NATIONAL QUALITY FORUM

Patient Outcomes: All-Cause Readmissions
Steering Committee
December 16, 2011
1:00 pm ET

Please use the following information to access the conference call line:

Dial-in Number: 1-800-818-6592
Conference ID: 5482993
Event Title: Readmissions Steering Committee Conference Call

Webinar: Register at **http://www.MyEventPartner.com/QualityForum232**
Please note that the registration link will be activated 15 minutes prior to the meeting.

AGENDA

1:00 pm **Welcome and Introductions**
Eliot Lazar, MD, MBA, Co-chair

1:10 pm **Discussion of Harmonization Issues**
Bruce Hall, MD, PhD, MBA, FACS, Steering Committee Member
- Measure 1768: Plan all-cause readmissions (NCQA)
- Measure 1789: Hospital-wide all-cause unplanned readmission measure (HWR) (CMS/Yale)

2:45 pm **NQF Member and Public Comment**

2:55 pm **Next Steps**
Alexis Forman Morgan, MPH, Senior Project Manager

3:00 pm **Adjourn**

MEMORANDUM

Subject: Harmonization of NCQA and Yale all-condition readmission measures

From: Leora Horwitz, YNHHSC/CORE

Robert Saunders, NCQA

Through: Lein Han, CMS

Jaya Ghildiyal, CMS

Date: December 13, 2011

Introduction

The National Quality Forum (NQF) Steering Committee requested that Yale and the National Committee for Quality Assurance (NCQA) address the possibilities and challenges of harmonizing their respective readmission measures on eight specific issues. As organizations that routinely bring measures to NQF for endorsement, we are committed to the framework and principles of the consensus development process, namely, that the measures demonstrate the four desirable attributes of importance, scientific acceptability, usability, and feasibility. We further agree that related measures should be harmonized to the fullest extent possible for ease of use and interpretation, and to minimize reporting of conflicting results. Our plan for harmonization reflects this commitment.

After consultation between NCQA and Yale and examination of the specifics of implementing potential changes to harmonize the measures in each of eight areas identified by the committee, the two measure developers came to conclusions on each issue as outlined in this memo. All of the proposed changes are most likely technically feasible for either organization. However, we are concerned about implementing specification changes without first evaluating the impact on scientific acceptability and feasibility. In addition, each organization requires substantial lead time for specification changes to allow for data gathering, analysis, revised data processing, and notification of measure changes prior to public reporting. We have also taken into consideration other NQF-endorsed measures with which harmonization is important. Our responses therefore reflect the NQF Steering Committee's concerns, the experience of the teams in developing the two measures (including through a period of public comment), the broader context of NQF-endorsed outcome measures, and the time limitations imposed by NQF.

In this memo, we:

1. Present existing evidence on the impact of the Steering Committee's recommendations for harmonization
2. Propose to evaluate the impact of the Steering Committee's recommendations in 2012, where such evidence does not yet exist

3. Propose to implement the agreed-upon changes during the NQF measure maintenance review cycle

Background on lead time and impact of specification changes

NCQA's measure is already in use by CMS, including in the STAR ratings used to report on Medicare Advantage plans and will also be factored into the mandated quality bonus payments under the Affordable Care Act. Thus, it is important to understand the lead time required for testing and the impact of implementing the requested changes for both organizations.

1. NCQA's specifications for 2013 go into production in January 2012 for publication in June 2012. NCQA cannot put into production an untested specification.
2. NCQA sub-contracts with commercial data vendors to support analyses designed by NCQA. The analytic work involved in testing any new changes to specifications will require approval from CMS to extend our existing sub-contracts and adjust the amounts allocated. Based on NCQA's three years of testing on the current specification, testing and review requires an additional six months.
3. Once NCQA has taken the specification through its multi-stakeholder review, we then reconfigure the data collection infrastructure. This process includes distribution of the revised specifications and supporting tables (e.g., codes for removing planned readmissions), data submission interfaces and logic checks, creation of test decks for our certified software vendors to verify their new calculations, and training of auditors to ensure collection of valid data.

Similarly, although the Yale measure is not yet in use, testing and implementing substantial changes to the measure would substantially slow its transition to public reporting by CMS. The measure is tentatively slated by CMS for a dry run to be privately reported to hospitals in 2012, with expectations for public reporting in 2013. Data for this dry run have already been requested.

Specific harmonization items suggested by the NQF committee

A. Choose either HCCs or CCs for risk adjustment; committee neutral on choice

For risk adjustment, both NCQA and Yale use CMS' hierarchical condition category (HCC) clinical classification system to group the more than 15,000 ICD-9-CM codes into 189 condition categories (CCs). Neither Yale nor NCQA uses all 189 condition categories (CCs) individually for risk adjustment. Both collapse related CCs together to avoid double-counting similar risk factors (such as diabetes with renal complications and diabetes with neuro complications). NCQA combines related conditions together using the HCC hierarchy. Yale combines related conditions together based on clinical judgment and analysis of the performance of each condition category in the readmission models.

