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3M™ All Patient Refined Diagnosis Related Groups (APR DRG)

Methodology Overview

Software version 33.0

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Chapter 1: History of the Development of the Diagnosis Related Groups (DRGs)

The Diagnosis Related Groups (DRGs) are a patient classification scheme which provides a means of relating the type of patients a hospital treats (i.e., its case mix) to the costs incurred by the hospital. There are currently four major versions of the DRG in use: classic Centers for Medicare & Medicaid Services (CMS) DRGs, Medicare Severity DRGs (MS-DRGs), All Patient DRGs (AP-DRGs), and APR DRGs. The classic CMS DRGs (prior to FY 2008) and MS-DRGs (beginning in FY 2008) are used by CMS for hospital payment for Medicare beneficiaries. The AP-DRGs are an expansion of the basic DRGs to be more representative of non-Medicare populations such as pediatric patients. The APR DRGs incorporate severity of illness subclasses into the AP-DRGs. Since the APR DRGs include both the CMS DRGs and the AP-DRGs, the development of all three versions of the DRGs will be reviewed.

The design and development of the DRGs began in the late sixties at Yale University. The initial motivation for developing the DRGs was to create an effective framework for monitoring the quality of care and the utilization of services in a hospital setting. The first large-scale application of the DRGs was in the late seventies in the State of New Jersey. The New Jersey State Department of Health used DRGs as the basis of a prospective payment system in which hospitals were reimbursed a fixed DRG specific amount for each patient treated. In 1982, the Tax Equity and Fiscal Responsibility Act modified the Section 223 Medicare hospital reimbursement limits to include a case mix adjustment based on DRGs. In 1983 Congress amended the Social Security Act to include a national DRG-based hospital prospective payment system for all Medicare patients.

The evolution of the DRGs and their use as the basic unit of payment in Medicare's hospital reimbursement system represent a recognition of the fundamental role which a hospital's case mix plays in determining its costs. In the past, hospital characteristics such as teaching status and bed size have been used to attempt to explain the substantial cost differences which exist across hospitals. However, such characteristics failed to account adequately for the cost impact of a hospital's case mix. Individual hospitals have often attempted to justify higher cost by contending that they treated a more complex mix of patients. The usual contention was that the patients treated by the hospital were sicker. Although there was a consensus in the hospital industry that a more complex case mix results in higher costs, the concept of case mix complexity had historically lacked a precise definition. The development of the DRGs provided the first operational means of defining and measuring a hospital's case mix complexity.

The concept of case mix complexity

The concept of case mix complexity initially appears very straightforward. However, clinicians, administrators and regulators have often attached different meanings to the concept of case mix complexity depending on their backgrounds and purposes. The term case mix complexity has been used to refer to an interrelated but distinct set of patient attributes which include severity of illness, risk of dying, prognosis, treatment difficulty, need for intervention, and resource intensity. Each of these attributes has a very precise meaning which describes a particular aspect of a hospital's case mix.

Attribute	Description
Severity of Illness	Refers to the extent of physiologic decompensation or organ system loss of function.
Risk of Mortality	Refers to the likelihood of dying.
Prognosis	Refers to the probable outcome of an illness including the likelihood of improvement or deterioration in the severity of the illness, the likelihood for recurrence, and the probable life span.
Treatment Difficulty	Refers to the patient management problems which a particular illness presents to the health care provider. Such management problems are associated with illnesses without a clear pattern of symptoms, illnesses requiring sophisticated and technically difficult procedures, and illnesses requiring close monitoring and supervision.
Need for Intervention	Relates to the consequences in terms of severity of illness that lack of immediate or continuing care would produce.
Resource Intensity	Refers to the relative volume and types of diagnostic, therapeutic, and bed services used in the management of a particular illness.

When clinicians use the notion of case mix complexity, they typically are referring to one or more aspects of clinical complexity. For clinicians, increased case mix complexity refers to greater severity of illness, greater risk of mortality, greater treatment difficulty, poorer prognoses, and/or a greater need for intervention. Thus, from a clinical perspective, case mix complexity refers to the condition of the patients treated and the treatment difficulty associated with providing care. On the other hand, administrators and regulators usually use the concept of case mix complexity to indicate that the patients treated require more resources which results in a higher cost of providing care. Thus, from an administrative or regulatory perspective, case mix complexity refers to the resource intensity demands that patients place on an institution. While the two interpretations of case mix complexity are often closely related, they can be very different for certain kinds of patients. For example, while terminal cancer patients are very severely ill and have a poor prognosis, they require few hospital resources beyond basic nursing care. No measure of case mix complexity can be equally effective for all the different aspects of case mix complexity.

There has sometimes been confusion regarding the use and interpretation of the Diagnosis Related Groups (DRGs) because the aspect of case mix complexity measured by the DRGs has not been clearly understood. The purpose of the DRGs is to relate a hospital's case mix to the resource demands and associated costs experienced by the hospital. Therefore, a hospital having a more complex case mix from a DRG perspective means that the hospital treats patients who require more hospital resources, but not necessarily that the hospital treats patient having a greater severity of illness, a greater risk of dying, a greater treatment difficulty, a poorer prognosis, or a greater need for intervention.

Patient classification

Given that the purpose of the Diagnosis Related Groups (DRGs) is to relate a hospital's case mix to its resource intensity, it was necessary to develop an operational means of determining the

types of patients treated and relating each patient type to the resources they consumed. While all patients are unique, groups of patients have demographic, diagnostic, and therapeutic attributes in common that determine their level of resource intensity. By developing clinically similar groups of patients with similar resource intensity, patients can be aggregated into meaningful patient groups. Moreover, if these patient groups covered the entire range of patients seen in an inpatient setting, then collectively they would constitute a patient classification scheme that would provide a means of establishing and measuring hospital case mix complexity. The DRGs were therefore developed as a patient classification scheme consisting of groups of patients who were similar, both clinically, and in terms of their consumption of hospital resources.

During the process of developing the DRG patient classification scheme, several alternative approaches to constructing the patient groups were investigated. Initially, a normative approach was used which involved having clinicians define the DRGs using the patient characteristics they felt were important for determining resource intensity. There was a tendency for these definitions to include an extensive set of specifications requiring information which might not always be collected through a hospital's medical information system. If the entire range of patients were classified in this manner, there would ultimately be thousands of DRGs, most of which described patients seen infrequently in a typical hospital. It therefore became evident that the process of DRG definition would be facilitated if data from acute care hospitals could be examined to determine the general characteristics and relative frequency of different patient types. In addition, statistical algorithms applied to this data would be useful to suggest ways of forming DRGs that were similar in terms of resource intensity. However, it was also discovered that statistical algorithms applied to historical data in the absence of clinical input would not yield a satisfactory set of DRGs. The DRGs resulting from such a statistical approach, while similar in terms of resource intensity, would often contain patients with a diverse set of characteristics which could not be interpreted from a clinical perspective. Thus, it became apparent that the development of the DRG patient classification scheme required that physician judgment, statistical analysis and verification with historical data be merged into a single process. It was necessary to be able to examine large amounts of historical data with statistical algorithms available for suggesting alternative ways of forming DRGs but to do so in such a way that physicians could review the results at each step to insure that the DRGs formed were clinically coherent.

Basic characteristics of the DRG patient classification system

Given the limitations of previous patient classification systems and the experience of attempting to develop Diagnosis Related Groups (DRGs) with physician panels and statistical analysis, it was concluded that in order for the DRG patient classification system to be practical and meaningful, it should have the following characteristics:

- The patient characteristics used in the definition of the DRGs should be limited to information routinely collected on hospital abstract systems.
- There should be a manageable number of DRGs which encompass all patients seen on an inpatient basis.
- Each DRG should contain patients with a similar pattern of resource intensity.
- Each DRG should contain patients who are similar from a clinical perspective (i.e., each group should be clinically coherent).

Restricting the patient characteristics used in the definition of the DRGs to those readily available insured that the DRGs could be extensively applied. The patient information routinely collected includes age, principal diagnosis, secondary diagnoses and the surgical procedures performed. Creating DRGs based on information that is collected only in a few settings, or on information that is difficult to collect or measure, would have resulted in a patient classification scheme which could not be applied uniformly across hospitals. This is not to say that information beyond that currently collected might not be useful for defining the DRGs. As additional information becomes routinely available, it must be evaluated to determine if it could result in improvements in the ability to classify patients.

Limiting the number of DRGs to manageable numbers (i.e., hundreds of patient groups, not thousands) insures that for most of the DRGs, a typical hospital will have enough experience to allow meaningful comparative analysis to be performed. If there were only a few patients in each DRG, it would be difficult to detect patterns in case mix complexity and cost performance and to communicate the results to the physician staff.

The resource intensity of the patients in each DRG must be similar in order to establish a relationship between the case mix of a hospital and the resources it consumes. Similar resource intensity means that the resources used are relatively consistent across the patients in each DRG. However, some variation in resource intensity will remain among the patients in each DRG. In other words, the definition of the DRG will not be so specific that every patient is identical, but the level of variation is known and predictable. Thus, while the precise resource intensity of a particular patient cannot be predicted by knowing to which DRG he belongs, the average pattern of resource intensity of a group of patients in a DRG can be accurately predicted.

Since one of the major applications of the DRGs is communicating with the physician community, the patients in each DRG must be similar from a clinical perspective. In other words, the definition of each DRG must be clinically coherent. The concept of clinical coherence requires that the patient characteristics included in the definition of each DRG relate to a common organ system or etiology and that a specific medical specialty should typically provide care to the patients in the DRG. For example, patients who are admitted for a D&C or a Tonsillectomy are similar in terms of most measures of resource intensity, such as length of stay, preoperative stay, operating room time, and use of ancillary services. However, different organ systems and different medical specialties are involved. Thus, the requirement that the DRGs be clinically coherent precludes the possibility of these types of patients being in the same DRG.

A common organ system or etiology and a common clinical specialty are necessary but not sufficient requirements for a DRG to be clinically coherent. In addition, all available patient characteristics, which medically would be expected to consistently affect resource intensity, should be included in the definition of the DRG. Furthermore, the definition of a DRG should not be based on patient characteristics that medically would not be expected to consistently affect resource intensity. For example, patients with appendicitis may or may not have peritonitis. Although these patients are the same from an organ system, etiology, and medical specialist perspective, the DRG definitions must form separate patient groups since the presence of peritonitis would be expected to consistently increase the resource intensity of appendicitis patients. On the other hand, sets of unrelated surgical procedures cannot be used to define a DRG since there would not be a medical rationale to substantiate that the resource intensity would be expected to be similar.

The definition of clinical coherence is, of course, dependent on the purpose for the formation of the DRG classification. For the DRGs, the definition of clinical coherence relates to the medical rationale for differences in resource intensity. On the other hand, if the purpose of the DRGs related to mortality, the patient characteristics which were clinically coherent and therefore

included in the DRG definitions might be different. Finally, it should be noted that the requirement that the DRGs be clinically coherent caused more patient groups to be formed than would be necessary for explaining resource intensity alone.

Chapter 2: 3M™ All Patient Refined Diagnosis Related Groups (APR DRGs)

Expanding the scope of the DRG system

The original objective of the Diagnosis Related Groups (DRGs) was to develop a patient classification system that related the types of patients treated to the resources they consumed. Thus, the DRGs focused exclusively on resource intensity. As the health care industry has evolved there has been increased demand for a patient classification system that can be used for applications beyond resource use, cost, and payment. In particular, a patient classification system is needed for:

- The comparison of hospitals across a wide range of resource and outcome measures. Such comparisons are typically disseminated to the public by state data commissions
- The evaluation of differences in inpatient mortality rates
- The implementation and support of critical pathways
- The identification of continuous quality improvement projects
- The basis of internal management and planning systems
- The management of capitated payment arrangements

In order to meet these needs, the objective of the DRG system needed to be expanded in scope to address patient severity of illness and risk of mortality as well as resource intensity. These patient attributes have the following meaning:

Attribute	Description
Severity of illness	The extent of physiologic decompensation or organ system loss of function.
Risk of mortality	The likelihood of dying.
Resource intensity	The relative volume and types of diagnostic, therapeutic, and bed services used in the management of a particular disease.

The APR DRG Classification System expands the basic DRG structure by adding four subclasses to each DRG. The addition of the four subclasses addresses patient differences relating to severity of illness and risk of mortality. Severity of illness and risk of mortality relate to distinct patient attributes. For example, a patient with acute choledocholithiasis (acute gallstone attack) as the highest secondary diagnosis may be considered a major severity of illness but only a minor risk of mortality. The severity of illness is major since there is significant organ system dysfunction associated with acute choledocholithiasis. However, it is unlikely that the acute episode alone will result in patient mortality and thus, the risk of mortality for this patient is minor. If additional, more serious diagnoses are also present, patient severity of illness and risk of mortality may increase. For example, if peritonitis is present along with the acute choledocholithiasis, the patient may be

considered an extreme severity of illness and a major risk of mortality. Since severity of illness and risk of mortality are distinct patient attributes, separate subclasses are assigned to a patient for severity of illness and risk of mortality. Thus, in the APR DRG system a patient is assigned three distinct descriptors:

- The base APR DRG (e.g., APR DRG 194 Heart Failure or APR DRG 440 Kidney Transplant)
- The severity of illness subclass
- The risk of mortality subclass

The four severity of illness subclasses and the four risk of mortality subclasses are numbered sequentially from 1 to 4 indicating respectively, minor, moderate, major, or extreme severity of illness or risk of mortality. For applications such as evaluating resource use or establishing patient care guidelines, the APR DRG in conjunction with severity of illness subclass is used. For evaluating patient mortality the APR DRG in conjunction with the risk of mortality subclass is used.

Although the subclasses are numbered 1–4, the numeric values represent categories and not scores. For example, severity subclass 4 congestive heart failure patients are not comparable to severity subclass 4 patients with a fractured leg. Thus, it is not meaningful to average the numeric values (i.e., 1–4) of the severity of illness or risk of mortality subclasses across a group of patients to compute an average severity score. However, the APR DRG severity and risk of mortality subclasses can be used to compute an expected value for a measure of interest (e.g., length of stay, cost, mortality), using statistical techniques such as indirect rate standardization.

The underlying clinical principle of APR DRGs is that the severity of illness or risk of mortality subclass of a patient is highly dependent on the patient's underlying problem and that patients with high severity of illness or risk of mortality are usually characterized by multiple serious diseases or illnesses. In the APR DRGs, the assessment of the severity of illness or risk of mortality of a patient is specific to the base APR DRG to which a patient is assigned. In other words, the determination of the severity of illness and risk of mortality is disease-specific. Thus, the significance attributed to complicating or comorbid conditions is dependent on the underlying problem. For example, certain types of infections are considered a more significant problem in a patient who is immunosuppressed than in a patient with a fractured arm. In APR DRGs, high severity of illness or risk of mortality are primarily determined by the interaction of multiple diseases. Patients with multiple comorbid conditions involving multiple organ systems represent difficult-to-treat patients who tend to have poor outcomes.

The development process

The process used in the development of the APR DRG Classification System involved an iterative process of formulating clinical hypotheses and then testing the hypotheses with historical data. Separate clinical models were developed for each of the base APR DRGs. Once the clinical model for severity of illness and risk of mortality was developed for each base APR DRG, it was evaluated with historical data in order to review the clinical hypotheses. If there was a discrepancy between clinical expectations and the data results, the clinical content of the diagnosis and procedure codes was closely examined to determine if ambiguities in the definition or content of the codes could explain the discrepancy. Any discrepancies between clinical expectations and data results were always resolved by using clinical expectations as the basis for the APR DRGs. Thus, the APR DRGs are a clinical model that has been extensively tested with historical data.

Development of the base APR DRGs

The process of forming the base APR DRGs begins by dividing all possible principal diagnoses into 23 mutually exclusive principal diagnosis categories referred to as Major Diagnostic Categories (MDCs).

