3M™ Health Information Systems

Potentially Preventable Readmissions Classification System

Methodology Overview

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Potentially Preventable Readmissions: A Classification System for Identifying Potentially Preventable Hospital Readmissions

THIS MANUAL PROVIDES AN OVERVIEW of the Potentially Preventable Readmissions (PPR) classification system–a clinically-based classification system that identifies acute care hospital readmissions that are potentially preventable, based on the computerized discharge abstract data. The output from the PPR classification system can be used to compute readmission rates across hospitals. Higher than expected readmission rates may indicate opportunities to improve the quality of care before and after discharge, as well as the coordination of services between the hospital and outpatient setting.

Introduction

Hospital readmissions have considerable potential as an important indicator of quality of care (Friedman and Basu, 2004). They have joined mortality rates and complication rates as promising quality measures that do not require intensive chart review, and can therefore serve to screen large numbers of records and provide a basis for comparing hospital performance.

Readmissions not only suggest quality problems, but also are expensive. It has been estimated that readmissions are responsible for a substantial proportion of expenditures for inpatient hospital care (Anderson and Steinberg, 1984; MEDPAC Report Chapter 5 June 2007).

Background

Readmissions have potential value as an indicator of quality of care because they may reflect poor clinical care and poor coordination of services either during hospitalization or in the immediate post discharge period (Halfon, et al, 2006, Kripalani, et al, 2007). The examination of readmissions can, therefore, focus attention on the critical time of the transition between inpatient and outpatient phases of treatment of an acute illness.

A readmission may also result from events during the initial hospital stay such as incomplete treatment of the underlying problem, or the development of a complication that only becomes evident after discharge. The relationship between quality of care and readmissions has been documented (Ashton et al., 1997; Hannan et al., 2003). Ashton concluded that an early readmission is significantly associated with the process of inpatient care and found that patients who were readmitted were roughly 55 percent more likely to have had a quality of care problem. Hannan found that 85 percent of readmissions following coronary bypass surgery were associated with complications directly related to the bypass surgery. There is also significant literature positing a relationship between variables such as availability of primary care, distance to the hospital, ethnicity, income, type of insurance and the probability of readmission (Ashton et al, 1997; Friedman and Basu, 2004).

The increasing interest in linking payment and quality (i.e. pay for performance) is in part a natural response to escalating health care costs. For readmission rates to serve as an indicator of hospital quality and performance, it is necessary to develop a methodology that identifies, in a clinically-precise manner, those readmissions that are potentially preventable.

Definitions

This section contains the terms and definitions that are used for identifying Potentially Preventable Readmissions.

Readmission

A readmission is a return hospitalization to an acute care hospital that follows a prior admission from an acute care hospital. Intervening admissions to non acute care facilities (e.g., a skilled nursing facility) are not considered readmissions and do not impact the designation of an admission as a readmission.

Readmission time interval

The readmission time 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.

Potentially Preventable Readmission

A Potentially Preventable Readmission (PPR) is a readmission (return hospitalization within the specified readmission time interval, as defined above) that is clinically-related (as defined below) to the initial hospital admission.

Clinically-related

Clinically-related is defined as a requirement 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 trauma) within a specified readmission time interval.

Initial Admission

The Initial Admission is an admission that is followed by a clinically-related readmission within a specified readmission time interval. Subsequent readmissions relate back to the care rendered during or following the Initial Admission. The Initial Admission initiates a readmission chain.

Readmission chain A readmission chain is 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.

Excluded Admission An Excluded Admission is an admission that is globally excluded from consideration as both a readmission and Initial Admission due to the nature and complexity of the required follow up care (e.g., multiple trauma) or because the patient left against medical advice.

Non-event A Non-event is an admission to a non-acute care facility such as a nursing home or an admission to an acute care hospital for non acute care (e.g., convalescence). Non-events during the interval between an Initial Admission and a readmission are ignored.

Only Admission An Only Admission is an admission for which there is neither a prior Initial Admission nor a clinically-related readmission within the readmission time interval.

