
3M™ Health Information Systems

# Potentially Preventable Readmissions Classification System

Methodology Overview

v36.0

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# About this document

This document describes 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.

# Chapter 1: Explanation of the PPR classification system

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 healthcare 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. For a list of acronym descriptions used in this manual, see Acronyms.

### 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.

### Excluded Admission

PPR identifies categories of readmissions that are not considered to be potentially preventable, and therefore are excluded from consideration as part of a PPR Readmission Chain. 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 extensive burns are not considered preventable and are globally excluded as an Initial Admission or readmission. Due to their unique attributes, readmissions following an Initial Admission for neonatal care with complications 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.

Following is a list of the categories of exclusions:

- Malignancies
- Data Errors
- Most newborn DRGs
- Left against medical advice (LA)
- Age exclusions -Certain pediatric diagnoses such as seizures, poisoning, certain infections
- Palliative Care (user option)
- Mental Health (user option)

### 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.

### Non-event

Non-event admissions are ignored by PPR logic. 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 APR DRGs for rehabilitation, aftercare, and convalescence
- Same-day transfers to an acute care hospital for non-acute care (e.g., hospice care)
- Malignancies with a chemotherapy or radiotherapy procedure
- Selected hematological disorders
- Certain blood disorder/procedure combinations
- Certain planned chemotherapy, radiation procedures

### 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.

### Potentially Preventable Readmission

A Potentially Preventable Readmission (PPR) is a readmission within a specified time interval that is clinically-related to the initial hospital admission.

### 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 a non acute care facility, for example, hospice, skilled nursing, home health, etc. should not be included. They are not considered readmissions and do not impact the designation of an admission as a readmission.

### Readmission chain

A readmission chain is a sequence of PPRs that are all clinically-related to the same 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.

### 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.

### 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.

## 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 a non acute care facility, for example, hospice, skilled nursing, home health, etc. should not be included. They 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 within a specified time interval that is clinically-related 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 same 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 excluded from consideration as both a readmission and Initial Admission due to the nature and complexity of the required follow up care (e.g., major or metastatic malignancy conditions) 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). Several procedure codes for chemotherapy, radiation therapy, and other cancer treatments that, if present, would classify the malignancy DRG as a Non-event. 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