The MDCs were formed by physician panels as the first step toward ensuring that the DRGs would be clinically coherent. The diagnoses in each MDC correspond to a single organ system or etiology and in general, are associated with a particular medical specialty. Thus, in order to maintain the requirement of clinical coherence, no final DRG could contain patients in different MDCs. In general, each MDC was constructed to correspond to a major organ system (e.g., Respiratory System, Circulatory System, Digestive System) rather than etiology (e.g., malignancies, infectious diseases). This approach was used since clinical care is generally organized in accordance with the organ system affected, rather than the etiology. Diseases involving both a particular organ system and a particular etiology (e.g., malignant neoplasm of the kidney) were assigned to the MDC corresponding to the organ system involved. However, not all diseases or disorders could be assigned to an organ system-based MDC and a number of residual MDCs were created (e.g., Systemic Infectious Diseases, Myeloproliferative Diseases, and Poorly Differentiated Neoplasms). For example, the infectious diseases such as food poisoning and Shigella dysentery are assigned to the Digestive System MDC, while pulmonary tuberculosis is assigned to the Respiratory System MDC. On the other hand, infectious diseases such as miliary tuberculosis and septicemia, which usually involve the entire body, are assigned to the Systemic Infectious Disease MDC.

Once the MDCs were defined, each MDC was evaluated to identify those additional patient characteristics which would have a consistent effect on the consumption of hospital resources. Since the presence of a surgical procedure which required the use of the operating room would have a significant effect on the type of hospital resources (e.g., operating room, recovery room, anesthesia) used by a patient, most MDCs were initially divided into medical and surgical groups. The medical-surgical distinction is also useful in further defining the clinical specialty involved.

Patients were considered surgical if they had a procedure performed which would require the use of the operating room. Since the patient data generally available does not precisely indicate whether a patient was taken to the operating room, surgical patients were identified based on the procedures which were performed. Physician panels classified every possible procedure code based on whether the procedure would normally be performed in the operating room. Thus, closed heart valvotomies, cerebral meninges biopsies and total cholecystectomies would be expected to require the operating room, while thoracentesis, bronchoscopy and skin sutures would not. If a patient had any procedure performed which was expected to require the operating room, that patient would be classified as a surgical patient.

Once each MDC was divided into medical and surgical groups, the surgical patients were usually further defined based on the precise surgical procedure performed, while the medical patients were further defined based on the precise principal diagnosis for which they were admitted to the hospital. The general structure of a typical MDC is shown in the following diagram. In general, specific groups of surgical procedures were defined to distinguish surgical patients according to the extent of the surgical procedure performed. For example, the procedure groups defined for the Endocrine, Nutritional and Metabolic MDC are amputations, adrenal and pituitary procedures, procedures for obesity, parathyroid procedures, thyroid procedures, thyroglossal procedures, and other procedures relating to Endocrine, Nutritional, or Metabolic diseases.

Since a patient can have multiple procedures related to their principal diagnosis during a particular hospital stay, and a patient can be assigned to only one surgical group, the surgical groups in each MDC were defined in a hierarchical order. Patients with multiple procedures would be assigned to the surgical group highest in the hierarchy.

Thus, if a patient received both a D&C and a hysterectomy, the patient would be assigned to the hysterectomy surgical group. It should be noted that as a result of the surgical hierarchy, the ordering of the surgical procedures on the patient abstract has no influence on the assignment of the surgical group and DRG.

In general, specific groups of principal diagnoses were defined for medical patients. Usually the medical groups in each MDC would include a group for neoplasms, symptoms and specific conditions relating to the organ system involved. For example, the medical groups for the Respiratory System MDC are pulmonary embolism, infections, neoplasms, chest trauma, pleural effusion, pulmonary edema and respiratory failure, chronic obstructive pulmonary disease, simple pneumonia, RSV pneumonia and whooping cough, interstitial lung disease, pneumothorax, asthma, respiratory symptoms and other respiratory diagnoses.

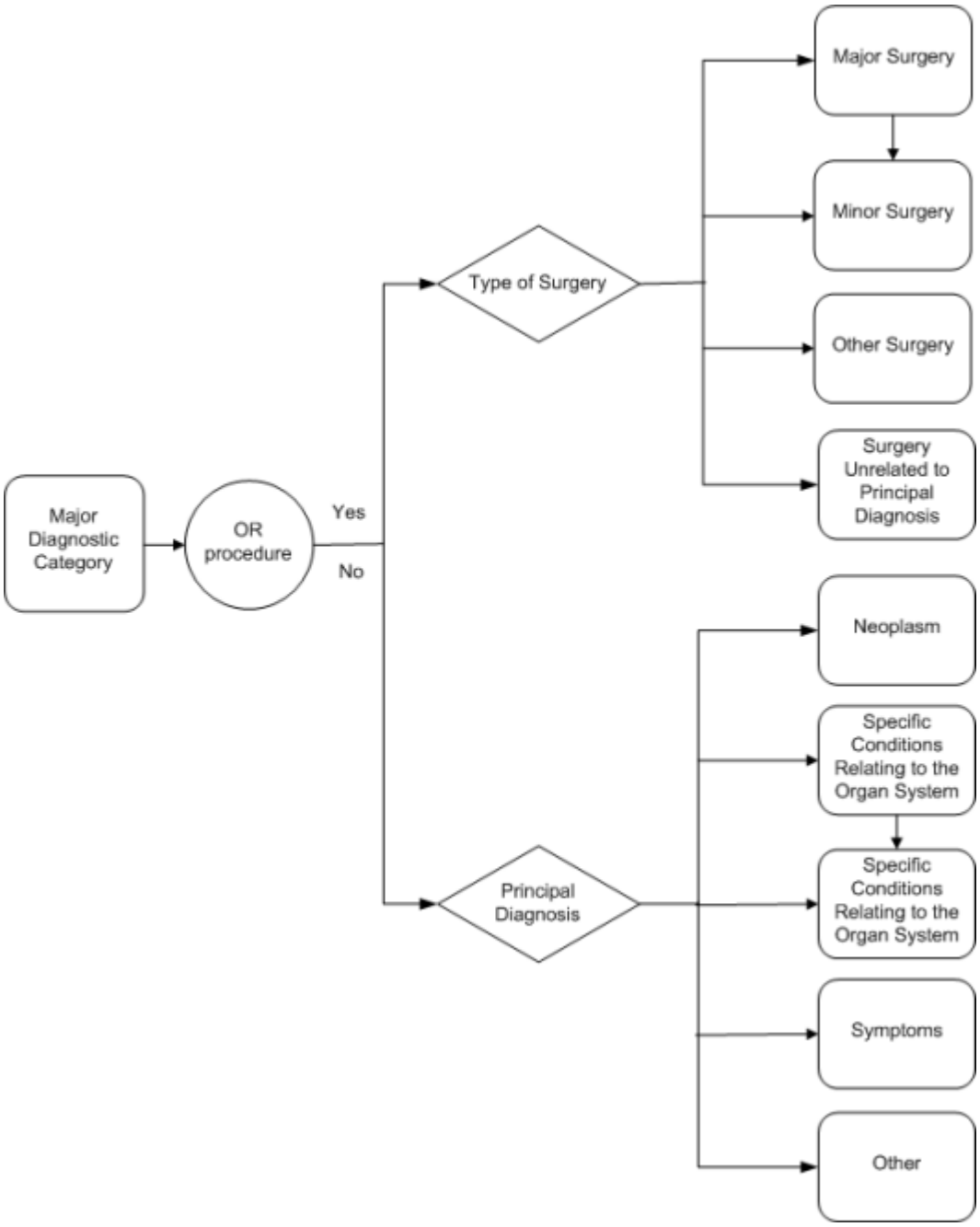


Figure 1: Typical DRG structure for a Major Diagnostic Category

In each MDC there is usually a medical and a surgical group referred to as "other medical diseases" and "other surgical procedures," respectively. The "other" medical and surgical groups are not as precisely defined from a clinical perspective. The other groups would include diagnoses or procedures which were infrequently encountered or not well-defined clinically. For example, the "other" medical group for the Respiratory System MDC would contain the diagnoses psychogenic respiratory disease and respiratory anomalies not otherwise specified, while the

"other" surgical group for the female reproductive MDC would contain surgical procedures such as liver biopsy and exploratory laparotomy.

The "other" surgical group contains surgical procedures which, while infrequent, could still reasonably be expected to be performed for a patient in the particular MDC. However, there are also patients who receive surgical procedures which are completely unrelated to the MDC to which the patient was assigned. An example would be a patient with a principal diagnosis of pneumonia whose only surgical procedure is a transurethral prostatectomy. Such patients are assigned to surgical groups referred to as "unrelated operating room procedures."

The process of defining the surgical and medical groups in an MDC required that each surgical or medical group be based on some organizing principle. Examples of organizing principles would be anatomy, surgical approach, diagnostic approach, pathology, etiology or treatment process. In order for a diagnosis or surgical procedure to be assigned to a particular group, it would be required to correspond to the particular organizing principle for that group. For example, in MDC 11 (Diseases & Disorders of the Kidney & Urinary Tract), a surgical group was formed for all patients with a procedure on the urethra (i.e., organizing principle based on anatomy).

The actual process of forming the base APR DRGs was highly iterative, involving a combination of statistical results from test data with clinical judgment. At any point during the definition of the DRGs there would often be several patient characteristics which appeared important for understanding the impact on hospital resources. The selection of the patient characteristics to be used and the order in which they would be used was a complex task with many factors examined and weighed simultaneously.

There are several base APR DRGs which contain patients whose medical record abstracts contain clinically inconsistent or invalid information. For example, there are DRGs for patients for whom all their operating room procedures performed are unrelated to the major diagnostic category of the patient's principal diagnosis. Typically, these are patients admitted for a particular diagnosis requiring no surgery, who develop a complication unrelated to the principal diagnosis and have an operating room procedure performed for the complication or have a diagnostic procedure performed for another concurrent diagnosis. The unrelated operating room procedures have been divided into three groups based on hospital resource use: extensive, prostatic and non-extensive. For example, a patient with a principal diagnosis of congestive heart failure who develops acute cholecystitis and whose only procedure is a cholecystectomy will be assigned to the extensive unrelated procedure DRG since a cholecystectomy is considered an extensive procedure. However, if a patient has a principal diagnosis of arrhythmia and has a biopsy performed for a breast mass discovered while in the hospital, the patient will be assigned to the non- extensive unrelated DRG since the biopsy is considered a non-extensive procedure. Finally, a patient with benign prostatic hypertrophy who develops prostatic obstruction while hospitalized for a medical problem such as pneumonia, will be assigned to the prostatic unrelated procedure DRG if a transurethral prostatectomy is performed.

When a principal diagnosis is coded which, although it is a valid ICD-10-CM code, is not precise enough to allow the patient to be assigned to a clinically coherent DRG the patient is assigned to a diagnosis invalid as principal diagnosis DRG. For example, ICD-10-CM code O2690 is an unspecified complication of pregnancy with the episode of care unspecified. Thus, this diagnosis code does not indicate the type of complication nor whether the episode of care was antepartum, postpartum or for delivery. Since the DRG definitions assign patients to different sets of DRGs depending on whether the episode of care was antepartum, postpartum or for delivery, a patient with a principal diagnosis of 64690 must be assigned to the diagnosis invalid as principal diagnosis DRG.

It should be noted that patients with a principal diagnosis not typically considered a reason for hospitalization such as V503 (ear piercing) are not assigned to the diagnosis invalid as principal diagnosis DRG but are assigned a DRG in the MDC most related to the diagnosis.

Patients are assigned to an ungroupable DRG if certain types of medical records errors which may affect DRG assignment are present. Patients with an invalid or non-existent ICD-10-CM code as principal diagnosis will be assigned to the ungroupable DRG. Patients will also be assigned to the ungroupable DRG if their sex, or discharge status is both invalid and necessary for DRG assignment. For example, if a patient has a non-numeric discharge status and has a principal diagnosis of an acute myocardial infarction, the patient will be assigned to the ungroupable DRG since patients with acute myocardial infarction will be assigned to different DRGs depending on whether their discharge status is alive or died. On the other hand, if the same patient had a principal diagnosis of hypertension, the assignment would not be to the ungroupable DRG since discharge status is not used in the determination of the DRG for hypertensive patients.

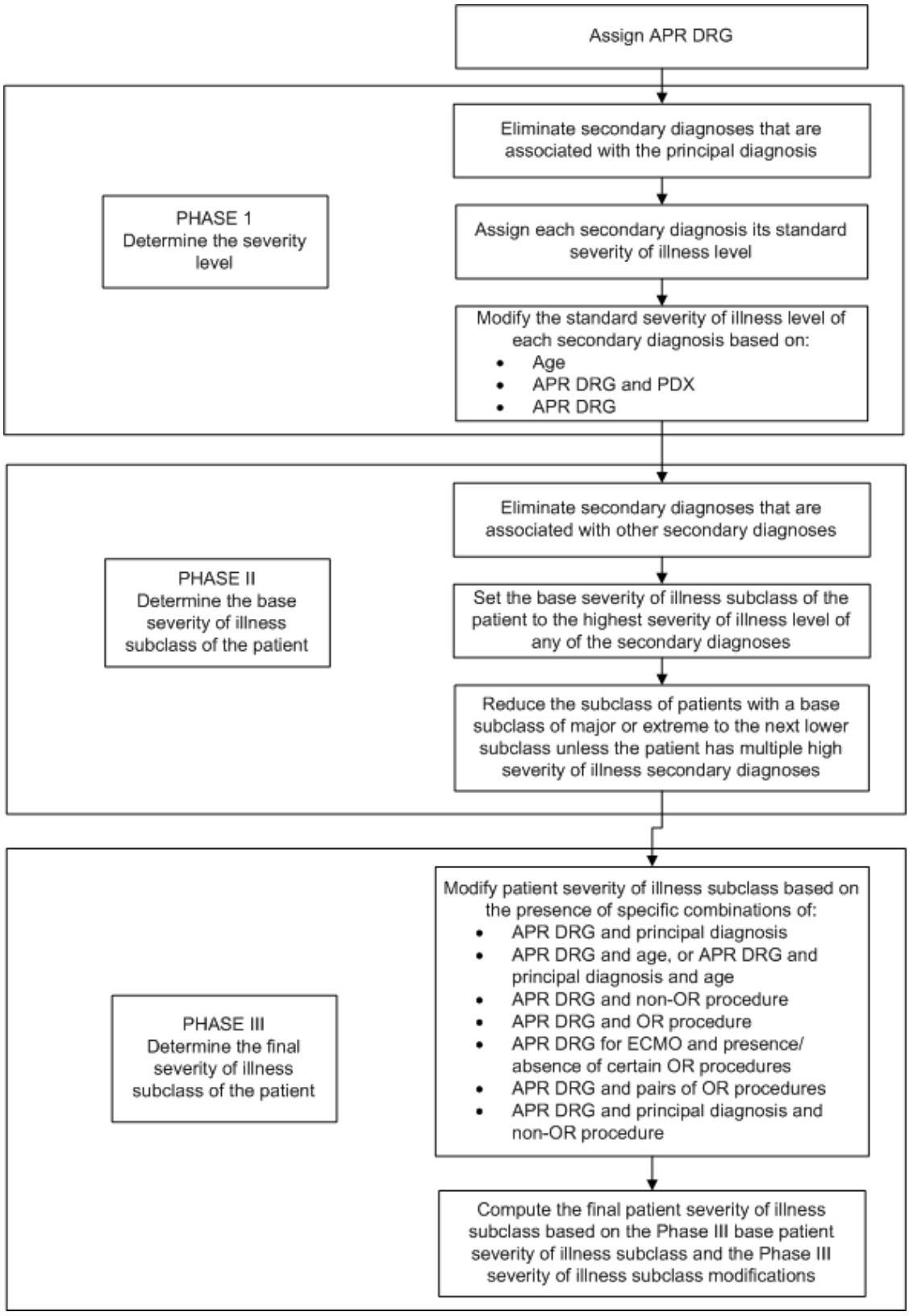
Overview of APR DRG subclass assignment

Once the base APR DRGs are formed, the process of determining the subclasses for an APR DRG begins by first assigning a severity of illness level and a risk of mortality level to each secondary diagnosis. The term "level" is used when referring to the categorization of a secondary diagnosis. The term "subclass" is used when referring to one of the subdivisions of an APR DRG. For secondary diagnoses, there are four distinct severity of illness levels and four distinct risk of mortality levels. The four levels are numbered sequentially from 1 to 4 indicating, respectively, minor, moderate, major or extreme severity of illness or risk of mortality. Each secondary diagnosis is assigned to one of the four severity of illness levels and one of the four risk of mortality levels. The severity of illness level and risk of mortality level associated with a patient's secondary diagnoses is just one factor in the determination of a patient's overall severity of illness subclass and risk of mortality subclass.