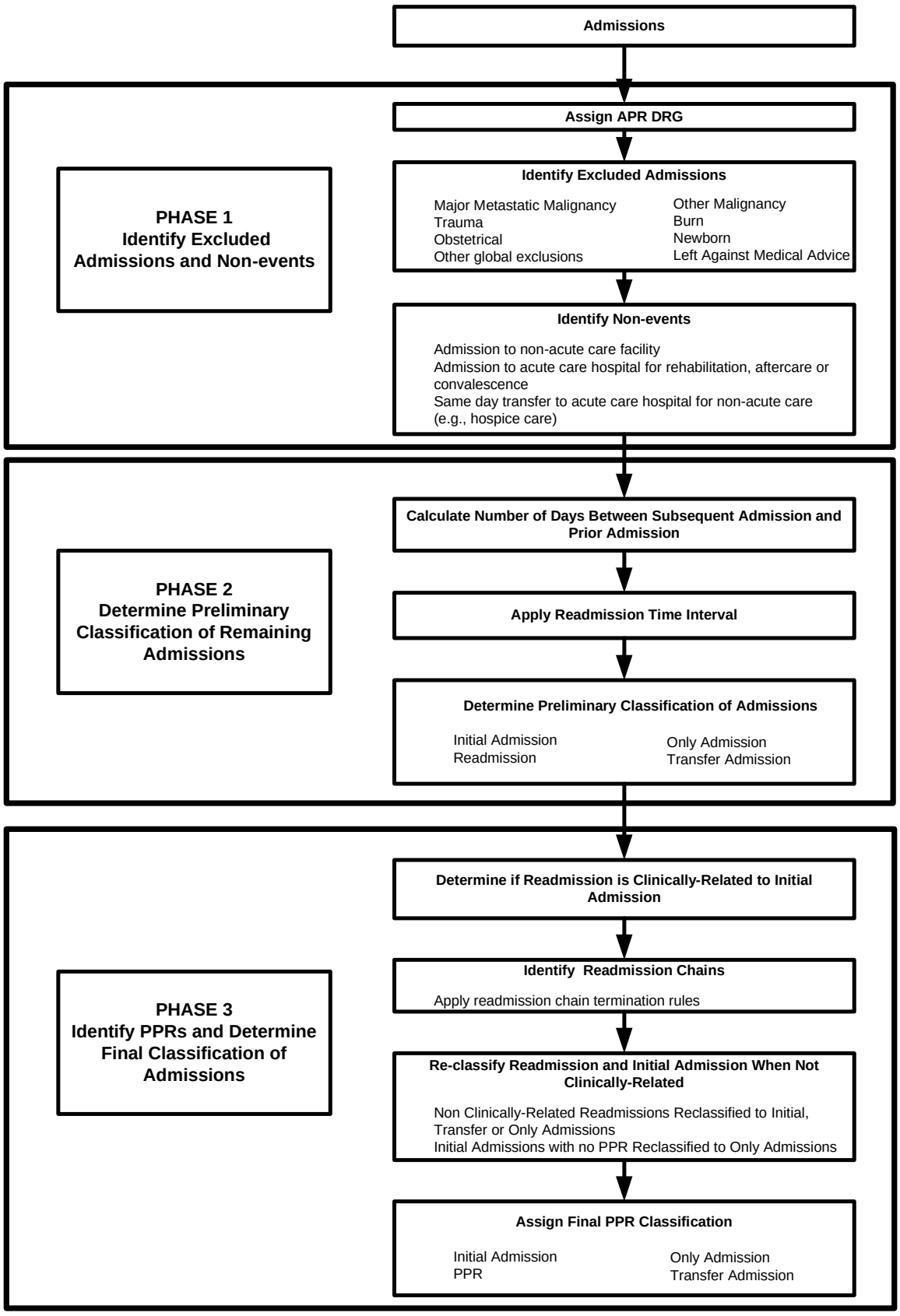
Transfer Admission Transfer Admissions are a special subset of Only Admissions that do not meet the criteria to be PPRs and have a discharge status of "transferred to an acute care hospital." They are not classified as an Initial Admission even if there is a subsequent readmission within the readmission time interval.

Overview of PPR Logic

This section provides and overview of the PPR logic. The logic can be divided into three phases:

1. Identify globally-excluded admissions and Non-events
2. Determine preliminary classification of admissions
3. Identify Potentially Preventable Readmissions and determine final classification of admissions

The following figure is a graphical representation of the three-phase PPR logic.