The HCC system was developed by CMS for use in all-encounter risk adjustment for Medicare Advantage plans. The hierarchical logic was developed to predict expenditures. Under the HCC algorithm, ICD-9-CM diagnosis codes are grouped into CCs, and then hierarchical logic is applied to transform the CCs into HCCs. The logic processes related conditions so that more severe manifestations of a disease cancel the effect of less serious ones. This approach reduces the documented number of patients coding into certain HCCs relative to the number assigned to related HCCs higher in the hierarchy.

It is technically possible either for Yale to include the hierarchy of the CMS-HCC system or for NCQA to collapse related risk factors using the Yale algorithm. The measure developers differ in their assessment of the value of the HCC hierarchy in risk assessment, and the hierarchy has different implications in their respective datasets as described below. Consequently each developer would need to evaluate the impact of an alternate approach in our different datasets.

NCQA response

NCQA believes implementing the full hierarchy is the appropriate choice to make. Besides the diabetes example described above (which is a part of implementing the HCC hierarchies), implementing the full hierarchy also permits inclusion of "interaction" conditions, such as when a patient has CHF and diabetes, that were significant (negative) predictors of readmission (see the final regression weights table in the supplemental material presented for the Steering Committee meeting on 12/5).

The NCQA model uses comorbid conditions from the past 12 months of inpatient, outpatient, and professional services claims whereas Yale only has access to inpatient diagnoses. NCQA will identify more of the variability in diagnosis and disease progression in patient populations than Yale, so retaining the hierarchy is of greater importance for NCQA's measure than for Yale's, and this is appropriate to the context of measurement.

Using the full HCC approach also harmonizes this measure with other measures in the final stage of NQF endorsement (e.g., Relative Resource Use for Diabetes) that utilize the CMS-HCC system. NCQA believes that using similar methodologies across health plan measures, when possible, increases the reliability and validity of measure results, and reinforces harmonization across different NQF consensus measurement domains.

Hospitals and health plans will have the opportunity to speak for themselves during the Public Comment period as to whether these differences will lead to confusion. From our experience working with health plans and hospitals, quality improvement professionals in both settings have an infrastructure in place for such dialogue to occur and that they understand better than us which differences matter operationally.

We expect they will not be shy about raising any issues during this Public Comment period.

Yale response

For its hospital-wide readmission measure and other Yale NQF-endorsed readmission and mortality measures, Yale uses a subset of the 189 CCs, but not the hierarchical logic that converts the CCs into HCCs. The CCs serve the primary purpose of reducing the ICD-9-CM codes into a manageable number of clinically coherent candidate variables for risk adjustment. We then used clinical judgment and statistical analysis to combine related CCs into single risk factors (such as a single risk factor for high risk cancers) and to exclude CCs that were not meaningful predictors of readmission risk. Applying the hierarchy modifies patients' risk factor profiles since some risk factors are zeroed out by others. This is problematic because HCCs may span multiple diseases.

> **Example:** If a patient has a comorbidity of CC 80 (CHF), other comorbidities such as CC 90 (hypertensive heart disease), CC 91 (hypertension), and CC 94 (other and unspecified heart disease) are considered not present because they are superseded by the CHF. Therefore, heart failure patients with and without hypertension are treated equally in the model and are non-distinguishable.

In the past, Yale did use the CMS-HCC approach for risk adjustment when it piloted the first single-condition mortality measures. After analysis of this approach we found that by dropping the hierarchy, the calculated risk factor coefficients better reflected the true disease burden when computing RSMRs and RSRRs, and interpretation of the risk factor frequencies reported to hospitals was more straightforward. It was confusing to hospitals to report different risk factor frequencies from those that their patients actually experienced.

An additional benefit of Yale retaining the CC approach for its measure is that it harmonizes the hospital-wide readmission measure with other NQF-endorsed, hospital-level, publicly-reported mortality and readmission measures, including those for acute myocardial infarction, pneumonia and heart failure. Those measures all use CCs rather than HCCs for risk adjustment. Hospitals routinely receive results from each of these outcome measures and will now also begin to receive results about all-condition readmission rates. It would be confusing for hospitals if the all-condition readmission measure and the single condition readmission measures used different risk adjustment methodology and reported different risk-factor frequencies for the same patients.