The assignment of a patient to a severity of illness or risk of mortality subclass takes into consideration not only the level of the secondary diagnoses but also the interaction among secondary diagnoses, age, principal diagnosis, and the presence of certain OR (operating room) procedures and non-OR procedures.

The process of determining the severity of illness or risk of mortality subclass of a patient consists of three phases. In Phase I, the level of each secondary diagnosis is determined. Once the level of each individual secondary diagnosis is established, then Phase II determines a base subclass for the patient based on all of the patient's secondary diagnoses. In Phase III, the final subclass for the patient is determined by incorporating the impact of principal diagnosis, age, OR procedure, non-OR procedures, multiple OR procedures, and combinations of categories of secondary diagnoses. A detailed description of the determination of the severity of illness subclass and the risk of mortality subclass will be presented separately.

The following flowchart summarizes the three-phase process of determining the severity of illness subclass. There are six steps to Phase I, three steps to Phase II, and nine steps to Phase III for a total of 18 steps.


Assign APR DRG
PHASE 1
Determine the severity level
Eliminate secondary diagnoses that are associated with the principal diagnosis
Assign each secondary diagnosis its standard severity of illness level
Modify the standard severity of illness level of each secondary diagnosis based on:
Age
APR DRG and PDX
APR DRG
PHASE II
Determine the base severity of illness subclass of the patient
Eliminate secondary diagnoses that are associated with other secondary diagnoses
Set the base severity of illness subclass of the patient to the highest severity of illness level of any of the secondary diagnoses
Reduce the subclass of patients with a base subclass of major or extreme to the next lower subclass unless the patient has multiple high severity of illness secondary diagnoses
PHASE III
Determine the final severity of illness subclass of the patient
Modify patient severity of illness subclass based on the presence of specific combinations of:
APR DRG and principal diagnosis
APR DRG and age, or APR DRG and principal diagnosis and age
APR DRG and non-OR procedure
APR DRG and OR procedure
APR DRG for ECMO and presence/ absence of certain OR procedures
APR DRG and pairs of OR procedures
APR DRG and principal diagnosis and non-OR procedure
Compute the final patient severity of illness subclass based on the Phase III base patient severity of illness subclass and the Phase III severity of illness subclass modifications

Phase I - Determining the severity of illness level of each secondary diagnosis

Step 1: Eliminate secondary diagnoses associated with the principal diagnosis

If a secondary diagnosis is closely related to the principal diagnosis and does not add any distinguishing information, the secondary diagnosis is excluded from the determination of the severity of illness subclass. For example, a secondary diagnosis of urinary retention is excluded from the determination of the severity of illness subclass if the principal diagnosis is benign prostate hypertrophy because the urinary retention is caused by the benign prostate hypertrophy and will usually be present for patients hospitalized for benign prostate hypertrophy. For version 20.0 APR DRGs, the secondary diagnosis and principal diagnosis exclusion list was comprehensively reviewed and extensively modified. Since that time, the list has only updated.

Step 2: Assign each secondary diagnosis to its standard severity of illness level

Each secondary diagnosis is assigned to one of the four distinct severity of illness levels. The severity of illness level for diabetes progresses from minor for uncomplicated diabetes to extreme for diabetes with hyperosmolar coma. Similarly, the severity of illness level for respiratory diagnoses progresses from minor for bronchitis to extreme for respiratory failure.

The process of determining the severity of illness subclass for a patient begins by assigning each secondary diagnosis its standard severity of illness level. The next step is to modify the standard severity of illness level based on other patient attributes. The patient attributes which can modify the standard severity of illness level of a secondary diagnosis are the age of the patient, the APR DRG and principal diagnosis, the APR DRG, and the presence of certain non-operating room procedures. These potential modifiers are evaluated and applied sequentially through Phase I.

Step 3: Modify the standard severity of illness level of a secondary diagnosis based on age

The age of the patient will modify the standard severity of illness level assignment for some secondary diagnoses. For pediatric patients there are some secondary diagnoses that are modified to a higher level throughout all childhood years. For example, hypertension is modified from minor to major and really represents a different disease in children than adults. There are other secondary diagnoses that are modified only for certain childhood ages, most often early childhood. For example, many congenital anomalies and syndromes have their most difficult presentation in the neonatal time period and the first year of life, and are modified to a higher level for these ages. For example, hypoplastic left heart syndrome and combined immune deficiency are both modified from major to extreme for children less than one year of age. There are also some secondary diagnoses that are modified to a lower level for pediatric patients. For example, thrush is modified from moderate to minor for children less than one year of age.

In general, for elderly patients, for select secondary diagnoses, the severity of illness level is increased. For example, the secondary diagnoses of hypovolemia (dehydration) and chronic bronchitis are modified from minor to moderate and asthma with status asthmaticus is modified from moderate to major for patients age >69 years.

Step 4: Modify the standard severity of illness level of a secondary diagnosis for APR DRG 190 and principal diagnosis

The standard severity of illness level for some secondary diagnoses may be modified depending on the APR DRG and principal diagnosis of the patient. This logic is applied only to APR DRG 190 Acute Myocardial Infarct. In general, secondary diagnoses that are closely related to the principal diagnosis are excluded from the determination of the severity of illness subclass. However, for a patient admitted for an acute anterior wall myocardial infarction, an acute anterolateral myocardial infarction represents an extension of the acute anterior wall myocardial infarction. Therefore, the acute anterolateral myocardial infarction is not excluded and is assigned a severity of illness level of moderate.

Step 5: Modify the standard severity of illness level of a secondary diagnosis based on the APR DRG

The standard severity of illness level for many secondary diagnoses may be modified depending on the APR DRG to which the patient is assigned. The APR DRG specific modifications to the severity of illness level of individual secondary diagnoses reflects the disease-specific nature of the determination of severity of illness.

The following table shows some examples of APR DRG modifications. Chronic renal failure significantly increases the severity of illness level for patients with diabetes and, thus, is increased to a major severity of illness for the APR DRG for diabetes. Cardiomegaly is not only common for congestive heart failure patients, but it is also an integral part of the disease and is reduced to a minor severity of illness level for the APR DRG for congestive heart failure. Uncomplicated diabetes is a minor secondary diagnosis, but for a vaginal delivery, represents a more difficult delivery and is therefore increased to a moderate severity of illness level.

Secondary Diagnosis	Standard Severity of Illness Level	APR DRG	Modified Severity of Illness Level
Chronic Renal Failure	Moderate	Diabetes	Major
Cardiomegaly	Moderate	Congestive Heart Failure	Minor
Uncomplicated Diabetes	Minor	Vaginal Delivery	Moderate

In general, for surgical APR DRGs, secondary diagnoses that constituted or were associated with the reason for performing the procedure had their standard severity of illness level decreased. In general, for medical APR DRGs, secondary diagnoses that were closely related to the reason for the admission had their standard severity of illness level decreased. In essence, the standard

severity of illness level of every secondary diagnosis was reviewed with every APR DRG and modified when appropriate.

Step 6: Modify the standard severity of illness level of a secondary diagnosis based on non-OR procedures

Some secondary diagnoses can vary significantly in terms of their severity and clinical impact on patients. The presence of certain non-OR (operating room) procedures can indicate a more extensive disease process. This type of modification is applied to only nine sets of non-OR procedure codes and to only a limited number of secondary diagnoses. The most important of these are the procedure codes for mechanical ventilation. Mechanical ventilation <96 hours is used to increase the standard severity level of a secondary diagnosis by an increment of one up to major; e.g., asthma with status asthmaticus would increase from level moderate to major if the patient had mechanical ventilation <96 hours. Mechanical ventilation 96+ hours is used to increase the standard severity level of illness of a secondary diagnosis by an increment of two up to extreme; e.g., other pulmonary insufficiency not elsewhere classified (which includes adult respiratory distress syndrome) increases the standard severity of illness level from moderate to extreme and a diagnosis such as pneumonia NOS which is already a level of major increases to extreme if the patient had mechanical ventilation 96+ hours. In each of these instances, the need for mechanical ventilation is indicative of a patient with more severe pulmonary illness, especially those who require ventilation for 96+ hours.

Among the other non-OR procedures that are used as part of this step, renal dialysis is used to increase the severity level of nephritis by an increment of one up to a maximum of major; total parenteral nutrition (TPN) is used to increase regional enteritis and ulcerative colitis by an increment of one up to major; and temporary pacemaker is used to increase heart block diagnoses such as trifascicular block by an increment of one up to major. Overall, non-OR procedures as part of this step in the APR DRG severity of illness logic are used more sparingly starting with version 20.0.

Phase II - Determine the base severity of illness subclass for the patient

Once each secondary diagnosis has been assigned its standard severity of illness level and the standard severity of illness level of each secondary diagnosis has been modified based on age, APR DRG and principal diagnosis, APR DRG, and presence of certain non-OR procedures, the Phase II base severity of illness subclass for the patient can be determined. The process of determining the base patient severity of illness subclass of the patient begins with the elimination of certain secondary diagnoses that are closely related to other secondary diagnoses. The elimination of these diagnoses prevents the double counting of clinically similar diagnoses in the determination of the severity of illness subclass of the patient. Once redundant diagnoses have been eliminated, the base severity of illness subclass is determined based on all of the remaining secondary diagnoses. There are three steps to Phase II.

Step 7: Eliminate certain secondary diagnoses from the determination of the severity of illness subclass of the patient

Certain secondary diagnoses are eliminated from the determination of the severity subclass. Closely related secondary diagnoses are grouped together with clinically similar diagnoses. If more than one secondary diagnosis from the same secondary diagnosis group is present, then only the secondary diagnosis with the highest severity of illness level is preserved. All other secondary diagnoses in the group are eliminated from contributing to the patient's base subclass determination. There are 289 secondary diagnosis groups defined for this step. For example, the secondary diagnoses of cerebral embolism with infarct and precerebral occlusion are in the same secondary diagnosis group, Cerebrovascular Diagnoses. Since the cerebral embolism with infarct is an extreme severity of illness level, and the precerebral occlusion is a moderate severity of illness level, the cerebral embolism with infarct will be preserved and the severity of illness level of the precerebral occlusion will be eliminated.

A subset of the 289 secondary diagnosis groups are designated as either a specific group or a general group. In step 7a all but one of the secondary diagnoses in each group are eliminated and there will be only a single secondary diagnosis code assign to a group. Each specific group has one or more general groups associated with it. The specific group represents a more specific description of the diagnoses in an associated general group. For example, the specific group for pneumonia has general groups associated with it that specify the infectious organism (e.g., pseudomonas, gram negative, etc). All diagnoses in the general group for the related organisms are eliminated by the specific pneumonia group. The one exception is if the general group creates an explicit secondary diagnosis combination in step 17, both the specific and general group are maintained. If the severity level of the diagnosis in the general group is higher than the severity level of the diagnosis in the specific group, the diagnosis in the general group is eliminated, but the severity level of the diagnosis in the specific group is increase to be equal to the severity level of the diagnosis in the general group.

It is anticipated that whenever a diagnosis in a general group is present, there will also be a diagnosis in an associated specific group present. However, in the circumstance in which there is no corresponding specific group diagnosis and there are diagnosis in multiple general groups present that would have been eliminated had the specific group been present, a hierarchy of general groups is used to eliminate all but one of the general groups. For example, if the general groups for pseudomonas, gram negative and E. Coli infections were present, the general group hierarchy would retain only the diagnosis in the general group for pseudomonas and eliminate the diagnosis in the general groups for gram negative and E. Coli infections. If any of the severity levels of the diagnoses being eliminated is higher than the severity level of the general group that is highest in the general group hierarchy, the severity level of the diagnosis that is in the general group that is highest in the hierarchy is increased to the severity level of the eliminated diagnosis with the higher severity level.

Step 8: Combine all secondary diagnoses to determine the base severity of illness subclass of the patient

Once secondary diagnoses that are related to other secondary diagnoses have had their severity levels reduced to minor, the base patient severity of illness subclass is set equal to the maximum severity of illness level across all of the remaining secondary diagnoses. For example, if there are five remaining secondary diagnoses and one is a major severity of illness level and four are a moderate severity of illness level then the base patient subclass is major.

Step 9: Reduce the base severity of illness subclass of patients with a major or extreme subclass unless the patient has multiple secondary diagnoses at a high severity level

In order to be assigned to the major or extreme severity of illness subclass, a patient must have multiple secondary diagnoses at a high severity of illness level. High severity of illness patients are usually characterized by the presence of multiple high severity of illness secondary diagnoses. Patients with a base severity of illness subclass of extreme must have two or more secondary diagnoses that are an extreme severity of illness level, or one secondary diagnoses at an extreme severity of illness level plus at least two other secondary diagnoses at a major severity of illness level—otherwise the base severity of illness subclass is reduced to major. Patients with a base severity of illness subclass of major must have two or more secondary diagnoses that are a major severity of illness level, or one secondary diagnosis at a major severity of illness level plus at least two other secondary diagnoses at a moderate severity of illness level—otherwise the base severity of illness subclass is reduced to moderate. Thus, a secondary diagnosis of AMI is not sufficient to assign a patient to an extreme severity of illness subclass. In addition to the AMI, there must be at least one additional extreme severity of illness secondary diagnosis (e.g., acute renal failure) or two or more additional major severity of illness secondary diagnoses (e.g., congestive heart failure and diabetic ketoacidosis).

Phase III - Determine the final severity of illness subclass of the patient

Once the base patient severity of illness subclass is computed, the patient severity of illness subclass may be increased or decreased based on specific values of the following patient attributes:

- Combinations of APR DRG and principal diagnosis
- Combinations of APR DRG and age, or APR DRG and principal diagnosis and age
- Combinations of APR DRG and non-OR (operating room) procedures
- Combinations of APR DRG and OR procedures
- Combinations of APR DRG and pairs of OR procedures
- Combination of APR DRG for ECMO and presence/absence of certain OR procedures
- Combinations of APR DRG and principal diagnoses and non-OR procedures
- Combinations of categories of secondary diagnoses

Phase III examines these eight patient attributes, seven of which are APR DRG specific, and then as its ninth step, computes the patient's final severity of illness subclass assignment.

In Phase I, age and non-OR procedures were used to modify the standard severity of illness level of a secondary diagnosis. However, age and non-OR procedures can also have an impact that is

specific to the patient's APR DRG or to a specific principal diagnosis within the APR DRG. Thus, the impact of age and non-OR procedures is reassessed in Phase III as part of the determination of the severity of illness subclass of the patient. Based on the patient attributes listed above, a series of modifications to the base patient severity of illness subclass are made during Phase III. The final patient severity of illness subclass is computed based on the Phase II base patient severity of illness subclass and the modifications to the base severity of illness subclass made in Phase III.

Step 10: Modify severity of illness subclass for the patient based on combinations of APR DRG and principal diagnosis

This step is used extensively in Phase III to modify a patient's severity of illness subclass.

