3M™ Potentially Preventable Complications (PPCs)

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Methodology Overview

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CHAPTER 1

Potentially Preventable Complications (PPCs)

POTENTIALLY PREVENTABLE COMPLICATIONS (PPCs)

This manual describes the Potentially Preventable Complications (PPC) classification system, a clinically-based classification system that identifies inpatient acute care hospital complications that are potentially preventable, based on computerized discharge abstract data. The output from the PPC classification system can be used to compute complication rates for hospitals. Higher than expected complication rates may indicate opportunities to improve the quality of care within the hospital stay.

For a complete description of the PPC logic, refer to the 3M(tm) Potentially Preventable Complications Definitions Manual (GRP-093).

Introduction

The PPC classification system identifies in-hospital complications primarily from among secondary diagnoses identified as not present on admission. The PPC classification system utilizes the present on admission (POA) indicator to determine if a secondary diagnosis was present on admission or arose after admission. The present on admission (POA) indicator also allows only those secondary diagnoses that were present on admission to be used in the risk adjustment process. Therefore, an event that occurs after admission is not used to determine the risk of a possible complication.

Background

The Institute of Medicine's 1999 report on the human and financial costs of medical errors, *To Err is Human: Building a Safer Healthcare System*, accelerated efforts to improve patient safety in the United States (Institute of Medicine 1999). Although many initial proposals focused on public reporting of quality measures, an increasing number of policy makers have advocated creating incentives for improvement by linking payment to quality measures (Midwest Business Group on Health 2005; Medicare Payment Advisory Commission 2005; National Committee for Quality Assurance 2004). Performance-based payment proposals can include rewards based on mortality rates, complication rates, readmission rates and adherence to processes of care guidelines. Performance measures are seen as a way to focus quality improvement efforts and to assist in the design of a safer health care system.

The reason for admission is an important determinant of a patient's risk of incurring complications. Patients treated for medical conditions are at risk for different complications, and at different rates, than patients admitted for surgery. Among surgical patients, the type of surgery strongly influences the type and frequency of complications. For example, a patient admitted for coronary bypass grafting is more likely to develop heart failure than one admitted for a hernia repair. Susceptibility to complications also varies widely among medical patients. A patient admitted with a stroke is more likely to develop aspiration pneumonia than one admitted with acute urinary retention, for example.

Risk of complications depends not only on the reason for admission, but also on the severity of the underlying illness and the presence of coexisting illness. Patients hospitalized with a more severe form of the underlying illness, or with multiple comorbid conditions, have a higher risk of complications (Daley 2001; Rosen 1995; Rothschild 2000). Fair comparisons of complication rates across hospitals require the use of risk-adjustment methods that account for each of these factors. The POA indicator not only allows potentially preventable complications to be identified from among diagnoses not present on admission, but also permits more accurate risk adjustment

by limiting the secondary diagnoses used for determining severity of illness to those present on admission.

Definitions

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

Complications. In-hospital complications are conditions that develop after admission to the hospital. Complications may or may not be preventable.

APR DRG. APR DRGs classify patients according to their reason for admission, severity of illness and risk of mortality.

Admission APR DRG. An "admission" APR DRG is based on the principal diagnosis from the discharge abstract, but eliminates certain secondary diagnoses that are not considered present on admission, as well as specific procedures that were not the cause of admission from consideration in the assignment of the APR DRG. Complications and other conditions that arise during the hospitalization are not used in the admission APR DRG assignment logic.

POA Indicator. The POA indicator is an additional data element on the Uniform Billing form (UB-04) that indicates if a principal or secondary diagnosis was present at the time of admission.

PPCs. Potentially Preventable Complications (PPCs) are harmful events (e.g. accidental laceration during a procedure, improper administration of medication) or negative outcomes (e.g., hospital-acquired pneumonia, C. difficile colitis) that develop after hospital admission and may result from processes of care and treatment rather than from natural progression of the underlying illness and are therefore potentially preventable.

Global Exclusion. A set of exclusion criteria for identifying admissions with certain severe or catastrophic conditions that are particularly susceptible to a range of complications, including those with trauma, HIV illness, and major or metastatic malignancies. Globally excluded admissions are not eligible to be assigned to most PPCs.

PPC Eligible Admission. A PPC eligible admission is an admission that did not meet any global exclusion criteria. Admissions that met the global exclusion criteria are not eligible admissions for any PPC.

Candidate Complication. Candidate Complications are those conditions that are considered a PPC when specific PPC assignment criteria are met. For example, a pulmonary embolism is a candidate to be a PPC but will only be a PPC when the specific clinical conditions are met.

PPC Candidate Admission. A PPC candidate admission is a PPC eligible admission that also has one or more conditions that are candidate complications.

