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To: HSCRC Commissioners

From: Dianne Feeney

Re: Modifications to the Maryland Hospital Preventable Readmissions (MHPR) Draft Recommendations

Date: January 5, 2011

This is to advise the Commissioners of the most recent changes to the MHPR Draft Recommendations document. Changes to the document from the December 1, 2010 version include:

- pgs. 10 (bottom) and 11 (top)- updated information on staff's work on methods and strategies to construct a unique patient ID to calculate accurate across-hospital PPR rates for the near- mid- and long-term; as indicated in the draft, staff anticipates determining whether a reliable unique ID can be constructed in the near-term with the current data available by the February Commission meeting.
- pg. 18- text indicating the final MHPR recommendation would be presented to the Commission in December 2010 has been deleted.

Draft Staff Recommendation on Rate Methods and Financial Incentives relating to Reducing Maryland Hospital Preventable Readmissions (MHPRs)

Health Services Cost Review Commission

January 5, 2011 Revised

This document represents a revised draft recommendation to be presented to the Commission on January 12, 2011.

1.0 - Background

Inpatient hospitalizations are one of the most costly categories of health care costs in the United States accounting for between 20-25% percent of total health care expenditures.[1] The Institute of Medicine has estimated that approximately 3% of US hospitalizations result in adverse events, and almost 100,000 patients die annually due to medical errors.[2] Reducing rates of hospital readmissions has, thus, attracted considerable attention from policy-makers as a way of improving quality and reducing costs.

Until recently, there has been limited information on the frequency and pattern of hospital readmissions and little ability to appropriately link hospital performance to payment in a responsible and meaningful way. Also, standard prospective payment systems, such as Medicare's Inpatient Prospective Payment System (IPPS) or Maryland's Charge per Case system (CPC) fail to provide incentives for hospitals to appropriately control the frequency of readmissions. Although the HSCRC incorporated a volume-related payment adjustment in 2008, there are few financial incentives for hospitals to invest in the necessary infrastructure to reduce unnecessary readmissions by reducing medical errors during the inpatient stay (that may lead to a repeat admission) or more actively cooperate with other providers to improve coordination of care post discharge.

Cost Implications of Readmissions and Wide Variation of Readmission Performance

In the Medicare program, inpatient care accounts for 37 percent of spending, [3] and readmissions contribute significantly to that cost: 18 percent of all Medicare patients discharged from the hospital have a readmission within 30 days of discharge, accounting for $15 billion in spending.[4]

In Maryland, the rate of readmissions is based on analysis of 2007 readmission data using the Potentially Preventable Readmissions (PPR) methodology:

- The top performing hospitals had risk/severity adjusted 15-day rates of readmission just below 4%
- The bottom performing hospitals had risk/severity adjusted 15-day rates of readmission just above 8%
- The 15-day readmission rate overall was 6.74%
- The 30-day readmission rate overall was 9.81%
- For readmissions in 15 days, there were $430.4 million (5.3%) estimated associated charges
- For readmissions in 30 days, there were $656.9 million (8.0%) estimated associated charges

[1] Catlin, A. et al. "National Health Spending in 2006: A Year of Change for Prescription Drugs," *Health Affairs,* January/February 2008, Vol. 27, No. 1, pp. 14-29.
[2] To Err is Human, The Institute of Medicine, November, 1999.
[3] Medicare Payment Advisory Commission. 2006. Healthcare Spending and the Medicare Program: A Data Book. Washington DC: Medicare Payment Advisory Commission, p.9.
[4] Medicare Payment Advisory Commission. 2007. Report to the Congress: *Promoting Greater Efficiency in Medicare*. Washington, DC: Medicare Payment Advisory Commission, p. 103.

According to a recent national study on readmissions of Medicare patients, Maryland appeared to have the second highest readmission rate (22%) of any jurisdiction in the U.S., with the District of Columbia at 23.2% (see **Appendix I** for a copy of this article and analysis).[5]

Factors Contributing to Unnecessary Readmissions

Multiple factors contribute to the high level of hospital readmissions in the U.S. generally and in Maryland in particular. They may result from poor quality care or from poor transitions between different providers and care settings. Such readmissions may occur if patients are discharged from hospitals or other health care settings prematurely; if they are discharged to inappropriate settings; or if they do not receive adequate information or resources to ensure a continued progression of services. System factors, such as poorly coordinated care and incomplete communication and information exchange between inpatient and community-based providers, may also lead to unplanned readmissions.

Hospital readmissions may also adversely impact payer and provider costs and patient morale. Some hypothesized in the 1980s that Medicare's implementation of IPPS would encourage physicians to discharge patients "sicker and quicker." That did not turn out to be a significant problem for the quality of inpatient care; yet, patients were discharged earlier, which may theoretically increase the risk of readmissions, resulting in greater costs to payers. Moreover, preliminary analysis suggests that the majority of readmissions are for medical services rather than surgical procedures, suggesting that hospital readmissions may not be profitable to hospitals.[6]

Reducing readmissions, then, represents a unique opportunity for policymakers, payers, and providers to reduce health care costs while increasing the quality of patient care. Identifying best practices and policy levers to reduce avoidable readmissions would likely improve quality, reduce unnecessary health care utilization and costs, promote patient-centered care, and increase value in the health care system. Moreover, as some individuals are at greater risk of readmissions as a result of individual characteristics, care coordination efforts that reduce hospital readmissions may help eliminate disparities in health care.

Clearly, there is an urgent need at both a state and national level to develop a set of payment reforms that can provide strong financial incentives for hospitals to reduce their rates of Potentially Preventable Readmissions (PPRs).[7] The increasing focus in linking payment and quality (i.e., the

[5] Jenks SF, Williams MV, Coleman EA, Rehospitalizations among Patients in the Medicare Fee-for-Service Program. *New England Journal of Medicine*. 360:1418-28, April 2, 2009.
[6] Interviews with Stephen F. Jencks, M.D., M.P.H., Mark V. Williams, M.D. and Eric A. Coleman, M.D., M.P.H. May 2005.
[7] Potentially Preventable Readmissions (PPRs) represent a categorical model developed by 3M Health Information Systems which categorizes and identifies return hospitalizations that may have resulted from the process of care and treatment or lack of post admission follow-up rather than unrelated events that occur post discharge.

overall value of the care provided) is motivated by the dramatic escalation in health care costs and the past inability of policymakers to measure and compare health outcomes.

If readmission rates are to serve as an overall measure of both quality and cost, it is necessary to apply an analytic approach that focuses on those readmissions that could have potentially been prevented. As the nation's only "All-Payer" rate setting system, and with its current use of the highly sophisticated All-Payer-Refined Diagnostic Related Grouping risk-adjustment and case mix classification system (APR-DRGs), the Maryland hospital payment system is uniquely positioned to make use of these readmission measurement systems and link relative hospital performance to financial incentives in a meaningful and productive way.

The following recommendation is intended to describe an approach for incorporating such a system of incentives into the Maryland hospital "All-Payer" payment system beginning in FY 2011.

2.0 - Using Payment Incentives to Reduce Unnecessary Readmissions in Maryland

Basic Principles for the Establishment of Payment Incentives

In developing its method for the incorporation of payment incentives for hospitals to reduce unnecessary readmissions, the HSCRC first identified a set of basic principles to help guide the Commission's overall effort.

1) Fairness in Measurement: First, there should be a focus on the development of appropriate adjustment factors to take into account systematic and less-controllable issues and factors that influence readmission rates that all hospitals may experience. Factors that were found to significantly influence readmission rates include age, the presence of mental health and substance abuse secondary diagnoses, disproportionate share effects (Medicaid status), and hospital location (hospitals near the state border will naturally have a higher proportion of their patients readmitted to hospitals outside of Maryland).

2) Broad Level of Applicability and Fairness in the Application of Rewards and Penalties: As the HSCRC learned during the course of development of its Maryland Hospital Acquired Conditions (MHACs) initiative, basing payment rewards and penalties on a hospital's relative rate of performance avoids problems generated by a focus on individual cases. Since readmissions are often the result of problems in the care processes relating to coordination and communication between hospitals and post-discharge care providers, a focus on systematic differences in readmission rates across hospitals (comparison of actual readmission rates relative to expected readmission rates by hospital) is appropriate and allows for a much broader level of application. However, a reward/penalty system that applies only to relative hospital performance in a given year does not address year to year changes in individual hospital readmission rates. The Commission may wish to consider the

application of a hybrid system of rewards and penalties, focusing both on relative hospital performance and year to year changes in hospital performance.

3) Prospective Application: During the process of the MHAC development, the HSCRC also realized the importance of prospective application of payment incentive programs linked to quality improvement. Individual hospital PPR rates should be compared to expected PPR rates (risk adjusted), and established targets should be set from a previous year so they are known in advance.

4) Emphasis on Infrastructure Development to Assist Hospitals in Reducing PPRs: A substantial effort should be made to facilitate hospitals' development of infrastructure and knowledge regarding best PPR-reducing mechanisms/strategies. The HSCRC and other entities (the Hospital Association - as demonstrated in states like Florida) can play a vital role in providing infrastructure support to hospitals to help them identify and implement best practices associated with readmission reduction.

5) Appropriate Level of Financial Incentive: Another important realization from the MHAC policy development process was the need to arrive at an appropriate level of financial risk for providers when establishing the link between provider payment and performance. For MHACs, the Commission decided to place hospitals under only a moderate level of risk in the early stages of the initiative. This was because the HSCRC wanted to give hospitals sufficient time to understand the methodology and make use of the available data tools to analyze their performance and put in place the clinical and operational changes necessary to improve performance.

The same arguments also apply to the introduction of payment incentives related to reducing PPRs. However, unlike MHACs, the incentives for reducing readmissions must take into consideration the significant counter-incentives the hospital will face in lost revenue from fewer readmissions. Eventually, the amount of revenue at risk for reducing PPRs must be sufficiently large to counterbalance loss of revenue due to reduced readmissions.

3.0 - Maryland Uniquely Positioned to Link Payment to Reduced Readmissions

Given the HSCRC's use of and experience with the APR-DRGs mechanism for both risk adjustment and revenue constraint, it is natural that the HSCRC might wish to consider the use of a complementary tool (Potentially Preventable Readmissions) as the basis for linking payment to performance related to the reduction of Maryland hospital readmissions. APR-DRGs and PPRs are products of 3M Health Information Systems and have been used in a number of other jurisdictions to measure and monitor rates of preventable hospital readmissions rates.

The following sections briefly identify and define the key components and steps involved in the application of the PPR methodology to measure relative hospital performance on their ability to reduce preventable readmissions.

Potentially Preventable Readmissions and PPR Logic

A **Potentially Preventable Readmission** is a readmission (return visit to a hospital within a specified period of time) that is clinically-related to an **Initial Hospital Admission**. For readmissions to be "**Clinically-Related**" to an initial admission, it is necessary that the underlying reason for readmission be plausibly related to the care rendered during or immediately following a prior hospital admission.

A clinically-related readmission may have resulted from the process of care and treatment during the prior admission (e.g., readmission for a surgical wound infection) or from a lack of post admission follow up (lack of follow-up arrangements with a primary care physician) rather than from unrelated events that occurred after the prior admission (broken leg due to a car accident) within a specified readmission window.

The **Readmission Window** (sometimes also referred to as the Readmission Interval) is the maximum number of days allowed between the discharge date of a prior admission and the admit date of a subsequent admission in order for the subsequent admission to be a readmission. Readmission analyses have traditionally focused on 30, 15, and 7 day readmission windows.

The Initial Admission is an admission that is followed by a clinically-related readmission within the specified readmission window. Subsequent readmissions relate back to the care rendered during or following the Initial Admission. The Initial Admission initiates a "**Readmission Chain**."

Readmission Chains are a sequence of PPRs that are all clinically-related to the Initial Admission. A readmission chain may contain an Initial Admission and only one PPR, which is the most common situation, or may contain multiple PPRs following the Initial Admission. In addition to the "clinically-related" PPR APR-DRGs matrix, all readmissions with a principal diagnosis of trauma are considered not potentially preventable.

Use of APR-DRGs

Under this approach, APR-DRGs can be used as the basis for establishing the clinic relationship between the Initial Admission and the Readmission. In developing the PPR logic, a matrix was created in which there were 314 rows representing the possible base APR-DRGs of the Initial Admission, and 314 columns representing the base APR-DRGs of the readmission. Each cell in the matrix then represented a unique combination of a specific type of Initial Admission and readmission. Clinical panels applied criteria for clinical relevance and preventability to the combination of base APR-DRGs and each cell. The end result was that each of the 98,596 cells contain a specification of whether the combination of the base APR-DRGs for the Initial Admission and for the readmission were clinically-related, and, therefore, potentially preventable. This matrix operationalized the definition of "clinically-related" in the PPR logic.

Exclusions and Non-Events

There are certain circumstances in which a readmission cannot be considered potentially preventable. Some types of admissions require follow-up care that is intrinsically clinically-complex and extensive, and for which preventability is difficult to assess. For these reasons, admissions for major or metastatic malignancies, multiple trauma, and burns are not considered preventable and are globally excluded as an Initial Admission or readmission.

A second type of global exclusion relates to the discharge status of the patient in the Initial Admission. A hospitalization with a discharge status of "left against medical advice" is excluded as either an Initial Admission or readmission because under these circumstances, the hospital has limited influence on the care rendered to the patient. All types of globally-excluded admissions are classified as Excluded Admissions.

The following admissions are classified as Non-events: admissions to non-acute care facilities; Admissions to an acute care hospital for patients assigned to the base APR-DRG for rehabilitation, aftercare, and convalescence; Same-day transfers to an acute care hospital for non-acute care (e.g., hospice care).

Readmission Rates

The 3M PPR Grouper Software classifies each hospital admission as a PPR, Initial Admission, Transfer Admission, Non-event, Excluded Admission, or an Only Admission. The output from the PPR Grouper software can be used to compute PPR rates by computing the ratio of the number of PPR chains divided by the sum of admissions classified as an Initial Admission or an Only Admission.

Non-events, Transfer Admissions, Only Admissions that died, and Excluded Admissions are ignored in the computation of a PPR rate. PPR rates can be computed for readmission to any hospital or can be limited to readmissions to the same hospital only.

Since a hospital PPR rate can be influenced by a hospital's mix of patient types and patient severity of illness during the Initial Admission, any comparison of PPR rates must be adjusted for case mix and severity of illness. A risk adjustment system such as APR-DRGs is necessary for proper comparisons of readmission rates. As discussed, higher than expected readmission rates can be an indicator of quality of care problems during the initial hospital stay or of the coordination of care between inpatient and outpatient settings.

Summary of PPR Logic

A readmission that is clinically-related to the prior Initial Admission or clinically-related to the Initial Admission in a readmission chain is a Potentially Preventable Readmission. A higher than expected rate of PPRs means that the readmissions could reasonably have been prevented through any of the following:

1) provision of quality care in the initial hospitalization;

2) adequate discharge planning;

3) adequate post discharge follow-up; and

4) coordination between the inpatient and outpatient health care team.

