

THE NATIONAL QUALITY FORUM

TO: NQF Members

FR: NQF Staff

RE: Revised voting draft report for *National Voluntary Consensus Standards for Hospital Care: Outcomes and Efficiency, Phase I – Readmission Measures*

DA: September 16, 2008

Background

In May 2008, at the request of the Centers for Medicare & Medicaid Services, NQF launched a project to identify and endorse measures suitable for both public accountability and quality improvement related to outcomes and efficiency of hospital care. Phase I of this project is focused only on hospital readmission measures.

A Steering Committee of 21 individuals representing the range of stakeholder perspectives was convened and reviewed and considered for endorsement a total of two candidate hospital readmission standards. This draft report recommends that both of these measures be endorsed.

The revised report (redlined) with the recommended readmission measures and additional recommendations is attached to this memo. (Note: Typographical errors and grammatical changes have not been red-lined to assist in reading.)

The draft document, *National Voluntary Consensus Standards for Hospital Care: Outcomes and Efficiency, Phase I – Readmission Measures*, is also posted on the NQF web site, www.qualityforum.org, along with the following additional information:

- measure evaluations and additional technical information;
- summaries of the Steering Committee deliberations and recommendations; and
- a table of comments received.

The Revised Document and NQF Staff Recommendations

NQF received a total of 35 comments from responders representing 20 NQF Member organizations and 2 non-member organizations or individuals. Generally, the comments reflected the Steering Committee's prior deliberation on the measures. The major themes of the comments included: 1) expanding the population beyond Medicare patients 65 and older, 2) the potential influence of socioeconomic status (SES), 3) hierarchical modeling and reporting for small samples, and 4) including aspiration pneumonia in the pneumonia readmission measure. The Steering Committee reviewed the comments and provided responses that are noted in the table of comments posted on the NQF web site and, in some cases, within the report.

NQF staff recommends approval of the two hospital readmission measures.

Comments and their Disposition

A synthesis of major concerns identified during the review period and actions taken are provided below. A detailed table of individual comments and their disposition is available on the NQF web site.

Expanding the population beyond Medicare patients age 65 and older. The Committee discussed expansion of the target population with CMS who is interested in doing so, but obtaining all-payer longitudinal claims data is the big challenge. The Committee added a research recommendation to explore expansion of the measure to all patients.

Hierarchical modeling and reporting for small samples. Some commenters expressed concern that hierarchical modeling makes small providers appear average and suggested not reporting on small providers. As noted during the Committee's deliberations, hierarchical modeling reduces the misclassification of small providers as outliers (either high or low); however, the suggestion regarding not reporting on small providers was referred to CMS. CMS is exploring approaches for reporting that provide more distinctions in performance (if they exist).

Potential influence of socioeconomic status. Some commenters questioned not including SES in the risk model. The purpose of risk-adjustment is to account for differences in severity of illness of patients at the start of care that affect the outcome being measured. As discussed during the Committee's evaluation of the measures, including factors such as community resources, SES, and race in risk models adjusts out potential disparities in quality related to those factors. Adjustment makes them less visible to the communities they affect and also implies that lower performance is acceptable for a certain case mix or that we do not need to identify and reduce disparities. The best strategy regarding factors related to disparities is to examine results by stratifying on those factors and CMS was asked to consider the possibility of stratification. This is consistent with NQF evaluation criteria. The Committee added a research recommendation to study the influence of SES on these measures to better inform potential policy responses and stratification of measure results.

Including aspiration pneumonia in the pneumonia readmission measure. The Committee agreed that aspiration pneumonia is different than acquired pneumonia and that it should not be included in the measure.

NQF Member Voting

Information for electronic voting has been sent to NQF Member organization primary contacts. Accompanying comments must be submitted by e-mail and identify the submitter, organization and the specific ballot item that the comments accompany.

Please note that voting concludes on Wednesday, October 15, 2008 at 6:00 PM Eastern Time – no exceptions.

THE NATIONAL QUALITY FORUM

National Voluntary Consensus Standards for Hospital Care: Outcomes & Efficiency Phase I – Readmission Measures

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THE NATIONAL QUALITY FORUM

National Voluntary Consensus Standards for Hospital Care: Outcomes & Efficiency Phase I – Readmission Measures

EXECUTIVE SUMMARY

To achieve quality care in hospitals and across the continuum, there is a need to focus on the six domains of healthcare quality: safety, effectiveness, efficiency, timeliness, equity, and patient-centered care. NQF has a growing set of hospital measures on safety and effectiveness, though often more oriented to process. There is a need for measures that specifically address the outcomes and efficiency of hospital care. Further, the growing recognition of the critical role that the hospital plays as the focal point for transitions to ambulatory care, home care, and skilled nursing facilities necessitates measures that take a broader view of results beyond the walls of the hospital (e.g., 30 to 90 days). For example, the rate of hospital readmissions among Medicare beneficiaries suggests the need for both improved processes in the hospital and at transition points. The expectation for the outcome of the hospitalization varies with the reason for admission (e.g., resolution or control of presenting symptoms vs. success of the treatment intervention). Along with outcome measures to evaluate the quality of care, measures are needed to evaluate the efficiency of hospital care.

This project is divided into two separate, though related tasks. Since measures of hospital readmission are the most urgently needed, the first task, to be accomplished in Phase I, will focus only on recommending hospital readmission measures. The Medicare Payment Advisory Commission (MedPAC) reported that in 2005, 17.6 percent of hospitalizations resulted in readmission within 30 days at a cost of \$12 billion and risk-adjusted rates varied across hospitals (e.g., 17% had rates more than 2 percentage points above expected)¹.

The second task will take a more expansive view of potential measures of hospital outcomes including for example, quality of the hospital transition, symptom resolution/control, surgical outcomes, physiological-biochemical intermediate outcomes, and adverse events/complications. Measures of hospital care efficiency also will be included in Phase II.

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Proposed National Voluntary Consensus Standards for Hospital Care: Readmission Measures

- Thirty-day all-cause risk standardized readmission rate following acute myocardial infarction (AMI) hospitalization (HOE-001-08)
- Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalization (HOE-002-08)

STEERING COMMITTEE CO-CHAIRS

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ACKNOWLEDGEMENT

This work was conducted under a contract from the Centers for Medicare & Medicaid Services.