PPC Specific Exclusion. A set of clinical exclusion criteria used for identifying admissions where a specific PPC may not be preventable and therefore, not assigned. The clinical exclusions most commonly identify complications that are redundant, or a natural consequence of one of the diagnoses present on admission, and therefore not preventable.

Admissions that contain candidate conditions are not assigned the specific PPC when the associated PPC exclusion criteria are met, even though the admission may be eligible and assigned to other specific PPCs.

PPC Hierarchy Exclusion. A PPC candidate admission can have more than one candidate complication. Some PPCs have the same assignment criteria except that one of the PPCs is a more significant manifestation of the other complication. In such cases the PPC logic precludes the assignment of the less significant candidate complications based on a hierarchy of related PPCs.

For example, the criteria used to assign PPC 57, Obstetric Lacerations and Other Trauma without Instrumentation, are the same used to assign PPC 58, Obstetric Lacerations and Other Trauma with Instrumentation. The difference being that the more significant PPC, 58, the procedure is performed with an instrument, and the less significant PPC is not. In such cases where an admission meets the criteria for both PPC 57 and 58, the PPC logic assigns the more significant PPC 58 and precludes the assignment of the less significant PPC 57.

PPC Assigned Admission. A PPC assigned admission is a PPC candidate admission with one or more candidate complications that are not excluded by the PPC exclusion or hierarchy exclusion logic.

PPC Level. To facilitate the reporting and display of PPC information, each PPC is assigned to one of two levels based on the relative clinical significance of the PPC.

PPC Group. To facilitate the reporting and display of PPC information, each PPC is assigned to one of eight mutually exclusive clinically descriptive categories.

Overview of PPC Logic

This section provides an overview of the PPC logic. The logic is divided into three phases:

1. Identify globally-excluded admissions

2. Identify admissions with candidate complications

3. Assign PPCs after applying PPC exclusions and hierarchy exclusions

The following figure is a graphical representation of the three-phase PPC logic. The list of Potentially Preventable Complications, along with the PPC group and level, is shown in Appendix F.