Admissions
PHASE 1
Identify Excluded Admissions and Non-events
Assign APR DRG
Identify Excluded Admissions
Major Metastatic Malignancy
Trauma
Obstetrical
Other global exclusions
Other Malignancy
Burn
Newborn
Left Against Medical Advice
Identify Non-events
Admission to non-acute care facility
Admission to acute care hospital for rehabilitation, aftercare or convalescence
Same day transfer to acute care hospital for non-acute care (e.g., hospice care)
PHASE 2
Determine Preliminary Classification of Remaining Admissions
Calculate Number of Days Between Subsequent Admission and Prior Admission
Apply Readmission Time Interval
Determine Preliminary Classification of Admissions
Initial Admission
Readmission
Only Admission
Transfer Admission
PHASE 3
Identify PPRs and Determine Final Classification of Admissions
Determine if Readmission is Clinically-Related to Initial Admission
Identify Readmission Chains
Apply readmission chain termination rules
Re-classify Readmission and Initial Admission When Not Clinically-Related
Non Clinically-Related Readmissions Reclassified to Initial, Transfer or Only Admissions
Initial Admissions with no PPR Reclassified to Only Admissions
Assign Final PPR Classification
Initial Admission
PPR
Only Admission
Transfer Admission

Phase 1–Identify globally-excluded admissions and Non-events

Phase one consists of using the PPR logic to identify globally-excluded admissions and Non-events.

Assign an APR DRG

Each admission is assigned to an All Patient Refined Diagnosis Related Group (APR DRG). APR DRGs classify patients according to their reason for admission and severity of illness (Averill, et al, 2002). APR DRGs assign patients to one of 314 base APR DRGs that are determined either by the principal diagnosis or, for surgical patients, the most important surgical procedure performed in an operating room. The base APR DRG represents the underlying reason for the hospital admission and is used in the PPR logic to identify Excluded Admissions and Non-events, and to define the clinical relationship between Initial Admissions and PPRs.

Each base APR DRG is then divided into four severity of illness (SOI) levels, determined primarily by secondary diagnoses that reflect both comorbid illnesses and the severity of the underlying illness. The combination of the base APR DRG and severity of illness level can be used for risk adjusting hospital PPR rates.

Identify global 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 metatastic malignancies, multiple trauma, and burns are not considered preventable and are globally excluded as an Initial Admission or readmission. In addition, neonatal and obstetrical admissions have unique attributes and only rarely lead to readmissions. As a consequence, readmissions following an Initial Admission for neonatal or obstetrical care are also globally excluded.

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)

Phase 2–Determine preliminary classification of admissions

To determine the preliminary classification of admissions, the logic first applies a readmission time interval, and then it classifies each admission.

Apply readmission time interval

Each admission is assessed to determine whether there is a readmission that occurs within the specified readmission time interval. A longer readmission time interval will classify more admissions as readmissions. For example, with a 30 day readmissions time interval a hospitalization that occurred 20 days following a prior admission would be considered a readmission, while with a 15 day readmission time interval it would not. Longer time intervals after the prior admission also increase the relative importance of the outpatient management of chronic diseases and decrease the likelihood that a readmission was related to the clinical care or discharge planning in the prior admission (Hannan et al, 1995).

Classify each admission

For the specified readmission time interval, each admission for a patient (not already classified as an Excluded Admission or Non-event) is preliminarily classified as one of four different types:

- Readmission
- Initial Admission
- Only Admission
- Transfer Admissions

The categorization of an admission as a readmission or an Initial Admission is highly dependent on the readmission time interval chosen.

The categorization of an admission also depends on the disposition of the patient at the time of discharge. An admission with a discharge disposition of transferred to another acute care hospital is eligible to be a PPR, but it is not eligible to be an Initial Admission because subsequent care is no longer under the control of the transferring hospital. An admission in which the patient died is also not eligible to be an Initial Admission since a readmission would not be possible.

