LVSD without ACEI contraindications



Numerator: AMI patients who receive smoking cessation advice or counseling Denominator: AMI patients with a history of smoking cigarettes during the year prior to arrival





Numerator: AMI patients who are prescribed a beta blocker at discharge Denominator: AMI patients without beta blocker contraindications



Numerator: AMI patients who are prescribed a beta blocker within 24 hours after hospital arrival Denominator: AMI patients without beta blocker contraindications





Time (in minutes) from hospital arrival to administration of thrombolytic agent in patients with ST segment elevation or LBBB on the ECG performed closest to hospital arrival



Time (in minutes) from hospital arrival to PTCA in patients with ST segment elevation or LBBB on the ECG performed closest to hospital arrival





Numerator: Inpatient mortality of AMI patients Denominator: AMI patients



Numerator: HF patients with documentation that they or their caregivers were given written discharge instructions Denominator: HF patients discharged home





Numerator: HF patients with documentation that LVF was assessed prior to, during, or planned after discharge Denominator: HF Patients



Numerator: HF patients who are prescribed ACEI at hospital discharge Denominator: HF patients with LVSD without ACEI contraindications





Numerator: HF patients who receive smoking cessation advice or counseling Denominator: HF patients with a history of smoking cigarettes during the year prior to arrival



Numerator: CAP patients who receive oxygenation assessment with ABG or pulse oximetry within 24 hours Denominator: CAP patients including patients transferred from long term care facilities





Numerator: CAP patients screened for vaccine status and were not vaccinated due to refusal or contraindication, or needed vaccine and received it

Denominator: CAP patients including patients transferred from long term care facilities



Numerator: CAP patients whose blood cultures are collected before the first dose of antibiotic Denominator: CAP patients including patients transferred from long term care facilities





Numerator: Adult CAP patients who receive smoking cessation advice or counseling Denominator: Adult CAP patients with a history of smoking cigarettes during the year prior to arrival



Numerator: Pediatric CAP patients and/or their caregivers who receive smoking cessation advice or counseling Denominator: Pediatric CAP patients and/or their caregivers with a history of smoking cigarettes during the year prior to arrival





Time (in minutes) from hospital arrival to administration of first antibiotic for inpatients with pneumonia (Guideline recommends < 8 hours [480 minutes])



History of Core Measure Set Development and Revisions

Throughout 2001, the Joint Commission received feedback from the participating state hospital associations, measurement systems, and hospitals. This feedback, the analysis of on-site reliability data, and the Joint Commission's ongoing discussions with CMS, directed toward alignment of similar measures, led to an number of improvements and modifications to the original core measures, prior to their release on November 21, 2001.

Major Revisions:

- Initially surgical procedures and complications were identified by key Joint Commission stakeholders as one of the initial priority areas for hospital core measure development. However, CMS is currently developing quality indicators related to surgical infection prevention (SIP) including selection and timing of prophylactic antibiotics. The Joint Commission is a member of the SIP Project Panel. Therefore, the Joint Commission will delay implementing the surgical core measure set to allow the opportunity to continue to work with CMS.
- Discussions with CMS centered on measures shared between CMS and the Joint Commission and led to the development of common data element definitions and allowable values, and common measure population inclusions and exclusions.
- During the pilot, data were collected for 2 measures, both of which addressed the use of angiotensin converting enzyme inhibitors (ACEI), in order to determine which of these similar measures should be implemented nationally. One measure removed the contraindications from the numerator while the other measure removed the contraindications from the denominator. Due to the complexity in the design we needed to remove the contraindications from the numerator while numerator, the cardiovascular advisory panel recommended deleting this measure in favor of the measure that was implemented nationally.
- The measure pertaining to warfarin prescribed at discharge was deferred for national implementation. The measure was deferred because contraindications to warfarin are difficult and time consuming to abstract and the measure population for this indicator includes some patients not eligible for any other measures in the HF core set making it difficult to identify patients eligible for the measure.
- The AMI, HF and CAP measure set all contain a measure focused on adult smoking cessation advice/counseling. The measures specifications are identical with the exception of the measure population (denominator).

A more in depth description of the development and modifications made to each measure -- and the rationale behind those decisions -- is included within the measure set specific sections that follow:



Overview of the Acute Myocardial Infarction (AMI) Core Measure Set (3/22/2002)

Acute myocardial infarction (AMI) was identified by key Joint Commission stakeholders as one of the initial priority focus areas for hospital core measure development. The literature supports the importance of measuring the processes and outcomes of care for patients with AMI based primarily on disease prevalence. Currently, cardiovascular disease, including AMI, is the leading cause of death in the United States and is the primary disease category for hospital patient discharges.² Each year 900,000 people in the United States are diagnosed with AMI; of these, approximately 225,000 cases result in death and, it is estimated that an additional 125,000 patients die before obtaining medical care.³ The Joint Commission's cardiovascular advisory panel articulated the clinical logic that provided the framework for identifying inter-related, evidence-based measures that, when used together, can more fully assess the overall quality of care provided for AMI patients. The scope of the AMI core measure set was limited to patients 18 years of age and older because the clinical treatment of younger patients is substantially different.