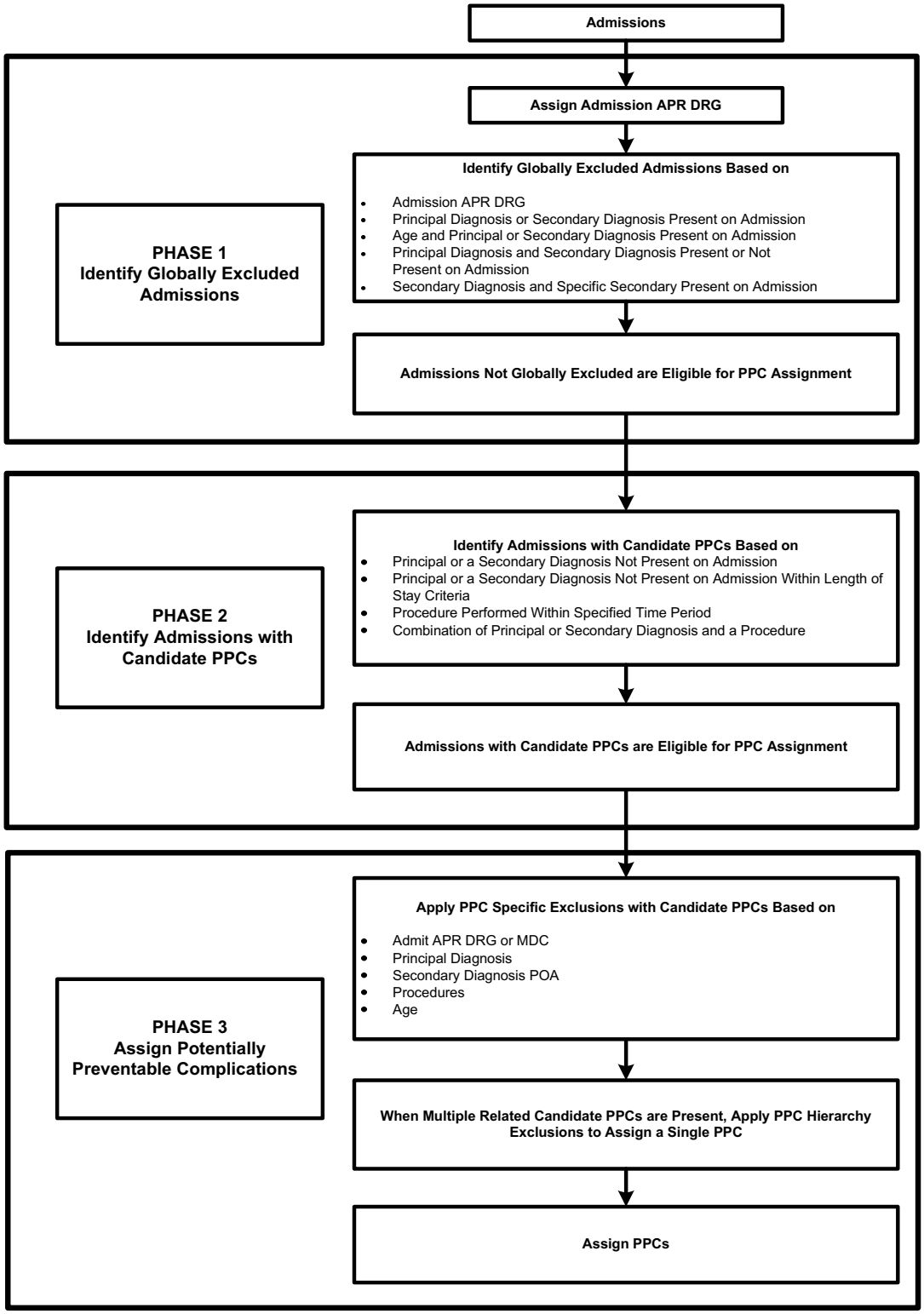

Figure 1: Overview of Three Phase Process for Identifying PPCs

Phase 1 – Identify Globally Excluded Admissions

Phase one of the PPC logic consists of identifying admissions that are globally excluded from being considered eligible for PPC assignment.

Assign Admission APR DRG

Each admission is assigned to an admission All Patient Refined Diagnosis Related Group (APR DRG). APR DRGs classify patients according to their reason for admission, severity of illness, and risk of mortality (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. For more information on APR DRGs, see Appendices A - D.

The assignment of the discharge APR DRG uses the diagnosis, procedures, age, sex, and discharge status fields on the standard claim form. In addition to these variables, the assignment of the admission APR DRG requires the POA indicator for each diagnosis and the date each procedure is performed (or instead of the date the number of days after admissions that the procedure is performed if the date is unavailable).

Each base admission 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 assignment of the admission base APR DRG, severity of illness subclass and risk of mortality subclass is accomplished through a seven-step process that essentially eliminates certain diagnoses and procedures from consideration in the assignment of the APR DRG. The logic for assigning the base APR DRG, severity of illness subclass, and risk of mortality subclass is identical for both the discharge and admission APR DRG. The one difference is that a reduced set of diagnoses, those that were present on admission, and a smaller set of procedures are used to assign the admission APR DRG. The seven steps in admission APR DRG assignment essentially represent a preprocessing that limits the diagnoses and procedures passed to the standard APR DRG assignment logic. For more information on Admission APR DRGs, see Appendix E.

The combination of the base admission APR DRG and admission severity of illness level can be used for risk adjusting hospital PPC rates.

Identify globally excluded admissions

Several kinds of admissions with certain severe or catastrophic illnesses that are particularly susceptible to a range of complications are not considered preventable and therefore cannot be classified as having assigned a PPC. Due to their complexity and inherent unpredictability which makes it difficult to discern a potentially preventable complication from a natural or frequent and predictable consequence of the illness or trauma, major or metatastic malignancies, organ transplants, multiple trauma, specific burns, and HIV illness are globally excluded.

Global and Clinical Exclusion Exception. There is one PPC that may be assigned regardless of global or clinical/PPC-specific exclusions: PPC 45 – Post-operative Foreign Bodies. Any patient that meets the appropriate diagnosis and DRG criteria will be assigned to PPC 45; PPC 45 will not be excluded for any reason.

Global exclusion criteria are defined by certain admission APR DRGs, age, diagnosis codes, and the present on admission indicator.

Admissions assigned to an admission APR DRG on the list of excluded APR DRGs are not eligible for PPC assignment. This list includes the admission APR DRG for transplants, HIV, neonatal anomalies, major trauma, etc. For example, no admissions in Admission APR DRG 001 Liver Transplant, are assigned PPCs. The list of globally excluded APR DRGs is found in Appendix G.

Specific diagnoses coded as the principal diagnosis are further used to define the criteria for global exclusions. The presence of any of these diagnoses as a principal diagnosis prevents the assignment of a PPC. For example, if the principal diagnosis is “fracture of the sacrum/coccyz, closed” (ICD-9-CM diagnosis code 805.6), a PPC is not assigned. The principal diagnosis global exclusion codes are found in Appendix H.

Other specific diagnosis codes when present on admission are used in the global exclusion criteria whether they are principal or secondary diagnoses. This list consists of diagnoses which, if present on admission either as a primary or secondary diagnosis, would be considered global exclusions and therefore prevent the assignment of any PPC. This list includes diagnoses related to extreme acute events such as ventricular flutter (ICD-9-CM diagnosis code 427.41), birth trauma (ICD-9-CM diagnosis code 767.8), and an extensive list of trauma codes. The exclusions based on a single principal or secondary diagnosis code that is present on admission are found in Appendix I.