The end result of the application of the PPR logic is the identification of the subset of Initial Admissions that were followed by PPRs. Admissions that are at risk for having a readmission but were not followed by a subsequent readmission (such as Only Admissions) are also identified by the logic. The identification of Initial Admissions, PPRs, and at-risk Only Admissions allows meaningful PPR rates to be computed. A description of the PPR logic with definition of terms and concepts is provided in **Appendix II** to this recommendation.

4.0 – Primary Considerations in Deciding on a Payment Model

Evaluating Readmissions to the Same Hospital or All Hospitals?

The first question that should be addressed is whether to focus on readmissions to the same hospital that treated the initial admission or to evaluate readmissions to all hospitals. Using only readmissions to the same hospital ("intra-hospital admissions") would capture most of the readmissions, and not require extensive additional risk-adjustments (given that the profile of a hospital's patient population--age, mental health and indigent mix-- would likely be relatively stable from year to year). A focus on readmissions to the same hospital would also avoid most of the problems associated with attempting to track unique patients across different institutions and also encourage hospitals to improve their absolute rate of intra-hospital readmissions year to year.

However, focus exclusively on intra-hospital readmissions does not capture patients who were so dissatisfied with the initial treatment that they decided to go to a different hospital. Using admissions to all hospitals ("inter-hospital" readmissions) is clearly a more comprehensive approach.

In analyzing intra- and inter-hospital readmission rates, staff has identified patient-level data concerns that hinder the accurate tracking of patients over time within the same hospital, and

technical difficulties greater still across all hospitals. These concerns and technical difficulties encountered are discussed in the section below entitled Challenges to and Alternatives for Tracking Patients Within and Across Hospitals.

Challenges to and Alternatives for Tracking Patients Within and Across Hospitals

As noted above, data challenges have been identified and are a barrier to accurately tracking patient readmissions within and across hospitals, ultimately causing a delay in the implementation of the MHPR initiative in 2010.

Within Hospital Data Issues

To calculate intra-hospital (within the same hospital) readmission rates staff ran the PPR grouper on data using the assigned medical record number (MRN) to match patients over time. Concurrent with the running of the grouper, staff learned that hospitals were not consistently assigning a unique MRN that is constant over time in compliance with HSCRC inpatient and outpatient data submission requirements. Multiple MRN assignments cause readmissions rates to be under-represented and render hospital specific rates inaccurate.

Across Hospital Data Issues

Since there is no unique identifier (ID) assigned for Maryland hospitalized patients, staff has developed a method for assigning unique IDs for matching patients across hospitals who are readmitted using a probabilistic matching approach. The core premise of the algorithm used is to identify unique patients and assign unique IDs to patients with the same gender, date of birth and zip code who are hospitalized within the window of time specified in the MHPR policy (e.g., 30 days).

To further validate the algorithm, the aggregate results yielded from the matching algorithm have been compared with patient matching results from Florida where a unique patient ID is used, and Maryland estimates of aggregate readmission rates fit within the expected relationships of statewide within vs. across hospital readmissions, total readmission rates, and differences by payer. Although these errors do not appear to disproportionately affect one group/class of hospitals over another, staff continues to have the following concerns:

- based on data analysis, the algorithm produces false negative (an individual patient is incorrectly assigned more than one ID) and false positive (different patients are incorrectly assigned the same unique ID) results;
- the data errors are further amplified to the extent that hospitals have assigned multiple MRNs to a unique patient, and have errors in the patients' dates of birth (DOB), and zip code;
- the patient-level case mix data submitted to HSCRC by hospitals does not, staff believe, contain a sufficient amount of patient identifying information (e.g., last four digits of SSN, first

name, last name, etc.) to construct an algorithm that diminishes false negatives and false positives sufficiently to calculate statistically accurate hospital-specific readmission rates.

Out of State Data Issues

Comparable data are not available for admissions out-of-state. As mentioned, failure to account for out-of-state readmissions would reduce the readmission rates for hospitals located close to the border with other states or for hospitals such as large academic centers that draw larger percentages of out-of-state patients for initial treatment who may be readmitted in their home states.

Staff Efforts to Address Identified Data Issues

To address multiple MRN assignments to unique individuals for FY 2010:

- Staff issued a memorandum to hospitals on 5/24/10 advising hospitals of the MRN error and directing hospitals to identify those patients with changed MRNs to HSCRC by 9/28/10, consistent with the final closing date for submission of the Qtr 4 of the case mix data.
- Hospitals were directed to identify patients for whom they purposefully changed the MRN (e.g., changing a social security number MRN to a number that does not contain patient identifying information) and for those whom they inadvertently assigned more than one MRN (e.g., the registration clerk did not identify the MRN previously assigned when the patient presents for care and assigns a new MRN, but the billing department reconciles the patient identity in the patient accounts system).
- Thus far, the results of the MRN data cleaning work are promising, however, certain hospitals still have high duplicate MRNs despite the improvement. Overall, the percentage of MRNs with the same date of birth, sex, and zip code declined by 2.12 as a result of the cleaning process; staff is working on creating an algorithm to link the patient records across the hospitals based on the new MRN data.
- Staff is continuing to work on establishing data mismatch thresholds to identify hospitals likely to have more than an acceptable number of unique patients with multiple MRNs assigned.

Regarding the across hospital readmission data concerns, staff has:

- worked over the last several months to identify best practices in constructing unique patient IDs and on considering what options are plausible in Maryland;
- interviewed 15 states that use statewide unique patient ID numbers;
- discussed with the Agency for Healthcare Research and Quality (AHRQ) Maryland's interest in participating as one of ten states in an AHRQ technical assistance effort to support states in developing unique statewide patient IDs, and AHRQ has indicated that Maryland is one of the ten selected states for participation with work beginning in January 2011.
- continued its work to construct a matching algorithm with the data currently available, and is presently non-conclusive in terms of our ability construct a reliable unique ID in the **short-term.**

- begun discussions with MHCC staff involved in implementing the Chesapeake Regional Information System for Our Patients (CRISP) to discuss collaboration opportunities for the **long-term** in assigning unique patient IDs using shared technology.

If matching algorithm cannot be constructed in the near term to identify patients such that the PPR grouper yields accurate hospitals-specific readmission rates across hospitals, a potential approach to address this in the **mid-term** is through the use of other comprehensive data that account for admissions and readmissions across hospitals in Maryland (see section entitled "Medicare and BlueCross Adjustment Factors" on Page 14). Staff anticipates that the analysis will be complete on whether we can construct a reliable matching algorithm and unique patient ID now by the February 2011 Commission meeting.

To address the out of state readmission issue, staff again proposes the use of other comprehensive data that account for admissions and readmissions both in and out of Maryland (see section entitled "Medicare and BlueCross Adjustment Factors" on Page 14).

Additional Adjustment Considerations

If the Commission is to use an analysis that ranks hospitals on the basis of relative rates of readmissions within a given year, it will need to apply a series of adjustments for variations in the rate of potentially preventable readmissions among hospitals. The rate of readmissions would be calculated using the PPR software developed by 3M, with additional adjustments that are described in this section.

It would be appropriate to adjust for differences in age, mental health status, and Medicaid status, which have been found to be substantially correlated with the case mix adjusted readmission rate. Finally readmission rates should also be adjusted to reflect readmissions from Maryland hospitals to facilities outside of the State. This latter adjustment is necessary to account fairly for the natural outmigration of patients from Maryland hospitals located near the Maryland border. Failure to adjust for this outmigration would unfairly advantage Maryland hospitals in the Metropolitan DC area and other border areas of the State.

Calculation of Chain Weights

Previous PPR calculations were based on the number of readmissions, with all readmissions weighted equally. Clearly the costs associated with readmissions will vary by the type of initial admission. The calculation described in this section modifies the calculation of the relative PPR rates of the hospitals to take into account the chain weights as well as mix of initial admissions in chains by APR-DRG and Severity of illness (SOI).

The APR-DRG and SOI output by the PPR grouper are the standard ones, and not the groupings as modified by the HSCRC to split the mental health admissions based on voluntary/involuntary, and the

splitting of the rehabilitation APR-DRGs. The weights developed for the HSCRC APR-DRGs were consolidated to produce weights that would be applicable to the standard APR-DRGs.

The weight for a re-admission chain was calculated by summing the APR-DRG/SOI weights for each readmission in the chain (not including the initial admission). These weights were then assigned to all readmission chains as the "actual" weight for the chain. The chain weights were then summarized by calculating the mean chain weight for all chains following an initial or only admission in a given APR-DRG/SOI. The resulting weight is the expected weight for readmissions following the initial or only admission in the particular APR-DRG/SOI. The rankings were then recalculated using these weights.

Options for Level of Adjustment to be Applied

1) Option 1 is to simply use the PPR rates themselves (counts of actual vs. expected readmissions). This is what has been presented in previous meetings.

2) Option 2 attempts to factor in the relative costliness of readmissions that follow an initial admission. As such it is most analogous to the MHAC methodology utilized by the Commission when attempting to differentiate hospital performance on the basis of Potentially Preventable Complications. In this instance, the PPR rate would be weighted by the expected weight associated with chains starting with the particular APR-DRG/SOI in the initial admission. This is the method used in the preceding discussion.

3) Option 3 would carry this logic of weighting the readmission chain by the actual weights of each readmission chain. In this option the PPR rate would be adjusted to account for the actual weight of readmissions in the subsequent chain.

4) Option 4, uses the Option 3 approach, but with some outlier threshold applied to limit the weight for which the initial hospital was accountable.

Each of the subsequent options beyond Option 1, are an attempt to refine the PPR rate analysis to make it fairer to individual hospitals and also to be a more accurate representation of actual and preventable additional resource use associated with preventable readmissions.

The HSCRC staff believes that Option 2 is the best compromise between accuracy and simplicity, and because it is the most consistent with the way in which the PPC calculations are being done. The following examples of each of these options should make them clearer. An expanded discussion of the four readmission chain weight options and the formulae for calculation of chain weights, and actual and expected values are shown in **Appendix II.**

Additional Adjustments Required

The following analysis used option 2 above for weighting purposes, data for fiscal years 2008 and 2009, the version 27.0 of the PPR grouper, and focused on readmissions within a 30-day readmission window. A longer readmission window would provide a more comprehensive approach to this analysis – as it captures cases that are potentially preventable but do not present immediately to hospitals in the form of a readmission.

PPR rates, adjusted by the weights of the readmission chains, were calculated by APR-DRG/SOI (risk adjusted) using the entire data set for both years. These statewide readmission rates were then used as the expected values in the analysis.

Adjustment for Age Category and Mental Health Status

The actual to expected, chain weight adjusted, PPR rates were calculated by age category and mental health status, and the ratio of the two was used as an adjustment factor for age category and mental health status. The age categories used were 0-17, 18-64, and 65 and older. The adjustment factors were as follows in Table 1:

Table 1 – Adjustment Factors for Age, Mental Health/Substance Abuse Secondary Diagnosis, and Medicaid Presence

Age category	Mental health diagnosis	Calculated factor
0 – 17	No	0.73
0 – 17*	Yes	0.73
18 – 64	No	0.95
18 – 64	Yes	1.05
65 and older	No	1.05
65 and older	Yes	1.07

* There are a small number of cases in age category 0 with positive mental health status, so the difference between the values is not significant. A combined factor of 0.73 should be used for all age category 0 cases independent of mental health status.

Adjustment for Medicaid as Primary of Secondary Payer

A chain was determined to be a Medicaid count if the principal or secondary payer was Medicaid or Medicaid HMO for any discharge for that patient in the data set. Using this definition of Medicaid, the Medicaid patients were found to have a substantially higher PPR rate than non-Medicaid patients. The adjustment factor for Medicaid was 1.188, and for non-Medicaid was 0.937 – a 25% difference. Given these results, adjustments should be made for age category, mental health status, and the patient's Medicaid status.

For patients with Medicaid as primary or secondary payer anywhere in the chain of readmissions, there was a significantly higher actual rate compared to the expected rate of readmissions than was explained solely by the APR DRG SOI category.

Medicare and Blue Cross Adjustment factors

In order to adjust for out-of-state readmissions, which would be expected to be higher for hospitals close to borders with other states, Medicare data was obtained for federal fiscal years 2007 and 2008.

The rate of PPRs was calculated by hospital, along with the expected rate using the statewide expected rates developed previously using all payers, and the age and mental health adjustment factors previously listed. The ratio of the actual to the expected was calculated by hospital, first using discharges to hospitals in any state, and then using just discharges from Maryland hospitals. The ratio of these two was the adjustment factor to be applied to adjust for out-of-state Medicare readmissions.

Staff also secured similar multi-state data from CareFirst Blue Cross of Maryland. This readmission factor calculated for Medicare data will be combined with the corresponding factor developed by Blue Cross to calculate an estimated adjustment factor for out-of-state readmissions.

For a majority of hospitals, the out of state readmission rates across the Medicare and CareFirst data were very consistent. In the case of a few hospitals, there are inconsistencies between the Medicare and CareFirst migration adjustment factors calculated. It may be necessary, therefore, to calculate an alternative out-of-state adjustment factor for these hospitals. Staff continues to work with the Department of Health and Mental Hygiene to develop a clean data set sufficient to calculate similar cross-state readmission rates from the Medicaid data. Thus far, it has not been possible to develop a similar adjustment using Medicaid data.

Staff can use the above-outlined methodology to calculate inter-hospital readmission rates within the state if an alternative to using HSCRC data is necessary in the short term, and will continue to work on these and other outstanding technical issues, but we believe that the data for out-of-state

readmission rates will be sufficient to establish meaningful adjustment factors to allow for a fair and reasonable comparison across hospitals.

Proposed Payment Methodology

Staff believes that the first phase of a PPR-based payment policy in Maryland can be implemented with a structure similar to the payment structure used in linking payment to performance for MHACs and the Quality-Based Reimbursement (QBR) initiatives. This means that PPR payment would be structured by scaling a magnitude of at-risk system revenue, either positive or negative, across all hospitals at the time of the application of the annual update factor (in the case of MHACs, this amount has been modeled using 0.5% of system revenue). As with MHACs and QBR, this first phase would be implemented in a revenue-neutral way with the precise magnitude of at-risk revenue determined in the context of anticipated future updates and the need to offset "counter-incentives" faced by the hospital, and other considerations.

Hybrid Model Recognizing Both Improvement and Attainment

HSCRC has met with MHA to discuss their proposal to initially measure intra-hospital (within) readmissions, and to base rewards and penalties on hospital improvement year-to-year. While staff is receptive to MHA's proposal, staff would urge the industry and the Commission to consider the readmission issue in a broader context that encompasses collaboration across the care continuum and supports achievement of desirable community/population health goals to lower readmissions. **Appendix III** contains comment letters from the industry on the draft MHPR recommendation.