Within specific All Patient Refined Diagnosis Related Groups (APR DRGs) there are also some principal diagnoses that are indicative of higher severity of illness relative to the other principal diagnoses in the APR DRG. For example, the severity of illness subclass of patients in APR DRG 221 Major Small & Large Bowel Procedures with a principal diagnosis of acute vascular insufficiency of the intestine is increased by one up to a maximum subclass of moderate. Relative to the other principal diagnoses associated with the procedures in APR DRG 221 (e.g., diverticulosis of colon, bowel malignancies), acute vascular insufficiency of the intestine represents a more severely ill patient. A medical example is hemophilia factor VIII that is increased by two up to major in APR DRG 661 Coagulation Disorders.

Conversely, within specific APR DRGs some principal diagnoses are indicative of lower severity of illness relative to the other principal diagnoses in the APR DRG. For example, within APR DRG 404 Thyroid, Parathyroid & Thyroglossal Procedures, patients with a principal diagnosis of nontoxic uninodular goiter will have their severity of illness subclass decreased by one if their severity of illness subclass up to this point in the process were major or moderate. Relative to the other principal diagnoses associated with the procedures in APR DRG 404 (e.g., malignant neoplasm of thyroid), nontoxic uninodular goiter represents a less severely ill patient. A medical example is first degree burns, which is decreased from moderate to minor in APR DRG 844 Partial Thickness Burns as these patients are less severely ill than second degree burn patients.

Step 11: Modify severity of illness subclass for the patient based combinations of APR DRG and age, or APR DRG, principal diagnosis and age

For some principal diagnoses in specific APR DRGs, the patient's age essentially represents a complicating factor. For specific principal diagnoses and age combinations in certain APR DRGs, the severity of illness subclass of the patient is increased by a specified increment up to a specified maximum subclass. For example, for pediatric patients in APR DRG 344 Osteomyelitis, Septic Arthritis & Other Musculoskeletal Infections with bone infection as a principal diagnosis, the severity of illness subclass is increased by one up to a maximum of a moderate subclass. The increase in the severity of illness subclass indicates that bone infection in a pediatric patient represents a more severely ill patient. Elderly patients with certain principal diagnoses have their severity of illness subclass increased by one to a maximum subclass of moderate. For example, patients age >69 years with certain septicemia principal diagnoses in APR DRG 720 Septicemia and patients age >79 years with chronic/unspecified ulcer with hemorrhage without obstruction in

APR DRG 241 Peptic Ulcer & Gastritis have their severity of illness subclass increased by one to a maximum of moderate.

For some APR DRGs the patient's severity of illness subclass is modified for all patients in an age range, not just for those certain principal diagnoses. This modification has been applied to just elderly patients and in just two MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders) APR DRGs and five MDC 19 (Mental Diseases & Disorders) APR DRGs. For example, patients age >79 years in APR DRG 421 Malnutrition, Failure to Thrive and Other Nutritional Disorders and APR DRG 422 Hypovolemia & Related Electrolyte Disorders will have their severity of illness subclass increased by an increment of one up to a maximum subclass of moderate.

Step 12: Modify the severity of illness subclass for the patient based upon combinations of APR DRG and non-OR procedures

For some APR DRGs the presence of certain non-OR (operating room) procedures represents a complicating factor. The most important of these are the codes for mechanical ventilation. For a number of neurological, respiratory, certain cardiovascular, neonatal, burn, and trauma patients, the need for mechanical ventilation indicates a more severely ill patient and the patient's severity of illness subclass is increased most often by an increment of one to a maximum subclass of major. In the same APR DRGs, mechanical ventilation 96+ hours is often used to increase the patient's severity of illness subclass by an increment of two up to a maximum subclass of extreme. The exact amount of the increment will vary according to the APR DRG category. For example, in the instance of neonates the increment varies depending upon birthweight and medical or surgical APR DRG. In the cardiovascular APR DRGs, balloon pulsation device is used to increase the severity subclass by an increment of one to a maximum of major for most surgical categories and by an increment of two to extreme for most medical APR DRGs.

Step 13: Modify the severity of illness subclass for the patient based on combinations of APR DRG and OR procedure

This step is used extensively in Phase III to modify a patient's severity of illness subclass. Within specific APR DRGs, some OR (operating room) procedures are indicative of higher severity of illness relative to the other OR procedures in the APR DRG. For example, the severity of illness subclass of patients in APR DRG 362 Mastectomy Procedures with an OR procedure of bilateral extended radical mastectomy is increased by one up to a maximum of a moderate subclass. Relative to the other OR procedures in APR DRG 362 (e.g., unilateral simple mastectomy), a bilateral extended radical mastectomy represents a patient that is more severely ill.

Conversely, within specific APR DRGs, some OR procedures are indicative of lower severity of illness relative to the other OR procedures in the APR DRG. For example, the severity of illness subclass of patients in APR DRGs 162 and 163 (Cardiac Valve Procedure With and Without Cardiac Catheterization) with an OR procedure of open heart valvuloplasty, is less complex than patients receiving cardiac valve replacements, and have their severity of illness subclass decreased by one for patients with a severity of illness subclass up to this point in the process that is moderate.

Step 14: Modify the severity of illness subclass for the patient based on combinations of APR DRG and pairs of OR procedures

Within specific APR DRGs some pairs of OR (operating room) procedures are indicative of higher severity of illness relative to the other patients in the APR DRG. Areas where multiple procedures are a significant determinant of severity of illness include: peripheral bypass surgery plus lower limb amputation or skin graft, cranial procedures plus face bone or jaw procedures, multiple spinal fusion procedures (anterior and posterior), and multiple procedures related to trauma such as multiple limb procedures, limb procedure plus back procedure, and limb procedure plus skin or fascia graft. For example, if a patient in APR DRG 308 Hip & Femur Procedure for Trauma receives both a femur procedure (upper leg) and one of a specified set of tibia/fibula procedures (lower leg) or shoulder/arm procedures, the severity of illness subclass will be increased by one up to a maximum subclass of extreme. Relative to other femur procedure patients, those who also have a procedure for trauma to other extremities have a higher severity of illness.

Step 15: Modify the severity of illness subclass for the patient based upon combination of APR DRG 583 and absence of certain OR procedures

This step is specific to the logic of how one APR DRG is defined, APR DRG 583 Neonate With ECMO (Extracorporeal Membrane Oxygenation). All of the patients who receive ECMO are severely ill but there are two subsets of ECMO patients, those who receive ECMO along with a major OR (operating room) procedure for a congenital diaphragmatic hernia or heart condition and those who receive ECMO because conventional therapy has been unsuccessful at treating pulmonary hypertension and respiratory failure. To distinguish, those neonatal patients who do not have any of the major neonatal surgeries from a specified list have their severity subclass decreased by one.

Step 16: Modify the severity of illness subclass for the patient based upon combinations of APR DRG, principal diagnosis and non-OR procedure

Specific principal diagnoses within an APR DRG in combination with certain non-OR (operating room) procedures will increase the severity of illness subclass by a specified increment up to a specified maximum severity of illness subclass. This step applies to a limited number of patients, mostly cancer patients receiving chemotherapy or radiation therapy. For example, patients with a principal diagnosis of malignancy in APR DRG 343 (Musculoskeletal Malignancy and Pathological Fracture Due To Musculoskeletal Malignancy) are increased by one level up to a maximum subclass of major if radiation therapy or chemotherapy is performed.

Step 17: Establish a minimum severity of illness subclass for the patient based on the presence of specific combinations of categories of secondary diagnoses

The presence of certain combinations of secondary diagnoses has great clinical significance. The interaction of specific combinations of secondary diagnoses makes treatment more difficult and typically indicates a more extensive disease process. Therefore, a minimum patient severity of illness subclass greater than minor is established if certain combinations of secondary diagnoses

are present. The presence of multiple interacting diagnoses is characteristic of high severity of illness patients. A subset of secondary diagnoses interact with each other causing patient severity of illness to be increased. All of the diagnosis codes were classified into either one of the 83 core secondary diagnosis categories applicable to all patients except Major Diagnostic Category (MDC) 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period) or to one of the 21 secondary diagnosis categories applicable to a subset of MDC 15. The following table shows the 83 core secondary diagnosis categories. Each of these categories represents a disease process and is further subdivided by severity of illness level. The full numbering of the categories includes the two digits shown in the table plus a third digit for the severity of illness level of the secondary diagnoses in the category. To illustrate, secondary diagnosis category 15 Cerebrovascular Diagnoses includes diagnoses that span all four severity levels so the full numbering and titling is: 151 Cerebrovascular Diagnoses (1), e.g., cerebral atherosclerosis; 152 Cerebrovascular Diagnoses (2), e.g., occlusion and stenosis of pre-cerebral artery without cerebral infarction; 153 Cerebrovascular Diagnoses (3), e.g., occlusion and stenosis of pre-cerebral artery with cerebral infarction; and 154 Cerebrovascular Diagnoses (4), e.g., cerebral thrombosis with cerebral infarction. Not all secondary diagnosis categories contain four severity levels. Some describe a disease process that has only three severity levels (e.g., Ear, Nose & Throat; Eye) or only two severity levels (e.g., Asthma; Hypertension). Others describe a more singular disease process that has only one severity level (e.g., Coronary Bypass Graft Status, Acute Myocardial Infarct, Hypovolemia). Altogether, the secondary diagnosis categories together with severity level breakouts contain 240 categories.

Category number	Category description
01	AMI–Subsequent/Unspecified
02	Abdominal Trauma
03	Abortion
04	Acute Myocardial Infarct
05	Alcohol & Drug Abuse
06	Arteries, Veins & Other Vascular DX
07	Asthma
08	Atrial Fibrillation
09	Bacterial Infections
10	Benign Neoplasm and CA in Situ
11	Brain Malignancy
12	Burn
13	CABG Status
14	Congestive Heart Failure
15	Cerebrovascular Diagnoses
16	Cardiac Diagnoses
17	Cardiac & Respiratory Arrest
18	Chest & Respiratory Trauma

Category number	Category description
19	Cardiovascular Device Malfunction
20	Hypertension
21	Child & Adult Abuse
22	Chronic Renal Failure
23	Cirrhosis
24	Head Trauma W Coma
25	Chromosomal Anomaly/Other Specified Syndromes
26	Decubitus Ulcer
27	Delirium Tremens
28	Dental & Oral Diagnoses
29	Dermatologic Diagnoses
30	Diabetes
31	Dialysis Status
32	Dysrhythmia
33	Ear, Nose & Throat Diagnoses
34	Electrolyte Diagnoses Except Hypovolemia
35	Endocrine, Nutritional & Metabolic Diagnoses
38	Eye Diagnoses
39	Gastrointestinal Diagnoses
40	Genitourinary Diagnoses
41	Gynecological Diagnoses
42	HIV
43	Head & Neck Trauma w/o Coma
44	Hematological & Immunological Diagnoses
45	Hematological Malignancy
46	Hemiplegia
47	Hemorrhoids
48	History of Major Organ Surgery
49	History of Malignancy
50	Hypotension
51	Hypovolemia
52	Incidental Signs, Symptoms & Findings

Category number	Category description
53	Incidental V Codes
54	Fx (Limb), Open Wounds & Other Injuries
55	Iron Deficiency Anemia
56	Kaposi's Sarcoma
57	Lung Malignancy
58	Digestive Malignancy
59	Malnutrition
60	Mental Health
61	Multiple Birth
62	Musculoskeletal Diagnoses
63	Neonatal Diagnoses
64	Neurological Diagnoses
65	Obstetrics
67	Osteoarthrosis
68	Ostomy Status - GI & GU
69	Other Complications
70	Other Malignancy
72	Pleural Effusion
73	Poisoning
74	TB, Fungal, Parasitic Infections
75	Pulmonary Diagnoses
76	Acute Renal Failure
77	Respirator Dependence
78	Secondary Malignancy
79	Shock
80	Sickle Cell Anemia
81	Spinal Cord & Vertebral Injuries
82	Surgical & Device Complications
83	Thrombophlebitis
84	Transplant Status
86	Urinary Tract Infection
87	Viral Infections

The next table shows the secondary diagnosis categories for MDC 15. These are intended for use with just two groups of MDC 15 patients: APR DRG 626 Neonate BWT 2000 – 2499 Grams, Normal Newborn Or Neonate With Other Problem and APR DRG 640 Neonate BWT >2500 Grams, Normal Newborn Or Neonate With Other Problem. The secondary diagnoses on this list are nearly all diagnoses with a severity of illness level of minor, so no further differentiation based on severity level is necessary. It is their purpose to distinguish newborns with multiple minor or other problems from those who are normal newborns or have a single minor problem. This is an important distinction because there is a very large case volume of these newborn patients.

Category number	Category description
900	Craniofacial Anomalies
901	Musculoskeletal Anomalies
902	Maternal Infections & Other Maternal Effects Except Noxious Substances
903	Chromosomal Anomaly NOS
904	Perinatal Jaundice from Prematurity/Other Specified Causes
905	Circulatory Disorder Diagnoses
906	Gastrointestinal Disorder Diagnoses
907	Newborn Peripheral Nerve Injury
908	Fetal Malnutrition
909	Newborn Meconium Aspiration
910	Other Newborn Respiratory Problem/Other Asphyxia
911	Newborn Feeding Problem Diagnoses
912	Hypo-Hypertonia/Other Newborn Problem Diagnoses
913	Noxious Influences Affecting Fetus Through Placenta/Breast Milk
914	Infant of Diabetic Mother
915	Hemolytic Disease Due to Isoimmunization
916	Other Hematologic Disorders Except Isoimmunization
917	Dehydration
918	Hypoglycemia
919	Fever
920	Transient Tachypnea

The next table shows there are nine different types of combinations of secondary diagnosis categories that will result in a minimum severity of illness subclass for a patient. For combination types 1 through 5, four significant secondary diagnoses are required in order to increase the severity of illness subclass of a patient. Two of the four secondary diagnoses must constitute one of the secondary diagnosis category combinations and must not have had their standard severity of illness level decreased as part of the Phase I severity level modifications. The addition of the

third and fourth secondary diagnoses increases the likelihood that the specific combination of secondary diagnosis categories represents a more extensive and severe disease process.

Combination Type	Combination of Categories	Additional Secondary Diagnoses Required	Minimum Severity of Illness
1	Specified combinations of two major categories	At least two additional secondary diagnoses of major or higher	Extreme (4)
2	Specified combinations of a major and moderate category	At least two additional secondary diagnoses of major or higher	Extreme (4)
3	Specified combinations of two moderate categories	At least two additional secondary diagnoses of moderate or higher	Major (3)
4	Specified combinations of a moderate and minor category	At least two additional secondary diagnoses of moderate or higher	Major (3)
5	Specified combinations of two minor categories	At least two additional secondary diagnoses of minor or higher	Moderate (2)
6	Specified combinations of two moderate categories	None	Major (3)
11	Specified combinations of two major categories	At least one additional secondary diagnosis of major or higher	Extreme (4)
13	Specified combinations of two moderate categories	At least one additional secondary diagnosis of moderate or higher	Major (3)
15	Specified combinations of two minor categories	At least one additional secondary diagnosis of minor or higher	Moderate (2)

Combination types 11, 13, and 15 only require a total of three significant secondary diagnoses, the two that make up the secondary diagnosis category combination and one additional secondary diagnosis. This reflects that the secondary diagnosis category combination is sufficiently significant that only one additional secondary diagnosis is required. Combination types 11, 13, and 15 are new starting with APR DRG Classification System version 20.0. Previous versions contained only types 1 through 6.

A type 1 combination consists of two secondary diagnosis categories that contain major severity of illness level diagnoses, plus any third and fourth secondary diagnosis that is at least a major severity of illness level. When a type 1 combination occurs, the minimum patient severity of illness subclass is extreme. An example of a type 1 combination is a major bacterial infection (category 9) with a major hematological/immunological diagnosis (category 44). If a diagnosis from both these categories is present plus at least two other secondary diagnoses that are at least a major severity of illness level, then the minimum patient severity of illness subclass will be extreme. A type 2 combination is the same as a type one combination except that the two categories consist of a major severity of illness category and a moderate severity of illness category. An example of a type 2 combination is a major bacterial infection (category 9) and brain malignancy (category 11). A type 3 combination consists of two categories that contain moderate severity of illness level diagnoses plus any third and fourth secondary diagnosis that is at least a moderate level. When a type 3 combination occurs, the minimum patient severity of illness subclass is major. An example

of a type 3 combination is a moderate alcohol and drug abuse diagnosis (category 5) and a moderate electrolyte disorder except hypovolemia (category 34).