Certain other specific principal and secondary diagnosis codes are also used for global exclusions whether or not they were present on admission. The list includes diagnoses such as HIV disease, malignancies, and transplants. The exclusions, based on a principal or secondary diagnosis code, that do not require the diagnosis to be present on admission are found in Appendix J.

Combinations of diagnoses are also used in the global exclusion criteria relating to malignancies, and consist of two sets of diagnoses. One diagnosis represents a malignancy that is often present as a localized finding. The other diagnosis suggests the malignancy is metastatic. The first list of diagnosis codes in Appendix K contains the malignancy codes often presenting as a localized finding that are globally excluded only when accompanied by another diagnosis present on admission found in the second list of diagnosis codes in Appendix K, which indicates an advanced stage of cancer.

The combination of a principal or secondary diagnosis code present on admission from both the “Malignancy codes that require another diagnosis code” list and the “Secondary codes for pairing” list classify the admission as a malignancy exclusion. Diagnoses that indicate that a malignancy is metastatic include those indicating the following:

- Poor nutrition (protein-calorie malnutrition)
- Bone marrow depression (thrombocytopenia, agranulocytosis)
- Metastatic disease (pathologic fractures).

For example a patient with a secondary diagnosis of “chronic lymphoid leukemia without mention of remission” and “thrombocytopenia NOS” would be globally excluded.

There are cases where the malignancy exclusion will not apply due to the nature of the complication. When a patient meeting the malignancy exclusion criteria has undergone major surgery, the following PPCs may be assigned:

38 – Post-operative Wound Infection and Deep Wound Disruption with Procedure

39 – Reopening Surgical Site

41 – Post-operative Hemorrhage and Hematoma with Hemorrhage control Procedure or I&D Procedure

Admissions not globally excluded in phase 1 are eligible for phase 2 candidate complication identification.

Phase 2 – Identify Admissions with Candidate Conditions

Once globally excluded admissions are identified, PPC assignment is applied to the remaining admissions to identify admissions with candidate conditions.

Development of the list of PPCs

The process used in the development of the list of potentially preventable complications involves an iterative process of extensive literature review, formulating clinical hypotheses, and then testing the hypotheses with historical data. The historical data used in the development of the PPCs was the California statewide all payer database of over 2.5 million records per year for 1999, 2000, 2004 and 2005. Since 1996, the California statewide dataset has included the POA indicator data.

The first step in developing the list of potentially preventable complications was a review of the existing literature and incorporating into a preliminary list many of the diagnosis codes used in the Complications Screening Protocol (CSP) developed by Iezzoni and colleagues, and the Patient Safety Indicators (PSI) from the Agency for Healthcare Research and Quality (AHRQ) (Iezzoni 1994a; Iezzoni 1992; Agency for Healthcare Research and Quality 2003).

The second step in the process involved a complete review of all International Classification of Diseases-9th Revision-Clinical Modification (ICD-9-CM) diagnosis and procedure codes to identify additional potentially preventable complications. In-hospital complications are defined as harmful events or negative outcomes that may result from processes of care and treatment rather than from natural progression of the underlying illness. It is important to note that complications do not necessarily represent medical errors, since they are not always preventable even with optimal care.

In considering when a post-admission secondary diagnosis should be considered a potentially preventable complication, the following conceptual guideline was adopted: If a hospital or other health care facility has a statistically significant, higher rate of a complication than comparable hospitals, reasonable clinicians would suggest further investigation for possible problems with quality of care.

The third step in the process was to create specific criteria that a secondary diagnosis must meet to qualify as a PPC. The criteria are as follows. The secondary diagnosis:

- Should not be redundant with the diagnosis that was the reason for hospital admission (e.g., a diagnosis of stroke in a patient admitted with intracranial hemorrhage)
- Should not be redundant with a secondary diagnosis determined by the admission APR DRG logic to be considered present on admission and included in the assignment of the admission APR DRG.
- Should not be an inevitable, natural, or expected consequence or manifestation of the reason for hospital admission (e.g., stroke in a patient admitted with a brain malignancy)

- Should be expected to have a significant impact on short or long-term debility, mortality, patient suffering, or resource use
- Should have a relatively narrow spectrum of manifestations, meaning that the impact of the diagnosis on the clinical course or on resource use must not be significant for some patients but trivial for others (e.g., iron deficiency anemia, atelectasis).

In addition to diagnosis codes, selected procedure codes were used to create some of the complication groups. In some cases, the procedure by itself could assign a patient to a complication group. For example, the procedure codes for endotracheal intubation or mechanical ventilation, if they met the timing criteria of occurring at least three days after admission, generated the complication group Acute pulmonary edema and respiratory failure. In other cases, the procedure code was combined with a diagnosis code to differentiate complication groups with greater clinical impact. For example, a patient with a secondary diagnosis of acute post-hemorrhagic anemia, not present on admission, would be assigned to a complication group named "Hemorrhage or anemia without transfusion." The same diagnosis, accompanied by a code for blood transfusion (at least two days after admission), would assign the patient to a different group, entitled "Hemorrhage or anemia with transfusion." If a procedure affects the assignment of the APR DRG, it is not considered for PPC assignment.