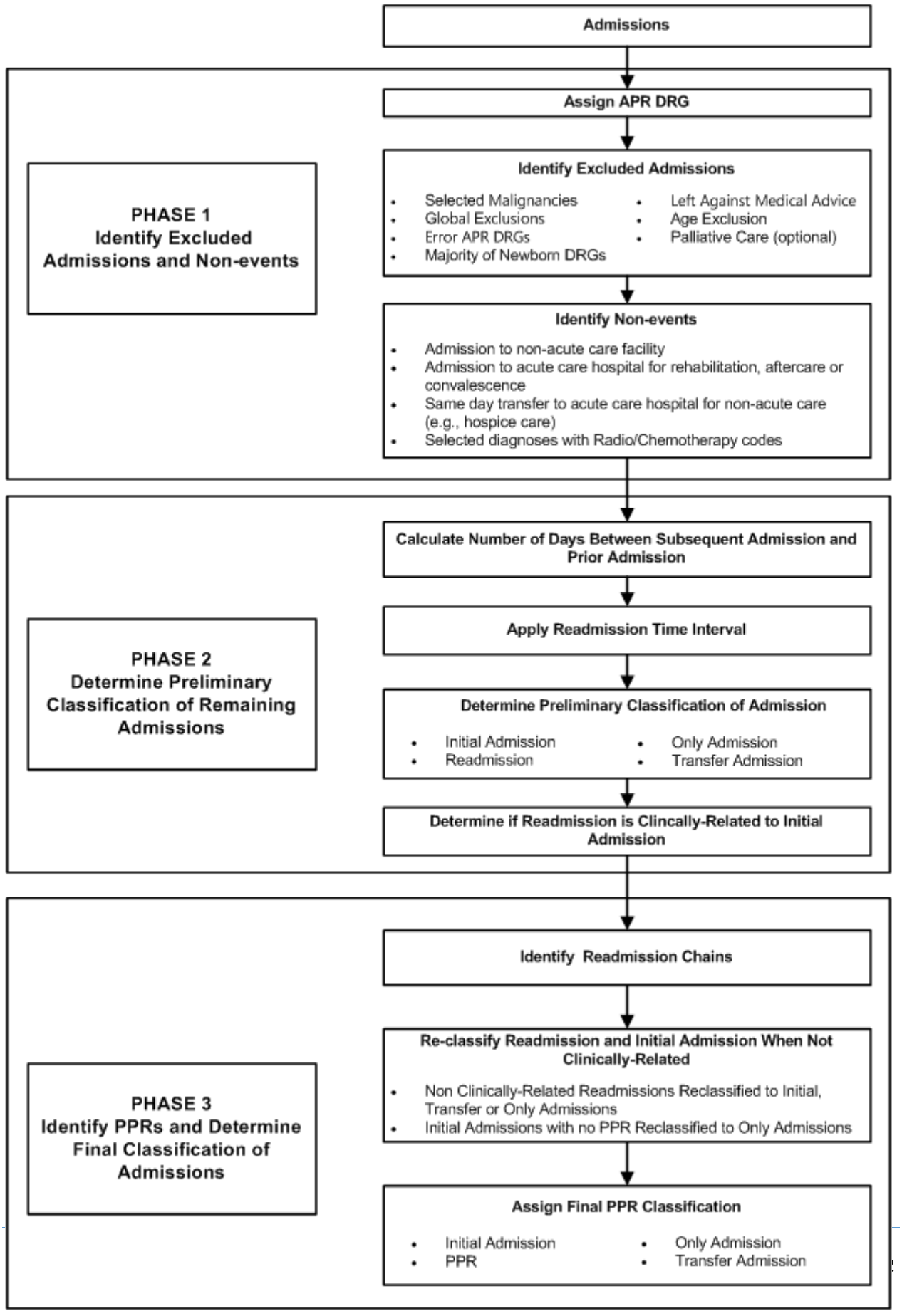
Transfer Admissions are a special subset of Only Admissions that do not meet the criteria to be PPRs and have a discharge status of “transferred to an acute care hospital.” They are not classified as an Initial Admission even if there is a subsequent readmission within the readmission time interval.

# Overview of PPR Clinical Logic

This section provides an overview of the PPR Clinical 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
Assign APR DRG
PHASE 1
Identify Excluded Admissions and Non-events
Identify Excluded Admissions
Selected Malignancies
Global Exclusions
Error APR DRGs
Majority of Newborn DRGs
Left Against Medical Advice
Age Exclusion
Palliative Care (optional)
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)
Selected diagnoses with Radio/Chemotherapy codes
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 Admission
Initial Admission
Readmission
Only Admission
Transfer Admission
Determine if Readmission is Clincally-Related to Initial Admission
PHASE 3
Identify PPRs and Determine Final Classification of Admissions
Identify Readmission Chains
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 I - Identify Globally-Excluded Admissions and Non-events

The first step to the PPR Logic is to assign the APR DRG classification system. Once data is grouped, Phase I begins by 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 mutually exclusive base APR DRG that is 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.

For PPR purposes, the APR-DRG is reassigned for patients receiving a tracheostomy procedure (APR-DRGs 4 and 5) when the PDX is not on a list of specified ENT conditions. The PPRs assign the patient to a category that identifies the underlying condition and is more relevant when comparing relatedness to other APR-DRGs.

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.

For a list of all APR DRGs, see List of All Patient Refined DRGs (MDC/SOI/ROM).