A type 4 combination consists of a moderate severity of illness category and a minor severity of illness category plus any third and fourth diagnosis that is at least a moderate severity of illness level. When a type 4 combination occurs, the minimum patient severity of illness subclass is major. An example of a type 4 combination is a moderate hematological/immunological diagnosis (category 44) and hypovolemia (category 51). A type 5 combination consists of two categories that contain minor severity of illness level diagnoses plus two additional minor severity of illness level diagnoses. When a type 5 combination occurs the minimum patient severity of illness subclass is moderate. An example of a type 5 combination would be diabetes without mention of complication (category 30) and minor bacterial infection (category 9).

Combination type 6 is a special combination type for APR DRGs 626 and 640 to distinguish neonates with multiple "other problems," i.e., problems that are generally viewed as minor severity of illness but distinguish a neonate from being a normal newborn. An example is a neonate with transient tachypnea (category 920) and newborn feeding problem (category 911). These diagnoses have a minor severity of illness level, but are each increased to moderate for APR DRGs 626 and 640 per an earlier Phase I step, and together, as part of this step, result in the patient's severity subclass being increased to major for APR DRGs 626 and 640.

Combination types 11, 13, and 15 are new to version 20.0 and pertain mostly to multiple trauma patients and a handful of other patients such as transplant status patients. A type 11 combination consists of two secondary diagnosis categories that contain major severity of illness diagnoses, plus any third secondary diagnosis that is at least a major severity of illness. An example is a major severity of illness transplant status diagnosis (category 84) and a major TB, fungal or parasitic infection (category 74). A type 13 combination consists of two secondary diagnosis categories that contain moderate severity of illness level diagnoses, plus any third secondary diagnosis that is at least a moderate severity of illness level. An example is a moderate cardiothoracic trauma diagnosis (category 18) and a moderate head and neck trauma with coma diagnosis (category 24). A type 15 combination consists of two secondary diagnosis categories that contain minor severity of illness level diagnoses, plus any third secondary diagnosis that is at least a minor severity of illness level. An example is a minor severity of illness level head and neck trauma without coma diagnosis (category 43) and a minor severity of illness level pulmonary diagnosis (category 75).

Step 18: Compute the final patient severity of illness subclass

The final patient severity of illness subclass is computed based on the Phase II base patient severity of illness subclass and the Phase III modified patient severity of illness subclasses. The modified severity subclasses from Phase III can be equal to, greater than or less than the Phase II base severity of illness subclass (step 9). In order to determine the final patient severity of illness subclass, the Phase III modified severity of illness subclasses are evaluated in a hierarchical order. In general, the Phase III severity subclass hierarchy is structured in the following order:

- Neonatal ECMO
- OR (operating room) Procedures
- Non-OR procedures or combinations or secondary diagnoses
- Principal diagnosis

- Age

Most of the Phase III severity modifications are in the form of specified increment up to a specified maximum severity subclass (e.g., increase severity subclass by 1 up to a maximum severity subclass of 3) or a specified decrement from specified severity subclasses (e.g., decrease severity subclass by 1 if the Phase II base severity subclass is 3 or 4). Thus, depending on the value of the Phase II base severity subclass, some Phase III severity modifications may be tried but not actually performed (e.g., if the Phase II base severity subclass is 3, a Phase III severity modification that specifies an increase of one up to a severity subclass of 3 is tried but is not actually performed because the Phase II base severity subclass is already a 3). In specifying the Phase III severity modification hierarchy, a differentiation will be made between Phase III severity modifications that are tried but not performed verses Phase III severity modifications that are actually performed. The following table contains the Phase III severity subclass modification hierarchy. The hierarchy is applied from top to bottom. Each row specifies the results from a Phase III step or combination of Phase III steps and contains the corresponding determination of the final severity subclass. In the table, base severity subclass refers to the subclass from step 9. The maximum Phase III decrease means the maximum decrease of any Phase III step that decrease the severity subclass. The maximum Phase III increase means the maximum increase of any Phase III step that increase the severity subclass.

Phase II Severity Modification		Phase III Severity Modification		Final Severity Subclass
Step	Result	Step	Result	
15	Actual or Tried Decrease			Base severity subclass minus one
13	Actual or Tried Increase			Base severity subclass plus maximum Phase III severity increase
13	Actual Decrease	12,14,16,17	Actual Increase	Base severity subclass minus maximum Phase III decrease plus one
13	Actual or Tried Decrease			Base severity subclass minus maximum Phase III decrease
10, 12, 14, 16, 17	Actual or Tried Increase			Base severity subclass plus maximum Phase III increase
10	Actual Decrease			Base severity subclass minus maximum Phase III decrease
10	Actual Decrease	11A, 11B	Actual Increase	Base severity subclass minus maximum Phase III decreases plus one
10	Tried Decrease			Base severity subclass minus maximum Phase III decrease

Phase II Severity Modification		Phase III Severity Modification		Final Severity Subclass
Step	Result	Step	Result	
10	Tried Decrease	11A, 11B	Actual Increase	Base severity subclass plus one
11A, 11B	Actual Increase			Base severity subclass plus maximum of phase III increases
11A, 11B	Actual Decrease			Base severity subclass minus maximum of phase III decreases

The Phase III step highest in the hierarchy is step 15 which relates to neonates. Any neonate that meets the criteria for step 15 will have their base severity subclass reduced by one and all other Phase III steps are not evaluated. Step 13 which relates to OR procedures is next in the hierarchy. If there is a step 13 actual or tried increase the final severity subclass is the base severity subclass plus the maximum Phase III severity increase. If step 13 results in an actual severity subclass decrease and any one of steps 12, 14, 16 or 17 result in severity subclass increase, the final severity subclass is the base severity subclass minus the maximum Phase III severity decrease plus one. The plus one is partial recognition that the OR procedure severity decrease in step 13 takes priority, but the severity increase from step 12, 14, 16, or 17 should contribute to the final severity subclass. However, if the step 13 decrease is tried but not actually done and there is an actual step 12, 14, 16 or 17 increase the final severity subclass is the base severity subclass minus the maximum Phase III severity decrease and a plus one is not added to the final severity subclass. In this situation step 13 tried to lower the severity subclass further but could not and therefore recognition of the step 12, 14, 16 or 17 increase is not applied. Next in the hierarchy, if any of steps 10, 12, 14, 16 or 17 results is a tried or actual severity subclass increase the final severity subclass is the base severity subclass plus the maximum Phase III severity subclass increase. Since steps 12, 14, 16 and 17 can only increase the severity subclass, the hierarchy does not have to address a severity subclass decrease for these steps. The application of the Phase III severity subclass modification hierarchy continues as describe above until all steps have been evaluated. If no Phase III steps result in an increase or decrease in the severity subclass, the final severity subclass is the base severity subclass from step 9. The combination of the All Patient Refined Diagnosis Related Group (APR DRG) and the final patient severity of illness subclass constitute the complete APR DRG description of the severity of illness of the patient.

Summary of APR DRG severity of illness subclass assignment logic

The following is a summary of the steps involved in computing the APR DRG severity of illness subclass of a patient.

Phase I: Determine the severity of illness level of each secondary diagnosis

Step 1: Eliminate secondary diagnoses that are associated with the principal diagnosis.

Step 2: Assign each secondary diagnosis its standard severity of illness level.

Step 3: Modify the standard severity of illness level of each secondary diagnosis based on the age of the patient.

Step 4: Modify the standard severity of illness level of each secondary diagnosis based on the principal diagnosis and the APR DRG to which the patient is assigned (applicable only to APR DRG 190 Acute Myocardial Infarct).

Step 5: Modify the standard severity of illness level of each secondary diagnosis based on the APR DRG to which the patient is assigned.

Step 6: Modify the standard severity of illness level of each secondary diagnosis based on the presence of certain non-OR (operating room) procedures.

Phase II: Determine the base severity of illness subclass of the patient

Step 7: Eliminate all secondary diagnoses that are in the same secondary diagnosis group except the secondary diagnosis with the highest severity of illness level.

Step 8: Compute the base patient severity of illness subclass as the maximum of all the secondary diagnosis severity of illness levels.

Step 9: If the base patient severity of illness subclass from Step 8 is major or extreme, then reduce the base patient severity of illness subclass to the next lower severity of illness subclass unless there are multiple secondary diagnoses at a high severity of illness level.

Phase III: Determine the final severity of illness subclass of the patient

Step 10: Modify the patient severity of illness subclass based on the APR DRG and principal diagnosis.

Step 11: Modify the patient severity of illness subclass based on the APR DRG and age of the patient.

Step 12: Modify the patient severity of illness subclass based on a combination of the APR DRG and the presence of certain non-OR procedures.

Step 13: Modify the patient severity of illness subclass based on the APR DRG and OR procedure.

Step 14: Modify the patient severity of illness subclass based on combinations of APR DRGs and pairs of OR procedures.

Step 15: Modify the patient severity of illness subclass based on the APR DRG 583 Neonate with ECMO and the presence/absence of certain OR procedures.

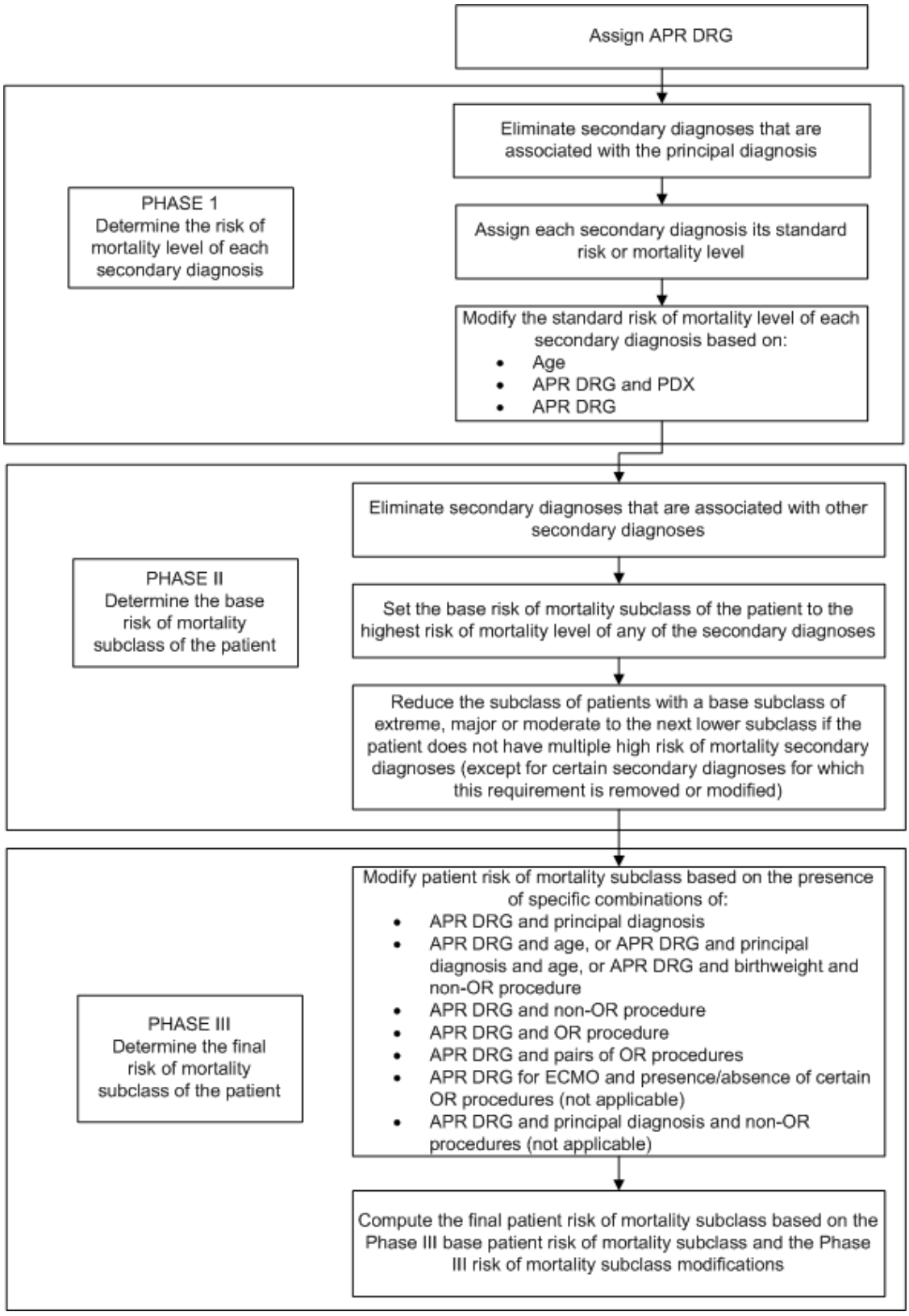
Step 16: Modify the patient severity of illness subclass based on the combination of APR DRG and principal diagnosis and the presence of certain non-OR procedures.

Step 17: Establish a minimum severity of illness subclass for the patient based on the presence of specific combinations of categories of secondary diagnoses.

Step 18: Compute the final patient severity of illness subclass based on the Phase II base patient severity of illness subclass from Step 9 and the modifications of the patient severity of illness subclasses from Steps 10–17.

Determination of the risk of mortality subclass

The following flowchart summarizes the three-phase process of determining the risk of mortality subclass. This three-phase process parallels the three phases in the determination of the severity of illness subclass. In Phase I, the risk of mortality of each secondary diagnosis is determined. Once the risk of mortality level of each individual secondary diagnosis is established, then Phase II determines a base risk of mortality subclass for the patient based on all of the patient's secondary diagnoses. In Phase III, the final subclass for the patient is determined by incorporating the impact of principal diagnosis, age, OR (operating room) procedures, certain non-OR procedures, multiple OR procedures, and combinations of categories of secondary diagnoses.


Assign APR DRG
PHASE 1
Determine the risk of mortality level of each secondary diagnosis
Eliminate secondary diagnoses that are associated with the principal diagnosis
Assign each secondary diagnosis its standard risk or mortality level
Modify the standard risk of mortality level of each secondary diagnosis based on:
Age
APR DRG and PDX
APR DRG
PHASE II
Determine the base risk of mortality subclass of the patient
Eliminate secondary diagnoses that are associated with other secondary diagnoses
Set the base risk of mortality subclass of the patient to the highest risk of mortality level of any of the secondary diagnoses
Reduce the subclass of patients with a base subclass of extreme, major or moderate to the next lower subclass if the patient does not have multiple high risk of mortality secondary diagnoses (except for certain secondary diagnoses for which this requirement is removed or modified)
PHASE III
Determine the final risk of mortality subclass of the patient
Modify patient risk of mortality subclass based on the presence of specific combinations of:
APR DRG and principal diagnosis
APR DRG and age, or APR DRG and principal diagnosis and age, or APR DRG and birthweight and non-OR procedure
APR DRG and non-OR procedure
APR DRG and OR procedure
APR DRG and pairs of OR procedures
APR DRG for ECMO and presence/absence of certain OR procedures (not applicable)
APR DRG and principal diagnosis and non-OR procedures (not applicable)
Compute the final patient risk of mortality subclass based on the Phase III base patient risk of mortality subclass and the Phase III risk of mortality subclass modifications

Phase I - Determining the risk of mortality level of each secondary diagnosis

Step 1: Eliminate secondary diagnoses associated with the principal diagnosis

This step is identical to the corresponding step in the determination of the severity of illness subclass. If a secondary diagnosis is closely related to the principal diagnosis and does not add any distinguishing information, then the secondary diagnosis is completely excluded from the 18 step process to determine the patient's risk of mortality subclass.