Hospital AMI Core Measures – Initial Release

The following nine measures comprise the initial set of hospital AMI Core Measures and will be implemented on July 1, 2002.

- AMI-1 Aspirin at arrival
- AMI-2 Aspirin prescribed at discharge
- AMI-3 ACEI for LVSD
- AMI-4 Adult smoking cessation advice/counseling
- AMI-5 Beta blocker prescribed at discharge
- AMI-6 Beta blocker at arrival
- AMI-7 Time to thrombolysis
- AMI-8 Time to PTCA
- AMI-9 Inpatient mortality

Hospital AMI Core Measures – Recommended for Future Core Measure Set Completion

The following measures were identified for potential future implementation. The specific date for implementation has not yet been determined. They are not included in the initial set because no specific measures have been identified for implementation at this time.



- Lipid profile drawn within 24 hours of patient arrival for AMI
- Patients with abnormal lipid profile results with documented plan for lipid management (e.g., diet and/or drug therapy)
- AMI mortality within 30 days post AMI

Individual Measure Descriptions:

The following describes the rationale and related considerations underlying each of the measures currently included in the AMI Core Measure Set.

AMI-1 Aspirin at arrival AMI-2 Aspirin prescribed at discharge

Aspirin is estimated to prevent subsequent AMI in 3.5 to 4% of patients previously treated for AMI. Current guidelines recommend that a patient with suspected AMI, upon arrival to the emergency department (ED), should immediately receive aspirin.4 This indicator addresses aspirin administration anytime over the 24 hours prior to arrival and 24 hours after arrival at the hospital. The accommodation to 24 hours prior to arrival was believed important because of the increased public awareness about the benefits of immediate aspirin use (i.e., many patients are taking aspirin at home and/or emergency medical services are administering aspirin during transport). Preliminary data gathered during the Joint Commission's pilot project shows a mean measure rate of 94% for the aspirin at admission measure, and a rate of 95% for the asprin at discharge measure.

Equating aspirin equivalents (e.g., clopidogrel) with aspirin was considered for these measures, but was rejected at this time for two reasons:

- Measure construct should not precede published guidelines. Doing so may focus attention on potentially controversial issues rather than on quality improvement.
- Patients with contraindications to aspirin (e.g., active bleeding) are excluded from the measure population. Thus, patients receiving aspirin equivalents would also already have been eliminated.

Finally, during the pilot test, antiplatelet drugs and non-steroidal anti-inflammatory drugs (NSAIDs) were exclusions from the measure population (i.e., they were included on the contraindication list). Updated guidelines, however, do not include NSAIDs and antiplatelet drugs as contraindications for aspirin therapy; therefore, these medications were removed from the list of contraindications for aspirin at discharge.

AMI-3 ACEI for LVSD



Clinical trials have established that the use of angiotensin converting enzyme inhibitor (ACEI) begun after a patient has recovered from an AMI improves long-term survival; patients with anterior infarctions or a left ventricular ejection fraction (LVEF) level <40% have the greatest benefit from this treatment. This measure assesses whether ACEI were prescribed at discharge for patients with left ventricular systolic dysfunction (LVSD) who have the potential to receive the intended benefit. Preliminary data from the pilot project shows a mean measure rate of 83% indicating an opportunity for improvement. During the pilot project, this measure excluded patients from the denominator admitted on angiotensin receptor blocker (ARB) drugs. Since this time, however, the Heart Failure Society of America (HFSA) guidelines, which reflect the latest clinical trial results, were modified and recommend that ACEIs and ARBs should not be considered equivalent. The HFSA guidelines recommend ARBs as second-line drugs to be used only when there are contraindications to ACEI. Therefore, ARBs were eliminated as a contraindication to prescribing ACEI.

In the pilot project, bilateral renal artery stenosis was among the contraindications to ACEI at discharge. According to the CMS National Heart Failure Project baseline data, this was a rare event, present in only approximately 0.3 % of cases. Thus, to reduce data collection effort, bilateral renal artery stenosis was also eliminated as a contraindication to prescribing ACEI in the final measure specifications for national implementation.

Finally, chronic renal dialysis was a contraindication for prescribing ACEI during the pilot project. Currently most nephrologists and cardiologists consider ACEI an appropriate medication for patients with LVSD undergoing chronic renal dialysis. Therefore, chronic renal dialysis was removed from the list of categorical contraindications.