THE NATIONAL QUALITY FORUM

National Voluntary Consensus Standards for Hospital Care: Outcomes & Efficiency Phase I – Readmission Measures

BACKGROUND

To achieve quality care in hospitals and across the continuum, there is a need to focus on the six domains of healthcare quality: safety, effectiveness, efficiency, timeliness, equity, and patient-centered care. NQF has a growing set of hospital measures on safety and effectiveness, though often more oriented to process. There is a need for measures that specifically address the outcomes and efficiency of hospital care. Further, the growing recognition of the critical role that the hospital plays as the focal point for transitions to ambulatory care, home care, and skilled nursing facilities necessitates measures that take a broader view of results beyond the walls of the hospital (e.g., 30 to 90 days). For example, the rate of hospital readmissions among Medicare beneficiaries suggests the need for both improved processes in the hospital and at transition points. Patients are admitted to the hospital for a variety of reasons, e.g., acute care of a new condition (e.g., heart attack); exacerbation of a chronic condition (e.g., sepsis due to diabetic foot ulcer); or for specific scheduled treatment intervention (surgery). The expectation for the outcome of the hospitalization varies with the reason for admission (e.g., resolution or control of presenting symptoms vs. success of the treatment intervention). Along with outcome measures to evaluate the quality of care, measures are needed to evaluate the efficiency of hospital care.

Outcome measures provide an integrative assessment of quality because they reflect the result of multiple care processes provided by all the healthcare workers involved in the care. Many outcome measures are inherently relevant because they reflect the reason consumers seek healthcare (e.g., to improve function, decrease pain, survive), as well as the result healthcare providers are trying to achieve. In addition to public reporting, outcome measures also can facilitate quality improvement.^a For example, if a provider's performance on a risk-adjusted

^a Medicare's home health quality initiative has been based almost entirely on outcome measures (http://www.cms.hhs.gov/HomeHealthQualityInits/16_HHQIOASISOBQI.asp).

80 outcome measure is poor in comparison to other providers, it identifies a need to investigate the
81 cause of poor performance, or performance on associated process measures, and initiate
82 strategies for improvement. Efficiency measures also provide an integrative approach to
83 quality assessment by associating cost/resource use with the quality of clinical processes and
84 outcomes.

85

86 This project is divided into two separate, though related tasks. Since measures of hospital
87 readmission are the most urgently needed, the first task, to be accomplished in a relatively short
88 period in Phase I, will focus only on recommending hospital readmission measures. The
89 Medicare Payment Advisory Commission (MedPAC) reported that in 2005, 17.6 percent of
90 hospitalizations resulted in readmission within 30 days at a cost of \$12 billion and risk-adjusted
91 rates varied across hospitals (e.g., 17% had rates more than 2 percentage points above
92 expected)¹.

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94 The second task will take a more expansive view of potential measures of hospital outcomes
95 including for example, quality of the hospital transition, symptom resolution/control, surgical
96 outcomes, physiological-biochemical intermediate outcomes, and adverse
97 events/complications. Measures of hospital care efficiency also will be included in Phase II.

98

99 This project follows a substantial amount of work on hospital care performance measures
100 beginning in 2003 ²⁻⁷, as well as projects that are applicable to other settings such as serious
101 reportable events and safe practices ^{8,9}. Additional projects in 2007-2008 addressed both
102 hospital measures and emergency department measures. This project will add to the portfolio
103 of hospital measures, specifically outcome and efficiency measures, and in Phase I, hospital
104 readmission measures. Currently there are three NQF-endorsed readmission measures.

105

- All-Cause Readmission Index (risk adjusted), PacifiCare (NQF# 0329)
- 30-Day All-Cause Risk Standardized Readmission Rate Following Heart Failure Hospitalization, CMS (NQF#0330)
- PICU Unplanned Readmission Rate, National Association of Children's Hospitals and Related Institutions (NQF# 0335)

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RECOMMENDING VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE: OUTCOMES & EFFICIENCY, PHASE I – READMISSION MEASURES

A Steering Committee (appendix B) established the approach for recommending measures for consensus standards. The purpose, framework, and scope were identified to facilitate measure review and evaluation.

Purpose

A set of voluntary consensus standards for hospital care outcomes and efficiency could be used to:

- facilitate improvement in hospital patient care and efficiency;
- facilitate benchmarking and sharing of best practices among providers;
- evaluate the performance of hospital care providers;
- serve as a mechanism for public reporting by supplying stakeholders with information that will enable them to better understand the quality of care (e.g., information for consumer choice); and
- stimulate improvement in systems of care across the continuum (including transitions).

Framework

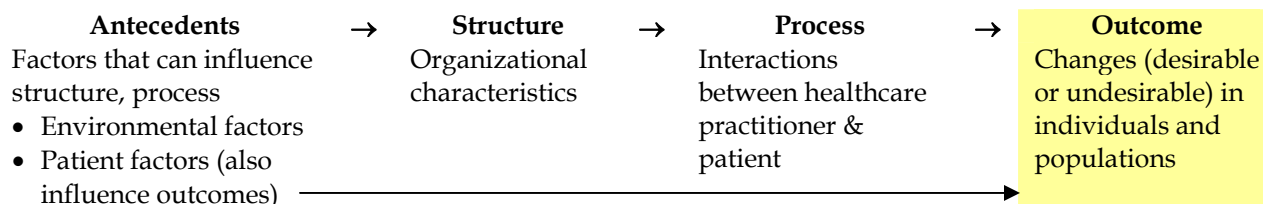
A framework for measurement is a conceptual approach to organizing measures. A framework provides general guidance for how to categorize measures for purposes of inclusion or exclusion and identifying gaps in available quality measures.

Outcomes

This project is focused on outcome measures. *Outcome refers to changes (desirable or undesirable) in individuals and populations that are attributed to healthcare*¹⁰. Donabedian’s structure-process-outcome model is a useful framework for quality assessment and illustrates the link between process and outcome. The following figure also shows that patient attributes can directly influence patient outcomes and therefore, need to be accounted for in risk adjusting outcome measures.

142

143 Figure 1.



144

145 There are a variety of types of outcome measures and ways to label them. Some represent an
 146 end result such as mortality or function; others are considered intermediate outcomes (e.g.,
 147 physiologic or biochemical values such as blood pressure or LDL cholesterol) that precede, and
 148 may lead to, a longer-range end-result outcome. Sometimes proxies are used to indicate an
 149 outcome (e.g., hospital readmission indicates deterioration in health status since discharge).
 150 Some potential types of outcome measures and examples are provided in table 1.