Staff also remains concerned that a model that focuses only on improvement will not recognize hospital performing relatively well on readmissions whose improvement levels may not be as high as those hospitals starting with worse readmission rates. Therefore, consistent with the Commission's approach for the Quality Based Reimbursement initiative, staff believes the Commission should consider a reward/penalty system for readmissions that takes into consideration both hospital improvement year to year by measuring intra-hospital readmissions, and hospital attainment or "relative performance" by measuring inter-hospital performance. The pros and cons of each approach are illustrated in the table below.

Table 2. Intra- and Inter-Hospital Readmission Measurement Pros and Cons

	Pros	Cons
MHA Proposal: Intra-Hospital Readmission	• Less data challenges • Recognizes improvement • Lesser need for adjustments	• Less fair: all readmissions not considered • Greater potential for gaming (e.g. readmit to another same system hospital)

Measurement		
Inter-Hospital Readmission Measurement	• Focus on attainment • Fairer: captures all readmissions • Recognizes attainment	• Relatively more data challenges, particularly due to lack of unique patient ID • More complex/ need for adjustments

Appendix IV shows the unadjusted readmission rates for intra-hospital, inter-hospitals and total readmission rates including those that occurred out of state using Medpar 2008 data. Overall, 30% of readmissions within 15 days and 26% of readmissions within 30 days have at least one readmission in a hospital other than the original hospital where the initial admission occurred. In some hospitals this rate is as low as 2% while in others it is more than 50%. Compared to inter-hospital readmission rates, out of state migration is smaller and has less variation. Overall, only 4% of readmissions have at least one readmission in an out of state hospital, with a range of 0 to 25% among hospitals. These data illustrate the need to include inter-hospital readmission rates as well as out of state adjustments in measuring hospital relative performance.

Timing Considerations Related to Base and Performance Measurement Periods

MHA and HSCRC staff agree that it is of great import that we implement the MHPR initiative as soon as possible, beginning in the latter part of the current fiscal year. Consistent with plan to address the Case Mix lag, April 1, 2011is recommended as the implementation start date. This necessitates that the initial measurement period begin this Rate Year, starting March 1, 2011 and using 13 months of performance, and that the base measurement period be March 1, 2010 to April 1, 2011. HSCRC staff will continue to work with the industry to identify and address the issues and implications of the recommended initial base and measurement periods.

Infrastructure Development Considerations

The HSCRC staff believe it will be extremely appropriate and helpful to the MHPR initiative for the HSCRC to assist in the development of a MHPR Improvement Infrastructure to assist hospitals in their attempt to improve upon the processes of transitioning patients out of the hospital after an admission and otherwise decreasing the rates of readmission within the targeted Readmission Window (currently recommended to be 30 days post initial discharge).

The staff intends to recommend an approach that would at first be funded by means of a small assessment on hospital rates (0.01% is anticipated – generating approximately $1 -1.2 million per year for at least the first two years). These funds are proposed to be used to obtain the technical assistance the state would need to establish an infrastructure using the Institute for Healthcare Improvement's STate Action on Avoidable Rehospitalizations (STAAR) approach.

STAAR Overview

In May 2009, the Institute for Healthcare Improvement (IHI) launched STate Action on Avoidable Rehospitalizations (STAAR). Initially funded through a grant from The Commonwealth Fund, STAAR is

a multi-state, multi-stakeholder approach to dramatically improve the delivery of effective care at a regional scale.

The initiative aims to reduce rehospitalizations by working across organizational boundaries in a state or region. The work requires not only front-line process improvement, but also identification and mitigation of barriers to system-wide improvement, especially policy and payment reforms that will reduce fragmentation and encourage coordination across the continuum of care. The initiative has three high leverage opportunities for action:

- improving transitions for all patients,
- proactively addressing the needs of high risk patients, and
- engaging patients and their caregivers in assuming a proactive role in their plans.

STAAR was initially implemented in three states— Massachusetts, Michigan, and Washington— by engaging payers, state and national stakeholders, patients and families, and caregivers at multiple care sites and clinical interfaces**.** The work in the first three states is anticipated as a four year project.

As this work has progressed for one year, IHI has offered to make programming and information learned from the initiative available to Maryland. The initiative would provide both technical assistance at the policy level and support provider efforts at the front line. Additional information about a proposed STAAR Initiative for Maryland may be found in **Appendix V**.

During this two-year period of State support the HSCRC would contract with IHI to provide technical assistance to establish and run the initiative, a collaborative style model. After the first two years HSCRC would assess the ongoing need to fund ongoing technical assistance or other features of the STAAR initiative, and would seek matching and/or replacement funding from Federal or outside foundation sources as needed for the ongoing work..

Other Related Activity and Next Steps

Since the early spring of this year, HSCRC staff has convened a series of educational, technical and clinical vetting sessions for representatives of the Maryland hospital and payer industries.

HSCRC convened a clinical vetting session on September 24, 2010 with hospital clinical and coding personnel, HSCRC staff, and the developers of the 3M Health Information System tools utilized in the proposed MHPR methodology. The responses to comments requested and received in advance of the meeting were reviewed as well as other clinical questions raised. As a result of the session, a clinical subgroup of mental health and substance use clinical representatives, including the Maryland Psychiatric Society, will be convened by HSCRC on October 29th to focus on specific clinical issues raised by the group. In addition, a second clinical vetting session is scheduled for November 1st.

Starting this Fall, staff began convening a series of meetings with MHA, DHMH and the Maryland Patient Safety Center, the first of which was October 14, 2010, to discuss the organization, development, and funding of the MHPR Infrastructure Initiative as described above that would be

designed to establish a Quality Improvement Program to assist Maryland hospitals in analyzing their own PPR performance and reducing their readmissions.

Staff will also continue to convene the MHPR Technical Finance Work Group as needed in order to address the outstanding technical and payment model issues identified.

Staff Draft Recommendations

Based on the staff work chronicled above and the input received thus far from the Maryland Hospital Preventable Readmission Work Group, for Rate Year FY 2011, the HSCRC staff makes the following draft recommendations:

1. Implement a rate-based approach for measuring PPRs where hospitals are evaluated both on their relative ranking in a given on inter-hospital readmission rates and on their year-to-year performance on intra-hospital readmissions rates;

2. Implement a hybrid system of rewards and penalties that will give equal weight to absolute attainment and year-to-year improvement in readmission rates;

3. For measuring performance on annual attainment, base the calculation of relative performance on inter-hospital readmission rates on actual vs. expected PPR rates using a 15-day Readmissions Window;

4. Adjust individual hospital inter-hospital PPR performance by adjustment factors relating to: a) age splits; b) presence of mental health/substance abuse secondary diagnoses; c) disproportionate share effects; and d) out-of-state migration;

5. Base the relative hospital performance for purposes of scaling at-risk revenue on the actual number of weighted readmissions over the expected number of weighted readmissions (weighted by the chain weight), divided by the total case mix weight associated with the included initial or only admission at the hospital;

6. Also use PPR rates for evaluating within-hospital (intra-hospital) readmissions rate of performance that measures hospital readmission rate improvement in the performance period compared with the base period;

7. Implement scaling of hospital payment adjustments so that a hospital's performance on the PPR methodology, either positive or negative, is reflected at the time of its update factor - the magnitude of funds scaled (at-risk revenue) should be established in the context of future rate discussions;

8. Regarding base and performance measurement periods, consistent with the case mix lag recommendation approved by the Commission in the June 9, 2010 meeting, for future fiscal year adjustments, staff recommends incorporating a three month lag into the data periods used for readmission base and performance measurement. This would go into effect for rate year 2012. The base measurement period would be the thirteen month period of March 1, 2010 through March 31,

2011. The performance measurement period would be the thirteen month period from March 1, 2011 through March 31, 2012. Performance-based adjustments would be applied rate year 2013. The base and performance periods will be 13 months in duration, in order to capture readmissions from the end of each period during the course of the 15-day readmission window. Further, future measurement will recognize and incorporate needed adjustments related to the most current methodologies such as denials and one day stays. Any technical implementation issues will be vetted with the MHPR Technical Finance Work Group and MHA's Financial Technical Issues Task Force as needed;

9. Consistent with the process for the establishment of the HSCRC's MHAC initiatives, provide a mechanism on an ongoing basis to receive input and feedback from the industry and other stakeholders to refine and improve the PPR logic;

10. Make a tracking tool reasonably accessible to hospitals so that they may track their performance throughout the measurement year;

11. Beginning in the Fall of 2010 and forward, work with the Institute for Healthcare Improvement, MHA, DHMH, the Maryland Patient Safety Center and representatives of the Maryland hospital and payer industries to develop and secure funding for a state-wide initiative Maryland Hospital Preventable Readmission Infrastructure and Quality Improvement Project utilizing the STAAR initiative model, which will provide technical assistance to implement the best methods to reduce preventable readmissions, provide assistance to hospitals to improve processes of transitioning patients out of the hospital after an acute care admission, and otherwise decrease the rate of hospital readmissions within the specified readmission time intervals.

Appendix I – NEJM Jencks Article on Readmissions

SPECIAL ARTICLE

Rehospitalizations among Patients in the Medicare Fee-for-Service Program

Stephen F. Jencks, M.D., M.P.H., Mark V. Williams, M.D., and Eric A. Coleman, M.D., M.P.H.

ABSTRACT

BACKGROUND

Reducing rates of rehospitalization has attracted attention from policymakers as a way to improve quality of care and reduce costs. However, we have limited information on the frequency and patterns of rehospitalization in the United States to aid in planning the necessary changes.

METHODS

We analyzed Medicare claims data from 2003–2004 to describe the patterns of rehospitalization and the relation of rehospitalization to demographic characteristics of the patients and to characteristics of the hospitals.

RESULTS

Almost one fifth (19.6%) of the 11,855,702 Medicare beneficiaries who had been discharged from a hospital were rehospitalized within 30 days, and 34.0% were rehospitalized within 90 days; 67.1% of patients who had been discharged with medical conditions and 51.5% of those who had been discharged after surgical procedures were rehospitalized or died within the first year after discharge. In the case of 50.2% of the patients who were rehospitalized within 30 days after a medical discharge to the community, there was no bill for a visit to a physician's office between the time of discharge and rehospitalization. Among patients who were rehospitalized within 30 days after a surgical discharge, 70.5% were rehospitalized for a medical condition. We estimate that about 10% of rehospitalizations were likely to have been planned. The average stay of rehospitalized patients was 0.6 day longer than that of patients in the same diagnosis-related group whose most recent hospitalization had been at least 6 months previously. We estimate that the cost to Medicare of unplanned rehospitalizations in 2004 was $17.4 billion.

CONCLUSIONS

Rehospitalizations among Medicare beneficiaries are prevalent and costly.

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Medicare currently pays for all rehospitalizations, except those in which patients are rehospitalized within 24 hours after discharge for the same condition for which they had initially been hospitalized. Recent policy proposals would alter this approach and create payment incentives to reduce the rates of rehospitalization. The Medicare Payment Advisory Commission (MedPAC) recommended to Congress in its report in June 2008 that hospitals receive from the Centers for Medicare and Medicaid Services (CMS) a confidential report of their risk-adjusted rehospitalization rates and that after 2 years, rates should be published. MedPAC also recommended complementary changes in payment rates, so that hospitals with high risk-adjusted rates of rehospitalization receive lower average per case payments. The commission reported that Medicare expenditures for potentially preventable rehospitalizations may be as high as $12 billion a year.[1] In July 2008, the National Quality Forum adopted two measures of hospital performance based on the rate of rehospitalization,[2] and the CMS indicated an interest in making the rehospitalization rate a measure for value-based hospital payment.[3] Reducing rehospitalization is an important element of President Barack Obama's February 2009 proposal for financing health care reform.[4] Such proposals would radically change the accountability of hospitals for patients' outcomes after discharge.

These proposals addressing all-cause rehospitalization highlight the importance of understanding the factors that influence the disparate causes of rehospitalization. Although there is extensive literature on rehospitalization attributed to particular conditions, especially heart failure,[5] there is very limited research addressing the broader issues involving the multitude of diseases and processes that contribute to rehospitalization. Until the 2007 MedPAC report (cited in the 2008 MedPAC report[1]), there was, to our knowledge, no follow-up of the measurement of the overall Medicare rehospitalization rate that Anderson and Steinberg made in their seminal study in 1984.[6] Building on the 2007 MedPAC report, we undertook this study to examine three key questions: What is the frequency of unplanned and planned rehospitalizations within 30 days after discharge? How long does the elevated risk of rehospitalization persist? What is the frequency of follow-up outpatient visits with a physician after a patient's discharge from a hospital?

METHODS

DATA SOURCES

We used data from the Medicare Provider Analysis and Review (MEDPAR) file for the 15-month period from October 1, 2003, through December 31, 2004; the MEDPAR file does not contain any discharges from 855 critical access hospitals or discharges of patients who were enrolled in managed-care plans. Inpatient claims for individual patients were linked with the use of the Health Insurance Claim Number–Beneficiary Identification Code. To study follow-up visits, we used the 5% national sample of linked physician and hospital claims for 2003 that is maintained in the CMS Chronic Condition Data Warehouse.[7] We used data from different intervals depending on the amount of previous or follow-up data that we needed for the analysis. The study design and procedures were approved by the Colorado Multiple Institutional Review Board.

ASSESSMENT OF REHOSPITALIZATION AND DIAGNOSES

We defined the rate of rehospitalization in the following way: the number of patients who were discharged from an acute care hospital and readmitted to any acute care hospital within 30 days divided by the total number of people who were discharged alive from acute care hospitals. We counted no more than one rehospitalization for each discharge. We excluded from the numerator and denominator patients who were transferred on the day of discharge to other acute care hospitals, including patients who were admitted to hospital specialty units, inpatient rehabilitation facilities, and long-term care hospitals (we included all other same-day rehospitalizations in our analyses). We also excluded patients who were rehospitalized for rehabilitation (diagnosis-related group [DRG] 462) within 30 days after discharge. We calculated rates over a 12-month period for the cohort that was discharged between October 1 and December 31, 2003, after determining that seasonal variation was less than 0.2 percentage point. In this calculation, data for a patient were censored when he or she was rehospitalized or died before hospitalization.

To examine the patterns of diagnoses at discharge and rehospitalization, we identified the five medical and five surgical DRGs that accounted for the largest number of rehospitalizations within 30 days after discharge and tabulated the 10 most frequent reasons for rehospitalization for each DRG. To estimate the fraction of rehospitalizations that might have been planned, we examined the 100 DRGs that are most frequently assigned to rehospitalized patients and ranked them according to whether planning was clinically plausible (e.g., rehospitalization for pneumonia is very unlikely to have been planned, whereas rehospitalization for placement of a stent could well be) and whether the rate of rehospitalization for the DRG showed the exponential rate of decrease that is characteristic of most DRGs when planned rehospitalization is unlikely (for details, see the Supplementary Appendix, available with the full text of this article at NEJM.org).