AMI-4 Adult smoking cessation advice/counseling

Each year, more than 430,000 deaths in the United States are attributed to a smoking related illness. ⁵ Smoking triggers coronary spasm, reduces the anti-ischemic effects of beta blockers, and increases mortality after AMI. Evidence indicates that within one year of quitting smoking, a patient's risk of acute myocardial reinfarction and AMI mortality is reduced. Because between one third and one half of AMI patients begin smoking again within 6 to 12 months of their diagnosis, the patient population for this measure includes those who have a history of smoking within one year of admission. ⁶

Preliminary data from the pilot project indicate that 65% of AMI patients with a history of smoking within the past year received smoking cessation advice or counseling. For



further discussion on smoking cessation measures, refer to material in the Overview of the Community Acquired Pneumonia Core Measure Set for Hospitals.

AMI-5 Beta blocker prescribed at discharge

AMI-6 Beta blocker at arrival

Evidence indicates that beta blocker therapy reduces both the degree of infarction and incidence of complications in patients not receiving concomitant thrombolytic therapy, and the incidence of reinfarction in patients who receive thrombolytic therapy. In addition, several placebo-controlled trials have shown that long-term beta blocker therapy decreases mortality by reducing the incidence of sudden and nonsudden cardiac death.⁷ Preliminary pilot test data on these measures reveal a mean rate of 90% for the beta blocker prescribed at discharge measure, and 85% for the beta blocker at arrival measure.

These beta blocker measures were originally adapted from the CMS PRO 6th Scope of Work (SOW) National AMI Project. The following contraindications to beta blockers were included initially in the measures: second and third degree heart block; bifasicular block; and PR interval >0.24 sec. interval. For ease of abstraction, and to reflect current treatment guidelines, the only categorical exclusions for prescribing beta blockers in the final measure specifications is the presence of second or third degree heart block. Bifasicular block and PR interval >0.24 sec. interval are acceptable contraindications only if so documented by a physician, nurse practitioner, or physician assistant as a reason for not prescribing a beta blocker. Shock on day of admission, documented by a physician, was added as a contraindication for the beta blocker on admission measure.

AMI-7 Time to thrombolysis

AMI-8 Time to PTCA

Evidence indicates that the timing of reperfusion is critical to the effective management of AMI patients and the earlier therapy is initiated, the better the outcome. Patients presenting with AMI and ST segment elevation or left bundle branch block (LBBB) are at a relatively high risk of death. This risk may be reduced by thrombolytic therapy or PTCA, but only if administered/performed in a timely manner. The greatest benefits of thrombolytic therapy are evident in the first 3 hours after the onset of symptoms, but there is proven benefit for up to 12 hours after the onset of symptoms.⁸

PTCA is associated with a 1-year survival rate of 90% to 96%. The timeliness of reperfusion is of great importance and interest to the public (it is one of the AMI



treatment issues addressed in Healthy People 2010), is very amenable to quality improvement efforts, and is the one indicator that requires that quality improvement activities be closely integrated across hospital departments.

The data elements comprising these two measures, particularly the time-related variables, are challenging to collect. This is primarily due to imprecise medical record documentation of time of patient arrival (found present in the medical record in 75% of the cases during the pilot test) and PTCA time (found present in the medical record in 70% of the cases). The data element assessing ST segment elevation is also problematic because ST segment elevation is often not stated explicitly in the ECG documentation. This lack of explicit documentation can result in cases being incorrectly eliminated from the population. However, the importance of these measures for monitoring AMI patient care transcends concerns raised by the data element related issues.

Preliminary data from the pilot test show an average median rate of 67.75 minutes for time to thrombolysis and an average median rate of 310.85 minutes (5.2 hours) for time to PTCA. Therefore both of these measure rates would indicate an opportunity for improvement, as current guidelines recommend 30 minutes to thrombolysis and 90 minutes to PTCA.

AMI-9 Inpatient mortality

Mortality of patients with AMI represents a significantly deleterious outcome that is potentially related to the quality of care. This rate-based indicator identifies an undesirable outcome of care, and measures only intrahospital inpatient mortality. Preliminary data from the pilot test show a mean measure rate of .09%.

Future Directions for the AMI Core Measure Set

The Joint Commission has chosen to measure time to thrombolysis and time to PTCA as a continuous variable for multiple reasons relating to both the spirit of the continuous quality improvement (CQI) cycle, and the opportunities for robust statistical analyses afforded by the use of X-bar and S control charts with respect to trending performance data overtime. Both the Joint Commission measure and the CMS measure are identical at the data element level; therefore, data collection is not affected by the difference in data reporting. However, the Joint Commission and CMS realize that both rates are important for quality improvement purposes; therefore, both organizations will report rates for this measure as a proportion and a continuous variable. The Joint Commission will prepare specifications for the proportion measures in 2002, with release expected later in the year.