151

152 **Table 1. Examples of Outcomes**

153

Type of Outcome	Example
Mortality	AMI mortality
Healthcare-acquired adverse event or complication	Healthcare-acquired infection, stroke after coronary artery bypass graft surgery
Intermediate outcomes: physiologic-biochemical measures; knowledge/ understanding, motivation	Blood pressure, Hba1c; knowledge and understanding of the treatment plan
Symptoms (physical, psychological)	Pain, difficulty breathing; depression
Service utilization as proxy for patient outcome	Hospital readmission, emergency department use
Function (physical, mental, social)	Ambulation, cognition
Health risk status/ behavior (including adherence)	Smoking, adherence to meds/prescribed treatment
Health-related quality of life	SF-36
Patient experience with care (including satisfaction)	CAHPS
Non-mortality clinical morbidity	ESRD related to diabetes or MI related to coronary artery disease

154

155 Efficiency

156 The definition of efficiency from prior NQF work will be used for this project. *“Efficiency of care*
 157 *is a measurement construct of cost of care or resource utilization associated with a specified level of*
 158 *quality of care. It is a measure of the relationship of the cost of care associated with a specific level of*
 159 *performance measured with respect to the other five IOM aims of quality. Efficiency might be thought of*
 160 *as a ratio, with quality as the numerator and cost as the denominator. As such, efficiency is directly*

161 *proportional to quality, and inversely proportional to cost.*"^b The types of measures that may be
162 used to assess efficiency include outcome, process, and cost/resource use.

163

164 **Scope**

165 The scope of this project includes measures of hospital care focused on two types of quality
166 measures: outcome and efficiency. Hospital-level performance measures are included in the
167 scope of this project. In NQF's framework for hospital care performance evaluation² the
168 content of the performance measure set for hospital care included acute inpatient and/or
169 hospital emergency care and was noted to initially include general acute care services, but
170 should be expanded over time to include specialty hospitals (e.g., rehabilitation, psychiatric,
171 orthopedic).

172

173 Although the scope is focused in terms of the types of measures, it is broad in terms of the
174 potential clinical outcomes, efficiency topics, and patient groups that might be addressed. The
175 Steering Committee will identify priorities within this broad scope to provide guidance for the
176 measures that will be considered in Phase II of this project.

177

178 **Priorities**

179 The priority for Phase I, addressed in this report, is for hospital readmission measures.

180

181 Phase II will address a broader set of outcome measures, as well as efficiency measures. The
182 Steering Committee will identify priorities for Phase II, which will be noted in a subsequent call
183 for measures. Some initial priority areas for outcome measures identified by the Steering
184 Committee for Phase II include measures related to:

- 185 • healthcare-acquired adverse events or complications;
- 186 • care coordination/transitions; and
- 187 • function.

188 Additional considerations for prioritizing measures include measures that pertain to all or large

^b NQF's *Measurement Framework: Evaluating Efficiency Across Episodes Of Care* was posted for comment in November 2007 <http://www.qualityforum.org/projects/ongoing/episodes/comments/index.asp>; based on AQA *Principles of Efficiency Measures* <http://www.aqaalliance.org/files/PrinciplesofEfficiencyMeasurementApril2006.doc>.

189 groups of hospitalized patients and measures that are harmonized^c with related hospital
190 measures or similar measures for other settings.

191

192 STRATEGIC DIRECTIONS FOR NQF

193 As NQF nears completion of its first decade, consideration of strategic issues to guide current
194 and future activities has been resulted in an expansion of NQF's mission to include three parts:

195 1) establishing priorities and goals for performance improvement; 2) endorsing performance
196 measures; and 3) education and outreach. As more measures are developed and brought to
197 NQF for consideration of endorsement, it is incumbent on NQF to assist stakeholders to
198 measure what makes a difference, and address what is important to achieving the best
199 outcomes for patients and populations. The NQF Measurement Framework^b promotes shared
200 accountability and measurement across episodes of care with a focus on outcomes and patient
201 engagement in decision-making, coupled with measures of the health care process, and
202 cost/resource use.

203

204 Several strategic issues have been identified to guide consideration of candidate consensus
205 standards:

206 Driving toward high performance. Over time, the bar of performance expectations should
207 be raised to encourage achievement of higher levels of system performance.

208 Emphasis on composite measures. Composite measures provide much needed summary
209 information pertaining to multiple dimensions of performance, and are more
210 comprehensible to patients and consumers.

211 Moving toward outcomes measurement. Outcomes measures provide information of
212 intense interest to consumers and purchasers, and, when coupled with healthcare process
213 measures, provide useful and actionable information to providers. Outcome measures also
214 focus attention on much-needed system-level improvements, because achieving the best

^c Measure harmonization refers to the standardization of specifications for similar measures on the same topic (e.g., *influenza immunization* of patients in hospitals or nursing homes), or related measures for the same target population (e.g., eye exam and HbA1c for *patients with diabetes*), or definitions applicable to many measures (e.g., age designation for children) so that they are uniform or compatible, unless differences are dictated by the evidence. The dimensions of harmonization can include numerator, denominator, exclusions, and data source and collection instructions. The extent of harmonization depends on the relationship of the measures, the evidence for the specific measure focus, and differences in data sources.

215 patient outcomes often requires carefully designed care process, teamwork, and coordinated
216 action on the part of many providers.

217 Consider disparities in all that we do. All Americans should receive quality health care,
218 regardless of their race, ethnicity, language, and socioeconomic status. Unfortunately,
219 significant healthcare disparities persist. Particular attention should be focused on
220 identifying disparity-sensitive measures and strategies that move toward routine data
221 collection of race, ethnicity, and language data and stratification of disparities-sensitive
222 performance measures for reporting purposes.

223

224 EVALUATING CANDIDATE MEASURES

225 Candidate measures were evaluated based on the NQF-endorsed criteria of importance,
226 scientific acceptability, usability, and feasibility (box E).