Finally, Yale emphasizes that the hierarchy was developed for cost estimation (more expensive conditions zero out less expensive ones). Yale has presented the above

rationale for using the CCs for risk adjustment. We ask NQF to consider the rationale.

Plan for harmonization

We believe the context of model development for Yale and NCQA argues for a staged approach to harmonization. Our proposed harmonization approach is for the teams to evaluate options for and the potential impact of harmonization on their respective testing datasets and report back to NQF during the measure maintenance cycle.

B. Choose either logistic or hierarchical modeling; committee prefers logistic for both or two separate approaches

NCQA response

NCQA agrees with the Steering Committee that the NCQA approach does not require implementation of the hierarchical modeling approach, and proposes no changes.

Yale response

The Yale developers maintain that the hierarchical statistical approach is scientifically valid and the most appropriate way to profile hospitals because it accounts for the clustering of the data and the random error associated with measuring hospital quality. The analysis used for calculation of a hospital's risk-standardized readmission rate must be appropriate to the nature of clustered data. Furthermore, Yale developers feel it is important to harmonize the hospital-wide readmission measure not only with the NCQA plan measure but also with other hospital-level readmission measures. In fact, Yale argues that the latter harmonization is more important from a consumer perspective since multiple hospital-level readmission measures are reported for each hospital. It would be very confusing for stakeholders to have different modeling approaches for different hospital-level readmission measures.

Plan for harmonization

As allowed by the Steering Committee, the NCQA and Yale measures will continue to differ on modeling approaches.

C. Include five structured specialty cohorts

NCQA response

Using “structured cohorts,” statistically, implies one believes that risk adjustors perform differently in each subpopulation, in this case, the 5 conditions identified by Yale: medicine; surgery/gynecology; cardiorespiratory, cardiovascular, and neurology. The null hypothesis is that a single model fits adequately.

It is technically feasible for NCQA to implement this, but we believe it prudent to evaluate model performance before committing to making this change. Evaluation would involve testing whether these conditions and not some other superset or subset is right, and whether the relationships identified by Yale in a FFS Medicare 65-and-older population would hold across the Medicare Advantage, Medicare under-65 population or the commercial under-65 population.

Yale response

Yale agrees with the Steering Committee that structured cohorts are an appropriate modeling approach and proposes no changes.

Plan for harmonization

Our proposed harmonization approach is for NCQA to evaluate the impact of this change and report back to NQF during the measure maintenance cycle.

D. Exclude planned readmissions

NCQA response

As noted in the panel discussion, NCQA considered making exclusions for planned readmissions but at the time we could not come up with an acceptable means of reliably identifying them. The Yale approach offers a technically feasible approach that NCQA would have considered in development had it known in advance. We support the appropriateness of making these exclusions as we do not wish to penalize health plans for providing appropriate care through re-hospitalizations.

Making this change to NCQA’s measure, as noted in the introduction to this document, requires re-estimation of the risk adjustment models in our testing data sets and involves lead time necessary to implement these changes at NCQA, for health plans submitting the data, as well as for certified auditors required for HEDIS submissions to NCQA and CMS.

We believe the potential consequences of collecting and reporting the measure in its current form while evaluating the impact of these changes are small. Recent pre-publication results from investigators at Johns Hopkins (see attached slides) found that planned readmissions accounted for less than 2% of readmissions. (The

Hopkins investigators use a different method to exclude planned readmissions than Yale, but they exclude similar types of cases.) They further found no significant differences in observed-to-expected ratios when excluding planned readmissions, and results under the alternative specifications were correlated at 0.85. The impact is likely to be even less as health plans aggregate the hospital data to produce health plan level results.

Yale response

Yale agrees with the Steering Committee that excluding planned readmissions is appropriate and proposes no changes.

Plan for harmonization

Our proposed approach to harmonization is for NCQA to incorporate this approach in its testing datasets for Medicare and commercial populations and evaluate the impact of changes on model performance and plan ratings on the final metric. NCQA would then initiate the process to implement the change outlined in the introduction and report back to NQF during the measure maintenance cycle.

E. Include patients with cancer

NCQA response

NCQA's measure already includes cancer patients in the measure, and so we propose no activity to address harmonization except what is associated with the exclusion of planned readmissions.