Overview of the Heart Failure (HF) Core Measure Set (3/22/2002)

Heart failure (HF) was identified by key Joint Commission stakeholders as one of the initial priority focus areas for hospital core measure development. The literature supports the importance of measuring the processes and outcomes of care for patients with HF primarily based on disease prevalence. Nearly 5 million patients in the U.S. have HF, and approximately 500,000 to 900,000 new cases are diagnosed each year. Heart failure is the most common Medicare diagnosis-related group, and more Medicare dollars are spent for the diagnosis and treatment of HF than for any other diagnosis.⁹

The Joint Commission's cardiovascular advisory panel articulated the clinical logic that provided the framework for identifying inter-related, evidence-based measures that, when used together, can more fully assess the overall quality of care provided for HF patients. The scope of the HF core measure set is limited to patients 18 years of age and older because the clinical treatment of younger patients is handled substantially differently.

Hospital HF Core Measures – Initial Release

The following four measures comprise the initial set of hospital HF Core Measures and will be implemented on July 1, 2002.

- HF-1 Discharge instructions
- HF-2 LVF assessment
- HF-3 ACEI for LVSD
- HF-4 Adult smoking cessation advice/counseling

Individual Measure Descriptions:

The following describes the rationale and related considerations underlying each of the measures currently included in the HF Core Measure Set.

HF-1 Discharge instructions

Educating patients with heart failure and their families is critical. Patient non-compliance with physician's instructions is often a cause of re-hospitalization. It is thus important that health care professionals ensure that patients and their families understand the prognosis of heart failure, the rationale for pharmacotherapy and prescribed medication regimen, dietary restrictions, and activity recommendations, and the signs and symptoms of



deteriorating condition. Additionally, patients discharged from the hospital after an exacerbation of heart failure should have follow-up to ensure clinical stability.

It is necessary that all six discharge instructions (see measure specifications) be given to the patient in order to qualify as a numerator event for this measure. For quality improvement efforts, the Joint Commission has provided algorithms to performance measurement systems that will assist health care organizations in identifying the individual discharge instructions that are problematic. During the Joint Commission pilot project, several participants believed this measure afforded them the greatest opportunity for quality improvement initiatives within their institution. This is substantiated by the overall pilot project data-the mean rate for this measure was 28%.

HF-2 LVF assessment

Measurement of left ventricular performance is a critical step in the evaluation and management of almost all patients with suspected or clinically evident heart failure. The combined use of history, physical examination, chest x-ray, and electrocardiography cannot reliably distinguish between the major categories of HF: left ventricular systolic dysfunction, left ventricular diastolic dysfunction, or a non-cardiac etiology. If measurement of ventricular performance is not obtained in patients presenting with heart failure, appropriate treatment may be withheld. Specifically, patients with left ventricular systolic dysfunction will not be identified and, therefore, will not be treated with agents known to prolong life. Preliminary data from the pilot test demonstrate an opportunity for improvement with a mean rate of 79%.

This measure only addressed HF patients not admitted on angiotensin converting enzyme inhibitor (ACEI) or angiotensin receptor blocker (ARB) during the Joint Commission pilot project. It has been modified for national implementation in accord with recent updated guideline recommendations related to LVF assessment for patient with HF.¹⁰

HF-3 ACEI for LVSD

Clinical trials have established that the using ACEI for patients diagnosed with HF can alleviate symptoms, improve clinical status, enhance overall sense of well-being, and can reduce the risk of death and hospitalization. ¹¹ This measure assesses whether ACEI were appropriately prescribed at discharge for patients with left ventricular systolic dysfunction (LVSD) who have the potential to receive the intended benefit. Preliminary data from the pilot project shows a mean measure rate of 86% indicating some opportunity for improvement.



During the pilot project, this measure excluded patients from the denominator admitted on ARB drugs. Since this time, however, the Heart Failure Society of America (HFSA) guidelines, which reflect the latest clinical trial results, were modified and recommend that ACEIs and ARBs should not be considered equivalent. The HFSA guidelines recommend that ARBs as second-line drugs to be used only when there are contraindications to ACEI.¹² Therefore, ARBs were eliminated as a contraindication to prescribing ACEI.

In the pilot project, bilateral renal artery stenosis was among the contraindications to ACEI at discharge. According to the CMS National Heart Failure Project baseline data, this was a rare event, present in only approximately 0.3 percent of cases. Thus, to reduce data collection effort, bilateral renal artery stenosis was also eliminated as a contraindication to prescribing ACEI in the final measure specifications for national implementation.