We calculated a hospital's expected rehospitalization rate as the rehospitalization rate expected if each of its Medicare discharges had the same rehospitalization risk as the national average for Medicare discharges in the same DRG (indirect adjustment). We used the ratio of observed to expected hospitalizations to stratify hospitals into quartiles and calculated differences in rehospitalization rates among hospitals with 1000 or more Medicare discharges.

We used the Medicare provider number to assess whether the patient was readmitted to the same hospital from which he or she had been discharged. We also tabulated length of stay and Medicare payment weights for DRGs (which are based on the average use of hospital resources for treatment of Medicare patients) for rehospitalized patients and for those who had not been hospitalized in the previous 6 months.

RELIABILITY OF DATA

Published definitions of DRGs include a classification of the diagnosis as medical or surgical. The CMS systematically audits the coding of DRGs. Dates of admission and discharge are tied to hospital billing systems, and errors may trigger audits or payment reviews. Whether a beneficiary is receiving dialysis treatment or is disabled is determined in the Medicare eligibility process. Discharge disposition is generally not used for payment and is often unreliable. We used black race, which is reported to be reliably coded, as a covariate but did not use Hispanic ethnic group, which is reported to be seriously undercoded.[8,9]

STATISTICAL ANALYSIS

We used the Cox proportional-hazards model to assess patient-level predictors of rehospitalization. The number of days before rehospitalization represented the survival time, data were censored at the time of death or the end of the observation period, and covariates were the patient characteristics that were available in the MEDPAR file or that could be calculated from the information in it: the hospital's ratio of observed to expected hospitalizations, the national rehospitalization rate for the patient's DRG, race (black or nonblack), use or nonuse of dialysis, presence or absence of disability, sex, Supplemental Security Income (SSI) status, length of stay as compared with the national average for the DRG, number of hospitalizations in the preceding 6 months, and age group. We included the hospital's ratio of observed to expected hospitalizations as a covariate so that differences among hospitals would not obscure the effects of other predictors. Hospital-level characteristics, such as the number of beds, urban or rural location, and teaching or nonteaching status — characteristics that Anderson and Steinberg used in their analyses[6] — are not available in the MEDPAR file, but their effect should be captured in the hospital's ratio of observed to expected hospitalizations. For this analysis we used discharges from April 1 through September 30, 2004, to allow 6 months for identifying previous hospitalizations. We performed all analyses with SAS software.[10]

RESULTS

FREQUENCY OF REHOSPITALIZATION

A total of 13,062,937 patients enrolled in the Medicare fee-for-service program were discharged from 4926 hospitals between October 1, 2003, and September 30, 2004; 516,959 of these patients were recorded as having died, and 690,276 went to other acute care settings, leaving 11,855,702 (90.8%) at risk for rehospitalization. Table 1 shows the cumulative percentage of rehospitalizations and outpatient deaths before rehospitalization by 30, 60, 90, 180, and 365 days after discharge for the cohort of Medicare patients discharged between October 1 and December 31, 2003; 19.6% of the patients were rehospitalized within 30 days,

Table 1. Rehospitalizations and Deaths after Discharge from the Hospital among Patients in Medicare Fee-for-Service Programs.

Interval after Discharge	Patients at Risk at Beginning of Period	Cumulative Rehospitalizations by End of Period	Cumulative Deaths without Rehospitalization by End of Period
		number (percent)	
All discharges			
0–30 days	2,961,460 (100.0)	579,903 (19.6)	103,741 (3.5)
31–60 days	2,277,816 (76.9)	834,369 (28.2)	134,697 (4.5)
61–90 days	1,992,394 (67.3)	1,006,762 (34.0)	151,901 (5.1)
91–180 days	1,802,797 (60.9)	1,325,645 (44.8)	177,234 (6.0)
181–365 days	1,458,581 (49.3)	1,661,396 (56.1)	200,852 (6.8)
>365 days	1,099,212 (37.1)		
Discharges after hospitalization for medical condition			
0–30 days	2,154,926 (100.0)	453,993 (21.1)	87,736 (4.1)
31–60 days	1,613,197 (74.9)	653,998 (30.3)	113,188 (5.3)
61–90 days	1,387,740 (64.4)	788,535 (36.6)	127,274 (5.9)
91–180 days	1,239,117 (57.5)	1,032,141 (47.9)	147,851 (6.9)
181–365 days	974,934 (45.2)	1,280,579 (59.4)	166,561 (7.7)
>365 days	707,786 (32.8)		
Discharges after hospitalization for surgical procedure			
0–30 days	806,534 (100.0)	125,910 (15.6)	16,005 (2.0)
31–60 days	664,619 (82.4)	180,371 (22.4)	21,509 (2.7)
61–90 days	604,654 (75.0)	218,227 (27.1)	24,627 (3.1)
91–180 days	563,680 (69.9)	293,504 (36.4)	29,383 (3.6)
181–365 days	483,647 (60.0)	380,817 (47.2)	34,291 (4.3)
>365 days	391,426 (48.5)		

34.0% within 90 days, and 56.1% within 365 days. About two thirds (62.9%) of Medicare fee-for-service beneficiaries who were discharged (67.1% after hospitalization for a medical condition and 51.5% after hospitalization for a surgical procedure) were rehospitalized or died within a year. To avoid double counting, we do not report deaths that occurred during or after rehospitalization. When we omitted cases of end-stage renal disease and included same-day readmissions, as Anderson and Steinberg did,[6] the 60-day rate of rehospitalization was 31.1%.

REASONS FOR REHOSPITALIZATION

Table 2 shows the five medical and five surgical reasons for the index (i.e., initial) hospitalization that were associated with the largest number of rehospitalizations and the top 10 reasons for rehospitalization for each index reason. Most rehospitalizations (84.4% among patients who were discharged after initial hospitalization for medical conditions and 72.6% among patients who were discharged after surgical procedures) were for medical diagnoses. The 100 most frequent rehospitalization DRGs accounted for 73.2% of total rehospitalizations. Among the rehospitalizations ascribed to these 100 DRGs, 10% belonged to 19 DRGs, such as chemotherapy and stent insertion, for which we estimated that planned rehospitalizations were probably an important part of total rehospitalizations (see the Supplementary Appendix). We did not attempt to estimate the percentage of these rehospitalizations that were actually planned.

Table 2. Highest Rates of Rehospitalization and Most Frequent Reasons for Rehospitalization, According to Condition at

Condition at Index Discharge	30-Day Rehospitalization Rate	Proportion of All Rehospitalizations	Most Frequent	2nd Most Frequent
	percent			
Medical				
All	21.0	77.6	Heart failure (8.6)	Pneumonia (7.3)
Heart failure	26.9	7.6	Heart failure (37.0)	Pneumonia (5.1)
Pneumonia	20.1	6.3	Pneumonia (29.1)	Heart failure (7.4)
COPD	22.6	4.0	COPD (36.2)	Pneumonia (11.4)
Psychoses	24.6	3.5	Psychoses (67.3)	Drug toxicity (1.9)
GI problems	19.2	3.1	GI problems (21.1)	Nutrition-related or metabolic issues (4.9)
Surgical				
All	15.6	22.4	Heart failure (6.0)	Pneumonia (4.5)
Cardiac stent placement	14.5	1.6	Cardiac stent (19.7)	Circulatory diagnoses (8.5)
Major hip or knee surgery	9.9	1.5	Aftercare (10.3)	Major hip or knee problems (6.0)
Other vascular surgery	23.9	1.4	Other vascular surgery (14.8)	Amputation (5.8)
Major bowel surgery	16.6	1.0	GI problems (15.9)	Postoperative infection (6.4)
Other hip or femur surgery	17.9	0.8	Pneumonia (9.7)	Heart failure (4.8)

* Index conditions listed within medical and surgical groups are in order of decreasing total number of rehospitalizations within 30 days after discharge. The diagnosis-related group (DRG) numbers for the conditions listed are as follows: acute myocardial infarction: 121, 122, 123, 516, 526; arrhythmias: 138, 139; amputation: 113; cardiac stent: 517, 527; chest pain: 143; circulatory disorders: 124; COPD: 088; depression: 429; drug toxicity: 449; drug or alcohol misuse: 521; fracture of hip or pelvis: 236; gastrointestinal bleeding: 592; gastrointestinal problems: 182, 183, 184; heart failure: 127; major bowel surgery: 148, 149; major hip or knee problems: 209; nutrition-related or metabolic issues: 296, 297, 298; operation for infection: 415; organic mental conditions: 429; other hip or femur surgery: 210; other circulatory diagnoses: 144; other vascular surgery: 478, 479; pneumonia: 79, 80, 81, 89, 90, 91; postoperative infection: 418; psychoses: 430; pulmonary edema: 087; rehabilitation: 462; renal failure: 316; respiratory or ventilation issues: 475; septicemia: 416, 417; and urinary tract infection: 320, 321, 322. COPD denotes chronic obstructive pulmonary disease, and GI gastrointestinal.

Index Discharge.*			
Reason for Rehospitalization			
3rd Most Frequent	4th Most Frequent	5th to 10th Most Frequent	Less Frequent
percent of all rehospitalizations within 30 days after index discharge			
Psychoses (4.3)	COPD (3.9)	GI problems, nutrition-related or metabolic issues, septicemia, GI bleeding, renal failure, urinary tract infection (17.0)	All other (58.9)
Renal failure (3.9)	Nutrition-related or metabolic issues (3.1)	Acute myocardial infarction, COPD, arrhythmias, circulatory disorders, GI bleeding, GI problems (14.0)	All other (36.9)
COPD (6.1)	Septicemia (3.6)	Nutrition-related or metabolic issues, GI problems, respiratory or ventilation problems, pulmonary edema, GI bleeding, urinary tract infection (14.9)	All other (38.9)
Heart failure (5.7)	Pulmonary edema (3.9)	Respiratory or ventilation problems, GI problems, nutrition-related or metabolic issues, arrhythmias, GI bleeding, acute myocardial infarction (12.5)	All other (30.3)
Drug or alcohol misuse (1.6)	Pneumonia (1.6)	Chest pain, nutrition-related or metabolic issues, depression, GI problems, COPD, organic mental conditions (7.0)	All other (20.6)
Pneumonia (4.3)	Heart failure (4.2)	Major bowel surgery, urinary tract infection, septicemia, GI bleeding, COPD, chest pain (13.4)	All other (52.1)
GI problems (3.3)	Septicemia (2.9)	Nutrition-related or metabolic issues, postoperative infection, placement of cardiac stent, GI bleeding, operation for infection (14.6)	All other (68.7)
Chest pain (6.1)	Heart failure (5.7)	Atherosclerosis, acute myocardial infarction, GI bleeding, GI problems, arrhythmias, other vascular surgery (19.4)	All other (40.6)
Pneumonia (4.2)	Postoperative infection (3.1)	GI problems, GI bleeding, heart failure, operation for infection, rehabilitation, nutrition-related or metabolic issues (15.8)	All other (60.6)
Heart failure (5.0)	Other circulatory problems (4.4)	Postoperative infection, other circulatory procedures, operation for infection, peripheral vascular disorders, pneumonia, septicemia (19.0)	All other (51.0)
Nutrition-related or metabolic issues (5.6)	GI Obstruction (4.3)	Pneumonia, major bowel surgery, renal failure, septicemia, operation for infection, GI bleeding (15.4)	All other (52.4)
Septicemia (4.7)	GI bleeding (4.0)	Urinary tract infection, fracture of hip or pelvis, other hip or femur surgery, aftercare, nutrition-related or metabolic issues, major hip or knee problems (20.7)	All other (56.1)

GEOGRAPHIC PATTERN

Figure 1 shows the geographic pattern of rates of rehospitalization within 30 days after discharge in the United States and two of its territories. The rehospitalization rate was 45% higher in the five states with the highest rates than in the five states with the lowest rates.

HOSPITALS

Except as noted, the following results are for hospitals with 1000 or more annual Medicare discharges. The correlation of the number of patients discharged with rehospitalization rates was low ($r=-0.11$, $P<0.001$). Hospitals with a ratio of observed to expected hospitalizations in the high-

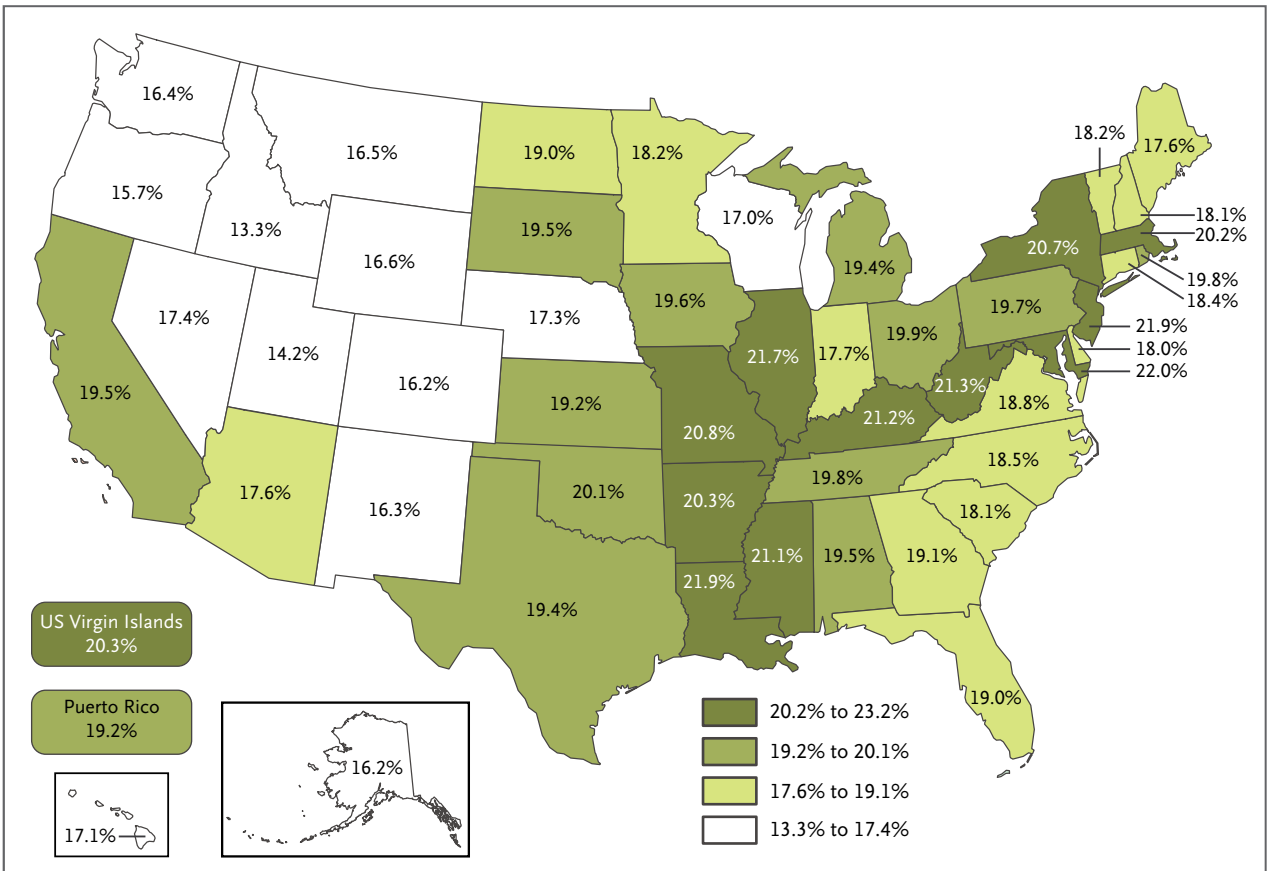

Figure 1. Rates of Rehospitalization within 30 Days after Hospital Discharge.