Of the 14,567 ICD-9-CM diagnosis codes, 1,572 diagnosis codes are identified as candidate complication diagnoses. Each candidate complication diagnosis is assigned to one of 65 mutually exclusive complication groups called PPCs based on similarities in clinical presentation and clinical impact. The list of PPCs is found in Appendix F.

Apply PPC assignment criteria

The PPC specific assignment criteria are based on

- Principal or secondary diagnosis
- Principal or secondary diagnosis with additional length of stay criteria
- Procedure performed within a specified time period
- Combination of Principal or secondary diagnosis not present on admission and a procedure

The PPC assignment criterion is described in Appendix L. The PPC assignment criteria references categories of APR DRGs and procedure categories. Appendix M details the admission APR DRG categories. Appendix N details the procedure categories.

PPC assignment criteria based on principal or secondary diagnosis

One type of PPC specific assignment criteria is based on secondary diagnoses not present on admission for any admission APR DRG. These PPCs comprise a set of diagnoses that, if not present on admission, identify candidate complications. For example, PPC 01, Stroke and Intracranial Hemorrhage, a candidate complication is identified when a subarachanoid hemorrhage (ICD-9-CM diagnosis code 430) is a secondary diagnosis which is not present on admission.

In contrast to the PPC criteria above, some of the PPC specific assignment logic is also based on secondary diagnoses not present on admission, but only for specific admission APR DRGs. These PPCs comprise a set of secondary diagnoses that, if not present on admission, identify candidate complications if the admission is assigned to one of a set of admission APR DRGs. For example,

in PPC 12, Cardiac Arrythmias & Conduction Disturbances, a diagnosis of Atrioventricular Block, Complete (ICD-9-CM diagnosis code 426.0) will only result in a candidate complication assignment if present with a Cardiac Surgical admission APR DRG (see Appendix M).

There is a special type of PPC assignment criteria exclusively for obstetrical admissions based on the principal or secondary diagnosis. These PPCs comprise a set of diagnoses which, if they are principal or secondary diagnosis, regardless of whether or not they are present on admission, identify candidate complications for a specific set of admission APR DRGs. For example, PPC 60, Major Puerperal Infection and Other Major Obstetric Complications, assigns a candidate complication if there is a principal or secondary diagnosis of Obstetrical shock, with delivery, with mention of postpartum complication (ICD-9-CM diagnosis code 669.12) and the admission APR DRG is any one of four obstetric DRGs. This type of PPC assignment criteria allows the use of present on admission diagnoses, and is therefore an exception to the approach of assigning PPCs only to the those diagnoses and procedures that are present on admission.

PPC assignment criteria based on principal or secondary diagnosis not present on admission with length of stay criteria

Certain PPC assignment criteria are based on secondary diagnoses not present on admission for admissions with a minimum length of stay. These PPCs comprise a set of diagnoses that, if not present on admission and the length of stay is greater than the length of stay minimum criteria, identify candidate complications. For example, PPC 05, Pneumonia and Other Lung Infections, identifies a candidate complication if Pneumonia streptococcus (ICD-9-CM diagnosis code 48231) is a secondary diagnosis that is not present on admission, but only if the length of stay for the admission is greater than 2 days.

PPC assignment criteria based on procedure or procedures performed within a specified time period

PPC assignment criteria can be based solely on the presence of select procedures performed in specific admission APR DRGs. These PPCs are comprised of a set of procedures which, regardless of when they were done, result in the assignment of a candidate complication if the admission is assigned to one of a set of admission APR DRGs.

PPC assignment criteria can also be based again on procedures, but only when performed within a specified time period for specific admission APR DRGs. These PPCs comprise a set of procedures which, if they are not done within a specified time period relative to the date of admission or operating room procedure, result in the identification of a candidate complication if the admission is assigned to one of a set of admission APR DRGs. For example, PPC 04, Acute Pulmonary Edema and Respiratory Failure with Ventilation complication is identified as a candidate complication when there is an insertion of an endotracheal tube (ICD-9-CM procedure, 960.4) performed more than 3 days after admission for a medical admission or one day after the most recent operating room procedure if the admission APR DRG is one of a designated set of surgical admission APR DRGs.