Chronic renal dialysis was also identified as a contraindication to ACEI during the pilot project. Currently, however, most nephrologists and cardiologists consider ACEI to be an appropriate medication for patients with LVSD undergoing chronic renal dialysis. Therefore, chronic renal dialysis was removed from the list of categorical contraindications.

HF-4 Adult smoking cessation advice/counseling

Each year more than 430,000 deaths in the United States are attributed to a smoking related illness.¹³ Because one third to one half of cardiovascular patients begin smoking again within 6 to 12 months of their diagnosis, the patient population for this measure includes those who have a history of smoking within one year of admission.¹⁴

Preliminary data from the pilot project indicates that 39% of HF patients with a history of smoking within the past year received smoking cessation advice or counseling. For further discussion on smoking cessation measures, refer to material in the Overview of the Community Acquired Pneumonia Core.



Overview of the Community Acquired Pneumonia (CAP) Core Measure Set (3/22/2002)

Community acquired pneumonia was one of the initial priority focus areas for hospital core measure development identified by key Joint Commission stakeholders. The importance of measuring the processes and outcomes of care for patients with pneumonia is further supported by the literature highlighting disease prevalence, increasing antibiotic resistance, and healthcare costs. In the United States, pneumonia is the sixth most common cause of death. From 1979-1994, the overall rates for death due to pneumonia and influenza increased by 59%. Much of the increase is due to a greater population of persons aged 65 years or older, and a changing epidemiology of pneumonia, including a greater proportion of the population with underlying medical conditions at increased risk of respiratory infection. Annually, 2-3 million cases of community acquired pneumonia (CAP) result in 10 million physician visits; 500,000 hospitalizations; and 45,000 deaths.¹⁵

The Joint Commission's Pneumonia Advisory Panel articulated the clinical logic that provided the framework for identifying inter-related evidence-based measures that when used together, can assess the overall quality of care provided for patients with pneumonia. The scope of the pneumonia core measure set is limited to CAP. Nosocomial pneumonia was excluded for the following reasons:

A limited number of well tested, evidence based measures are currently available;

- Case identification is difficult and not always accurate;
- Definitions are problematic;
- The literature has not clearly addressed how to decrease the incidence, suggestions available but lack scientific evidence;
- Therapy is difficult to standardize;
- Mortality and incidence may be due to comorbidities; and
- The linkage between best practices and outcomes has yet to be established

Of the four initial hospital core measure sets, only the CAP core measure set contains measures applicable to the pediatric population. Four of the six measures in the CAP core measure set are applicable to pediatrics with populations that include patients 29 days of age and older. These measures include CAP 1, CAP 3, CAP 4b, and CAP 5 and are described in the Individual Measure Descriptions below.

Hospital CAP Core Measures – Initial Release



The following six measures comprise the initial set of hospital CAP Core Measures and will be implemented on July 1, 2002.

- CAP-1 Oxygenation assessment
- CAP-2 Pneumococcal screening and/or vaccination
- CAP-3 Blood cultures
- CAP-4a Adult smoking cessation advice/counseling
- CAP-4b Pediatric smoking cessation advice/counseling
- CAP-5 Antibiotic timing

Hospital CAP Core Measures – Delayed Implementation

The implementation of the following two measures was delayed because 1999/2000 guideline revisions differed on antibiotic selection for CAP patients. Implementation will be delayed until consensus can be reached among specialty organizations. It is anticipated that the measures will be implemented in late 2002.

- CAP-6 Initial antibiotic selection consistent with current recommendation Intensive Care Unit (ICU) patients
- CAP-7 Initial antibiotic selection consistent with current recommendations non-Intensive Care Unit (ICU) patients

Hospital CAP Core Measures – Recommended for Future Core Measure Set Completion

The following measures were identified for potential future implementation. The specific date for implementation has not yet been determined.

- Appropriate timing of IV to oral antibiotic switch
- Excessive antibiotic use
- Discharge within 24 hours of IV to oral antibiotic switch
- Intra-hospital risk adjusted pneumonia mortality rate
- Inpatients 65 years of age or older who are screened for or given influenza vaccine
- High risk inpatients less than 65 years of age who are screened for or given influenza vaccine

Individual Measure Descriptions:



The following describes the rational and related considerations underlying each of the measures currently in the Community Acquired Core Measure Set

CAP-1 Oxygenation assessment within 24 hours of hospital arrival

This measure allows for an oxygenation assessment using either pulse oximetry or arterial blood gas as the diagnostic tool. Questions arose during the pilot test as to whether or not a capillary gas for infants could be used as a substitute for arterial blood gas. The decision, based on pediatric panel member input, was that the capillary gas is not a good measure of oxygenation. Pulse oximetry is a much better measurement and is as good a reflector of oxygenation in infants and children as it is in adults in the vast majority of cases.