The rates include all patients in fee-for-service Medicare programs who were discharged between October 1, 2003, and September 30, 2004. The rate for Washington, DC, which does not appear on the map, was 23.2%.

est quartile had an expected 30-day rehospitalization rate of 20.6%, as compared with their observed rate of 26.1%. The corresponding rates for hospitals in the lowest quartile were 18.7% and 14.3%, respectively. One quarter (25.1%) of the admissions in hospitals in the highest quartile came from rehospitalizations within 30 days after discharge (as compared with 17.0% of admissions in all hospitals and 13.1% of admissions in hospitals in the lowest quartile).

The rehospitalization rate that was expected on the basis of DRGs strongly predicted the observed rate (R^2=0.276, P<0.001). Unadjusted hospital rates correlated strongly with DRG-adjusted rates (r=0.975, P<0.001); rehospitalization rates 30 and 90 days after discharge also correlated strongly (r=0.953, P<0.001). In the case of hospitals with 1000 or more Medicare discharges, 24.4% (interquartile range, 17.4 to 29.5) of the patients who were rehospitalized within 30 days were admitted to another hospital; in the case of hospitals with fewer than 1000 discharges, 44.2% (interquartile range, 23.6 to 60.0) of the patients were admitted to another hospital.

PATIENTS

The average hospital stay for rehospitalized patients was 0.6 day (13.2%) longer than the stay for patients in the same DRG who had not been hospitalized within the previous 6 months (2,962,208 patients) (P<0.001). The average Medicare payment weight is 1.41 for index hospitalizations and 1.35 for rehospitalizations. Table 3 shows the relative risk of rehospitalization within 30 days after discharge that was associated with each of the variables we analyzed. The reason for the index hospitalization (i.e., the DRG), the number of previous hospitalizations, and the length of stay had more

influence on the risk of rehospitalization than demographic factors such as age, sex, black race, SSI status, and presence or absence of disability.

OUTPATIENT VISITS

Figure 2 shows the percentage of patients discharged to the community after hospitalization for medical conditions and subsequently rehospitalized for whom there was no bill for an outpatient physician visit between the time of discharge and rehospitalization; both the percentage on each day after discharge and the cumulative percentage are shown. There was no associated bill for an outpatient visit for 50.1% of the patients who were rehospitalized within 30 days after discharge and for 52.0% of those who were rehospitalized for heart failure within 30 days after discharge.

DISCUSSION

The 19.6% rate of rehospitalization within 30 days after discharge that we report for Medicare beneficiaries in 2003–2004 is consistent with the rate in MedPAC's 2008 report of 2005 data (17.6% at 30 days),[1] and the difference probably reflects methodologic differences rather than a temporal trend. We found that the rehospitalization rate at 60 days was 31.1% when we analyzed the data in the same way as Anderson and Steinberg, who reported a rate of 22.5% at 60 days for the 1976–1978 period.[6] This larger difference is more likely to indicate an actual increase in rehospitalization rates over time, perhaps owing to a shorter duration of index hospitalization or to the increase in ambulatory surgery over the past 30 years. Friedman and Basu found that among persons 18 to 64 years of age in five states, the rate of rehospitalization for any reason within 6 months after discharge was 81% of the rate among those older than 64 years of age,[11] which is consistent with our finding that the rehospitalization rate was only weakly related to age.

Our analysis also shows that the risk of rehospitalization after discharge persists over time (Table 1). Further studies will be needed to understand the relative contributions to this risk of failures in discharge planning, insufficient outpatient and community care, and severe progressive illness.

This study was limited by our reliance on Medicare billing data, which provide an incomplete picture and contain some unreliable elements, and on DRGs, which are not fully adjusted for severity of illness. Unmeasured differences in severity of illness might bias comparisons of rehospitalization rates across states, hospitals, and demographic groups. However, DRG adjustment is a moderately strong predictor of the rehospitalization rate ($R^2=0.276$), so the very high

Table 3. Predictors of Rehospitalization within 30 Days after Discharge.*

Variable	Hazard Ratio (95% Confidence Interval)
Hospital's ratio of observed to expected hospitalizations†	1.097 (1.096–1.098)
National rehospitalization rate for DRG†	1.268 (1.267–1.270)
No. of rehospitalizations since October 1, 2003	
0	1.00
1	1.378 (1.374–1.383)
2	1.752 (1.746–1.759)
≥3	2.504 (2.495–2.513)
Length of stay	
>2 times that expected for DRG	1.266 (1.261–1.272)
0.5–2 times that expected for DRG	1.00
<0.5 times that expected for DRG	0.875 (0.872–0.877)
Race‡	
Black	1.057 (1.053–1.061)
Other	1.00
Disability	1.130 (1.119–1.141)
End-stage renal disease	1.417 (1.409–1.425)
Receipt of Supplemental Security Income	1.117 (1.113–1.122)
Male sex	1.056 (1.053–1.059)
Age	
<55 yr	1.00
55–64 yr	0.983 (0.978–0.988)
65–69 yr	0.999 (0.989–1.009)
70–74 yr	1.023 (1.012–1.035)
75–79 yr	1.071 (1.059–1.084)
80–84 yr	1.101 (1.089–1.113)
85–89 yr	1.123 (1.111–1.136)
>89 yr	1.118 (1.105–1.131)

* Data are for patients in Medicare fee-for-service programs who were discharged from the hospital between April 1, 2004, and September 30, 2004, and were followed until October 31, 2004. Data were analyzed with the use of the Cox proportional-hazards model. P<0.001 for all variables except an age of 65 to 69 years. DRG denotes diagnosis-related group.
† These estimates are standardized.
‡ Race was determined from MEDPAR files.

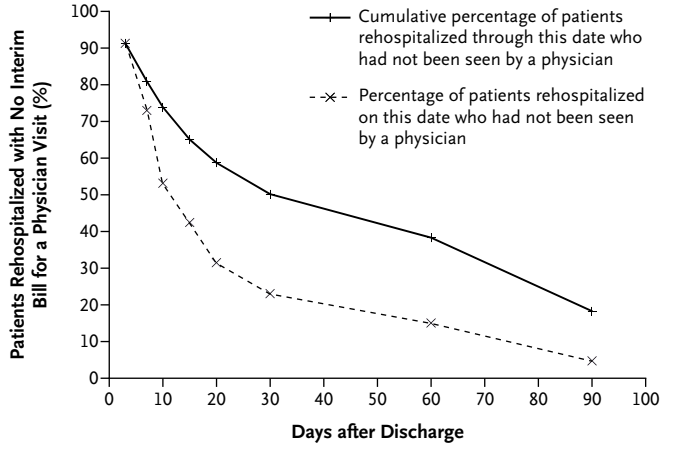

Figure 2. Patients for Whom There Was No Bill for an Outpatient Physician Visit between Discharge and Rehospitalization.

Data are for patients in fee-for-service Medicare programs who were discharged to the community between January 1, 2003, and December 31, 2003, after an index hospitalization for a medical condition. Data are derived from claims maintained in the Chronic Condition Data Warehouse of the Centers for Medicare and Medicaid Services.

correlation between unadjusted and DRG-adjusted hospital-level rates suggests that additional adjustment for risk may not add greatly to the analysis of rehospitalization rates. In addition, our assessment of outpatient follow-up was limited by the use of billing data that do not capture most visits to nonphysician providers.

Fisher et al.[12] have argued that the availability of hospital beds induces demand without improving health and that the availability of a bed may also facilitate hospitalization if a patient's condition deteriorates, but we were unable to link measures of the number of hospital beds in a community to the data analyzed here. Nevertheless, their argument bears directly on the question of whether higher rehospitalization rates are evidence of better care or just more care. Similarly, better access to primary care and better continuity of care may reduce the number of rehospitalizations, but we have no data on where in the United States these features are provided, nor do we know where a "medical home"[13] — an enhanced primary care coordinator for all of a patient's care — has been adopted.

Five lines of evidence suggest that rates of rehospitalization might be reduced. First, controlled studies[14-16] have shown that certain interventions at the time of discharge sharply reduce the rates of rehospitalization among patients with heart failure and other Medicare beneficiaries, and preliminary reports suggest that these and other interventions are more effective when used more widely. In contrast, coordination-of-care interventions that are limited to community settings appear to be ineffective in reducing rehospitalization.[17] Research also shows that supportive palliative care can reduce rehospitalization and increase patient satisfaction.[18] In addition, the Quality Improvement Organizations appear to have reversed a national trend of increased hospitalizations from home settings by working with individual agencies that provide home health care.[19]

Second, the absence of a bill for an outpatient physician visit in the case of more than half of the patients with a medical condition who were readmitted within 30 days after discharge to the community is of great concern and suggests a considerable opportunity for improvement. Our concern is heightened by the same finding among patients with heart failure, who are known to have a response to intensified care.[20] Hospitals and physicians may need to collaborate to improve the promptness and reliability of follow-up care.

Third, although claims data are less informative about follow-up care after surgical procedures (because of the global surgical fee), many patients who are discharged after a surgical procedure may benefit from earlier medical follow-up, since a substantial majority of postsurgical rehospitalizations are for medical conditions.

Fourth, our estimate that 90% of rehospitalizations within 30 days after discharge are unplanned suggests that rehospitalization is probably not primarily driven either by clinical practices (e.g., staged surgery) that cannot be efficiently rendered in one hospitalization or by profit-seeking division of services into multiple hospitalizations.

Fifth, the variation among states (Fig. 1) and hospitals suggests that improvement on a national scale may be possible, but the data do not show which practices cause the differences or whether the differences are exportable.

Medicare payments for unplanned rehospitalizations in 2004 accounted for about $17.4 billion of the $102.6 billion in hospital payments from Medicare,[21] making them a large target for cost reduction. (This cost estimate is derived by multiplying the 19.6% rehospitalization rate by 90%,

which represents the percentage of unplanned rehospitalizations, and multiplying that product by 96%, since DRG-based payments for rehospitalizations are 4% lower than those for index hospitalizations.) Convincing estimates of potential savings must await evaluation of large-scale improvement efforts.

Although the care that prevents rehospitalization occurs largely outside hospitals, it starts in hospitals. In a quarter of the hospitals, about 25% of the admissions are rehospitalizations that occur within 30 days after discharge. Cynics may suggest that preventing rehospitalization is not in the financial interest of hospitals, but our analysis suggests a more complex picture. Rehospitalizations may not be profitable for many hospitals. Although the average length of stay for rehospitalized patients was 0.6 day more than that for patients in the same DRG whose most recent hospitalization had been at least 6 months previously, DRG-based payments would be largely the same. For a hospital with excess capacity, there may be as much financial benefit from rehospitalizations as from first-time admissions, but for a hospital that manages its capacity more carefully, there may not.

Almost all hospitals will need help in gauging their performance with respect to rehospitalizations, because they have no access to data on the 20 to 40% of their patients who are rehospitalized elsewhere. Only holders of all-hospital discharge data, such as governments and other third-party payers, have the ability to track patients across providers and systems. Medicare could help by providing data on all Medicare rehospitalizations (suitably de-identified) to help hospitals and communities better understand their performance.

Our analysis generally confirms Anderson and Steinberg's findings regarding the value of demographic factors in predicting the risk of rehospitalization,[6] but it shows that previous rehospitalization, a longer index hospitalization as compared with the norm for the DRG, the need for dialysis, and the DRG to which the patient is assigned at the end of the stay are more powerful predictors. However, when the typical patient has almost two chances in three of being rehospitalized or of dying within a year after discharge, it is probably wiser to consider all Medicare patients as having a high risk of rehospitalization. For example, ensuring that a follow-up appointment with a physician is scheduled for every patient before he or she leaves the hospital is probably more efficient than trying to identify high-risk patients and arranging follow-up care just for them.

Rehospitalization is a frequent, costly, and sometimes life-threatening event that is associated with gaps in follow-up care. We are beginning to understand that the rate of rehospitalization can be reduced with the implementation of more reliable systems, but it would be premature to predict how much reduction can be achieved. Although the rehospitalization rate is often presented as a measure of the performance of hospitals, it may also be a useful indicator of the performance of our health care system.[22] From a system perspective, a safe transition from a hospital to the community or a nursing home requires care that centers on the patient and transcends organizational boundaries. Our purpose in this report has been to strengthen the empirical foundation for designing and providing such care.

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Formulae for calculation of chain weights, and actual and expected values

Let W_i be the case mix weight for a case in APR-DRG/SOI i.

If chain j has n readmissions with weights w_{jk}, k=1,..,n, then:

c_j = chain weight for chain j = $\sum_k w_{jk}$

where the index k runs from 1 to n.

The expected chain weight for a chain starting with a discharge with an initial APR-DRG/SOI of i is:

$e_i = \sum_j c_j / n_i$

where the summation runs over all the readmission chains starting with an initial APR-DRG/SOI of i and n_i is the number of readmission chains starting with an initial APR-DRG/SOI of i.

Assign an expected chain weight to each readmission chain , and an expected chain weight of zero to each only admission, call these g_i.

Calculate the statewide expected chain weight for each only or initial admission in APR-DRG/SOI i. This is:

$$f_i = e_i \times \frac{\text{(\# initial admissions with APR-DRG/SOI i)}}{\text{(\# of initial or only admissions with i)}}$$

For all APR-DRG/SOI i, assign f_i to each initial or only admission i.

The readmission index for a hospital is then:

$\sum g_n / \sum f_n$, where n runs over all initial or only admissions at the hospital.

It should be noted that this calculation does not take account of the adjustment factors for age category, mental health status or Medicaid status. These factors can be applied to the individual expected numbers f_i before the final summation.

Option 1: PPR rate

In this option all readmission chains are counted, and they all have equal weight. The APR-DRG/SOIs will have different proportions of readmissions associated with them, and the expected readmission rate for a hospital is adjusted using these different proportions.