### *Identify Global Exclusions and Non-events*

#### Global Exclusion 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 leukemias, lymphomas, and chemotherapy are not considered preventable and are globally excluded as an Initial Admission or readmission. In addition, neonatal admissions have unique attributes and only rarely lead to readmissions. As a consequence, readmissions following an Initial Admission for neonatal care are also globally excluded.

The exclusion criteria are defined by APR DRGs, diagnosis codes, and patient discharge status codes. There are a number of global exclusion types (MA, OG, NT, EE, LA, NT and PL) which will be specified in this section. Global exclusions will be excluded from the PPR chain meaning:

- Will not start a chain even if followed by another admission within the readmission time interval
- Will end a chain when occurring within the readmission time interval of the prior admission

**Non-events Criteria**

Admissions for certain non-acute care services during the interval between a prior admission and subsequent admission do not affect the classification of the subsequent admission. These admissions are called Non-events because they are ignored when determining eligibility based on the readmission time interval. Admissions with an APR DRG of rehabilitation, aftercare, or convalescence are classified as Non-events.

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)
- Malignancies and selected disorders/diseases with a chemotherapy or radiotherapy procedures (e.g., connective tissue, coagulation and platelet disorders)

## Phase II - 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*

The dates of admission and discharge of any admissions not excluded in Phase I are used to calculate the days between admissions. 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
- Transfer Admissions
- Only Admission

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 (including those to cancer or children's hospitals) 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 III - Identify Potentially Preventable Readmissions and determine final classification of admissions

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 336 columns representing the base APR DRG and APR DRG splits 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 105,054 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.

For more information, see Phase III - Identify PPRs and determine final classification of admissions.

### *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 a mental health or substance abuse category, 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 clinical relationship reason of clinically-related medical and surgical readmissions are as follows:

1. 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).
2. Ambulatory Sensitive and Chronic Condition (two subgroups):

a. Ambulatory care sensitive conditions as designated by the Agency for Healthcare Research and Quality (AHRQ).

b. All other readmissions for a chronic problem that may be related to care either during or after the Initial Admission.

3. Medical readmission for an acute medical condition or complication that may be related to or may have resulted from care during the Initial Admission or in the post-discharge period after the Initial Admission.

4. Readmission for a surgical procedure to address 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).

5. Readmission for a surgical procedure to address a complication that may be related to or may have resulted from care during the Initial Admission (a readmission for drainage of a post-operative wound abscess following an Initial Admission for a bowel resection).

6. Mental Health and Substance Abuse Readmissions (three subgroups):

a. Readmission for mental health reasons following an Initial Admission for a non-mental health, non-substance abuse reason.

b. Readmission for a substance abuse diagnosis reason following an Initial Admission for a non-mental health, non-substance abuse reason.

c. Mental health or substance abuse readmission following an Initial Admission for a substance abuse or mental health diagnosis.

The process of determining if a readmission is clinically-related also checks the following:

- Neoplasm Logic
- Laterality Logic
  - Laterality APR-DRG combos
  - Laterality procedures
- DRG splits
- Clinically-related readmissions
- Non clinically-related readmissions

### *Hospitalizations not considered potentially preventable*

For a number of reasons an Initial Admission/Readmission combination may be classified as not potentially preventable. PPR assigns a Clinical Relationship Reason for its determination of these pairs as not potentially preventable. All Non-Clinically Related Readmissions are assigned one of the following reasons:

- NC (Not clinically related)
- NP (Clinically related, not preventable)

- P (Probably planned readmission)
- M (Malignancy)
- T (Trauma)
- E (Error)
- OB (Obstetrics)
- TR (Transplants)
- C (Catastrophic)

### *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.

For more information, see The Identification of Potentially Preventable Readmissions.

### *Terminate readmission chains*

- 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 based on time interval but 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 of PPR chains (count of IAs) divided by the sum of admissions classified as an Initial Admission or an Only Admission.

Non-events, Transfer Admissions, Only Admissions that died, Excluded Admissions, and selected malignancies with a chemotherapy or radiotherapy procedure 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 healthcare 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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