Yale response

The Yale measure currently excludes 182,213 admissions for medical treatment of cancer from the eligible cohort (2.3% of eligible admissions). Yale made this decision for several reasons:

a. The post-discharge mortality without readmission rate for these patients is exceptionally high compared to the rest of the hospital population. In the five non-cancer specialty cohorts, 81% of patients are not readmitted, and of the non-readmitted patients, only 5% die within 30 days of discharge. Thus, although competing mortality is always a concern, for most conditions we can assume that a patient who is not readmitted has had a good outcome and is doing well in the community. For the cohort of patients being medically treated for cancer, on the other hand, only 57% of patients are not readmitted, and of the non-readmitted patients, 23% die within 30 days of discharge. *Therefore, lack of readmission may represent an adverse outcome for patients admitted for medical cancer treatment.* Consequently, there is a risk that an institution with low readmission

rates for patients being treated for cancer may be providing *worse* care than comparable institutions because more of its patients are dying post-discharge.

b. Supporting this concern, analyses indicate that hospital performance on readmission for the cohort of patients being medically treated for cancer had very low correlation with hospital performance on readmission for all other cohorts individually, and for hospital performance overall (see table). This is consistent with the hypothesis that readmission is not as strong a signal of hospital quality for the cancer cohort. Furthermore, the internal consistency of the measure (Cronbach's alpha) improved substantially without the cancer cohort. The internal consistency of the measure with six cohorts including cancer is 0.801. As the table below indicates, the internal consistency worsens if any of the cohorts is removed except the cancer cohort. Internal consistency increases meaningfully when the cancer cohort is removed.

Correlation of model SRRs with composite SRR

Model	Correlation with composite SRR*	Cronbach's alpha of composite measure *without* model*
Medicine	0.732	0.724
Surgery/gynecology	0.652	0.747
Cardiorespiratory	0.663	0.777
Cardiovascular	0.541	0.744
Neurology	0.553	0.772
Cancer treatment	0.228	0.835

*higher number indicates a better correlation

c. During our public comment period, we received numerous comments in support of excluding conditions with high post-discharge mortality (nearly all of which are cancer conditions), including from:

American Hospital Association
American Physical Therapy Association
Duke University Medical Center
Federation of American Hospitals
National Association of Children's Hospitals and Related Institutions
National Association of Public Hospitals
Premier
University HealthSystem Consortium

d. The majority of patients with cancer (approximately 86%) are still included in the measure. Over 1 million admissions (13.5%) included in the measure have a secondary diagnosis of cancer. This includes patients in the process of receiving

medical cancer treatment who are admitted for conditions such as neutropenia or sepsis. Furthermore, the surgical cohort includes an additional 214,808 patients admitted for surgical treatment of their cancer.

e. CMS has another contractor that is currently developing quality measures for cancer specialty hospitals. NCQA is a subcontractor to Mathematica Policy Research in the development of these measures for the 11 PPS-exempt cancer hospitals. A measure that looks at readmissions specific to cancer hospitals is a candidate for specification and testing this year.

Given these compelling reasons to exclude the small cohort of patients undergoing medical treatment for cancer, including a clinical rationale to exclude, worse statistical performance when they are included, and strong public support for their exclusion, Yale is reluctant to alter this exclusion criterion to harmonize with the NCQA measure.

Plan for harmonization

At this time the two measure developers do not plan to harmonize on this point. Yale has provided the rationale based on detailed analyses for excluding cancer patients. We ask NQF to consider and provide feedback on our rationale.

F. Allow readmissions to count as index readmissions

NCQA response

As noted in the Steering Committee discussion, we are not ideological about inclusion or exclusion of readmissions. NCQA modeled its approach to exclude readmissions as index events upon Yale's work on the condition-specific readmission measures and the standard used in the literature. Had we known about Yale's new approach during development, we would have considered it. Re-specification is technically uncomplicated.

As stated above, implementation considerations include the fact that CMS and NCQA have already begun collecting and using NCQA's measure. We believe in the short-term that it is desirable to accept this difference. We propose to review the logic for excluding readmissions as index events during the measure maintenance cycle.

The intent of counting readmissions as index events is to hold hospitals accountable for the total impact of mistakes that lead to readmission and failure to correct on subsequent readmissions. However, as a statistical issue, this has the effect of double-counting (or more) the impact of comorbid conditions in the risk model, which may lead to erroneous conclusions about which factors predict readmission. We ask

that the Steering Committee weigh this factor that was not as clearly explained in the earlier meeting.

Consider, for example, a patient admitted for diabetes (admission A) who is discharged on a new regimen and is not adequately educated on self-management. The patient becomes hypoglycemic two days later because of confusion between short and long-acting insulin preparations and is readmitted (admission B). Perhaps this patient experiences further complications that lead to a chain of additional less than 30-day readmissions (call them admissions C and D). Now, consider that this patient has a comorbid diagnosis of COPD recorded during the preceding 12 months that would appear in the regression model for each hospitalization (i.e., the index stay A and readmissions B, C, and D).