In each of the options we will consider the same 2 cases with initial admissions in:

Case 1: APR-DRG/SOI 811.1 - allergic reaction / minor

Case 2: APR-DRG/SOI 161.4 - cardiac defibrillator and heart assist implant/ extreme.

Under Option 1 readmission chains following either of these initial admissions are counted as equal.

Option 2: Expected chain weight

The chain weight is the mean case mix weight associated with readmissions following a given APR-DRG/SOI. The chain weights are used to calculate both the actual and expected PPR rates for each hospital. Thus, the hospital is being held accountable for the proportion of readmission chains within each APR-DRG/SOI, and these are weighted by the expected chain weight for the APR-DRG/SOI, but not for the actual case mix weights of the readmissions.

The expected chain weights vary from .3 to 7.6. with a median value of 1.26.

APR-DRG/SOI 811.1 (minor allergic reaction) has a chain weight of 0.53, while 161.4 (cardiac defibrillator and heart assist implant) has a chain weight of 1.93. Under Option 1 a readmission chain following 811.1 would have the same impact as a readmission chain following an initial admission in 161.4. Under Option 2 the readmission chain following 161.4 would be weighted with the chain weight of 1.93.

In neither case would any account be taken of the actual case mix weights of the readmissions that occurred.

Case 1: Expected and actual weight is 0.53

Case 2: Expected and actual weight is 1.93

Option 3: Actual and expected chain weights

The chain weight is the mean case mix weight associated with readmissions following a given APR-DRG/SOI. The chain weights are used to calculate the expected PPR rates for each hospital. The actual case mix weights for the readmissions would be used to calculate the actual PPR rate for the hospital. Thus, the hospital is being held accountable for both the proportion of readmission chains within each APR-DRG/SOI, and the case mix weights for the actual readmissions.

A chain with an initial APR-DRG/SOI of 161.4 would have an expected chain weight of 1.93, but its actual chain weight would be the sum of the case mix weights for the readmissions that actually occurred following that particular initial admission.

Since some chains can be quite long, and the case mix weights associated with some of the readmissions can be high, it would be desirable to place a limit, or outlier threshold, on the chain weights used in the actual PPR rate calculation, which leads to option 4. The individual chain weights range from 0 to 35.

Case 1: Expected weight is 0.53, actual weight anywhere from 0.26 to 0.76.

Case 2: Expected weight is 1.93, actual weight anywhere from 0.45 to 8.5.

Option 4: Option 3 with an outlier

The non-zero individual chain weights range from 0.16 to 35. Only 1% have a chain weight greater than 10. To reduce the risk an outlier threshold should be applied if option 3 is selected.

Appendix III: Comment Letters on the MHPR Draft Recommendation

Maryland
Hospital Association

MHA
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Fax: 410-379-8239

October 12, 2010

Robert Murray
Executive Director
Health Services Cost Review Commission
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Dear Mr. Murray:

On behalf of the 67 members of the Maryland Hospital Association (MHA), we are writing to comment on the October 13 staff draft recommendation, "Rate Methods and Financial Incentives Relating to Reducing Maryland Hospital Preventable Readmissions (MHPR)." Maryland's hospitals are committed to achieving an unavoidable readmissions rate of zero. As part of the annual payment update process, MHA, United, CareFirst, and Secretary Colmers in June proposed a hospital update that included an additional 0.44 percent to help hospitals put into place, this fiscal year, programs to reduce all-cause readmissions by 10 percent. We appreciate the opportunity to work with HSCRC staff over the last several months on technical aspects of the proposal, and we remain committed to implementing a readmissions payment policy this fiscal year.

However, the October draft proposal includes two specific provisions that we cannot support:

- It measures readmissions across all hospitals (inter-hospital); it should measure readmissions to the same hospital (intra-hospital).
- It rewards hospitals for achieving a lower readmission rate than the statewide average; it should reward improvement compared to the hospital's own prior performance.

Intra-hospital Readmissions

Identifying readmissions to the same hospital

HSCRC staff relies on each hospital's assignment of the medical record number (MRN) to identify readmissions to the same hospital. Ideally, the hospital assigns a unique MRN to each patient, and that MRN stays with the patient for life. In reality, data entry errors are inevitable, and can include transposing a patient's birth year, misspellings or culturally acceptable but unusual spellings of a patient's last name, nicknames, or name changes associated with marriages and divorces. All may cause a patient to have two or more MRNs. Hospitals with many such errors have, as a logical result, an artificially low readmissions rate. HSCRC has required hospitals to correct these MRN errors and is developing a method to monitor and sanction excessive errors. We believe the MRN assignment is adequate to compare a hospital's readmission rate to itself over time.

- more -

Identifying readmissions to other Maryland hospitals

To identify a readmission to a different hospital than where the initial admission occurred, the HSCRC must be able to identify the same patient at different hospitals. Accurately identifying patients in different databases requires a sophisticated algorithm that identifies potential matches using several pieces of patient-specific information. Most commonly, these algorithms use first name, last name, middle name, date of birth, and the last four digits of the social security number. The HSCRC discharge database is limited to the MRN, date of birth, zip code, and gender. These four elements are not enough to accurately identify patients admitted to different hospitals. The method proposed by HSCRC staff, therefore, results in false positives by identifying different people as the same person, and false negatives by failing to identify readmissions.

Identifying readmissions to out-of-state hospitals

Hospitals near state borders, and hospitals whose patients are referred from out of state, are likely to have patients readmitted to hospitals outside of Maryland. To capture these readmissions, the HSCRC would need timely access to all-payor claims data from the surrounding states. However, readmissions data from out-of-state hospitals is limited. At best, the HSCRC can analyze historical data from Medicare and CareFirst. The limited data are not sufficient to identify readmissions in real time. Instead, the HSCRC proposes an adjustment factor for each hospital. An adjustment based on limited historical data is insufficient for a payment methodology.

Compare Hospital to Self, not to a Benchmark

The payment incentive should be structured to reward hospitals for improvement compared to their own prior performance, not compared to the statewide average or some other arbitrary benchmark. Many intrinsic factors affect a hospital's readmissions rate--the mix of cases, the geographic area from which patients are drawn (including transfers in, and referrals from other states), the level of family support and resources of the patients, and the availability of primary care and specialty care in the community. Comparing one hospital's readmissions rate to a benchmark or to another hospital, and basing payment on this relative ranking, assumes we know and are able to adjust for all those factors. Comparing a hospital's performance to its own performance in a prior time period truly measures improvement and mitigates those intrinsic factors.

The potentially preventable readmissions (PPR) methodology uses the all-patient refined (APR) diagnosis groupings and the severity of illness (SOI) categories as a proxy for readmission risk. The APR/SOI groupings are based on the cost and utilization of care and were developed to explain resource use at the hospital. It is not clear how well the APR/SOI resource use groupings predict readmissions. Until we have more experience with the PPR methodology, and can validate the APR/SOI as a proxy for readmission risk, we should not compare one hospital's readmission rate to another.

Incentive Funding

We appreciate HSCRC staff's acknowledgment that additional resources are required to help hospitals reduce readmissions. However, the 0.01 percent funding proposed by Commission staff is inadequate to the task. Reducing readmissions requires not just technical assistance and knowledge sharing, but also additional resources at each hospital. While HSCRC staff mentions the Institute for Healthcare Improvement's (IHI) State Action on Avoidable Rehospitalizations (STAAR) initiative, Project RED is one of only four interventions with very strong evidence to indicate it reduces readmissions. Project RED is a standardized process created at Boston University Medical Center to prepare patients for discharge, and is one of the National Quality Forum's Safe Practices. The objective is to reduce readmissions and increase patients' personal health literacy. The intervention includes 11 specific steps involving patient education, comprehensive discharge planning using a standardized "After Hospital Care Plan," making appointments for post-discharge follow-up and testing, medication reconciliation, and post-discharge telephone follow-up. A key aspect of the program involves the hiring and training of "Discharge Advocates." Each step requires additional resources.

Clinical Issues

3M PPR Clinical Logic

Maryland hospitals appreciate the series of educational and clinical vetting sessions that the HSCRC has convened so that clinicians, coders, and other hospital representatives could review the clinical logic underlying 3M's Potentially Preventable Readmissions methodology. We have submitted detailed questions and recommended changes to the inclusion and exclusion criteria during these sessions, and we believe the HSCRC needs to make further refinements to the PPR methodology for inclusion in its initiative. Significant concerns remain about mental health and substance abuse conditions, chronic conditions, planned surgical readmissions, and selected major diagnoses such as kidney transplants and sickle cell disease. We support the HSCRC's plan to convene a subgroup of mental health and substance abuse professionals to address these issues, and recommend that the other concerns identified above be given a similar opportunity for further discussion.

Readmission Window

Studies make clear that the more time passes after the initial admission, the more likely the readmission is due to the progression of chronic disease, socio-economic factors, and access to outpatient care. MHA, therefore, in a clinical vetting session last spring, recommended that the readmission window be 15 days instead of the 30 days originally recommended by HSCRC staff. We are pleased that staff has agreed and revised its original recommendation.

Infrastructure Support/STAAR Initiative

In addition to implementing financial incentives for hospitals to reduce preventable readmissions, the HSCRC staff proposes to initiate an MHPR Infrastructure and Quality Improvement Project using IHI's STAAR project. We have been invited to attend an October 14 meeting to learn more about this initiative and HSCRC's proposed approach for implementing it

in Maryland. We will be pleased to provide feedback to the HSCRC staff once we have had an opportunity to review the information and share it with our members.

In conclusion, Maryland's hospitals are committed to implementing a readmissions payment policy this fiscal year, and we expect to present the HSCRC with a more formal recommendation at its next meeting. Our proposal will measure intra-hospital readmission rates and provide clear incentives for hospitals to reduce readmissions from one year to the next. Please contact either of us with any questions.

Sincerely,

Beverly Miller
Senior Vice President, Professional Activities

Traci La Valle
Assistant Vice President, Financial Policy

cc: Frederick W. Puddester, Chairman, HSCRC
HSCRC Commissioners

JOHNS HOPKINS
MEDICINE

UNIVERSITY OF MARYLAND
MEDICAL SYSTEM

October 20, 2010

Robert Murray
Executive Director
Health Services Cost Review Commission
4160 Patterson Avenue
Baltimore, Maryland 21215-2299

Dear Bob:

The Johns Hopkins Health System (JHHS) and University of Maryland Medical System (UMMS) strongly support the development and implementation of strategies to reduce preventable readmissions, and are, in fact, engaged in aggressive projects to address care coordination across the transitions of care throughout the health systems and into the community. We believe that providers and payers at all levels of care need to partner in order to find ways in which to manage patients at increased risk for readmission to the hospital. JHHS and UMMS also endorse the need for pay-for-performance tools, especially as CMS is poised to implement pay-for-performance for disease specific readmission rates, and believe that Maryland is well positioned to provide leadership in this area. However, provider engagement and patient and public acceptance of performance improvement programs require that the measures be evidence-based, have at least "face validity," and be continually evaluated and adjusted as data become available. Nonetheless, there are currently no standardized statistical models adequately developed that meet all of these criteria as they pertain to identifying preventable readmissions.[1, 2] It is for this reason that the "STate Action on Avoidable Readmissions (STAAR--an IHI and Commonwealth fund project across multiple states), has pointedly chosen an all-cause readmission measure for organizational performance improvement.

The HSCRC has proposed the use of the 3M Potentially Preventable Readmissions (PPRs) as a global readmissions measurement tool and the use of a comparative risk adjustment model to gauge Maryland hospital performance. We have serious concerns with the implementation of this model as planned, and instead would like to propose an alternative model which we believe may achieve the same ends while alleviating these concerns.

Our specific concerns are:

1. Readmissions which have not been proven to be clinically related to the original admission and are not preventable should not be part of the methodology:

While the 3M PPRs tool is an innovative attempt to determine preventable readmissions by initial APR-DRGs, and associated readmission APR-DRGs, the relationships between these APR-DRGs have not been studied or validated. In this model, readmissions are counted as potentially preventable if they are assumed to be related to the initial diagnosis or the initial hospitalization. Many diagnoses are linked that in our view cannot be justified as clinically related and would lack face validity among our providers as well as the public. A preliminary examination of individual readmission encounters using the PPR methodology reveals oversimplification of the multitude of interrelationships that impact readmissions and influence preventability. In a small sample of cases readmitted in all categories, readmissions were either not related, related but planned, or related but not preventable in 60% of the cases. (Not a statistically significant sample, See **Addendum**). For example, a patient originally admitted for heart failure and then readmitted with "Other Endocrine Disorders" or "Schizophrenia" would be counted as a potentially preventable readmission. In these, as well as numerous other instances, there is no evidence to suggest that there is a reasonable association between the original and subsequent admissions, nor are there outcome studies that define specific interventions which could prevent such a rehospitalization. While the argument exists that all hospitals are judged by the same criteria and therefore no one system is unfairly penalized, we believe the criteria should bear an obvious relationship to care quality.

2. The proposed Risk Adjustment Methodology does not fairly adjust for factors which hospitals do not control, is not transparent, and has never been tested or validated.

We believe that the proposed risk adjustment model to rank Maryland hospitals according to an observed/expected PPR rate and ascribe financial incentives does not accurately depict hospital performance and therefore may penalize hospitals unfairly. As with all global indicators such as mortality, complications and readmissions, *validated and context* specific risk adjustment must be applied… "the measure must be sufficiently valid for the explicit purpose for which it is used."[3,4] Risk adjustment outcomes must meet certain standards, especially when used for profiling. Model transparency is critical to determine these standards and include at a minimum a detailed description of the process for selecting predictor variables, variable frequencies and associated odds ratios for *readmission* prediction; and various other validation criteria.[5] With any readmission methodology, appropriate risk adjustment for age, socioeconomic status, access to care, severity of illness, and number of co-morbid conditions must be included to best focus opportunities for improvement. "From a policy perspective, a validated risk-standardized statistical model to accurately profile hospitals using readmission rates is unavailable in the published English-language literature to date."[2]

- The use of APR-DRG Severity of Illness (SOI) categories is limited in its ability to measure the risk of readmission.[3] The literature is clear that while SOI may be useful as one indicator of hospital resource utilization, it is not a predictor of rehospitalizations. Higher severity levels

"usually reflect multiple organ impairment with the greatest association of resource use and risk of mortality.[6]"

- The proposal to adjust for average readmission chain weights, yet another utilization indicator, is not tested or validated and, we believe, does not measure care quality.

- Maryland as a normative group is small and each hospital has its own unique characteristics and dominance in certain specialty areas that cannot be adequately compared across this one state alone.

- The risk model as a whole is obscure with poorly defined adjustment factors for age, mental health, and Medicaid; as well as presumptive estimations for out of state migration and inter-hospital readmission calculations.