227

228 For outcome measures such as readmission rates, risk adjustment is considered under the
229 criterion of scientific acceptability (box E, 2.f.). As noted previously, outcomes are influenced by
230 factors other than the quality of the healthcare provided, for example, the severity of illness.
231 Therefore, adjusting for clinical severity and conditions present at the start of care helps “level
232 the playing field” when comparing outcomes across providers. Two caveats regarding risk
233 factors require special mention. Complications that occur after the care begins can represent
234 quality problems (e.g., infection) and generally are not included in risk adjustment models used
235 for purposes of evaluating quality of care. Factors such as race, gender, and socioeconomic
236 status require careful scrutiny as they also are linked to inequalities in healthcare services and
237 practices and inclusion as risk factors would mask those disparities. Including these factors in
238 risk models implies that lower performance is acceptable for a certain case mix or providers do
239 not need to try to identify and reduce disparities ¹¹.

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241

Box E – Criteria for Evaluation and Selection

Proposed measures are evaluated for their suitability based on four sets of standardized criteria (e.g., importance, scientific acceptability, usability, and feasibility). Not all acceptable measures will be strong—or equally strong—among each of the four sets of criteria, or strong among each of their related criteria. Rather, a candidate measure is assessed regarding the extent to which it meets any of the desired criteria within each set:

- 1. Importance.** This set addresses the extent to which a measure reflects a variation in quality, low levels of overall performance, and the extent to which it captures key aspects of the flow of care.
 - a. The measure addresses one or more key leverage points for improving quality.
 - b. Considerable variation in the quality of care exists.
 - c. Performance in the area (e.g., setting, procedure, condition) is suboptimal, suggesting that barriers to improvement or best practice may exist.

- 2. Scientific acceptability.** A measure is scientifically sound if it produces consistent and credible results when implemented.
 - a. The measure is well defined and precisely specified. Measures must be specified sufficiently to be distinguishable from other measures, and they must be implemented consistently across institutions. Measure specifications should provide detail about cohort definition, as well as the denominator and numerator for rate-based measures and categories for range-based measures.
 - b. The measure is reliable, producing the same results a high proportion of the time when assessed in the same population.
 - c. The measure is valid, accurately representing the concept being evaluated.
 - d. The measure is precise, adequately discriminating between real differences in provider performance.
 - e. The measure is adaptable to patient preferences and a variety of contexts of settings. Adaptability depends on the extent to which the measure and its specifications account for the variety of patient choices, including refusal of treatment and clinical exceptions.
 - f. An adequate and specified risk-adjustment strategy exists, where applicable.
 - g. Patient outcome or consistent evidence is available linking the structure and process measures to patient outcomes.

- 3. Usability.** Usability reflects the extent to which intended audiences (e.g., consumers, purchasers) can understand the results of the measure and are likely to find them useful for decision making.
 - a. The measure can be used by the stakeholder to make decisions.
 - b. The differences in performance levels are statistically meaningful.
 - c. The differences in performance are practically and clinically meaningful.
 - d. Risk stratification, risk adjustment, and other forms of recommended analyses can be applied appropriately.
 - e. Effective presentation and dissemination strategies exist (e.g., transparency, ability to draw conclusions, information available when needed to make decisions).
 - f. Information produced by the measure can/will be used by at least one healthcare stakeholder audience (e.g., public/consumers, purchasers, clinicians and providers, policymakers, accreditors/regulators) to make a decision or take an action.
 - g. Information about specific conditions for which the measure is appropriate has been given.
 - h. Methods for aggregating the measure with other, related measures (e.g., to create a composite measure) are defined, if those related measures are determined to be more understandable and more useful in decision making. Risks of such aggregation, including misrepresentation, have been evaluated.

- 4. Feasibility.** Feasibility is generally based on the way in which data can be obtained within the normal flow of clinical care and the extent to which an implementation plan can be achieved.
 - a. The point of data collection is tied to care delivery, when feasible.
 - b. The timing and frequency of measure collection are specified.
 - c. The benefit of measurement is evaluated against the financial and administrative burden of implementation and maintenance of the measure set.
 - d. An auditing strategy is designed and can be implemented.
 - e. Confidentiality concerns are addressed.

244 NATIONAL VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE: READMISSION
245 MEASURES

246 Two measures are recommended for voluntary consensus standards (table 2). The detailed
247 measure specifications appear in appendix A.

248

249 **Table 2. National Voluntary Consensus Standards for Hospital Care: Readmission Measures**

Measure Title	Measure Description	IP Owner
HOE-001-08 Thirty-day all-cause risk standardized readmission rate following acute myocardial infarction (AMI) hospitalization	Hospital-specific 30-day all-cause risk standardized readmission rate following hospitalization for AMI among Medicare beneficiaries aged 65 years or older at the time of index hospitalization.	CMS
HOE-002-08 Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalization	Hospital-specific 30-day all-cause risk standardized readmission rate following hospitalization for pneumonia among Medicare beneficiaries aged 65 years or older at the time of index hospitalization	CMS

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252 **DISCUSSION OF CANDIDATE MEASURES**

253 Candidate measures were solicited through an open “Call for Measures” in May 2008. Initially,
254 three measures were submitted for consideration. However, one measure submission was
255 incomplete and the developer opted to resubmit the measure in Phase II, so it is not discussed
256 in this report.

257

258 **Recommended Performance Measures for Voluntary Consensus Standards**

259 The Steering Committee recommended two 30-day all-cause readmission measures as
260 voluntary consensus standards. These measures were developed using the same methodology
261 as a prior endorsed measure, # 0330, *30-Day All-Cause Risk Standardized Readmission Rate*
262 *Following Heart Failure Hospitalization*.

263

264 Because the two recommended measures have the same methodology, they are discussed
265 together.

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270 **HOE-001-08 Thirty-day all-cause risk standardized readmission rate following acute**
271 **myocardial infarction (AMI) hospitalization (CMS)**

272 **HOE-002-08 Thirty-day all-cause risk standardized readmission rate following pneumonia**
273 **hospitalization (CMS)**

274 The Steering Committee evaluated both measures as meeting all four criteria and recommend
275 both for voluntary consensus standards.

276

277 Importance

278 The Committee evaluated that both measures were highly important. MedPAC identified that
279 AMI and pneumonia are two of seven conditions that account for nearly 30% of potentially
280 preventable readmissions ¹. Some committee members questioned whether there was sufficient
281 variability across providers to justify the measure; however the NQF criteria also recognize
282 overall poor performance as an indicator of importance. Improvement is relevant to both
283 reducing variation and improving the mean (i.e., narrowing the distribution and shifting the
284 entire curve).