PPC assignment criteria based on the combination of principal or secondary diagnosis not present on admission and a procedure

Some PPC assignment criteria are based on the combination of secondary diagnosis not present on admission and procedure for a specified set of admission APR DRGs. These PPCs are comprised of one of a set of secondary diagnoses that, when not present on admission and there is a procedure used to treat that diagnosis for a specified set of admission APR DRGs, the admission is identified with a candidate complication. For example, the candidate complication upon which

PPC 56, Obstetrical Hemorrhage with Transfusion, is identified when there is a diagnosis of Hemorrhage NOS (ICD-9-CM diagnosis code 459.0) accompanied by a transfusion (e.g., ICD-9-CM procedure code 990.4, Transfusion of Red Cells).

PPC assignment criteria is also based on the combination of a principal or secondary diagnosis and procedures in specific admission APR DRGs. A candidate complication is identified if one of a set of diagnoses is coded a principal or secondary diagnosis and contains one of a set of procedures coded on the admission. These diagnoses can be present on admission or not present on admission. For example, the criteria for the complication that underlies PPC 56, Obstetrical Hemorrhage with Transfusion, is met with a diagnosis of Other immediate postpartum hemorrhage, with delivery (ICD-9-CM diagnosis code 666.12) and a transfusion (ICD-9-CM procedure code 990.4, Transfusion of Red Cells) if the admission APR DRG is any one of four obstetrical admission APR DRGs. This type of PPC assignment criteria, which is used exclusively for obstetrical admissions, allows the use of present on admission diagnoses and is, therefore, an exception to the approach of assigning PPCs only to the those diagnoses and procedures which are present on admission.

PPC assignment criteria can also be based on the combination of a secondary diagnosis when not present on admission and procedures performed within a specified time period for admissions specified for specific admission APR DRGs. An admission is identified with a candidate complication if one of a set of diagnosis is a secondary diagnosis not present on admission and one of a set of procedures is performed within a predetermined time period. For example, the criteria for the complication that is used in PPC 18, Major Gastrointestinal Complications with Transfusion or Significant Bleeding requires that one of a set of secondary diagnosis that are not present on admission, including Esophageal Hemorrhage (ICD-9-CM diagnosis code 530.82) in combination with one of the listed transfusion procedures (e.g., ICD-9-CM procedure code 99.04, Packed cell transfusion) performed three or more days after the most recent major surgery for any one of a set of admission APR DRGs.

PPC-eligible admissions with candidate complications are evaluated for PPC assignment in Phase 3.

Phase 3 – Assign PPCs

Phase three of the PPC logic consist of the following tasks:

- Assign PPC specific exclusion logic
- Apply PPC hierarchy exclusion logic
- Assign PPCs

Apply PPC specific exclusion criteria

A PPC diagnosis may be preventable for some types of patients but not for others. Some PPCs only apply to certain types of patients. For example, post-operative complications occur only in surgical patients, and obstetric complications occur only in women who deliver after admission. For some PPCs, more specific clinical exclusions were created, most commonly dealing with possible complication diagnoses not present on admission that were redundant codes or a natural consequence of one of the diagnoses present on admission, and therefore not preventable.

Specific clinical exclusion criteria were created for each PPC that prevent the PPC from being assigned. PPC exclusions take precedence over PPC assignment criteria. The application of the PPC exclusions is similar to that used to assign PPCs.

- There can be more than one exclusion criterion for a PPC.
- When the requirements of any single exclusion criterion is met, the specific PPC is not assigned even if the admission meets criteria for the assignment of a PPC.

PPC exclusions can be expressed as admission APR DRGs, MDCs, diagnoses, procedures, and patient age. The PPC specific exclusion criteria for each of the PPCs is described in Appendix L following the PPC assignment section. Diagnoses and procedures are specified in groups of clinically-similar codes called diagnosis or procedure exclusion groups. The contents of the exclusion groups are documented in Appendix O. Some exclusion groups may also have dependencies on other variables including:

Length of stay. For example, diagnoses exclusion group 23 Chronic Obstructive Pulmonary Disease and diagnoses exclusion group 24 Asthma require the admission length of stay LOS to be less than four days for PPC 05 (Pneumonia and other Lung Infections) and PPC 08 (Other Pulmonary Complications).

Number of days since procedure was performed. For example, procedure exclusion group 61 Dialysis Access Procedures require the procedure to be performed at the same day or earlier than the dialysis procedure for PPC 25 (Renal Failure with Dialysis).

Present on Admission indicator status. All diagnosis codes used for PPC exclusion must be present on admission.

Admission APR DRGs or MDCs. Specific APR DRGs or MDCs may be excluded for certain PPCs. For example, a patient belonging to Admission APR DRG 130, Respiratory System Diagnoses with ventilator support 96+ hours would not be eligible for PPC 01, Stroke and Intracranial Hemorrhage even though a post-admission stroke occurred.