The numbers and interrelationships of chronic conditions to be managed outside of the hospitalization, i.e. access to primary care and patient characteristics such as functional status, motivation and literacy, are major drivers of readmissions even after optimal care in the hospital and are not captured in the SOI. As an example, with the proposed methodology, Johns Hopkins Bayview Medical Center (JHBMC) has a high observed/expected PPR rate. Yet the average number of chronic conditions in the JHBMC index admission group for those ultimately readmitted, using the AHRQ Co-Morbidity classifications, is 20% higher than the same population at The Johns Hopkins Hospital (JHH), which has a 3% higher average SOI. Furthermore, JHBMC is a highly regarded leader in nationally recognized innovations related to care coordination and transitions of care to decrease preventable readmissions, including "Safe-Discharge," "Hospital at Home," the "Aliki Project," and "Guided Care." If the ultimate goal is to incentivize hospitals to implement strategies which reduce readmissions, the measurement must be able to detect those improvements.

Our Proposal for a constructive Maryland model:

1. **Given the above concerns, we propose first that Maryland implement the use of PPRs as a multi-year process, so that early steps can be taken while other issues are addressed in parallel.**

2. **Implement readmission methodology based on hospitals' improvement as opposed to comparing hospitals to one another, until a validated Risk of Readmission statistical model is available.**

    a. If PPRs are to be used as a method for pay for performance in the state of Maryland, we recommend implementation based on an **improvement** rather than a **scaling** model.

    b. Measure hospitals on *observed* readmissions returning to the original hospital (*intrahospital* measurement). Examination of JHHS data shows an intrahospital readmission rate of 68-82%. Readmission process improvements made in the areas of

care coordination and discharge processes should ultimately reduce *all* avoidable readmissions, whether intra or inter hospital.

c. We would also support alternative approaches such as implementing the **NQF endorsed** CMS readmission measures for Heart Failure, Myocardial Infarction and Pneumonia, or an all cause readmission measure (as recommended by the IHI STaar Initiative), until such time as evidenced-based and validated risk adjustment can be applied to global indicators such as PPRs.

We are very much committed to partnering with the HSCRC and 3M to further the science of readmission indicators through our research infrastructure.

3. **As the tools for validated and risk adjusted readmission measures are limited, we propose using the 3M PPRs for initiating organizational quality improvement with the following modifications:**

a. **Include only the "clinical related categories" that are most likely attributable to the initial admission and can be impacted by improved care coordination and quality processes (i.e. 1, 3, and 5).** This excludes those categories that relate to chronic illnesses, ambulatory conditions, surgery to address a continuation of a problem, and readmissions for mental illness or substance abuse (2a, 2b, 4, 6a, 6b, 6c).

- The clinical related categories of 2a and 2b relate to chronic illnesses, and ambulatory chronic conditions over which the acute care setting exerts very limited control. Access to primary care is a significant factor in avoiding preventable hospitalizations related to chronic conditions[7] and Maryland has a growing shortage of primary care physicians. (MHA and MedChi, 2008). There is a plethora of evidence on the relationship of chronic disease and increased risk of hospitalization from *unmodifiable* causes and "pending an agreed on method to adjust for confounders, global readmission rates are not a useful indicator of quality of care." 6,8,9,10

- Including readmissions for "surgery to address a continuation of a problem," may inadvertently increase hospital costs as well as patient risk by increasing diagnostic studies and invasive procedures in order to avoid rehospitalization after a "watch and wait" period.

- The current proposal includes almost all hospital readmissions for mental health and substance abuse as potentially preventable, regardless of cause. Evidence related to clinically effective treatment for psychiatric and substance abuse illnesses lags behind that of the non-behavioral illnesses, e.g., heart failure. Recent large studies demonstrate that current medications for schizophrenia, bipolar disorder and major depression are no more effective than ones used 30 years ago. Only a minority of patients start care with a commitment to stay in care and comply with the healthcare team recommendations. In a recent study of Medicaid beneficiaries with mood

disorders, it was found that 24% of patients were rehospitalized after discharge. "Those with co-morbid substance abuse accounted for 36% of all baseline admissions, and half of all readmissions."[11] The New York Medicaid program has excluded the behavioral health conditions from its adoption of PPRs. We believe these should be excluded from the proposed Maryland program as well.

b. **The time interval to measure hospital attribution for readmissions should be no longer than 15 days. We are pleased that the HSCRC has chosen to accept this recommendation after the initial draft proposal.**

- The literature is disparate on the time interval that most closely correlates to problems evolving from an initial hospitalization. Consensus is that the further the re-admission is from the index hospitalization, the more likely it is attributable to chronic disease progression, socio-economic factors, and failure of the outpatient environment. Hospital readmissions cluster shortly after discharge (1-7 days) and decline thereafter. [12] Evaluation of the PPR readmission rates for JHHS shows that 66% of the readmissions occur within 15 days of the initial hospitalization, with the largest bolus of readmission being in the 1—7 day period.

c. **Eliminate "elective" readmissions as a proxy for "planned."**

- "Elective" admissions are considered to be planned, and should be excluded from the methodology[9] based on HSCRC "nature" of admission. In the JHHS PPR analysis up to 7% of the readmission chains were "elective." In the clinical related category #4 (readmissions for a surgical procedure to address a continuation or a recurrence of the problem causing the initial admission), the rate was as high as 57%.

4. **Evaluate the impact of the readmission program in each year, monitoring for unintended consequences, and comparing to all-cause readmission rates to validate the measurement.**

As we move forward with the implementation of care coordination strategies to reduce readmissions, we believe we must also pay close attention to the development of unintended consequences. It is quite possible that acute care length of stay will increase due to pressures to address all issues related to ambulatory and chronic conditions during the hospitalization. Pressures on Emergency Departments to treat and discharge patients may be increased especially where access to primary care is problematic. Unnecessary invasive procedures and diagnostic studies may be performed to avoid readmissions for those traditionally "watch and wait" conditions. More seriously, there may be delays in timely care for sick patients while alternative strategies are employed. Finally, there may be a risk of increased mortality due to delay in needed care while trying to avoid rehospitalization. A recent important study revealed that a "higher occurrence of readmissions after index admissions was associated with lower risk-adjusted 30 day mortality" and "a higher readmission rate may be a consequence of successful care."[13]

We believe the proposal above is a sound basis for an initial readmission measurement methodology in Maryland. The fundamental reasons for readmissions most directly attributable to hospitals are inadequate care coordination and poor quality of inpatient care. If the principal objective of the HSCRC proposal is hospital performance improvement, potentially preventable readmission measures should focus on these two areas. Patient characteristics, chronic disease progression, and failure of the ambulatory environment, while important reasons for rehospitalization, are under limited control of the acute care organization alone. Readmissions as a clinical outcome are both a **quality** and a **utilization** indicator. While we need to understand both dimensions, it is in the area of quality that acute care organizations can have the greatest impact. The Johns Hopkins Health System and the University of Maryland Medical System are committed to reducing unnecessary hospitalizations and are actively engaged in finding the best ways to do this. All Maryland hospitals deserve to be measured in a way that will accurately reflect their efforts to reduce rehospitalizations.

Sincerely,

Ronald R. Peterson
President
Johns Hopkins Health System

Robert A. Chrencik
President and Chief Executive Officer
University of Maryland Medical System

Johns Hopkins Health System and University of Maryland Medical System

Position Statement on the HSCRC Proposal for Implementation of Maryland Hospital Preventable Readmissions (MHPRs): Executive Summary

1. **We agree that readmissions should be prevented and that hospitals should have a role in that effort.**

2. **We are concerned that the current proposal may unfairly reward/penalize hospitals for factors which are not in their control.**

3. **We therefore propose that Maryland:**

   a. **Adopt a multiple year framework for implementation.**

   b. **Use 3M PPR methodology, but use only reason categories 1, 3 and 5 as basis for measurement, using 15 days as the time limit, and excluding elective admissions.**

   c. **Use an improvement-only methodology using *observed* readmission rates, as expected risk models have not been validated or tested in a readmissions context.**

   d. **Include readmissions back to the same hospital only (intrahospital), as accuracy in identifying readmissions to all hospitals in the state is problematic (as noted by the HSCRC), and lack of data transparency will impede process improvements.**

   e. **Validate, after each of first 3 years, the 3M results against an all-cause readmission methodology to determine whether results are similar. If very different, this should drive changes; if very similar, this would support the methodology and its continuation.**

4. **As we contribute to overall healthcare cost reductions by reducing unnecessary admissions, hospitals will need adequate revenues to cover their costs in order to remain financially viable.**

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Addendum

Example 1: **Child with severe Lupus is readmitted for planned hemodialysis**. 12 Year old child with APR-DRG 115 OTHER EAR, NOSE, MOUTH, THROAT & CRANIAL/FACIAL DIAGNOSES and readmitted with APR-DRG 346 CONNECTIVE TISSUE DISORDERS (clinical category 2B). Child has underlying stage IV severe Lupus nephritis; index admission with Sialoadenitis with airway obstruction; readmitted for PLANNED dialysis catheter placement and hemodialysis (after failing courses of Rituximab, and steroids). **Questionably Related, PLANNED; not preventable**

Example 2: **Child awaiting heart transplant readmitted for elective cardioversion for an abnormal heart rhythm.** 13 year old patient admitted with APR-DRG 201 CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS; readmitted with same diagnosis (clinical category 1). Patient has complex congenital cardiac disease; awaiting heart transplant; recent admission for atrial tachycardia managed by medication. In follow-up clinic appointment, noted continued atrial flutter (although stable), **PLANNED** readmission for cardioversion. **Related, not preventable.**

Example 3: **A female readmitted for planned breast reconstruction following bilateral mastectomy for breast cancer.** 67 year old post bilateral Mastectomy patient admitted and readmitted as PLANNED for staged 363 BREAST PROCEDURES EXCEPT MASTECTOMY (free DIEP Flap). (Clinical category 4) **Related, Planned.**

Example 4: **Woman awaiting a liver transplant is readmitted with liver failure following an unrelated surgery for breast cancer.** 51 year old women with end-stage liver disease (secondary to autoimmune hepatitis), admitted for 362 MASTECTOMY PROCEDURES; and readmitted with 279 HEPATIC COMA & OTHER MAJOR ACUTE LIVER DISORDERS. Patient initially admitted for mastectomy for early stage breast cancer which did not preclude her from being on the liver transplant list. She was at baseline until 2 days prior to admission when she became increasingly lethargic and readmitted with hepatic encephalopathy (rising ammonia). Patient treated and evaluated for causes of decompensation of hepatic disease. (Multiple other co-morbid conditions including venous stasis, recurrent cellulitis, etc.). (Clinical category 2b). **Unrelated; not preventable**

Example 5: **Male with end stage kidney disease and multiple chronic conditions, is readmitted for heart failure after missing his dialysis appointments.** 53 year old with multiple end stage organ diseases, including ESRD, congestive hepatopathy, Diabetes, COPD, Hepatitis C; hypoglycemia, (and more), admitted with 460 RENAL FAILURE and readmitted with 194 HEART FAILURE. Patient readmitted after missing 2 hemodialysis sessions, as he felt his "legs didn't work." Patient has history of noncompliance and continues to be readmitted due to failure to keep dialysis appointments. (Patient has had significant family and social services support to understand issues surrounding non-compliance with dialysis). (Clinical category 2a) **Related; not preventable.**

Example 6: **Woman readmitted for mental illness after refusing transfer to psychiatry following initial admission for bladder infection**. 62 year old with long history of bipolar disorders, non-compliance with meds, and multiple co-morbid conditions (COPD, Hypertension, Peptic Ulcer Disease,

Diabetes, Morbid Obesity, etc.) admitted for 463 KIDNEY & URINARY TRACT INFECTIONS and readmitted for 753 BIPOLAR DISORDERS. Initially admitted for Acute Renal Failure and UTI. Patient had not been taking meds, was depressed and expressed suicidal ideation. Psychiatry consulted; lithium restarted. Patient refused admission/transfer to Psych. Discharged to niece's home. Readmitted 2 days later "floridly thought disordered and psychotic." (Clinical related category 6a) **Questionably related; not preventable**

Example 7: **Patient undergoes planned additional coronary intervention within month post heart attack.** IK is a 78 year old woman with a history of chronic renal insufficiency and coronary artery disease who experienced an NSTEMI and underwent PCI of two vessels on 4/20/09. She had coronary disease in another vessel as well, but this was deferred electively because of her renal dysfunction. On 5/19/09 she returned for elective PCI of the remaining vessel. Admitted with 175 PERCUTANEOUS CARDIOVASCULAR PROCEDURES W/O AMI and readmitted for same APR-DRG. (Clinical category 4, nature of admission emergency due to original planned observation status). **Related; Planned**

Example 8: **Patient has a bleed while taking needed medications post-coronary intervention**. DM is a 43 year old gentleman who was admitted with a non-ST elevation myocardial infarction (174 PERCUTANEOUS CARDIOVASCULAR PROCEDURES W AMI) and underwent stenting of the culprit lesion on 12/8/09. He was discharged on dual antiplatelet therapy and GI prophylaxis. He presented on 12/24/09 with GI bleeding (254 OTHER DIGESTIVE SYSTEM DIAGNOSES). He was without a GI bleed history (and H Pylori negative). (Clinical category 3.) **Related; Unpreventable**

Example 9: **Patient is readmitted for depression after admission for chest pain.** KH is a 46 year old gentleman with a history of hypertension, sternotomy secondary to gunshot wounds, depression (on therapy), alcohol abuse who presented on 9/14/09 for chest pain (203 CHEST PAIN). He stayed in ED for observation for the day (never admitted to a medical care team) and underwent stress test which was negative for ischemia. He was discharged and then returned to the hospital on 10/14/09 with depression (754 DEPRESSION EXCEPT MAJOR DEPRESSIVE DISORDER) and was discharged on the same depression medications and doses as had been discharged from ED observation. (Clinical category 6a). **Unrelated; Unpreventable**

Example 10 : **Elderly man readmitted for planned amputation and skin grafting due to progression in arterial vascular disease.** 80 year old man with APR DRG 464 Wound debridement with skin graft excision for musculoskeletal/connective tissue disease WCC and readmitted with APR DRG 905 Skin graft for injuries. Patient has a long standing history of vascular disease, osteoarthritis with total knee replacement, chronic obstructive pulmonary disease, stroke, hypertension, Type II Diabetes Mellitus who had the first of several femoral artery bypass grafts in August 2006. Due to the patient's chronic and progressive debility, multiple gangrenous toes and secondary infections, decubitus ulcers on the feet and heels, the patient was readmitted ELECTIVELY for amputation and skin grafting. Clinical category #5; case is evidence of both disease progression and scheduled procedure and NOT preventable. **Related; Planned; Not Preventable**