285

286 Some committee members raised the issue that hospital care is not the only influence on
287 readmission; however, others noted that hospital practices such as discharge readiness (clinical
288 stability) and preparedness, care coordination/transition, and communication do influence
289 readmissions to the hospital. Overall the Committee agreed there is a need to identify problems
290 and stimulate strategies for improvement, including transitions and strategies that cross
291 settings.

292

293 Scientific acceptability

294 The Committee evaluated both measures to be moderately to highly scientifically acceptable.
295 Both measures are risk-adjusted using hierarchical generalized linear modeling to accommodate
296 the clustering of patients within hospitals and small numbers for some hospitals (same method
297 used for the current endorsed measure). The claims-based models were validated against
298 records-based models.

299

300 Patient factors that influence readmission are drawn from conditions on admission, as well as
301 the 12 months prior to the index admission. Complications that occurred during hospitalization

302 were not included so as not to adjust for potential quality problems that occurred during the
303 hospital stay. Race and socioeconomic status were not included in the risk model so as not to
304 obscure potential quality problems related to those factors. Some committee members thought
305 SES does influence readmission and asked if any analysis had been done. The developer
306 responded that individual-level SES variables were not available so they were not analyzed.
307 However, CMS and the developer do not consider that a limitation because factors such as race
308 and SES may be related to supply and quality problems and should not be included in an
309 adjustment. This approach also is consistent with the recent clarifications to NQF's evaluation
310 criteria regarding risk adjustment and identifying disparities of care. Although not all
311 Committee members agreed with this approach, ultimately the majority voted to recommend
312 the measures with the risk factors as specified.

313
314 Some committee members questioned the 30-day time window and asked if other time frames
315 were analyzed. The developer did not analyze other time windows because 30 days is
316 consistent with prior NQF-endorsed measures for readmission and mortality. A fixed period
317 such as 30 days rather than the end of hospitalization reduces the confounding effect of
318 different practice patterns (e.g., LOS, early discharge); however, the more time elapsed, the
319 more other factors can influence the outcome. The Committee also discussed that the 30-day
320 time window does stimulate improvement strategies that involve transitions and possibly
321 broader systems approaches involving other providers, especially if other providers also have
322 similar or complementary measures.

323
324 For the AMI measure, a committee member asked about the use of cardiovascular risk scores,
325 such as TIMI [Thrombolysis in Myocardial Infarction], in the risk model. Because the model is
326 derived from administrative data rather than clinical records, those types of clinical data were
327 not available. However, the administrative model was validated against a model derived from
328 clinical record chart abstraction. The developer also responded that a variable for elevated ST
329 segment was explored in the clinical model, but was not statistically significant. The final AMI
330 risk model includes 2 demographic, 10 cardiovascular, and 19 comorbidity factors relevant to
331 the risk of readmission. The final pneumonia risk model includes 2 demographic and 38
332 comorbidity factors relevant to the risk of readmission.

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Some committee members questioned using all-cause readmissions rather than just those for AMI or pneumonia. The submission materials and developer noted that all readmissions are of concern and limiting to only AMI/pneumonia presents challenges with coding and may miss readmissions due to quality problems that occurred during the index AMI admission.

Some committee members questioned the hospital effect on the variance in readmission rates. The developer clarified that a key summary of “hospital effect” in the hierarchical model is represented by the “between-hospital variance” component after adjusting for patient clinical characteristics. For example, in the AMI model, the estimated between-hospital variance in the adjusted log-odds of readmission is 0.023. This number represents the amount of between-hospital variation there is in the log-odds of a readmission for an “average” patient. Because it is measured on the log-odds scale, a meaningful transformation would be exponentiation of the between-hospital standard deviation (SD) in order to interpret it as an odds ratio. For example, the between-hospital standard deviation in log-odds ratios is $\sqrt{0.023} = 0.152$. If we constructed a ± 1 SD interval estimate for a hospital and refer to this roughly as the range of odds ratios, then we have $\exp(2 * 1 * 0.152) = 1.36$. This one-number summary is interpreted to mean the odds of readmission for a “high-readmission hospital” (+1 SD) are 1.36 times that of a “low-readmission hospital” (-1 SD). Alternatively, for a 95% interval estimate (± 2 SD), we have $\exp(2 * 1.96 * 0.152) = 1.82$. This implies that the odds of readmission for a high-readmission hospital (+2 SD) are 1.82 times that of a low-readmission hospital (-2 SD).

Some committee members questioned the variability in risk-adjusted rates and one member asked about the number of hospitals with risk-adjusted rates that are statistically significantly different from the mean. CMS has not yet analyzed statistically significant differences; however, the developer provided the frequency distribution for the graphs in their report. The AMI measure risk-adjusted readmission rates ranged from 15.0% to 23.6%; median of 19.0%; 5th percentile 17.9%; 95th percentile 20.3%. The pneumonia measure risk-adjusted readmission rates ranged from 13.4% to 26.4%; median of 17.3%; 5th percentile 15.7%; 95th percentile 19.5%.

365 Usability

366 Both measures were considered moderately useable. Some committee members questioned the
367 usefulness of an outcome measure with potentially multiple processes that can affect it;
368 however, others noted that does not limit its usefulness in identifying a potential problem and
369 stimulating improvements. Some committee members noted that the ideal risk-adjusted
370 readmission rate is not known, possibly hampering understanding; however, others noted that
371 the risk-adjusted rates should be evaluated in comparison across providers to determine best
372 performance, and in comparison to prior performance, to stimulate continuous improvement.

373
374 A committee member questioned whether there was sufficient variability across providers to be
375 useful to consumers in selecting hospitals. As noted previously, variability is not the only
376 criterion for importance (i.e., ~~also~~ overall poor performance also provides an indication of
377 importance to measure and report) and as with the other criteria, usability is a matter of degree.
378 The developer also discussed that few hospitals may be currently measuring and trying to
379 improve readmission rates; as some hospitals focus on readmission and initiate improvements,
380 there may be more distinctions. However, patients will benefit from improvements in care
381 processes that lead to overall decreases in readmission rates. CMS has not yet determined how
382 it will report the measure results (and NQF endorsement does not include reporting
383 methods/formats).