Diagnosis Exclusion Groups. For example, for PPC 01 Stroke and Intracranial Hemorrhage, there are additional exclusion criteria based on five diagnosis-based exclusion groups. These include exclusion group 3 (Intracranial Hemorrhage), exclusion group 4 (Cerebrovascular Accident with Infarction), exclusion 5 (Cerebral Artery Dissection), exclusion group 8 (Severe Nontraumatic Brain Injury & coma), and exclusion group 11 (Brain Contusion / Laceration). If any diagnosis associated with one of these groups is present on admission, the PPC is not assigned regardless of whether the complication has occurred.

Procedure Exclusion Groups. For example, PPC 25, Renal Failure with Dialysis, there are two procedure-based exclusion groups specified. These are 60 (Kidney Transplant), and 61 (Dialysis Access Procedures) when the procedure is performed at same day or earlier than the dialysis procedure.

In addition to the DRG-, diagnosis-, and procedure-based exclusion criteria, the patient's age is also used as part of the PPC exclusion criteria. For example, PPC 10, Congestive Heart Failure, is not assigned for patients who's age is less than 18 years old.

Global and Clinical Exclusion Exception. There is one PPC that may be assigned regardless of global or clinical/PPC-specific exclusions: PPC 45 – Post-operative Foreign Bodies. If any patient meets the DRG and diagnosis criteria for PPC 45, it will be assigned.

Apply PPC hierarchy exclusion

Admissions can meet the criteria for more than one PPC based on a combination of diagnoses and procedures. Certain PPCs share diagnosis codes with the difference between them being that one contains an additional code implying a more acute or severe form of the complication. For example, the criteria used to assign PPC 17, Major Gastrointestinal Complications without Significant Bleeding, are a subset of those used to assign PPC 18, Major Gastrointestinal Complications with Significant Bleeding. The difference between them is that the more significant PPC has codes that identify acute bleeding and the less significant one does not. In such cases the PPC logic precludes the assignment of the less significant PPC. Appendix P shows the hierarchical relationship between select PPCs.

An admission may meet the criteria for more than one PPC that represents a single condition due to coding of the general conditions (e.g., post-op infection) and the specific condition (e.g., cellulitis). In such cases, the PPC logic precludes assignment of the general or less significant PPC. Table 2 in appendix P shows the hierarchical relationship between PPCs that likely represent a single condition.

Determine final PPC classification

After the PPC candidate admissions are identified and the exclusion criteria have been applied for each identified candidate complication, the final PPCs are assigned. For each PPC, the admission is classified to one of the following:

Globally Excluded. Those admissions that met any of the global exclusion criteria are classified as globally excluded for all PPCs

Clinically Excluded. Those admissions that where not globally excluded and had candidate complications for the PPC that were clinically excluded.

PPC Assigned. Those admissions that were not globally excluded and had candidate complications for the PPC that were not clinically excluded.

No PPC Assigned. Those admissions that were not globally excluded and did not have any candidate complications for the specific PPC.

Determine Patients at Risk for a PPC

Patients that were not globally excluded and had no specific clinical exclusions for a PPC were considered at risk for the specific complication group. An admission may or may not have a specific PPC assigned, but as long as the admission did not meet the exclusion criteria for the PPC, and was not globally excluded, the admission is considered at risk for the specific PPC. At risk admissions for a specific complication are included in the denominator for the calculation of the PPC specific rate.

Potentially Preventable Complication Rates

The PPC classification system recognizes that the probability that a complication will occur depends not only on the reason for admission, but also on the patient's severity of illness at admission. A hospital's PPC rate therefore depends on the case-mix of its patients and the quality of hospital care.

Differences in case-mix among hospitals are to be expected. To compensate for those differences, i.e., to eliminate the impact of case-mix, data are standardized using the 3M™ All Patient Refined Diagnosis Related Groups (APR DRG) Software, a well-established classification system for hospitalized patients. In the PPC classification system logic, both the reason for admission and the severity of illness level at admission are determined using APR DRGs.

The output from the PPC software can be used to compute PPC rates by computing the ratio of the number of admissions assigned a specific PPC, divided by the sum of admissions "at risk" for that specific PPC.

Once PPCs are identified and standardized using APR DRGs, the information for each hospital is summarized for review and comparison with other hospitals. Higher than expected PPC rates may be an indicator of quality of care problems during hospitalization.

Summary

The inability to distinguish complications from comorbid conditions limits the use of discharge abstracts for the purpose of identifying complications. The POA indicator allows for more accurate identification of hospital-acquired complications, allows screening for complications to be applied to a broader group of patients, and allows for more meaningful risk assessment by restricting the diagnoses used for risk stratification to those that were present on admission.

Given the level of public and governmental scrutiny, and the considerable resources and effort expended to date on these issues, it is likely that public reporting, as well as financial incentives related to patient safety performance measures in general, and hospital complication rates in particular, will only increase. The effectiveness of these efforts depends on the integrity of the data and the validity of the methods used in any public reports and performance-based payment systems. The PPC System, which uses the POA indicator both to identify complications and to improve the accuracy of the APR DRG risk-adjustment process, is an important advance in providing useful and fair assessments of hospital performance based on complication rates.