While treating stays A-D as index events may produce a more complete picture of readmission frequency, it also lends greater weight to COPD as a predictor of readmission (you have in the example quadrupled the number of index events), even though the precipitating readmission condition occurs only in the interval between admissions A and B. This additional weighting of comorbid conditions will make it harder, statistically, to identify new conditions like the hypoglycemia as predictors of readmission—all the past comorbidities appear on each of the new observations (admissions B, C, and D) and strengthen the association between those conditions and the readmission—and may misdirect hospitals' and plans' quality improvement activities.

We believe our plan-based approach to accountability addresses the issues the Yale team raises regarding discharge planning and patients who experience multiple readmissions. We expect that our respective analyses will resolve remaining differences during the measure maintenance cycle.

Yale response

Yale agrees with the Steering Committee that counting readmissions as index admissions is appropriate and proposes no changes. We had several rationales for this decision:

- Institutions should be held accountable for all readmissions.
- A readmission is a signal that discharge planning might not have been adequate during the first discharge – hospitals should therefore pay particular attention to discharge planning, goals of care etc. during the readmission – if further readmissions are not counted in measure, there is no incentive to do so.
- Encourages attention to recidivist patients, more attention to goals of care.
- Some conditions/diagnoses may be more likely to be readmissions – infections for instance – if we do not count the readmission as index case we may be excluding certain types of conditions more than others.

- Some hospitals are likely to be worse at handling readmissions than others; if readmissions cannot serve as index admissions, we will not be able to identify hospitals that generate more of these sequential readmissions.

Plan for harmonization

Our proposed harmonization approach is for NCQA to develop and test a modified specification in its testing datasets and assess the impact upon plan performance relative to the current specification. If the change results in an improvement and meets the scientific acceptability criteria, NCQA would then initiate the process to implement the change described in the introduction.

G. Include patients admitted for behavioral health/substance abuse conditions

Both Yale and NCQA agree that patients with behavioral health and substance abuse conditions should be included in an all-condition readmission measure, and both the Yale measure and the NCQA measure currently do so. The Yale measure places these patients in the medical cohort, since in acute care hospitals these patients are typically cared for by medical teams.

AHRQ CCS	Description	Admissions
653	Delirium, dementia, and amnestic and other cognitive disorders	44,266
660	Alcohol-related disorders	8,578
661	Substance-related disorders	11,050
663	Screening and history of mental health and substance abuse codes	4,482
	Total behavioral health and substance abuse patients in medicine cohort	**68,376**

H. Include patients admitted for psychiatric treatment

NCQA response

NCQA's measure already includes index hospitalization events and identifies comorbidities for these conditions, and so we propose no activity to address harmonization.

Yale response

The Yale measure currently excludes a small number of patients admitted for primary psychiatric treatment because most facilities caring for such patients are not acute care hospitals and this measure is intended only for acute care hospitals. The 21,483 patients that receive primary psychiatric treatment in acute care hospitals have insufficient volume to form their own cohort. In principle, Yale would gladly

include patients with these conditions in a separate psychiatric cohort which has already been specified and which would include the following condition categories:

AHRQ CCS	Description
657	Mood disorders
659	Schizophrenia and other psychotic disorders
651	Anxiety disorders
670	Miscellaneous disorders
654	Developmental disorders
650	Adjustment disorders
658	Personality disorders
652	Attention-deficit, conduct, and disruptive behavior disorders
656	Impulse control disorders, NEC
655	Disorders usually diagnosed in infancy, childhood, or adolescence
662	Suicide and intentional self-inflicted injury

We also note that NCQA is a subcontractor to Mathematica Policy Research on a CMS-funded project to develop measures for inpatient psychiatric facilities (IPFs), both freestanding psychiatric hospitals and units within general hospitals. A readmission measure specific to IPFs is a candidate for specification and testing this year.

Plan for harmonization

The Yale measure was built to be used in the IQR program, which profiles short-term acute care hospitals only. Psychiatric hospitals are not included in this program. For this purpose, consequently, Yale will assess the impact of including patients receiving primary psychiatric treatment in acute care hospitals in the medicine cohort. If the measure were to be used in other settings including psychiatric hospitals, Yale would seek to identify whether psychiatric hospitals could appropriately be included in the measure, and if so, whether the proposed psychiatric specialty cohort has adequate performance characteristics. If testing merits, Yale would add a sixth specialty cohort to the measure.

In summary, we expect that many of these issues can be harmonized in the long run. In the short term we do not expect these issues to cause much confusion given that we expect these measures would rarely, if ever, be reported on exactly the same patient population, and that the measures have a fundamentally different focus—what hospitals can do to reduce readmissions and what health plans can do post-hospitalization to reduce readmissions. We appreciate the opportunity to respond to the Steering Committee's concerns.