384
385 The biggest concern voiced regarding these measures is that they are not ready to be used for
386 any payment initiatives at this time. The Committee echoed the MedPAC recommendations
387 that readmission rates should not be used to adjust payments until there is more experience
388 with the measures^d, if at all. Although this cannot be required as part of endorsement, it will be
389 included as a committee recommendation.

^d **MedPAC:** “The first step is public disclosure of hospital-specific, risk-adjusted readmission rates. This will ensure that hospitals know their rates and how they compare with those of their peers and will allow beneficiaries and other providers to use this information when they make health care decisions or admit patients. After a year or two, public disclosure could be complemented by a change in payment rates, so that hospitals with high risk-adjusted rates of readmission receive lower average per case payments. Depending on design, the policy not only could encourage hospitals with excessive rates to reduce readmissions but also could encourage top-performing hospitals to consider opportunities for continued improvement. An important parallel policy would be to encourage other providers, including physicians, SNFs, and home health providers to prevent readmissions. Holding each entity accountable will motivate them to collaborate with one another because their success will partly depend on the success of their care partners. (MedPAC, June 2007 Report to Congress, p. 114;

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Feasibility

Both measures were considered highly feasible. The measures are computed from claims data, so do not require any additional data collection effort by hospitals. The limitations of claims data are that non-FFS Medicare patients and those <65 are not included and some potential risk factors such as clinical cardiovascular risk scores are not available.

Comments

Comments received during the 30-day review period generally reflected the Steering Committee’s prior deliberation on the measures. The major themes of the comments included: 1) expanding the population beyond Medicare patients age 65 and older, 2) the potential influence of socioeconomic status (SES), 3) hierarchical modeling and reporting for small samples, and 4) including aspiration pneumonia in the pneumonia readmission measure. The Committee agreed that a measure including all patients and payers is desirable; CMS also agreed, but noted the significant challenge in acquiring all-payer longitudinal claims data to do so. The committee agreed that it was appropriate not to include aspiration pneumonia in the pneumonia readmission measure.

Socioeconomic status and hierarchical modeling were discussed extensively when the Committee evaluated the measures and the same discussion points noted above were reiterated. As noted during the Committee’s deliberations, hierarchical modeling reduces the misclassification of small providers as outliers (either high or low); however, the suggestion regarding not reporting on small providers was referred to CMS. CMS is exploring approaches for reporting that provide more distinctions in performance (if they exist). The purpose of risk-adjustment is to account for differences in severity of illness of patients at the start of care that affect the outcome being measured. As discussed during the Committee’s evaluation of the measures, including factors such as community resources, SES, and race in risk models adjusts out potential disparities in quality related to those factors. Adjustment makes them less visible to the communities they affect and also implies that lower performance is acceptable for a certain case mix or that we do not need to identify and reduce disparities. The best strategy

http://www.medpac.gov/documents/jun07_EntireReport.pdf)

420 regarding factors related to disparities is to examine results by stratifying on those factors and
421 CMS was asked to consider the possibility of stratification. This is consistent with NQF
422 evaluation criteria. The Committee added a research recommendation to study the influence of
423 SES on these measures to better inform potential policy responses and stratification of measure
424 results.

426 RECOMMENDATIONS

427 Hospital readmission is a multifaceted problem influenced by hospital factors, as well as factors
428 related to the patient and family, physicians and primary care providers, other healthcare
429 providers, and the larger healthcare system. The committee made the following
430 recommendations related to the Phase I hospital readmission measures.

- 432 • In accordance with Support the MedPAC recommendation, that readmission rates should
433 not be used to adjust payments until after a year or two of public disclosure when there is
434 more experience with the measures and information to support their use in adjusting
435 payment rates for that purpose and when parallel policies for other settings can be
436 implemented.
- 437 • Study the various factors that contribute to hospital readmission and their time window of
438 influence to inform quality improvement efforts, policy responses, and potential refinement
439 of the measures.
- 440 • Examine whether disparities related to socioeconomic status influence 30-day readmission
441 rates to better inform potential policy responses and stratification by SES factors for
442 reporting the measure results.
- 443 • Explore methods and approaches to expand the Medicare hospital readmission measures to
444 all patients/all payers.

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APPENDIX A – SPECIFICATIONS OF NATIONAL VOLUNTARY CONSENSUS STANDARDS FOR HOSPITAL CARE: READMISSION MEASURES

<p>HOE-001-08 Thirty-day all-cause risk standardized readmission rate following acute myocardial infarction (AMI) hospitalization. (CMS)</p>
<p>Description: Hospital-specific 30-day all-cause risk standardized readmission rate following hospitalization for AMI among Medicare beneficiaries aged 65 years or older at the time of index hospitalization.</p>
<p>Setting: Hospital Level of Analysis: Facility</p>
<p>Type of Measure: Outcome Data Source: Administrative Claims Data</p>
<p>Numerator Statement: The “numerator” of the risk-adjusted ratio is the predicted number of readmissions within 30 days given the hospital’s performance with its observed case mix. The term “predicted” describes the numerator result, which is calculated using the hospital-specific intercept term.</p> <p>The ratio is converted to a rate by multiplying by the national unadjusted rate.</p> <p>Admissions not counted as readmissions: Some AMI patients have planned readmissions for revascularization procedures – for example, to perform angioplasty (percutaneous coronary intervention [PCI]) on a second vessel or a second location in the same vessel, or to perform coronary artery bypass graft (CABG) surgery after AMI and a period of recovery outside the hospital. Because admissions for PCI and CABG may be staged or scheduled readmissions, we do not count as readmissions those admissions after discharge that include PCI or CABG procedures unless the principal discharge diagnosis for the readmission is one of the following diagnoses (which are not consistent with a scheduled readmission): heart failure (HF), AMI, unstable angina, arrhythmia, and cardiac arrest (i.e., readmissions with these diagnoses and a PCI or CABG procedure are counted as readmissions).</p>
<p>Denominator Statement: The “denominator” of the risk-adjusted ratio is the expected number of readmissions given the hospital’s case mix. The term “expected” describes the denominator, which is calculated using the average intercept term.</p> <p>Outcome measure cohort definition: Admissions for Medicare fee-for-service beneficiaries aged =>65 years discharged alive from the hospital with a principal discharge diagnosis of AMI and with a complete claims history for 12 months prior to admission and 30 days post-discharge.</p>
<p>Exclusions: Cohort exclusions (excluded admissions):</p> <ol style="list-style-type: none"> 1. Admissions for patients with an in-hospital death are excluded because they are not eligible for readmission. 2. Admissions for patients having a principal diagnosis of AMI during the index hospitalization and subsequently transferred to another acute care facility are excluded because we are focusing on discharges to non-acute care settings. 3. Admissions are excluded for patients who are discharged alive not to another acute care facility on the same day that they are admitted, because these patients are unlikely to have had an AMI. 4. If a patient has one or more additional AMI admissions within 30 days of discharge from an index AMI admission, we do not consider the additional AMI admissions as index admissions (they are considered as potential readmissions). Thus, any AMI admission is either an index admission or a readmission, but not both.
<p>Adjustments: Hierarchical logistic regression modeling to calculate a hospital-specific risk standardized readmission rate (RSRR). This rate is calculated as the ratio of “predicted” to “expected” readmissions, multiplied by the national unadjusted rate.</p>