APPENDIX F

List of Potentially Preventable Complications (PPCs)

This appendix contains a list of Potentially Preventable Complications (PPCs) and their descriptions, as well as the group and level for each PPC.

PPC Group

1 - Extreme Complications

2 - Cardiovascular-Respiratory Complications

3 - Gastrointestinal Complications

4 - Perioperative Complications

5 - Infectious Complications

6 - Malfunctions, Reactions, etc.

7 - Obstetrical Complications

8 - Other Medical and Surgical Complications

PPC Level:

1 - Other

2 - Major

PPC	Description	Group	Level
1	Stroke & Intracranial Hemorrhage	2	2
2	Extreme CNS Complications	1	2
3	Acute Pulmonary Edema and Respiratory Failure without Ventilation	2	1
4	Acute Pulmonary Edema and Respiratory Failure with Ventilation	1	2
5	Pneumonia & Other Lung Infections	2	2
6	Aspiration Pneumonia	2	2
7	Pulmonary Embolism	2	2
8	Other Pulmonary Complications	2	1
9	Shock	1	2
10	Congestive Heart Failure	2	2
11	Acute Myocardial Infarction	2	2
12	Cardiac Arrythmias & Conduction Disturbances	2	1
13	Other Acute Cardiac Complications	2	1
14	Ventricular Fibrillation/Cardiac Arrest	1	2
15	Peripheral Vascular Complications except Venous Thrombosis	2	2
16	Venous Thrombosis	2	2
17	Major Gastrointestinal Complications without Transfusion or Significant Bleeding	3	1
18	Major Gastrointestinal Complications with Transfusion or Significant Bleeding	3	1
19	Major Liver Complications	3	2
20	Other Gastrointestinal Complications without Transfusion or Significant Bleeding	3	1
21	Clostridium Difficile Colitis	5	2
23	GU Complications except UTI	8	1
24	Renal Failure without Dialysis	8	1
25	Renal Failure with Dialysis	1	2
26	Diabetic Ketoacidosis & Coma	8	1
27	Post-Hemorrhagic & Other Acute Anemia with Transfusion	8	1
28	In-Hospital Trauma and Fractures	8	1
29	Poisonings except from Anesthesia	6	1
30	Poisonings due to Anesthesia	6	1
31	Decubitus Ulcer	8	2
32	Transfusion Incompatibility Reaction	6	1
33	Cellulitis	5	1
34	Moderate Infections	5	1
35	Septicemia & Severe Infections	5	2
36	Acute Mental Health Changes	8	1

PPC	Description	Group	Level
37	Post-Operative Infection & Deep Wound Disruption without Procedure	4	1
38	Post-Operative Wound Infection & Deep Wound Disruption with Procedure	4	2
39	Reopening Surgical Site	4	2
40	Post-Operative Hemorrhage & Hematoma without Hemorrhage Control Procedure or I&D Procedure	4	1
41	Post-Operative Hemorrhage & Hematoma with Hemorrhage Control Procedure or I&D Procedure	4	2
42	Accidental Puncture/Laceration during Invasive Procedure	4	2
43	Accidental Cut or Hemorrhage during Other Medical Care	8	1
44	Other Surgical Complication - Moderate	8	1
45	Post-procedure Foreign Bodies	4	2
46	Post-Operative Substance Reaction & Non-O.R. Procedure for Foreign Body	4	1
47	Encephalopathy	8	2
48	Other Complications of Medical Care	8	1
49	Iatrogenic Pneumothorax	6	2
50	Mechanical Complication of Device, Implant & Graft	6	2
51	Gastrointestinal Ostomy Complications	6	1
52	Infection, Inflammation & Other Complications of Devices, Implants or Grafts except Vascular Infection	6	2
53	Infection, Inflammation and Clotting Complications of Peripheral Vascular Catheters and Infusions	6	1
54	Central Venous Catheter-Related Blood Stream Infection	6	2
55	Obstetrical Hemorrhage without Transfusion	7	1
56	Obstetrical Hemorrhage with Transfusion	7	2
57	Obstetric Lacerations & Other Trauma without Instrumentation	7	2
58	Obstetric Lacerations & Other Trauma with Instrumentation	7	2
59	Medical & Anesthesia Obstetric Complications	7	1
60	Major Puerperal Infection and Other Major Obstetric Complications	7	2
61	Other Complications of Obstetrical Surgical & Perineal Wounds	7	1
62	Delivery with Placental Complications	7	1
63	Post-Operative Respiratory Failure with Tracheostomy	1	2
64	Other In-Hospital Adverse Events	8	1
65	Urinary Tract Infection	5	2
66	Catheter-Related Urinary Tract Infection	5	2