Data gathered from field studies indicated the initial test most often used was the pulse oximetry. This is usually done in the ED upon arrival and is quick and easy to perform, non-invasive, and cost-effective. Initial data from the pilot test show a mean measure rate of 95%.

CAP-2 Inpatients screened for, and/or given pneumococcal vaccination

Pneumococcal screening and vaccination is a very important national health issue that transcends the pneumonia diagnosis and measure set. Streptococcus pneumoniae is among the leading infectious causes of illness and death worldwide for young children, persons who have underlying chronic systemic conditions, and in the elderly. It accounts for two-thirds of over 7,000 cases in which an etiologic diagnosis was made, and for two-thirds of the cases of lethal pneumonia. It is estimated that 125,000 cases of pneumococcal pneumonia necessitate hospitalization each year.¹⁶ According to guidelines of the Advisory Council on Immunization Practices of the Centers for Disease Control and Prevention (CDC), the major preventive measures for CAP are use of influenza and pneumococcal vaccines.¹⁷ Some stakeholder input suggested that this measure might be better utilized in the outpatient environment; however, many felt strongly that hospitalization was an under-utilized opportunity to provide the vaccine.

This measure is limited to patients 65 years of age and older. In the near future, the Joint Commission will seek to provide a pneumonia core measure that focuses on a younger population with risk factors. The current measure first identifies that the patient was screened for pneumococcal vaccination, and if a candidate for the vaccine, the patient must receive it in order to meet the intent of the indicator. The CMS 7th Scope of Work and Joint Commission measure are identical.



Preliminary data from the pilot test show a mean measure rate of 29%. Information from onsite pilot test field reviews indicate documentation of screening and vaccination are often missing from the medical record. As a result, data collection has been difficult and time consuming. Many pilot test hospitals have set up processes for screening and created new forms for documentation, thereby making data collection more efficient by locating measure documentation in one place in the medical record.

CAP-3 Blood cultures obtained prior to first antibiotic administration

The requirement for blood cultures for all hospitalized CAP patients remains a controversial issue. Although there is consensus that blood cultures prior to antibiotics is good practice, there was not sufficiently compelling evidence to infer, through the use of a core measure, that all CAP patients have a blood culture obtained. A guiding principle in the selection of the Joint Commission core measures is that the measures be evidence-based. While there is now emerging evidence in the literature to support blood cultures for all hospitalized CAP patients, the Joint Commission has taken a conservative approach in the selection of a blood culture core measure in order to promote cost effective care and reduce the data collection burden. This measure was selected in October 1999 over other blood culture measures, because the denominator consists of CAP patients who have had a blood culture, as opposed to all CAP patients.

Many questions arose during the pilot test relative to patients who had antibiotics given prior to hospital arrival and were then cultured during the hospital stay. In the original version of the measure, such patients were excluded from the population. Early tests also identified that a large number of patients are treated with antibiotics prior to hospital arrival. Often the patients are hospitalized for failure to respond to treatment. Based on further input, it was determined that these patients should be included in the measure population. A new data element "*antibiotic received*" was added with allowable values that capture this type of patient.

Preliminary data from the pilot test show a mean measure rate of 79%. Information gained from the onsite reliability test indicates initial antibiotic time/date and initial blood culture time/date are well documented and easy to find.

CAP-4a Adult CAP smoking cessation counseling CAP-4b Pediatric CAP smoking cessation counseling

As with the measure for pneumococcal screening and vaccination, input suggested that tobacco use was an important national health issue that transcends the pneumonia diagnosis and measure set. More than 430,000 deaths each year are attributed to a



smoking related illness;¹⁸ included in these deaths are roughly 4,000 infants.¹⁹ Furthermore, a high percentage of all smokers (at least 70%) have expressed a desire to quit smoking.²⁰ Recent studies indicate patients that receive brief smoking-cessation advice from their physicians are more likely to quit than those who receive no counseling at all.

The smoking cessation counseling measure selected for the Pneumonia core measure set was adapted from the CMS PRO 6th Scope of Work (SOW) National AMI Project, and addressed the adult population. The denominator was changed to address CAP patients. Input strongly suggested that pediatric caregivers should also be counseled about the effects of second hand smoke; thus, a second measure was added to address the primary pediatric caregiver, and younger children who smoke.

Stakeholder comment acknowledged the positive impact on patient and national health, and the Advisory Panel believed that hospitalization was an excellent opportunity to initiate coordinated interventions that could lead to successful tobacco dependence treatment strategies. However, stakeholder input also indicated a perceived data collection burden. Some indicated that the measures would be more suitable to the ambulatory setting.