More specifically, the expected number of readmissions in each hospital is estimated using its patient mix and the average hospital-specific intercept. The predicted number of readmissions in each hospital is estimated given the same patient mix but an estimated hospital-specific intercept. Operationally, the expected number of readmissions for each hospital is obtained by regressing the risk factors on the readmission outcome using all hospitals in our sample, applying the subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, transforming, and then summing over all patients in the hospital to get a value. This is a form of indirect standardization. The predicted hospital outcome is the number of readmissions in the “specific” hospital estimated given its performance and case mix. Operationally, this is accomplished by estimating a hospital-specific intercept that herein represents baseline readmission risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, transforming, and then summing over all patients in the hospital to get a value. To assess hospital performance in any given year, we re-estimate the model coefficients using that year’s data.

Risk Adjustment Variables:

Male

Age-65 (years above 65, continuous)

CC 15-20, 119-120 Diabetes and DM complications

CC 47 Iron deficiency and other/unspecified anemias and blood disease

CC 80 Congestive heart failure

CC 86 Valvular and rheumatic heart disease

CC108 COPD

CC129-130 End-stage renal disease or dialysis

CC136 Other urinary tract disorders

CC 92-93 Arrhythmias

CC 111-113 Pneumonia

CC 131 Renal failure

CC 104-106 Vascular or circulatory disease

CC 22-23 Disorders of fluid/electrolyte/acid-base

CC 84 Coronary atherosclerosis/other chronic ischemic heart disease

CC 1,3-6 History of infection

CC 97-99,103 Cerebrovascular disease

CC 7 Metastatic cancer and acute leukemia

CC 8-12 Cancer

CC 148-149 Decubitus ulcer or chronic skin ulcer

CC 49-50 Dementia and senility

CC 83 Angina pectoris/old myocardial infarction

CC 95-96 Stroke

CC 110 Asthma

CC 81-82 Acute coronary syndrome

CC 67-69,100-102,177-178 Hemiplegia, paraplegia, paralysis, functional disability

CC 21 Protein-calorie malnutrition

Anterior myocardial infarction (ICD-9-CM 410.00-410.19)-

Other location of myocardial infarction (ICD-9-CM 410.20-410.69)

History of CABG (ICD-9-CM V45.81, 36.10-36.16)

History of PCI (ICD-9-CM V45.82, 00.66, 36.01, 36.02, 36.05, 36.06, 36.07)

Note: CCs are condition categories or diagnostic groups that combine related sets of ICD-9-CM codes (Pope et al., 2000). For more details, please see the methodology report.

Numerator Codes: ICD-9-CM codes used to define excluded readmissions:

ICD-9-CM codes associated with PCI and CABG revascularization procedures:

PCI: 00.66, 36.01, 36.02, 36.05, 36.06, 36.07

CABG: 36.10–36.16

ICD-9-CM codes associated with HF, AMI, unstable angina, arrhythmia, and cardiac arrest:

HF: 402.01, 402.11, 402.91, 404.01, 404.03, 404.11, 404.13, 404.91, 404.93, 428.xx

AMI: 410.xx except 410.x2 (AMI, subsequent episode of care)

Unstable angina: 411.xx

Arrhythmia: 427.xx, except 427.5

Cardiac arrest: 427.5.

Denominator Codes: ICD-9-CM codes that define the patient cohort:

- 410.00 AMI (anterolateral wall) – episode of care unspecified
- 410.01 AMI (anterolateral wall) – initial episode of care
- 410.10 AMI (other anterior wall) – episode of care unspecified
- 410.11 AMI (other anterior wall) – initial episode of care
- 410.20 AMI (inferolateral wall) – episode of care unspecified
- 410.21 AMI (inferolateral wall) – initial episode of care
- 410.30 AMI (inferoposterior wall) – episode of care unspecified
- 410.31 AMI (inferoposterior wall) – initial episode of care
- 410.40 AMI (other inferior wall) – episode of care unspecified
- 410.41 AMI (other inferior wall) – initial episode of care
- 410.50 AMI (other lateral wall) – episode of care unspecified
- 410.51 AMI (other lateral wall) – initial episode of care
- 410.60 AMI (true posterior wall) – episode of care unspecified
- 410.61 AMI (true posterior wall) – initial episode of care
- 410.70 AMI (subendocardial) – episode of care unspecified
- 410.71 AMI (subendocardial) – initial episode of care
- 410.80 AMI (other specified site) – episode of care unspecified
- 410.81 AMI (other specified site) – initial episode of care
- 410.90 AMI (unspecified site) – episode of care unspecified
- 410.91 AMI (unspecified site) – initial episode of care

Note: We do not include 410.x2 (AMI, subsequent episode of care).