Step 2: Assign each secondary diagnosis its standard risk of mortality level

Each secondary diagnosis is assigned one of four distinct risk of mortality levels. In general, except for malignancies and certain extreme acute diseases such as acute renal failure, the risk of mortality level tends to be lower than the severity of illness level for the same diagnosis. Mortality is relatively rare. There are a limited number of diagnoses that significantly increase the risk of mortality. For example, traumatic amputation of the arm, acute cholecystitis, and acute osteomyelitis are all at a major severity of illness level since they represent serious diseases with significant loss of organ function. However, they present relatively low risk of mortality and therefore are assigned to a minor risk of mortality level. Example of secondary diagnoses that would have an extreme risk of mortality are intracranial hemorrhage, acute vascular insufficiency of intestine, acute myocardial infarct, and acute renal failure.

Step 3: Modify the standard risk of mortality level of a secondary diagnosis based on age

The standard risk of mortality for certain secondary diagnoses may be modified depending upon the age of the patient. This age modification is applied much more extensively for risk of mortality, than for severity of illness. For pediatric patients, the standard risk of mortality level of secondary diagnoses is often decreased. For example, the risk of mortality level for diabetes with ketoacidosis is lowered from moderate to minor for pediatric patients. It is also lowered for many other secondary diagnoses including infectious illnesses and traumatic injuries. However, for some pediatric diagnoses, mostly congenital anomalies, the risk of mortality level is increased during the neonatal time period and sometimes the first year of life. For example, the risk of mortality level for hypoplastic left heart syndrome is increased from major to extreme during the neonatal period; renal dysphasia is increased from moderate to major during the neonatal period; and congenital tricuspid atresia/stenosis is increased from moderate to major during the first year of life.

For elderly patients, the standard risk of mortality level is increased to a higher level for many secondary diagnoses. Elderly patients are most often defined as age >65 years or age >69 years but also sometimes for a more narrowly defined subset of elderly patients such as age >79 years. For example, for elderly patients age >65 years the risk of mortality level is increased from minor to moderate for secondary diagnoses such as atrial fibrillation, chronic obstructive lung disease

and nephritis, and is increased from moderate to major for acidosis and hypotension. For elderly patients age >69 years, the risk of mortality level is increased from minor to moderate viral pneumonia, mitral valve disorder, and anemia; and from moderate to major for streptococcal, staphylococcal, and other bacterial pneumonias; and from major to extreme for peritonitis. For elderly patients age >79 years, the risk of mortality level is increased from minor to moderate for fracture of femur or pelvis; and from moderate to major for pleural effusion.

Step 4: Modify the standard risk of mortality level of a secondary diagnosis based on the APR DRG and principal diagnosis

The standard risk of mortality level for some secondary diagnoses may be modified depending on the APR DRG and principal diagnosis of the patient. In versions 20.0 to 33.0, this logic is applied only to APR DRG 190 Acute Myocardial Infarct. In general, secondary diagnoses that are closely related to the principal diagnosis are excluded from the determination of the risk of mortality subclass. However, for a patient admitted for an acute anterior wall myocardial infarction, an acute anterolateral myocardial infarction represents an extension of the acute anterior wall myocardial infarction. Therefore, the acute anterolateral myocardial infarction is not excluded and is assigned a risk of mortality level of moderate.

Step 5: Modify the standard risk of mortality of a secondary diagnosis based on the APR DRG

The standard risk of mortality level for many secondary diagnoses is modified depending upon the APR DRG to which the patient is assigned. As with severity of illness, the APR DRG specific modifications to the risk of mortality level of individual secondary diagnoses reflects the disease-specific nature of the determination of risk of mortality.

For example, the risk of mortality level for secondary diagnoses is increased from minor to moderate for the following combinations of secondary diagnoses and APR DRGs: right bundle branch block and APR DRG for acute myocardial infarct; chronic obstructive lung disease and major chest and major cardiovascular surgery; hypovolemia and APR DRGs for cancer, cardiovascular disease, and respiratory failure. The risk of mortality level for secondary diagnoses is increased from moderate to major for the following combinations of secondary diagnoses and APR DRGs: acidosis and APR DRGs for acute myocardial infarct, congestive heart failure, and septicemia; hypotension and APR DRGs for respiratory failure, acute myocardial infarct, and liver and pancreas disorders.

There are also many APR DRGs where the standard risk of mortality level for some secondary diagnoses is decreased, such as for secondary diagnoses that are closely related to the definition of the APR DRG. For example, the risk of mortality level is decreased from moderate to minor for secondary diagnosis of obstructive hydrocephalus in the APR DRG for ventricular shunt procedures, since the hydrocephalus is the underlying reason for performing the procedure. The risk of mortality level is decreased from extreme to major for secondary diagnosis of cerebral edema in a number of nervous system APR DRGs including craniotomy, cerebrovascular disease, and malignancy. If there is essentially complete overlap between the secondary diagnosis and the APR DRG, the risk of mortality level for the secondary diagnosis may be decreased from extreme or major to minor. For example, acute respiratory failure is decreased from extreme to minor for APR DRGs for respiratory system diagnosis with mechanical ventilation

96+ hours and tracheostomy with mechanical ventilation 96+ hours. There are many secondary diagnoses for which the standard risk of mortality level is lowered to minor for a patient in one of eleven elective, non-extensive surgical APR DRGs. For example, in these APR DRGs, secondary diagnoses of malignant neoplasm are reduced from major or moderate to minor, since the patient would likely not have these surgical procedures performed if the malignancy was at a stage that represented a significant risk of mortality.

Step 6: Modify the standard risk of mortality level of a secondary diagnosis based on non-OR procedure

Certain non-OR (operating room) procedures will sometimes be used to modify the standard risk of mortality level of some secondary diagnoses. For risk of mortality, this step is just used with one non-OR procedure, pulsation balloon implant. For example, subendocardial infarction has a standard risk of mortality level of moderate but is increased by an increment of two up to extreme if the patient had a pulsation balloon implanted. The need for the pulsation balloon is an indicator of the extent of the subendocardial infarction.

Phase II - Determine the base risk of mortality subclass for the patient

Once each secondary diagnosis has been assigned its standard risk of mortality level and the standard risk of mortality level of each secondary diagnosis has been modified based on the patient's age, All Patient Refined Diagnosis Related Group (APR DRG) and principal diagnosis, APR DRG, and certain non-OR (operating room) procedure, the Phase II base risk of mortality subclass for the patient can be determined. The process of determining the base patient risk of mortality subclass begins with the elimination of certain secondary diagnoses that are closely related to other secondary diagnoses. The elimination of these diagnoses prevents the double counting of clinically similar diagnoses in the determination of the risk of mortality subclass of the patient. Once redundant diagnoses have been eliminated, the base risk of mortality subclass is determined based on all of the remaining secondary diagnoses. There are three steps to Phase II for risk of mortality. The first two are the same as for severity of illness. The third step is similar to severity of illness but has some additional exceptions logic.

Step 7: Eliminate certain secondary diagnoses from the determination of the risk of mortality subclass of the patient

This step is identical to the corresponding step in the determination of the severity of illness subclass. Secondary diagnoses that are related to other secondary diagnoses have their risk of mortality level reduced to minor.

Step 8: Combine all secondary diagnoses to determine the base risk of mortality subclass of the patient

Once secondary diagnoses that are related to other secondary diagnoses have their risk of mortality level reduced to minor, the base patient risk of mortality subclass is set equal to the maximum risk of mortality level across all of the remaining secondary diagnoses. This is done the same way as for severity of illness. For example, if there are five remaining secondary diagnoses and one is a major risk of mortality level and four are a moderate risk of mortality level, then the base patient risk of mortality subclass is major.

Step 9: Reduce the base risk of mortality subclass if the patient does not have multiple secondary diagnoses with a significant risk of mortality, except for certain secondary diagnoses for which this requirement is removed or modified

In general, high risk of mortality patients are characterized by multiple secondary diagnoses with a significant risk of mortality. In order for the base risk of mortality subclass to be extreme, there must be two or more extreme risk of mortality secondary diagnoses present or a single extreme risk of mortality secondary diagnosis plus two or more major risk of mortality secondary diagnoses. If this multiple criteria is not met, the patient's base risk of mortality subclass is lowered to either major or moderate. If the multiple criteria is not met, but in addition to a single extreme risk of mortality secondary diagnosis there is at least one other major or moderate secondary diagnosis, then the patient's risk of mortality subclass is lowered to major. If there is not at least one other major or moderate secondary diagnosis in addition to an extreme risk of mortality secondary diagnosis, then the patient's base risk of mortality subclass is lowered to moderate. There are, however, two exceptions to these criteria. There is one set of secondary diagnoses that have such an inherent high risk of mortality that no other secondary diagnoses are required for the patient's base risk of mortality subclass to be extreme. Examples include: pulmonary anthrax, ruptured aortic aneurism, hepatorenal syndrome, head trauma with deep coma, and 60-90% body burn/50-59% third degree. There is a second set of secondary diagnoses that also have an inherently high risk of mortality and for which only one other major secondary diagnosis is required for the patient's base risk of mortality to be extreme. Examples included: defibrination syndrome, acute myocardial infarct, intracranial hemorrhage, cerebral thrombosis with infarct, dissection of aortic aneurism, acute respiratory failure, acute renal failure, and shock.

Patients with a base risk of mortality subclass of major are reduced to moderate unless, in addition to the major risk of mortality secondary diagnosis, there is at least one additional major risk of mortality secondary diagnosis or two more additional secondary diagnoses with a moderate risk of mortality. If this multiple criteria is not met then the patient's base risk of mortality subclass is lowered to moderate. There are, however, two exceptions to these criteria. There is one set of secondary diagnoses that have a sufficiently high inherent risk of mortality that no other secondary diagnoses are required for the patient's base risk of mortality subclass to be set at major. Examples include: flail chest, major liver laceration, 40-49% body burns/10-19% third degree. There is a second set of secondary diagnoses that have a significant inherent risk of mortality so that only one moderate secondary diagnoses is required for the patient's base risk of mortality subclass to be set at major. Examples include: food/vomit pneomonitis, acute lung edema, and perforation of intestine.

Patients with a base risk of mortality subclass of moderate are reduced to minor unless there are at least two moderate risk of mortality secondary diagnoses present. There is, however, one

exception to this criteria. These moderate risk of mortality secondary diagnoses do not require any other secondary diagnoses to be present. Examples include: malignant neoplasm diagnoses that are moderate risk of mortality level diagnoses, acidosis, bacterial pneumonia, congestive heart failure, chronic renal failure, Alzheimer's disease, and decubitus ulcer.

Phase III - Determine the final risk of mortality subclass of the patient

Once the base patient risk of mortality subclass is computed then the risk of mortality subclass may be increased or decreased in Phase III based on specific values of certain patient attributes. In Phase III, the risk of mortality algorithm examines six of the eight patient attributes utilized in Phase III of the severity of illness logic. The two that are not used by risk of mortality are only used to a very limited extent in the severity of illness logic. The patient attributes are:

- Combinations of APR DRG and principal diagnosis
- Combinations of APR DRG and age, or APR DRG and principal diagnosis and age, or APR DRG and birthweight and absence of certain non-OR (operating room) procedures
- Combinations of APR DRG and non-OR procedures
- Combinations of APR DRG and OR procedures
- Combinations of APR DRG and pairs of OR procedures
- Combination of the APR DRG for ECMO and presence/absence of certain OR procedures (not applicable for risk of mortality)
- Combinations of APR DRG and principal diagnoses and non-OR procedures (not applicable for risk of mortality)
- Combinations of categories of secondary diagnoses

In Phase I, age and non-OR procedures were used to modify the standard risk of mortality level of a secondary diagnosis. However, age and non-OR procedures can also have an impact that is specific to the patient's APR DRG or a specific principal diagnosis within an APR DRG. Thus, the impact of age and non-OR procedures is reassessed as part of the determination of the risk of mortality subclass of the patient. Based on the patient attributes listed above, a series of modifications to the base patient risk of mortality subclass are made during Phase III. The final patient risk of mortality subclass will be computed based on the Phase II base patient risk of mortality subclass and the modifications to the base risk of mortality subclass made in Phase III.

Step 10: Modify the risk of mortality subclass for the patient based on the APR DRG and principal diagnosis

Within specific APR DRGs some principal diagnoses are indicative of higher or lower risk of mortality relative to the other principal diagnoses in the APR DRGs. This is one of the most important and extensively used modifications to the patient's base risk of mortality subclass that occurs as part of the Phase III risk of mortality logic. The majority of the modifications are increases to the patient risk of mortality subclass, but there are also some decreases to the

patient risk of mortality subclass. Some of the increases are an increment of one up to a maximum subclass of moderate, while others pertain to more dramatic clinical situations and provide greater increases to the patient risk of mortality subclass. Most of the decreases reduce the patient risk of mortality subclass by one from major or moderate. Following are examples:

- APR DRG 309 Hip & Femur Procedures For Non-Trauma Except Joint Replacement and principal diagnosis of secondary malignancy of bone: increase patient risk of mortality subclass by one up to a maximum of moderate.
- APR DRG 135 Major Chest & Respiratory Trauma and principal diagnosis of flail chest: increase patient risk of mortality subclass by one up to a maximum of major.
- APR DRG 221 Major Large & Small Bowel Procedures and principal diagnosis of perforation of intestine: increase patient risk of mortality subclass by two up to a maximum of major.
- APR DRG 169 Major Thoracic & Abdominal Procedures and principal diagnosis of ruptured abdominal aortic aneurism: increase patient risk of mortality subclass by three up to extreme.
- APR DRG 44 Intracranial Hemorrhage and principal diagnosis of subdural hemorrhage: decrease patient risk of mortality subclass by one from moderate.
- APR DRG 52 Non traumatic Stupor & Coma and principal diagnosis of transient alteration of awareness: decrease patient risk of mortality subclass by one from extreme, major, or moderate.

Step 11: Modify the risk of mortality subclass for the patient based on combinations of the APR DRG and principal diagnosis and age, or APR DRG and age, or APR DRG and birthweight and presence/absence of certain non-OR procedures

For some principal diagnoses in specific APR DRGs, the patient's age essentially represents a complicating factor. For specific principal diagnosis and age combinations in certain APR DRGs, the risk of mortality subclass of the patient is increased by a specified increment up to a specified maximum subclass. For example, elderly patients age >79 years in APR DRG 137 Major Respiratory Infections & Inflammations with a principal diagnosis of staphylococcal pneumonia and elderly patients age >79 years in APR DRG 710 Septicemia & Disseminated Infections with most of the septicemia principal diagnoses, have their risk of mortality subclass increased by one up to a maximum subclass of moderate. Elderly patients age >69 years in APR DRG 44 Intracranial Hemorrhage with a principal diagnosis of intracerebral hemorrhage have their risk of mortality subclass increased by one up to a maximum subclass of moderate. The increase indicates that intracranial hemorrhage in an elderly patient represents a higher risk of mortality.

This step is also sometimes implemented for all patients in a specified age range in an APR DRG rather than just for patients with a particular principal diagnoses. This approach is used for elderly patients age >84 years for 19 APR DRGs involving major surgery. For example, patients age >84 years in APR DRG 120 Major Chest & Respiratory Procedures have their risk of mortality subclass increased by one to a maximum subclass of moderate.

The last part of this step examines the relationship between APR DRG and birthweight and presence/absence of certain non-OR procedures for extremely low birthweight neonates in MDC 15. Many of the neonates at an extremely low birthweight (<750 grams or 1.6 pounds) are non-viable and receive comfort-only care. Nearly all of these newborns die and most of the time this is within a few days of being born. There are no ICD-10-CM diagnosis codes for non-viability due to extreme prematurity, which, if such codes existed, would allow a risk of mortality subclass

of extreme to be assigned. In its place, the APR DRG system has developed logic to identify these cases. Since newborns <750 grams will virtually always receive some therapeutic interventions if the goal is to maintain life (e.g., respiratory therapy, tube feedings), the absence of any of these non-OR procedures can be used to infer the newborn is receiving comfort-only measures and their risk of mortality subclass is increased to extreme for APR DRGs 589 and 591. Without this logic, most of these newborns would be a risk of mortality subclass minor or moderate because of the lack of codes for identifying non-viability.