Rehospitalization

- Gerard Anderson, PhD
- Scott Berkowitz, MD, MBA
- Steve Jencks, MD, MPH

Project funded by Commonwealth Fund

Project has two objectives

- Refine Commonwealth Fund scorecard
- Provide data to CMS about rehospitalizations

Presentation Examines Three Questions:

- What are the characteristics of beneficiaries who get rehospitalized?
- What is the likely impact of excluding certain clinical conditions or procedures?
- What are the characteristics of hospitals with above and below expected rates of rehospitalization?

Data Set

- 2008 Medicare 5% sample
- Beneficiaries must be continuously enrolled in Part A and B and live in US
- Beneficiaries discharged from acute care hospitals in first 9 months of 2008
- Each discharge was a new index hospitalization
- Beneficiaries who died during the index hospitalization or who left against medical advice were removed from the analysis

Definition Of Rehospitalization

- All cause 30 day rehospitalizations excluding transfers
  - Transfer is defined as a O day rehospitalization
  - Note –Possible problems with the transfer code 2
    - We found many transfers taking multiple days

What are the characteristics of beneficiaries who get rehospitalized?

- Comparison group is beneficiaries with index hospitalization, not all beneficiaries
- 86 percent of rehospitalized beneficiaries have 5+ chronic conditions
- 25 to 1 variation in probability of rehospitalization by index DRG
- Less variation by demographic characteristics (age, gender, race)

Beneficiaries with 5+ chronic conditions are responsible for most rehospitalizations

#Co morbidities	% of beneficiaries	% rehospitalized
0	12.9%	0.2%
1	9.9%	0.6%
2	13.1%	1.8%
3	14.9%	4.0%
4	13.6%	6.9%
5+	35.5%	86.5%

Some DRGs are 25 times more likely to result in rehospitalization

- Lowest -2.7% - DRG 766 – Caesarean Section w/o CC/MCC
- Highest - 66.6% - DRG – Chemotherapy w/o Acute Leukemia as Secondary Diagnosis

The Five Index DRGs with Highest Total Number of Rehospitalizations Within 30 Days

- 15.3% -DRG 470 -Major joint replacement or reattachment of lower extremity w/o MCC
- 26.0% -DRG 885 -Psychoses
- 18.3% -DRG 392 - Esophagitis, gastroent & misc digest disorders w/o MCC
- 27.1% -DRG 871 - Septicemia w/o MV 96+ hours w MCC
- 19.1% - DRG 194 - Simple pneumonia & pleurisy w CC

Impact of Demographic Factors on Rehospitalization

- Negligible Association
  - Age (declines slightly after age 65)
  - Gender (no difference)
- Relatively Minor Association
  - Race (blacks 30% higher)
  - Dual eligibility status (dual eligibles 20% higher)
- Disabled and ESRD have higher rehospitalization rates than aged beneficiaries

Clinical Exclusions

- Sometimes rehospitalizations for additional procedures are planned and represent standard medical practice.
- We examined a second definition of rehospitalizations to also exclude some clinical combinations

Clinical Exclusions

- We identified 4 types of rehospitalizations where the procedures are routine and may represent good medical care that may (but never “always”) be followed by a planned rehospitalization for a procedure within 30 days.
  - *Chemotherapy Administration*
  - *Staged/Planned Cardiac Revascularization*
  - *Obstetrics*
  - *Staged Bilateral Vascular Procedures*
- Attempted to be as conservative as possible by including as many procedures as possible

Problems We Encountered Including/Excluding Medical Procedures

- Adding additional exclusions becomes a "slippery slope"
- Additional coding complexity
- Coding may not be reliable in certain instances
- There is greater possibility of Type 1 and Type 2 errors

Chemotherapy

- Rehospitalization within 30 days for chemotherapy may represent standard medical practice.
- We excluded any 30 day rehospitalization that includes one of the following chemotherapy DRG codes:
  - DRG 837, 838, 839 (chemotherapy with acute leukemia)
  - DRG 846, 847, 848 (chemotherapy without acute leukemia as secondary diagnosis)

Staged/Planned Cardiac Revascularization Procedures

- We used the same exclusion coding as in Hospital Compare.
- This includes readmissions within 30 days of discharge specifically where angioplasty or coronary bypass surgery occur that are not matched with a diagnosis code for heart failure, acute MI, unstable angina, arrhythmia or cardiac arrest.

Obstetrics

- All DRGs associated with obstetrics for delivery were excluded because a procedure (delivery) is necessary in any pregnancy.
- In the case of false labor, a woman is coming with the concern that she is going to deliver on that admission. This has nothing to do with the behavior of the hospital.
- We excluded rehospitalizations associated with; cesarean section, vaginal delivery, abortion or threatened abortion, ectopic pregnancy and false labor.