Example 11: **Male readmitted for amputation following unsuccessful blood vessel grafting to restore circulation to injured foot.** 76 year old patient hospitalized for APR DRG – 623 Skin graft and wound debridement for endo, nutrit, metabolic disease wcc and readmitted for APR DRG – 240 Amputation for circulatory system disorder except upper limb and toe W/CC. The patient is known to have coronary artery disease, diabetes Mellitus Type II, MI with coronary artery bypass graft, gastrointestinal bleed, syncope, chronic renal failure. The patient suffered a fall 5 months prior with resulting pneumothorax, cellulites with open foot wounds that required amputation of the toes and plantar artery bypass grafting. A note from the attending physician…."WILL NEED A TRANS METATARSAL AMPUTATION OF THE FOOT BUT THIS WILL NEED TO BE SCHEDULED FOR A LATER DATE AS THE PATIENT'S …spouse…IS VERY ILL AND HAS BEEN PLACED IN HOME HOSPICE. Patient discharged home with open areas on foot to be readmitted later for surgery." The patient was readmitted for definitive, ELECTIVE readmission for below the knee amputation after the spouse expired. Clinical category #5: The readmission was not preventable due to the progression of long standing vascular disease. This case demonstrates the patient's right to choose when and how they will be treated. **Related; Planned; Not preventable.**

Appendix IV – Inter- and Intra- hospital Rates of Preventable Readmissions (Medpar Data 2008)

UNADJUSTED INTRA AND INTER HOSPITAL AND OUT OF STATE READMISSION RATES, CY2008 MEDICARE DATA

PROVIDER NAME	15 DAY READMISSION INTERVAL			30 DAY READMISSION INTERVAL			ADJUSTMENT FACTORS			
							INTRA/INTER HOSPITAL		OUT OF STATE	
	INTRA HOSPITAL	INTRA & INTER HOSPITAL	TOTAL W/ OUT OF STATE	INTRA HOSPITAL	INTRA AND INTER HOSPITAL	TOTAL W/ OUT OF STATE	15 DAY	30 DAY	15 DAY	30 DAY
Washington County Hospital	7.20%	7.48%	7.76%	11.11%	11.54%	11.96%	1.028	1.024	1.055	1.04
Univ. of Maryland Medical System	6.36%	12.16%	12.48%	9.29%	17.32%	17.72%	1.864	1.798	1.044	1.04
Prince Georges Hospital	7.70%	11.39%	12.19%	11.41%	17.03%	18.63%	1.429	1.417	1.134	1.15
Holy Cross Hospital of Silver	5.71%	8.20%	8.62%	9.27%	13.08%	13.50%	1.397	1.354	1.088	1.06
Frederick Memorial Hospital	7.90%	8.63%	8.84%	12.42%	13.44%	13.71%	1.082	1.067	1.038	1.03
Harford Memorial Hospital	8.75%	11.29%	11.47%	13.25%	16.09%	16.28%	1.248	1.150	1.028	1.02
St. Josephs Hospital	6.20%	9.22%	9.39%	9.03%	13.67%	13.83%	1.456	1.471	1.024	1.01
Mercy Medical Center, Inc.	6.03%	9.77%	9.86%	8.98%	13.89%	14.06%	1.561	1.466	1.015	1.01
Johns Hopkins Hospital	6.40%	9.98%	10.56%	9.52%	14.60%	15.45%	1.520	1.481	1.099	1.09
St. Agnes Hospital	5.96%	8.49%	8.57%	9.13%	12.96%	13.06%	1.385	1.359	1.016	1.01
Sinai Hospital	5.49%	8.99%	9.06%	8.15%	13.45%	13.52%	1.588	1.577	1.017	1.01
Bon Secours Hospital	6.93%	13.26%	13.19%	10.71%	19.73%	19.78%	1.736	1.600	0.995	1.00
Franklin Square Hospital	7.26%	9.37%	9.45%	11.69%	14.24%	14.36%	1.253	1.169	1.013	1.01
Washington Adventist Hospital	6.05%	9.50%	10.43%	9.30%	14.06%	15.35%	1.519	1.438	1.156	1.14
Garrett County Memorial Hospital	5.73%	5.97%	6.91%	9.11%	9.28%	10.29%	1.035	1.012	1.186	1.12
Montgomery General Hospital	7.89%	10.13%	10.38%	11.21%	14.53%	14.86%	1.253	1.252	1.043	1.03
Peninsula Regional Medical Center	6.76%	7.33%	7.78%	10.46%	11.28%	11.96%	1.078	1.068	1.093	1.08
Suburban Hospital Association,Inc	6.57%	8.07%	8.69%	9.28%	11.65%	12.57%	1.214	1.231	1.112	1.10
Anne Arundel General Hospital	6.63%	7.57%	7.74%	9.93%	11.46%	11.73%	1.123	1.126	1.033	1.03
Union Memorial Hospital	5.23%	9.46%	9.54%	8.18%	14.40%	14.50%	1.746	1.674	1.012	1.01
The Memorial Hospital	7.38%	8.79%	9.11%	11.02%	13.31%	13.56%	1.172	1.179	1.052	1.03
Sacred Heart Hospital	7.58%	8.71%	8.85%	11.42%	12.98%	13.28%	1.139	1.116	1.028	1.03
St. Marys Hospital	9.59%	10.56%	11.25%	14.85%	16.04%	16.63%	1.092	1.065	1.090	1.05
Johns Hopkins Bayview Med.	8.64%	12.52%	12.65%	13.08%	18.02%	18.15%	1.386	1.295	1.022	1.01
Chester River Hospital Center	7.80%	8.18%	8.28%	11.76%	11.82%	12.00%	1.034	0.988	1.025	1.02
Union Hospital of Cecil County	9.60%	10.18%	11.05%	14.33%	15.17%	15.95%	1.055	1.049	1.122	1.08
Carroll County General Hospital	7.72%	8.54%	8.73%	12.05%	13.05%	13.43%	1.079	1.046	1.030	1.03
Harbor Hospital Center	6.53%	9.54%	9.62%	10.33%	14.34%	14.37%	1.406	1.311	1.012	1.00
Civista Medical Center	8.70%	10.01%	10.34%	13.35%	15.55%	15.87%	1.129	1.135	1.053	1.03
Memorial Hospital at Easton	7.94%	8.27%	8.31%	12.23%	12.69%	12.79%	1.031	1.022	1.012	1.01
Maryland General Hospital	8.39%	13.85%	13.93%	13.56%	21.30%	21.43%	1.516	1.393	1.012	1.01
Calvert Memorial Hospital	5.81%	7.24%	7.53%	9.72%	12.14%	12.28%	1.221	1.217	1.060	1.02
Northwest Hospital Center, Inc.	7.23%	10.07%	10.23%	11.52%	15.95%	16.16%	1.337	1.296	1.023	1.01
Baltimore Washington Medical	7.56%	9.88%	10.09%	12.15%	15.41%	15.66%	1.272	1.216	1.025	1.02
Greater Baltimore Medical Center	5.12%	7.15%	7.35%	7.69%	10.88%	11.11%	1.358	1.351	1.035	1.02
McCready Foundation, Inc.	5.75%	9.09%	9.06%	8.51%	12.50%	12.46%	1.550	1.429	1.000	1.00
Howard County General Hospital	6.27%	8.19%	8.39%	10.24%	12.84%	13.09%	1.275	1.207	1.036	1.02
Upper Chesepeake Medical Center	6.87%	8.50%	8.67%	10.95%	12.99%	13.24%	1.204	1.138	1.029	1.02
Doctors Community Hospital	6.96%	9.93%	10.40%	10.52%	15.02%	15.59%	1.391	1.378	1.080	1.06
Southern Maryland Hospital	7.77%	9.59%	10.62%	11.82%	14.43%	15.76%	1.215	1.188	1.161	1.13
Laurel Regional Hospital	7.06%	9.99%	10.54%	11.18%	15.17%	15.91%	1.358	1.261	1.084	1.07
Good Samaritan Hospital	8.19%	10.05%	10.11%	12.77%	15.79%	15.88%	1.175	1.164	1.010	1.00
Shady Grove Adventist Hospital	6.38%	7.28%	7.60%	9.92%	11.38%	11.79%	1.117	1.112	1.065	1.05
James Lawrence Kernan Hospital	1.23%	5.13%	5.08%	1.30%	6.31%	7.14%	4.000	4.667	1.000	1.14
Fort Washington Medical Center	4.61%	8.46%	9.99%	7.17%	11.54%	13.73%	1.795	1.547	1.253	1.25
Atlantic General Hospital	6.79%	7.98%	8.04%	10.58%	12.41%	12.87%	1.162	1.149	1.026	1.05
MD TOTAL	**6.92%**	**9.23%**	**9.52%**	**10.61%**	**13.91%**	**76.24%**	**1.300**	**1.263**	**1.049**	**1.04**

Appendix V-- Maryland Proposed STAAR Initiative

Proposed Approach for a Maryland STate Action on Avoidable Rehospitalizations (STAAR) Initiative
October 2010

Background

In May 2009, the Institute for Healthcare Improvement (IHI) launched STate Action on Avoidable Rehospitalizations (STAAR). Funded through a grant from The Commonwealth Fund, STAAR is a multi-state, multi-stakeholder approach to dramatically improve the delivery of effective care at a regional scale.

The initiative aims to reduce rehospitalizations by working across organizational boundaries in a state or region. The work requires not only front-line process improvement, but also identification and mitigation of barriers to system-wide improvement, especially policy and payment reforms that will reduce fragmentation and encourage coordination across the continuum of care. The initiative has three high leverage opportunities for action:

- improving transitions for all patients,
- proactively addressing the needs of high risk patients, and
- engaging patients and their caregivers in assuming a proactive role in their plans.

STAAR was initially implemented in three states— Massachusetts, Michigan, and Washington— by engaging payers, state and national stakeholders, patients and families, and caregivers at multiple care sites and clinical interfaces**.** The work in the first three states is anticipated as a four year project. As this work has progressed for one year, IHI has offered to make programming and information learned from the initiative available to Maryland. The initiative would provide both technical assistance at the policy level and support provider efforts at the front line.

ROLE AND OPTIONS FOR MARYLAND STAAR LEADERSHIP PARTNERS

The role of the key leadership group for STAAR is to identify strategies to address systemic barriers to improving transition of care and to establish an ongoing feedback loop with providers on the progress of addressing the barriers. Specifically, STAAR leaders are to address barriers in the following areas:

- State-wide data/ measurement,
- Payment/policy reforms,
- Financial implications on providers, and
- Working / communicating across the care continuum.

To build upon the success of the initial group of states implementing STARR, a public-private partnership of four key stakeholders is proposed as the leadership group. The proposed entities include:

- The Health Services Cost Review Commission
- The Maryland Hospital Association
- Maryland Patient Safety Center

- DHMH Office of the Secretary or designee

ROLE & POTENTIAL ENTITIES TO BE REPRESENTED ON THE STEERING COMMITTEE

The role of the Steering Committee for STAAR is to work with the key leadership group of STAAR to fully identify the systemic barriers and flesh out the potential strategies for addressing the barriers as well as engaging in the action steps to put the agreed upon strategies in place. Entities to consider for representation on the Steering Committee include:

- Maryland Health Care Commission
- Delmarva QIO
- Health Services Cost Review Commission
- Hospital association
- State medical society
- Maryland equivalent of osteopathic association?
- Department of health
- Blue Cross Blue Shield plan
- State association of health plans
- Aging services
- Maryland Patient Safety Center
- Key hospital industry representatives
- Institute for Healthcare Improvement
- Medicaid program operations and quality assurance
- Hospice and palliative care association
- State association of nurse executives
- Large nursing home provider-Genesis or Erickson?
- Consumer organizations
- Home health association
- Health Information exchange- CRISP
- Senior health organizations

STAAR CORE SET UP FEATURES FOR PROVIDERS

For Maryland to implement a STAAR initiative, provider participants must agree to engaging in three areas of activity, including:

- Conducting initial and ongoing measurement of 30-day all-cause readmission rates;
- Establishing cross-continuum teams comprising physician office, skilled nursing facility; hospital, home care and patient/family members;[8] and,
- Performing a readiness diagnostic by conducting at least five interviews and root cause analysis where readmission has occurred within the 30 day window in the measurement "base" period.

STAAR CORE IMPROVMENT PROCESSES FOR PROVIDERS

Key improvement processes that STARR participants must agree to implement include:

- Conducting enhanced readmission assessment that includes social and logistic information/factors for patients and families that impact risk for readmissions.
- Employing enhanced learning and coaching "teach-back" techniques with patients and families that includes facilitating their understanding and responding back regarding:
    - The reason they are admitted to the hospital.
    - How to do self care after discharge.
    - What to do if their symptoms worsen after they leave the hospital.
- Employing systematic methods to ensure timely communication with the next setting of care such that information is transferred the day of discharge.

[8] To date, 67 cross continuum teams have been established across MA, MI and WA, 38 of which include patient and family representatives/participants.

- Employing systematic methods to ensure timely follow up with patients and families at moderate risk for readmission.

Next Steps

To move forward in determining whether STAAR is an appropriate fit for Maryland, the following next steps and timelines are proposed:

- Meet with proposed key leadership entities to discuss the proposal and next steps.
- Review and modify as needed the proposed list of leadership and steering committee participants.
- Should we determine it appropriate to go forward, convene a meeting with the proposed key leadership organizations and IHI staff.

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Appendix A:
IHI STAAR Resources Currently Available

The blue text below are URL links currently posted on STAAR to the IHI website.

How-to Guide: Creating an Ideal Transition Home

This guide was created to support participating organizations in their work over the course of the STAAR initiative and beyond to improve transitions in care.

- How-to Guide Summary and Strategies for Getting Started

STAAR Project Summary

A one-page summary of the STAAR initiative.

STAAR: A State-Based Strategy to Reduce Avoidable Rehospitalizations

This document reflects the work of IHI to date to develop a state-wide strategy for reducing avoidable rehospitalizations.

As part of the *Effective Interventions to Reduce Rehospitalizations* project, which preceded the STAAR initiative, IHI produced materials to highlight promising approaches to reduce avoidable rehospitalizations.

- **A Survey of the Published Evidence**

This document is a survey of the published literature regarding the effective interventions to reduce avoidable rehospitalizations.

- **A Compendium of Promising Interventions**

This companion document to the Published Evidence provides information regarding current best programs and practices to reduce rehospitalizations.

STAAR: A Tool for State Policy Makers

The checklist provided in this tool focuses on aspects of the health care system that policy makers can influence and for which data is available to assess their state's performance regarding hospital readmission rates.

Decreasing Avoidable 30-Day Rehospitalizations

This Minicourse presentation at the December 2009 IHI National Forum describes key drivers of rehospitalization rates, how national data compares to state and regional findings, high-leverage changes to reduce hospitalizations, and characteristics of the STAAR multistakeholder quality initiative that crosses organizational boundaries.

STAAR Issue Briefs on Reducing Barriers to Care Across the Continuum

Measuring Rehospitalizations at the State Level

The Financial Impact of Readmisisons on Hospitals

Engaging Payers

Working Together in a Cross-Continuum Team