Preliminary data from the pilot test show a mean measure rate of 35% for the adult smoking measure, and 18% for the pediatric measure, indicating significant room for improvement. Information from onsite pilot test field reviews indicate that documentation of smoking history, and especially smoking counseling, is often missing from the medical record. Some pilot test hospitals created new forms for documentation, or added a category for smoking assessment and counseling to already existing forms, making data collection more efficient.

CAP-5 Time from initial hospital arrival to first dose of antibiotic

Data strongly support the timing of antibiotics as an important factor in reducing mortality in CAP. The data further suggests that positive effects were seen with administration of antibiotics as early as 4 to 8 hours after admission. Recent studies completed by the Centers for Medicare and Medicaid Services on a 1998-1999 data set indicate administration of antibiotics to Medicare patients with pneumonia within 4 hours of hospital arrival is associated with improved in-hospital and 30-day mortality. This has prompted CMS to change their proportion measure to identify patients who received their initial antibiotic within 4 hours of hospital arrival instead of the previous measure that looked at 8 hours. The Joint Commission has chosen to measure antibiotic timing as a continuous variable for multiple reasons relating to both the spirit of the continuous



quality improvement (CQI) cycle, and the opportunities for robust statistical analyses afforded by the X-bar and S control chart with regard to trending performance data overtime. Both the Joint Commission measure and the Centers for Medicare and Medicaid Services measure are identical at the data element level; therefore data collection is not affected by the difference in data reporting. However, the Joint Commission and CMS realize that both rates are important for quality improvement purposes; therefore, both organizations will report rates for this measure as a proportion and a continuous variable.

Throughout the pilot test, questions arose about the measure population exclusion for patients who receive their initial antibiotic greater than 36 hours from the time of hospital arrival. The Joint Commission measure was adapted from the CMS 6th Scope of Work (SOW) measure where the exclusion existed. CMS excluded these patients since it was assumed that if a physician waits longer than 36 hours to start a patient on an antibiotic, there must be a good reason that the abstraction process may not have identified. For example, the physician may have had a discussion with family members regarding aggressiveness of treatment (patient receiving comfort measures only) that was either not documented or not found. Preliminary data from the pilot test show an average median rate of 194.04 minutes (3.2 hours).

CAP Core Measures – Delayed Implementation

Increasing antibiotic resistance is an important public health issue underscoring the need to include measures addressing appropriate antibiotic selection for the treatment of CAP.

Implementation of the following CAP core measures was delayed when revisions to guidelines from specialty organizations were published last year. Each specialty organization differed in their recommendations for antibiotic selection. Thus, these measures were held until consensus could be reached:

- CAP-6 Initial antibiotic selection consistent with current recommendations (ICU patients), and
- CAP-7 Initial antibiotic selection consistent with current recommendations (Non-ICU patients).

During the past year, CMS has coordinated efforts among specialty organizations (American Thoracic Society, the Infectious Diseases Society of America, the Center for Disease Control and Prevention, and the Canadian Infectious Disease Society) to achieve a consensus statement thereby providing a simple, comprehensive antibiotic selection performance measure. The work was reviewed by the Joint Commission Pneumonia



Advisory Panel and, with minor revisions, a table of antibiotics was prepared for the two measures that will be shared by CMS and the Joint Commission. Technical specifications are now being developed and implementation of CAP-6 and CAP-7 for the Joint Commission Pneumonia Core Measure Set is planned for late 2002.

Future Directions for the CAP Core Measure Set

The following areas have been highlighted for future measure evaluation and possible inclusion into the core measure set.

- Antibiotic Switch Therapy (IV to oral). The panel was impressed with current research in the area of switch therapy and thought it an important area for measurement related to cost-effective care. Existing measures have been identified, and if submitted by the developer(s), will be evaluated for possible inclusion into the set in the future.
- Measures for influenza screening and vaccination were recommended for inclusion into the pneumonia core measure set following initial panel meetings. One measure was adapted from the CMS PRO 6th SOW (Inpatients 65 years of age or older who are screened for or given influenza vaccine), and an additional measure was recommended to address high risk CAP patients less than 65 years of age. The implementation of both measures was delayed due to the need to identify salutary mechanisms for accommodating monthly data points and subsequent reporting. In the interim, the Joint Commission encourages health care organizations to utilize hospitalization as an opportunity to screen and vaccinate patients for influenza, as this is one of the major preventive measures for the prevention of CAP.
- The Pneumonia Advisory Panel recently recommended expanding the measure population of CAP-2 (Pneumococcal screening and vaccination) as identified in current guidelines, to include high risk patients less than 65 years of age, as immunization is one of the major preventive measures for CAP. The recommendation will require the addition of another measure to the pneumonia core measure set. Technical specifications for the measure are being developed and are expected to be released some time next year.
- A risk adjusted mortality measure to address outcome of care, and a measure for excessive antibiotic use to address increasing antibiotic resistance, were recommended to complete the pneumonia core measure set. The Joint Commission is still in the process of identifying appropriate measures that can be evaluated for inclusion into the set.
- As mentioned earlier in this section, the Joint Commission and CMS will both report the antibiotic timing measure (CAP-5) as a continuous variable and a



proportion as the individual measurements yield slightly different information which is thought to be necessary for quality improvement purposes. The Joint Commission will prepare specifications for the proportion measure in early 2002, with release expected later in the year.