Phase 3–Identify Potentially Preventable Readmissions and determine final classification of admissions

Phase 3 of the PPR logic consists of the following tasks:

- Determine if a readmission clinically-related
- Identify readmission chains
- Terminate readmission chains for clinically-unrelated admissions
- Reclassify clinically-unrelated Initial Admissions and readmissions

Determine if a readmission is clinically-related

A readmission is considered clinically-related to the Initial Admission if the reason for the readmission falls into one of three categories for medical readmissions and one of two categories for surgical readmissions. Readmissions for medical reasons are much more common than readmissions for surgical procedures, regardless of the reason for the Initial Admission. The three categories of clinically-related medical readmissions are as follows:

- A medical readmission for a continuation or recurrence of the reason for the Initial Admission, or for a condition closely related to the reason for the Initial Admission (e.g. a readmission for diabetes following an Initial Admission for diabetes).
- A medical readmission for an acute decompensation of a chronic problem that was not the reason for the Initial Admission but could have resulted from inadequate care during the Initial Admission or inadequate outpatient follow-up care (e.g. a readmission for diabetes in a patient whose Initial Admission was for an acute MI).
- A medical readmission for an acute medical problem that could have been a consequence of care provided in the Initial Admission. For example, in a patient readmitted for a urinary tract infection ten days after a hernia repair, the infection was likely related to the use of a foley catheter during the Initial Admission.

Surgical readmissions were generally considered not preventable unless they met one of the two criteria for a clinical relationship to the Initial Admission:

- A readmission for a surgical procedure that addressed a continuation or a recurrence of the problem causing the Initial Admission (a patient readmitted for an appendectomy following an Initial Admission for abdominal pain and fever).
- A readmission for a surgical procedure that addressed a complication resulting from care during the Initial Admission (a readmission for drainage of a post-operative wound abscess following an Initial Admission for a bowel resection).

A readmission that did not fit one of these categories (e.g., a readmission for trauma) was classified as a clinically-unrelated readmission and therefore not potentially preventable, (i.e. not a PPR).

APR DRGs were used as the basis for establishing the clinical relationship between the Initial Admission and the readmission. 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 DRG 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 in each cell. The end result was that each of the 98,596 cells contain a specification of whether the combination of the base APR DRG 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.

In addition to the "Clinically-Related" PPR APR DRG matrix, all readmissions with a principal diagnosis of trauma are considered not potentially preventable.

Identify readmission chains

In some instances, two or more readmissions will all be related to a single Initial Admission. A readmission chain is essentially a sequence of clinically-related admissions. If for a given readmission, the preceding admission is itself a readmission related to a prior Initial Admission, then the most recent readmission is assessed to determine if it is clinically-related to the Initial Admission that initiated the readmission chain, rather than to the readmission immediately preceding it.

In a readmission chain, the total time period encompassed can exceed the specified readmission time interval. This is because the most recent readmission must be within the readmission time interval of the readmission immediately preceding it, not the Initial Admission. For example, if the readmission time interval is 15 days and there are two readmissions related to an Initial Admission, both 14 days apart, the second readmission is still considered a readmission related to the Initial Admission even though it occurred 28 days after the Initial Admission to which it is clinically-related. Thus, a chain of related readmissions can encompass a time interval beyond the specified readmission time interval.

Terminating a readmission chain

A readmission that is not clinically-related to the Initial Admission in a readmission chain terminates the readmission chain. A readmission that has a discharge status of transferred to an acute care hospital, left against medical advice or died terminates a readmission chain. The occurrence of an Excluded Admission also terminates a readmission chain.

Reclassify clinically-unrelated Initial Admissions and readmissions

If a readmission is not clinically-related to the Initial Admission, it is not considered a PPR and is re-classified as an Initial Admission, Transfer Admission, or an Only Admission. If the readmission is re-classified as an Initial Admission, it could in turn initiate a new readmission chain. Additionally, if there is an admission that was preliminarily classified as an Initial Admission because it preceded a clinically-unrelated readmission, it is re-classified from an Initial Admission to an Only Admission.

Readmission Rates

The 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 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 readmissions 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 comparisons 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. Higher than expected readmission rates can be an indicator of quality of care problems during the initial hospital stay or with the coordination of care between the inpatient and outpatient setting.

Summary

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:

- Provision of quality care in the initial hospitalization
- Adequate discharge planning
- Adequate post discharge follow-up
- 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. The identification of Initial Admissions, PPRs and at-risk Only Admissions allows meaningful PPR rates to be computed.

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