Staged Bilateral Vascular Procedures

- Bilateral vascular procedures, if clinically indicated, for significant peripheral arterial disease or carotid disease, either surgical or stenting, are typically not performed at once but likely would be performed within a month.
- We selected particular ICD-9 or DRG codes for peripheral vascular stenting, peripheral bypass vascular surgery, carotid artery stenting, and carotid artery endarterectomy surgery, and if the same codes were found on index and 30 day readmission, excluded the rehospitalization as staged and bilateral (in the absence of a code for “side”).

Excluding Medical Procedures

- These four categories accounted for only **1.7%** of total rehospitalizations.
- There are no DRGs where every discharge is rehospitalized- highest percentage is 66.6%.
- Preferred alternative is to have hospital use a code to specify that there is a prospectively planned rehospitalization that will occur within 30 days for a procedure.
  - Routinely used in private sector

Expected Rehospitalization Rate

- As noted earlier each DRG has a different national rehospitalization rate
  - 25 to 1 variation across all DRGs
- A case mix adjuster is needed because not all hospitals have the same case mix and their rehospitalization rate could be a function of their case mix
- We created an observed to expected (O/E) ratio of rehospitalization for each hospital

Methods -An expected rehospitalization rate

- A national rehospitalization rate for each DRG is calculated
- The national rehospitalization rate is multiplied by the number of discharges in that DRG at that hospital
- It is then divided by the total number of discharges for all DRGs in that hospital
- This represents the hospital's expected rehospitalization rate if the hospital had rehospitalized beneficiaries at the national rate in each DRG

Methods – O/E Rehospitalization Rate

- We then divided the observed rehospitalization rate at the hospital by the expected rehospitalization rate at that hospital to obtain a case mix adjusted rehospitalization rate
- Example: At Johns Hopkins Hospital the expected rehospitalization rate is 23.4% while the actual rate is 29.0%. The actual/expected ratio is 1.237 or Johns Hopkins has a 23.7% higher rehospitalization rate than would be expected based on case mix alone.
- We calculated the O/E rehospitalization ratio for each hospital

Result - O/E Rehospitalization Rate Has Normal Distribution

- Hospitals were almost normally distributed

7 hospitals	> 2.0 ratio
19 hospitals	1.75-2.0 ratio
74 hospitals	1.5- 1.75 ratio
272 hospitals	1.25-1.5 ratio
779 hospitals	1.0- 1.25 ratio
871 hospitals	0.75 -1.0 ratio
270 hospitals	0.50 – 0.75 ratio
28 hospitals	0.25-0.50 ratio
1 hospital	<0.25 ratio

Variation in the O/E Rehospitalization Rate

- For all cause rehospitalizations the range was from:
  - 2.42 at the Michael Reese Hospital in Chicago
  - 0.16 at West Valley Medical Center in Idaho.
- In other words, Michael Reese an observed rehospitalization rate that was 142% greater than expected based on the mix of DRGs treated at the hospital and West Valley had a 84% lower than expected rate.

Variation in the Actual/Expected Rehospitalization Rate

- Normal distribution suggests randomness in the O/E ratio but other tests are needed
- We then examined the variation in the O/E ratio by
  - Bed size
  - Teaching status
  - DSH payments
  - Total revenues
  - Ownership status
  - Dual eligible

Univariate Variation in the O/E Rehospitalization Ratio

- Average ratio by bed size

0.98	1-99 beds
1.02	100-199 beds
0.98	200-299 beds
0.96	300-399 beds
0.99	400-499 beds
1.00	500+ beds

Univariate Variation in the O/E Rehospitalization Ratio

- Average ratio by number of residents
  - 0.99 no teaching
  - 0.99 1-100 residents
  - 1.07 > 100 residents
- Average ratio by DSH payments
  - 0.92 no DSH payments
  - 1.00 DSH payments $1-$4,999,999
  - 1.03 DSH payments >$5,000,000