Exclusion Codes:

HOE-002-08 Thirty-day all-cause risk standardized readmission rate following pneumonia hospitalization. (CMS)
Description: Hospital-specific 30-day all-cause risk standardized readmission rate following hospitalization for pneumonia among Medicare beneficiaries aged 65 years or older at the time of index hospitalization
Setting: Hospital Level of Analysis: Facility
Type of Measure: Outcome Data Source: Administrative Claims Data
Numerator Statement: The “numerator” of the risk-adjusted ratio is the predicted number of readmissions within 30 days given the hospital’s performance with its observed case mix. The term “predicted” describes the numerator result, which is calculated using the hospital-specific intercept term. The ratio is converted to a rate by multiplying by the national unadjusted rate.
Denominator Statement: The “denominator” of the risk-adjusted ratio is the expected number of readmissions given the hospital’s case mix. The term “expected” describes the denominator, which is calculated using the average intercept term. Outcome measure cohort definition: Admissions for Medicare fee-for-service beneficiaries aged =>65 years discharged alive from the hospital with a principal discharge diagnosis of pneumonia and with a complete claims history for 12 months prior to admission and 30 days post-discharge.
Exclusions: Cohort exclusions (excluded admissions): 1. Admissions for patients with an in-hospital death are excluded because they are not eligible for readmission. 2. Admissions for patients having a principal diagnosis of pneumonia during the index hospitalization and subsequently transferred to another acute care facility are excluded because we are focusing on discharges to non-acute care settings; 3. If a patient has one or more additional pneumonia admissions within 30 days of discharge from an index pneumonia admission, we do not consider the additional pneumonia admissions as index admissions (they are considered as potential readmissions). Thus, any pneumonia admission is either an index admission or a readmission, but not both.
Adjustments: Hierarchical logistic regression modeling to calculate a hospital-specific risk standardized readmission rate (RSRR). This rate is calculated as the ratio of “predicted” to “expected” readmissions, multiplied by the national unadjusted rate. More specifically, the expected number of readmissions in each hospital is estimated using its patient mix and the average hospital-specific intercept. The predicted number of readmissions in each hospital is estimated given the same patient mix but an estimated hospital-specific intercept. Operationally, the expected number of readmissions for each hospital is obtained by regressing the risk factors on the readmission outcome using all hospitals in our sample, applying the subsequent estimated regression coefficients to the patient characteristics observed in the hospital, adding the average of the hospital-specific intercepts, transforming, and then summing over all patients in the hospital to get a value. This is a form of indirect standardization. The predicted hospital outcome is the number of readmissions in the “specific” hospital estimated given its performance and case mix. Operationally, this is accomplished by estimating a hospital-specific intercept that herein represents baseline readmission risk within the hospital, applying the estimated regression coefficients to the patient characteristics in the hospital, transforming, and then summing over all patients in the hospital to get a value. To assess hospital performance in any given year, we re-estimate the model coefficients using that year’s data. Risk Adjustment Variables: Age-65 (years above 65, continuous)

Male

History of CABG ICD-9-CM V45.81, 36.10-36.16

CC 1, 3-6 History of infection

CC 2 Septicemia/shock

CC 7 Metastatic cancer and acute leukemia

CC 8 Lung, upper digestive tract, and other severe cancers

CC 9-10 Lymphatic, head and neck, brain, and other major cancers; breast, prostate, colorectal and other cancers and tumors

CC 15-20, 119, 120 Diabetes and DM complications

CC 21 Protein-calorie malnutrition

CC 22, 23 Disorders of fluid/electrolyte/acid-base

CC 36 Other gastrointestinal disorders

CC 44 Severe hematological disorders

CC 47 Iron deficiency and other/unspecified anemias and blood disease

CC 49, 50 Dementia and senility

CC 51-53 Drug/alcohol abuse/dependence/psychosis

CC 54-56 Major psychiatric disorders

CC 60 Other psychiatric disorders

CC 67-69, 100-102, 177, 178 Hemiplegia, paraplegia, paralysis, functional disability

CC 79 Cardio-respiratory failure and shock

CC 80 Congestive heart failure

CC 81, 82 Acute coronary syndrome

CC 83, 84 Chronic atherosclerosis

CC 86 Valvular and rheumatic heart disease

CC 92, 93 Arrhythmias

CC 95, 96 Stroke

CC 104-106 Vascular or circulatory disease

CC 108 COPD

CC 109 Fibrosis of lung and other chronic lung disorders

CC 110 Asthma

CC 111-113 Pneumonia

CC 114 Pleural effusion/pneumothorax

CC 115 Other lung disorders

CC 129, 130 End-stage renal disease or dialysis

CC 131 Renal failure

CC 135 Urinary tract infection

CC 136 Other urinary tract disorders

CC 148, 149 Decubitus ulcer or chronic skin ulcer

CC 157 Vertebral fractures

CC 162 Other injuries

Note: CCs are condition categories or diagnostic groups that combine related sets of ICD-9-CM codes (Pope et al., 2000). For more details, please see the methodology report.

Numerator Codes:

Denominator Codes: ICD-9-CM codes that define the patient cohort:

480.0 Pneumonia due to adenovirus

480.1 Pneumonia due to respiratory syncytial virus

480.2 Pneumonia due to parainfluenza virus

480.3 Pneumonia due to SARS-associated coronavirus

480.8 Viral pneumonia: pneumonia due to other virus not elsewhere classified

480.9	Viral pneumonia unspecified
481	Pneumococcal pneumonia [streptococcus pneumoniae pneumonia]
482.0	Pneumonia due to klebsiella pneumoniae
482.1	Pneumonia due to pseudomonas
482.2	Pneumonia due to hemophilus influenzae (h. influenzae)
482.30	Pneumonia due to streptococcus unspecified
482.31	Pneumonia due to streptococcus group a
482.32	Pneumonia due to streptococcus group b
482.39	Pneumonia due to other streptococcus
482.40	Pneumonia due to staphylococcus unspecified
482.41	Pneumonia due to staphylococcus aureus
482.49	Other staphylococcus pneumonia
482.81	Pneumonia due to anaerobes
482.82	Pneumonia due to escherichia coli [e.coli]
482.83	Pneumonia due to other gram-negative bacteria
482.84	Pneumonia due to legionnaires' disease
482.89	Pneumonia due to other specified bacteria
482.9	Bacterial pneumonia unspecified
483.0	Pneumonia due to mycoplasma pneumoniae
483.1	Pneumonia due to chlamydia
483.8	Pneumonia due to other specified organism
485	Bronchopneumonia organism unspecified
486	Pneumonia organism unspecified
487.0	Influenza with pneumonia

Exclusion Codes:

APPENDIX B – STEERING COMMITTEE

Bruce A. Boissonnault, MBA (Co-Chair)

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Frank Opelka, MD, FACS (Co-Chair)

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