Step 12: Modify the risk of mortality subclass for the patient based on combinations of APR DRG and non-OR procedure

For some APR DRGs the presence of certain non-OR (operating room) procedures is indicative of a more extensive disease process with a higher risk of mortality. In these instances, the risk of mortality subclass is increased by a specific increment up to a specified maximum. There are three non-OR procedures used for this step: mechanical ventilation 96+ hours, mechanical ventilation <96 hours, and balloon pulsation device. For example, for patients in APR DRG 194 Heart Failure the risk of mortality subclass is increased by two up to a maximum subclass of extreme if mechanical ventilation 96+ hours is performed and is increased by one up to a maximum subclass of major if mechanical ventilation <96 hours is performed.

Step 13: Modify the risk of mortality subclass for the patient based on combinations of APR DRG and OR procedure

Within specific APR DRGs, some OR (operating room) procedures are indicative of higher risk of mortality relative to the other OR procedures in the APR DRG. For example, the risk of mortality subclass of patients in APR DRG 443 Kidney and Urinary Tract Procedures for Non-Malignancy, is increased by two up to a maximum of major if the procedure bilateral nephrectomy is performed. Relative to other procedures in DRG 443, a bilateral nephrectomy represents a patient that has a higher risk of mortality.

Within specific APR DRGs, there are also some OR procedures that are indicative of lower risk of mortality relative to other patients in the same APR DRG. For example, a patient in APR DRG 220 Major Stomach Esophageal & Duodenal Procedures who receives a procedure to create esophogastric sphincteric competence has a lower risk of mortality than other surgical patients in APR DRG 220 (e.g., esophagectomy, gastrectomy), and if up to this point in the process their risk of mortality subclass is moderate, it is decreased by 1 to minor.

Step 14: Modify the risk of mortality subclass for the patient based on combinations of APR DRG and pairs of OR procedures

Within specific APR DRGs the presence of certain pairs of OR (operating room) procedures is indicative of a more extensive disease process and a higher risk of mortality relative to other patients in the same APR DRG. For risk of mortality, this logic is applicable primarily for patients who receive both a peripheral bypass procedure and a lower limb amputation. For example, a patient in either APR DRG 173 Other Vascular Procedures or APR DRG 305 Amputation of Lower Limb who receives both a peripheral bypass procedure and a lower leg amputation has

their risk of mortality subclass increased by an increment of one up to a maximum subclass of major.

Step 15: Modify the risk of mortality subclass for the patient based upon combination of the APR DRG for ECMO and presence/absence of certain OR procedures

This step is not applicable to risk of mortality.

Step 16: Modify the patient risk of mortality subclass based on the APR DRG and principal diagnosis and certain non-OR procedures

This step is not applicable to risk of mortality.

Step 17: Establish a minimum risk of mortality subclass for the patient based on combinations of categories of secondary diagnoses

The presence of certain combinations of secondary diagnoses has great clinical significance. The interaction of specific combinations of secondary diagnoses increases the risk of mortality. Therefore, a minimum patient risk of mortality subclass greater than subclass minor is established if certain combinations of secondary diagnoses are present. The presence of multiple interacting diagnoses is characteristic of high risk of mortality patients. A subset of secondary diagnoses will interact with each other causing patient risk of mortality to be increased.

The categories of secondary diagnoses used for this step in risk of mortality are the same 83 core secondary diagnosis categories that are used for severity of illness see "Step 17: Establish a minimum severity of illness subclass for the patient based on the presence of specific combinations of categories of secondary diagnoses" on page 29. The only difference is that these same 83 secondary diagnosis categories are then subdivided by risk of mortality level, not severity of illness level. The additional 21 secondary diagnosis categories developed for use with neonatal APR DRGs 626 and 640 are not used for risk of mortality. These additional 21 secondary diagnosis categories are intended to differentiate neonates with multiple minor or other problems from those who are normal newborns or who have a single minor problem, which is significant for severity of illness but is not applicable for risk of mortality since these diagnoses do not increase the risk of dying.

All of the secondary diagnosis category combination types for risk of mortality are the same as those defined for severity of illness see "Step 17: Establish a minimum severity of illness subclass for the patient based on the presence of specific combinations of categories of secondary diagnoses" on page 29. Of the nine possible combination types, six are applicable for risk of mortality. These are combination types 1, 2, 3, 4, 5, and 13.

A type 1 combination consists of two categories that contain major risk of mortality level diagnoses, plus any two additional secondary diagnoses that are at least major level. When a type 1 combination occurs, the minimum patient risk of mortality subclass is extreme. An example

of a type 1 combination is a major pulmonary diagnosis (category 75) such as acute pulmonary edema and a major neurological diagnosis (category 64) such as cerebral thrombosis without infarct combined with any other two major secondary diagnoses. A type 2 combination is the same as type 1 except that the two categories consist of a major risk of mortality category and a moderate risk of mortality category. For a type 2 combination, the minimum patient risk of mortality subclass is extreme. An example of a type 2 combination is a major bacterial infection (category 9) such as peritonitis and a moderate level secondary malignancy (category 78) combined with any other two major secondary diagnoses.

A type 3 combination consists of two categories that contain moderate risk of mortality level diagnoses, plus any two additional secondary diagnoses that are at least a moderate risk of mortality level. For a type 3 combination, the minimum patient risk of mortality is major. An example of a type 3 combination is a moderate bacterial infection (category 9) such as staphylococcal enteritis with chronic renal failure (category 20) combined with any other two moderate secondary diagnoses. A type 4 combination consists of a moderate risk of mortality category and a minor risk of mortality category, plus any two additional secondary diagnoses that are at least moderate. For a type 4 combination, the minimum patient risk of mortality subclass is major. An example of a type 4 combination is a decubitus ulcer (category 26) and hypovolemia (category 51) combined with two other secondary diagnoses that are at least moderate.

A type 5 combination consists of two categories that contain minor risk of mortality level diagnoses, plus any two additional secondary diagnoses that are at least a minor risk of mortality level. For a type 5 combination, the minimum patient risk of mortality is moderate. An example of a type 5 combination is atrial fibrillation (category 8) and hypovolemia (category 51) combined with any other two minor secondary diagnoses.

A type 13 combination consists of two secondary diagnosis categories that contain moderate risk of mortality diagnoses, plus any third secondary diagnosis that is at least a moderate risk of mortality diagnosis. For a type 13 combination, the minimum patient risk of mortality subclass is major. An example of a type 13 combination is cirrhosis (category 23) and hypotension (category 50) combined with any other moderate secondary diagnosis.

Step 18: Compute the final risk of mortality subclass

The final patient risk of mortality (ROM) subclass is computed based on the Phase II base patient ROM subclass and the Phase III modified patient risk of mortality subclasses. The modified ROM subclasses from Phase III can be equal to, greater than or less than the Phase II base ROM subclass (step 9). In order to determine the final patient ROM subclass, the Phase III modified ROM subclasses are evaluated in a hierarchical order. In general, the Phase III ROM subclass hierarchy is structured in the following order:

- Extremely premature neonate
- OR (operating room) Procedures
- Non-OR procedures or combinations or secondary diagnoses
- Principal diagnosis
- Age

Most of the Phase III ROM modifications are in the form of specified increment up to a specified maximum ROM subclass (e.g., increase ROM subclass by 1 up to a maximum ROM subclass of

3) or a specified decrement from specified ROM subclasses (e.g., decrease ROM subclass by 1 if the Phase II base ROM subclass is 3 or 4). Thus, depending on the value of the Phase II base ROM subclass, some Phase III ROM modifications may be tried but not actually performed (e.g., if the Phase II base ROM subclass is 3, a Phase III ROM modification that specifies an increase of one up to a ROM subclass of 3 is tried but is not actually performed because the Phase II base ROM subclass is already a 3). In specifying the Phase III ROM modification hierarchy, a differentiation will be made between Phase III ROM modifications that are tried but not performed verses Phase III ROM modifications that are actually performed. The following table contains the Phase III ROM subclass modification hierarchy. The hierarchy is applied from top to bottom. Each row specifies the results from a Phase III step or combination of Phase III steps and contains the corresponding determination of the final ROM subclass. In the table, base ROM subclass refers to the subclass from step 9. The maximum Phase III decrease means the maximum decrease of any Phase III step that decrease the ROM subclass. The maximum Phase III increase means the maximum increase of any Phase III step that increase the ROM subclass.

Phase III ROM Modification		Phase III ROM Modification		Final ROM Subclass
Step	Result	Step	Result	
13	Actual or Tried Increase			Base ROM subclass plus maximum Phase III ROM increase
13	Actual Decrease	12,14,17	Actual Increase	Base ROM subclass minus maximum Phase III decrease plus one
13	Actual or Tried Decrease			Base ROM subclass minus maximum Phase III decrease
10,12,14,17,	Actual or Tried Increase			Base ROM subclass plus maximum Phase III increase
10	Actual Decrease			Base ROM subclass minus maximum Phase III decrease
10	Actual Decrease	11A, 11B	Actual Increase	Base ROM subclass minus maximum Phase III decrease plus one
10	Tried Decrease			Base ROM subclass minus maximum Phase III decrease
10	Tried Decrease	11A, 11B	Actual Increase	Base ROM plus one
11A, 11B	Actual Increase			Base ROM subclass plus maximum of phase III increase

Phase III ROM Modification		Phase III ROM Modification		Final ROM Subclass
Step	Result	Step	Result	
11A, 11B	Actual Decrease			Base ROM subclass minus maximum of phase III decrease

The Phase III step highest in the hierarchy is step 13 which relates to OR procedures. If there is a step 13 actual or tried increase the final ROM subclass is the base ROM subclass plus the maximum Phase III ROM increases. If step 13 results in an actual ROM subclass decrease and any one of steps 12, 14, or 17 result in ROM subclass increase, the final ROM subclass is the base ROM subclass minus the maximum Phase III ROM decrease plus one. The plus one is partial recognition that the OR procedure ROM decrease in step 13 takes priority, but the ROM increase from step 12, 14, or 17 should contribute to the final ROM subclass. However, if the step 13 decrease is tried but not actually done and there is an actual step 12, 14, or 17 increase the final ROM subclass is the base ROM subclass minus the maximum Phase III ROM decrease and a plus one is not added to the final ROM subclass. In this situation step 13 tried to lower the ROM subclass further but could not and therefore recognition of the step 12, 14, or 17 increase is not applied. Next in the hierarchy, if any of steps 10, 12, 14, or 17 results is a tried or actual ROM subclass increase the final ROM subclass is the base ROM subclass plus the maximum Phase III ROM subclass increase. Since steps 12, 14, and 17 can only increase the ROM subclass, the hierarchy does not have to address a ROM subclass decrease for these steps. The application of the Phase III ROM subclass modification hierarchy continues as describe above until all steps have been evaluated. If no Phase III steps result in an increase or decrease in the ROM subclass, the final ROM subclass is the base ROM subclass from step 9. The combination of the APR DRG and the final patient risk of mortality subclass constitute the complete APR DRG description of the risk of mortality of the patient.

Summary of APR DRG risk of mortality subclass assignment logic

The following is a summary of the steps involved in computing the APR DRG risk of mortality subclass of a patient.

Phase I: Determine the risk of mortality level of each secondary diagnosis

Step 1: Eliminate all secondary diagnoses that are associated with the principal diagnosis of the patient.

Step 2: Assign each secondary diagnosis its standard risk of mortality.

Step 3: Modify the standard risk of mortality level of each secondary diagnosis based on the age of the patient.

Step 4: Modify the standard risk of mortality level of each secondary diagnosis based on the APR DRG and principal diagnosis (applicable only to APR DRG 190 Acute Myocardial Infarct).

Step 5: Modify the standard risk of mortality level of each secondary diagnosis based on the APR DRG to which the patient is assigned.

Step 6: Modify the standard risk of mortality level of each secondary diagnosis based on the presence of certain non-OR (operating room) procedures.

Phase II: Determine the base risk of mortality subclass of the patient

Step 7: Eliminate all secondary diagnoses that are in the same secondary diagnosis group except the secondary diagnosis with the highest risk of mortality level.

Step 8: Compute the base patient risk of mortality subclass as the maximum of all the secondary diagnosis risk of mortality levels.

Step 9: Reduce the base patient risk of mortality subclass if the patient does not have multiple secondary diagnoses at a significant risk of mortality, except for certain secondary diagnoses for which this requirement is removed or modified.

Phase III: Determine the final risk of mortality subclass of the patient

Step 10: Modify the patient risk of mortality subclass based on the APR DRG and principal diagnosis.

Step 11: Modify the patient risk of mortality subclass based on the APR DRG and age, or APR DRG and principal diagnosis and age, or APR DRG and birthweight and absence of certain non-OR procedures.

Step 12: Modify the patient risk of mortality subclass based on a combination of the APR DRG and certain non-OR procedures.

Step 13: Modify the patient risk of mortality subclass based on the APR DRG and OR procedure.

Step 14: Modify the patient risk of mortality subclass based on the APR DRG and certain pairs of OR procedures.

Step 15: Modify the patient risk of mortality subclass based on the APR DRG 583 Neonate With ECMO and the presence/absence of certain OR procedures (this step is applicable only to severity of illness, not to risk of mortality).

Step 16: Modify the patient risk of mortality subclass based upon the APR DRG and principal diagnosis and certain non-OR procedures (this step applicable only to severity of illness, not to risk of mortality).

Step 17: Establish a minimum risk of mortality subclass for the patient based on the presence of specific combinations of categories of secondary diagnoses.

Step 18: Compute the final patient risk of mortality subclass based on the Phase II base patient risk of mortality subclass from Step 9 and the modifications of the patient risk of mortality subclass from Steps 10–17.

Conclusion

The APR DRGs form a clinically coherent set of severity of illness and risk of mortality adjusted patient groups. The APR DRGs are designed to describe the complete cross-section of patients seen in acute care hospitals.

Through APR DRGs, hospitals, consumers, payers, and regulators can gain an understanding of the patients being treated, the costs incurred, and, within reasonable limits, the services and outcomes expected. Through APR DRGs, areas for improvement in efficiency and areas with potential quality problems can be identified. The classification of patients into APR DRGs is constantly evolving. As the ICD-10-CM coding scheme changes or as medical technology or practice changes, the APR DRG definitions will continue to be updated to reflect these changes.

Chapter 3: Determination of Admission All Patient Refined Diagnosis Related Groups (APR DRGs)

Hospitals report discharge diagnoses on the Medicare claim form that include diagnoses that were present on admission as well as diagnoses that develop post admission. As a result, the base APR DRG, severity of illness subclass and risk of mortality subclass represent the patients condition at the time of discharge and include the impact of conditions that developed during the hospital stay. The Deficit Reduction Omnibus Reconciliation Act of 2005 requires that hospital report a "present on admission" (POA) indicator for each diagnosis that specifics whether the diagnosis was present at the time of admission on all Medicare claims beginning in FY 2008. The states of New York and California have required a POA indicator be reported for all hospital discharges since the mid 1990's and numerous other states have begun mandating the reporting of the POA indicator for all hospital discharges. With the availability of the POA indicator an admission base APR DRG, severity of illness subclass and risk of mortality subclass can be assigned in addition to the discharge base APR DRG, severity of illness subclass and risk of mortality subclass. For some applications such as comparing inpatient complication rates, the use of the admission APR DRG is preferable to discharge APR DRG.

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).

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 and 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. We have taken a strict approach to the determination of the secondary diagnoses that are passed to the admission APR DRG. Certain procedures are included in the admission APR DRG assignment only if they occur within a specified number of days after admission. We have taken a conservative approach to the determination of the procedures that are passed to the admission APR DRG. Unless the date of the procedure explicitly specifies that it did not occur within the specified number of days after admission, it will be included in the admission APR DRG.