Univariate Variation in the O/E Rehospitalization Ratio

- Average ratio by total hospital revenues

1.03	<$10 million
1.00	10-100 million
0.98	>$100 million

Multivariate Analysis of Variation in the O/E Rehospitalization Ratio

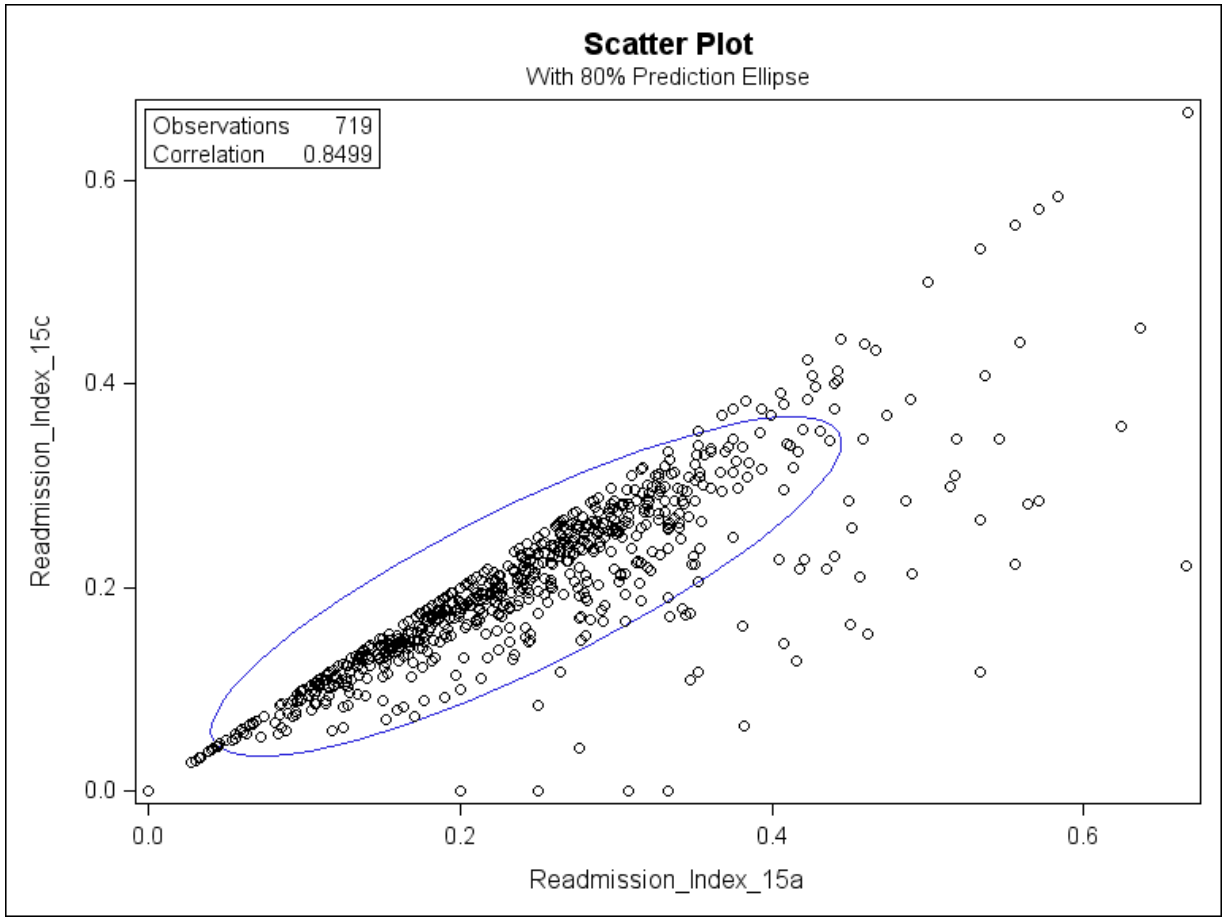
- We ran multiple regressions with O/E rehospitalization rate as dependent variable and
  - Bed size
  - Interns and residents
  - GME payments
  - DSH payments
  - Total hospital revenues
  - Ownership
  - Percent dual eligibles

  as independent variables
- Only 2 percent of total variance explained
- We could not identify any factors that explained the variation in O/E ratio

Multivariate Analysis of Variation in the O/E Rehospitalization Ratio

- We ran the same analysis excluding and planned clinical conditions
- Similar results were discovered
  - No systematic differences in O/E ratios by hospital characteristics
- Given the small number of cases it had minimal impact on most hospitals
- It did have significant impact on 15-20 mostly cancer hospitals

Scatter Plot for Hospital Values for All Cause and for All Cause Excluding Clinical Procedures



Pearson Correlation = 0.85

Summary of Findings

- 86% of all rehospitalizations occur in beneficiaries with 5+ chronic conditions.
- Case mix adjuster is needed – 25 to 1 variation by index DRG
- One can select a cohort of clinical procedures that can be excluded from readmission. Our conservative grouping only excluded 1.7% of rehospitalizations.
- However, for some hospitals it makes a major difference
- Alternatively, CMS could develop a system where hospitals can prospectively identify patients at discharge that will require planned readmission for a procedure.

Summary of Findings Continued

- We created a readmission index which is case mix adjusted to assess hospitals
- It results in a normal distribution and is minimally impacted by clinical exclusions
- It does not vary by
  - Bed size
  - Ownership
  - Teaching status
  - DSH status
  - Hospital revenues.
  - Dual eligible status