Overview of the Pregnancy and Related Conditions (PR) Core Measure Set (3/22/2002)

Pregnancy and related conditions was one of the initial priority focus areas for hospital core measure development identified by key Joint Commission stakeholders. Maternal mortality and morbidity as well as fetal and infant deaths are of continuing concern, along with associated conditions such as preterm births and birth defects.²¹

The Joint Commission's pregnancy advisory panel articulated the clinical logic that provided the framework for identifying inter-related, evidence-based measures that, when used together, can more fully assess the overall quality of care provided for pregnancy related patients. All three measures in the Pregnancy and Related Conditions Core Measure Set can be primarily derived from administrative data and have been field tested in conjunction with the National Perinatal Information Center (NPIC) using its trend database to analyze the measures. This testing permitted refinement respecting the measures and provided information pertinent to risk adjustment models.

Hospital PR Core Measures – Initial Release

The following three measures comprise the initial set of hospital Pregnancy and Related Conditions and will be implemented on July 1, 2002.

- PR-1 VBAC
- PR-2 Inpatient neonatal mortality
- PR-3 Third or fourth degree laceration

Hospital PR Core Measures – Recommended for Future Core Measure Set Completion

The following measures were identified for potential future implementation. The specific date for implementation has not yet been determined. They have not been included in the initial set because no sufficiently evaluated measures have been identified for implementation at this time.

- Presence of prenatal record at time of admission
- Episiotomy rate
- Indications and/or rate of elective labor induction
- Primary cesarean section rate
- Attempted (unsuccessful) vaginal birth after cesarean section
- Neonatal transfer to perinatal center



• Maternal transfer to perinatal center

Individual Measure Descriptions:

The following describes the rationale and related considerations underlying each of the measures currently included in the Pregnancy and Related Conditions Core Measure Set.

PR-1 VBAC

A trial of labor is usually successful and is relatively safe however, major maternal complications can occur. Selecting a measure pertaining to vaginal birth after cesarean section (VBAC) <u>should not be construed</u> as promoting VBAC. The Joint Commission believes that it is appropriate and important to proceed with implementation of this measure for several reasons:

- This measure is configured as a neutral measure, assessing the rate of vaginal births after a history of cesarean section delivery. Individual organizations must determine what rate change direction is most appropriate for their facility and case mix.
- This measure should be used in conjunction with other obstetrical measures, such as primary cesarean section, repeat cesarean section, maternal complications, and neonatal complications to best assist organizations with internal quality improvement activities.
- Risk adjustment has been applied to adjust for variation in case mix to allow for fair and accurate inter-organizational comparisons.
- VBAC measures have been selected and are being used by more than 20% of accredited hospitals (i.e., approximately 1,000 hospitals) to meet their current non-core ORYX requirements.
- Tracking VBAC rates will assist Joint Commission surveyors in probing and understanding internal hospital processes and practices.

PR-2 Inpatient Neonatal Mortality

The leading causes of neonatal death in 1997 were birth defects, disorders related to short gestation and low birth weight, respiratory distress syndrome, and maternal complications of pregnancy. Of these, the most likely to be preventable are those related to preterm birth and low birth weight, which represent approximately 20% of neonatal deaths. Additionally, one of the indicators in Healthy People 2010 is the reduction of neonatal deaths.²²



This Joint Commission risk adjusted indicator calculates the rate of impatient newborn mortalities stratified by birth weight. The denominator population includes neonates who were transferred in from another facility and as a result of the NPIC pilot project, the ICD-9-CM codes for inborns were included as a risk factor.

PR-3 Third or fourth degree laceration

Third and fourth degree perineal laceration can produce significant long term morbidity of women undergoing childbirth. The percentage of deliveries involving third and fourth degree lacerations is a useful quality indicator of obstetrical care and can assist in reducing the morbidity from extensive perineal tears.

Future Directions for the PR Core Measure Set

The following enhancements are being considered as modifications to current measures:

- Risk Model Validation Initially, the risk models developed by the original measure developers and tested through the core measure pilot project were used to create risk adjustment models. However, these models will be further validated (following national implementation) and enhanced to insure their sufficiency and applicability.
- Stratification of PR-3 This measure will be re-evaluated to determine whether it would be advantageous to report this measure as a stratified measure separating third and fourth degree laceration.



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