The following seven steps determine the subset of diagnoses and procedures that will be used to assign the admission APR DRG.

1. Identify diagnoses present on admission

Using the POA (present on admission) indicator secondary diagnoses present on admission are identified. All secondary diagnoses present on admission are included in the assignment of the admission APR DRG.

2. Identify diagnoses always considered present on admission

Chronic disease (e.g., multiple sclerosis), malignancies and infections with long incubation periods (e.g., Lyme disease) are always considered present on admission. If the POA (present on admission) indicator identifies such secondary diagnoses as not present on admission, the POA indicator is presumed to be reported in error and such secondary diagnoses are included in the assignment of the admission APR DRG.

3. Substitute underlying chronic disease for acute exacerbation of a chronic disease not present on admission

Coding rules for reporting the POA (present on admission) status of an acute exacerbation of a chronic disease (e.g., diabetic ketoacidosis) specify that the POA status is determined relative to the acute exacerbation (e.g., whether the ketoacidosis was present on admission) and not the underlying chronic disease. In ICD-10-CM the acute exacerbation and the underlying chronic disease are sometimes included in a single code. When a single ICD-10-CM code representing an acute exacerbation of an underlying chronic disease is reported as not POA, an ICD-10-CM code representing the chronic disease without an acute exacerbation (e.g., diabetes) is substituted for the acute exacerbation code. The substituted chronic disease code is included in the assignment of the admission APR DRG. The substitution of the chronic disease code allows the chronic disease to be taken into account in the assignment of the APR DRG while excluding the post admission acute exacerbation from the APR DRG assignment.

4. Include complication of care codes* when present on admission

In the discharge APR DRG assignment ICD-10-CM codes for complications of care (e.g., instrument left in after a procedure) were assigned a default severity of illness and risk of mortality level of 1. With the incorporation of the POA (present on admission) indicator in version 26.1 of the APR DRG Classification System, a subset of the complication of care codes were assigned a default severity of illness and risk of mortality level greater than 1 (e.g., Foreign body left during procedure). If the complication of care code is present on admission, it is included in both the

discharge and admission APR DRG assignment. If the complication of care code is not present on admission it is excluded from both the discharge and admission APR DRG assignment.

* There are codes associated with extremely high mortality rates that will be treated within the logic in the same way as complication of care codes. Meaning, they are only included when calculating admission and discharge DRGs, and they are flagged as present on admission.

5. Use procedures to identify diagnoses present on admission

The occurrence of certain non OR (operating room) procedures early in a patient's stay indicate that the diagnosis associated with the non OR procedure must have been present on admission or an extension of the patient's condition at the time of admission. For example, if acute renal failure is specified as not present on admission but dialysis was initiated within the first four days of stay, the acute renal failure is presumed to have been present on admission and is included in the assignment of the admission APR DRG.

6. Use length of stay to identify diagnoses present on admission

Certain diagnoses require an extended period of time to develop. For example, a patient must be hospitalized an extend period of time for a post admission decubitus ulcer to develop. For short length of stay patients diagnoses with long development periods will be considered present on admission. For example, for patients with a length of stay of four days or less, a decubitus ulcer specified as not present on admission is presumed to be in error and the decubitus ulcer is included in the assignment of the admission APR DRG.

7. Exclude certain OR and non OR procedures from the admission APR DRG assignment unless performed early in the stay

In general, OR (operating room) and non OR are included in the assignment of the APR DRG. However, some OR and non OR procedures will not be included in the assignment of the APR DRG unless they are performed early in the hospital stay. In several of the steps in the APR DRG assignment logic, the performance of certain non OR procedures (e.g., mechanical ventilation) is used to increase the patients severity of illness or risk of mortality subclass. For assignment of the admission APR DRG these non OR procedures are only used if they are performed early in the patient's stay. For example, mechanical ventilation is only used in the assignment of the admission APR DRG if it is performed during the first two days of stay. Similarly, the OR procedures for repair of an obstetrical laceration are only used to assign the APR DRG if they are performed in the first two days of the hospital stay.

Chapter 4: Background and Explanation of Approach for Rerouting Logic in All Patient Refined Diagnosis Related Groups (APR DRGs)

The basic organizing approach to classification in the 3M™ All Patient Refined Diagnosis Related Groups Classification System is to first assign a patient to a Major Diagnostic Group (MDC), based upon principal diagnosis, and then to a specific APR DRG category based upon principal diagnosis (if medical) or operating room procedure (if surgical). This works well in the vast majority of cases to categorize the patient into an MDC and APR DRG that most aptly describes the reason for the hospitalization.

There are several different kinds of situations, however, where the principal diagnosis (PDX) based approach, as the starting point for establishing the MDC and APR DRG, needs to be supplemented by additional information and logic to yield the most useful classification. One situation is where there is an overwhelming consideration that should take priority. This is handled by a Pre-MDC Assignment Logic. The Pre-MDC Assignment Logic handles assignment to the major organ transplant APR DRGs, the neonatal MDC (based on age), the two tracheostomy APR DRGs, the Multiple Significant Trauma MDC, and the HIV MDC.

The other situation where the PDX-based starting point for APR DRG classification needs to be supplemented by additional information and logic, is where the PDX is overly broad or the sequencing of PDX and secondary diagnosis (SDX) is unclear, or in some instances the OR (operating room) procedure is unclear. These are handled through what is referred to as APR DRG "rerouting logic." This is the logic that considers secondary diagnoses, procedures and sometimes age, most often in conjunction with the PDX, to clarify the reason for the hospitalization. The rerouting logic either reassigns the patient to a new APR DRG within the same MDC (Within MDC Rerouting) or to a new MDC and APR DRG (Across MDC Rerouting).

These situations are not unique to the APR DRG classification system. They represent ambiguities that confront any DRG classification system. What is unique to the APR DRG classification system is the rerouting logic developed to assign these patients to the most appropriate and useful category.

Following is a description of the need for APR DRG rerouting logic, an explanation of the methodology for the APR DRG reroutings, and a set of detailed examples of Within MDC Reroutings and Across MDC Reroutings. Also included is a table summarizing all of the APR DRG reroutings.

Methodology for APR DRG Rerouting Logic

As identified earlier, the assignment of patients to a Major Diagnostic Category (MDC) is usually very straightforward based upon the principal diagnosis (PDX). Likewise, the assignment to an APR DRG is usually straightforward based upon the PDX for medical patients and OR (operating room) procedure for surgical patients. Occasionally, the surgical APR DRGs split into separate categories based upon PDX or non-OR procedure.

There are situations however, where it is necessary to consider several different factors together to assign the patient to the most appropriate and useful MDC and APR DRG. There are five different factors considered for this: PDX, secondary diagnosis (SDX), OR procedure, non-OR procedure, and age. The entire logic and specifications for the APR DRG reroutings contain three elements:

1. Whether the rerouting applies within MDC or across MDCs;
2. The combination of factors that define the rerouting;
3. Whether there is any special handling of SDXs, specifically, any resequencing of SDX and PDX for grouping purposes.

There are ten specific combinations of factors introduced in the rerouting logic. Some are very similar to each other, but are technically different. The most frequently used combination of factors is #1, PDX or SDX and Medical. This means a diagnosis, whether recorded as PDX or SDX, determines the APR DRG category assignment for medical patients.

0 – PDX or SDX and Medical

1 – PDX and Age and Medical

2 – PDX and Non-OR Procedure and Medical

3 – PDX and OR Procedure (and other OR procedures allowed if lower in MDC surgical hierarchy)

4 – PDX and Only OR Procedure Except Related OR Procedures

5 – SDX and OR Procedure (and any other OR procedures are allowed)

6 – DX and SDX and Medical

7 – DX and SDX and Either Surgical/Medical

8 – PDX and SDX and Only OR Procedure Except Related OR Procedures

9 – PDX and SDX and Only OR Procedure

There are fundamentally two ways that SDXs are used as part of the rerouting logic. One way is for the SDX to clarify the PDX. The APR DRG grouper uses the clarifying information of the SDX to reassign the patient to a new APR DRG, but does not, for grouping purposes, alter the sequence of PDX and SDX. This can be done within or across MDCs. An example of a Within MDC Rerouting is PDX liver disease and SDX alcoholic liver disease, clarifying that the patient

should be assigned to APR DRG 280 Alcoholic Liver Disease. An example of an Across MDC Rerouting is PDX complication of other vascular device (includes both peripheral vascular devices and renal dialysis shunt) and SDX renal failure (without heart failure) clarifying that the patient should be reassigned to MDC 11 (Diseases & Disorders of the Kidney & Urinary Tract), APR DRG 466 Malfunction, Reaction, Complication of Genitourinary Device or Procedure.

The second way the SDXs are used as part of the rerouting logic is to function as the PDX for APR DRG grouping purposes. There are two ways that the APR DRG system implements this: one way for Within MDC Reroutings and another way for Across MDC Reroutings. These are technically different approaches but accomplish the same end result.

In the instance of Within MDC Reroutings, the technical approach is for the APR DRG grouper to reassign the patient to a new APR DRG and then resequence the SDX as PDX for Severity of Illness (SOI) and Risk of Mortality (ROM) purposes. For example, a patient with a PDX of chest pain and an SDX of angina pectoris is reassigned from DRG 203 Chest Pain to DRG 198 Angina Pectoris and Coronary Atherosclerosis, and since the SDX of angina pectoris drove the APR DRG assignment, it is resequenced as the PDX for the subsequent steps of assigning SOI and ROM levels. This prevents angina pectoris from contributing as a redundant SDX to the SOI and ROM levels.

In the instance of Across MDC Reroutings, the technical approach is for the APR DRG grouper to resequence the PDX and SDX as its first action step and then proceed through all of its regular steps—MDC assignment, APR DRG assignment, and SOI and ROM level assignment. For example, if a patient has a PDX of hypovolemia (dehydration) and an SDX of gastroenteritis, the APR DRG grouper resequences the PDX and SDX so that gastroenteritis becomes the PDX and the patient is assigned to MDC 6 (Diseases & Disorders of the Digestive System) and to the appropriate APR DRG per the logic and specifications of MDC 6. Since gastroenteritis is already resequenced as the PDX, it will not contribute as a redundant SDX to the SOI and ROM levels. Hypovolemia, which is resequenced as the SDX, would contribute to the SOI and ROM levels if judged to be a significant comorbidity or complication by the APR DRG system (which, in this case it is not).

Note, the sequencing of PDX and SDX on the patient discharge record is not altered by any of these resequencing processes. Rather, the APR DRG grouper is redesignating PDX and SDX for specified steps that are part of its logic. In the example of PDX hypovolemia and SDX gastroenteritis, the APR DRG grouper resequences PDX and SDX for grouping purposes, but when users examine their own discharge records, hypovolemia will still be the principal diagnosis. This also means that when users examine their patients in MDC 6 (Diseases & Disorders of the Digestive System) and especially APR DRG 249 Non-Bacterial Gastroenteritis, Nausea & Vomiting, some of the patients will have a PDX of hypovolemia, which is ordinarily assigned to MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders).

Following is a list that summarizes the different types of logic used for the APR DRG reroutings. There are three characters to the APR DRG rerouting type number. Each character captures the following aspects of the rerouting logic:

- The first character refers to whether the rerouting occurs within or across MDCs.
  - W = Within MDC Rerouting
  - A = Across MDC Rerouting
- The second character refers to the combination of diagnostic, procedure and demographic factors used in rerouting (values 0–9 described earlier).

- The third character refers to special handling of SDXs, if any.
  - P = Resequence SDX as PDX for new APR DRG assignment and SOI/ROM purposes.
  - S= Resequence SDX as PDX for SOI/ROM purposes (after assignment to new APR DRG).
  - X = SDX clarifies PDX; no special handling of SDX needed. Type C also includes where Age or Procedure clarify the APR DRG assignment.

Type	Within or Across MDC	Combination of Factors	Special Handling of SDXs
W0S	Within MDC	PDX or SDX and Medical	Resequence SDX as PDX for SOI/ROM.
W1X	Within MDC	PDX and Age and Medical	
W3X	Within MDC	PDX and OR Procedure (and other OR procedures lower in MDC surgical hierarchy are allowed)	
W6S	Within MDC	PDX and SDX and Medical	Resequence SDX as PDX for SOI/ROM.
W6X	Within MDC	PDX and SDX and Medical	SDX clarifies PDX; no special handling needed.
A2X	Across MDC	PDX and Non-OR Procedure	
A3X	Across MDC	PDX and OR Procedure (and other OR procedures lower in MDC surgical hierarchy are allowed)	
A4X	Across MDC	PDX and Only OR Procedure Except Related OR Procedures	
A5X	Across MDC	SDX and OR Procedure (and any other OR procedures are allowed)	
A6P	Across MDC	PDX and SDX and Medical	Resequence SDX as PDX.
A6X	Across MDC	PDX and SDX and Medical	SDX clarifies PDX; no special handling needed.
A7P	Across MDC	PDX and SDX and Surg/Med	Resequence SDX as PDX.
A8P	Across MDC	PDX and SDX and Only OR Procedure Except Related OR Procedures	Resequence SDX as PDX.
A9P	Across MDC	PDX and SDX and Only OR Procedure	Resequence SDX as PDX.

List of All Patient Refined DRGs

A list of each All Patient Refined Diagnosis Related Group (APR DRG) with a specification of the MDC (Major Diagnostic Category) and whether the APR DRG is medical or surgical. Some APR DRGs which contain patients from multiple MDCs (e.g., 003 Bone Marrow Transplant) do not have an MDC specified. The letter M is used to designate a medical APR DRG and the letter P is used to designate a surgical APR DRG.

MDC	Med/Surg	Code	Code description
	P	001	Liver transplant &/or intestinal transplant
	P	002	Heart &/or lung transplant
	P	003	Bone marrow transplant
	P	004	Tracheostomy w MV 96+ hours w extensive procedure or ECMO
	P	005	Tracheostomy w MV 96+ hours w/o extensive procedure
	P	006	Pancreas transplant
01	P	020	Craniotomy for trauma
01	P	021	Craniotomy except for trauma
01	P	022	Ventricular shunt procedures
01	P	023	Spinal procedures
01	P	024	Extracranial vascular procedures
01	P	026	Other nervous system & related procedures
01	M	040	Spinal disorders & injuries
01	M	041	Nervous system malignancy
01	M	042	Degenerative nervous system disorders exc mult sclerosis
01	M	043	Multiple sclerosis & other demyelinating diseases
01	M	044	Intracranial hemorrhage
01	M	045	CVA & precerebral occlusion w infarct
01	M	046	Nonspecific CVA & precerebral occlusion w/o infarct
01	M	047	Transient ischemia
01	M	048	Peripheral, cranial & autonomic nerve disorders
01	M	049	Bacterial & tuberculous infections of nervous system
01	M	050	Non-bacterial infections of nervous system exc viral meningitis

MDC	Med/Surg	Code	Code description
01	M	051	Viral meningitis
01	M	052	Nontraumatic stupor & coma
01	M	053	Seizure
01	M	054	Migraine & other headaches
01	M	055	Head trauma w coma >1 hr or hemorrhage
01	M	056	Brain contusion/laceration & complicated skull Fx, coma < 1 hr or no coma
01	M	057	Concussion, closed skull Fx nos,uncomplicated intracranial injury, coma < 1 hr or no coma
01	M	058	Other disorders of nervous system
02	P	070	Orbital procedures
02	P	073	Eye procedures except orbit
02	M	080	Acute major eye infections
02	M	082	Eye disorders except major infections
03	P	089	Major cranial/facial bone procedures
03	P	090	Major larynx & trachea procedures
03	P	091	Other major head & neck procedures
03	P	092	Facial bone procedures except major cranial/facial bone procedures
03	P	093	Sinus & mastoid procedures
03	P	095	Cleft lip & palate repair
03	P	097	Tonsil & adenoid procedures
03	P	098	Other ear, nose, mouth & throat procedures
03	M	110	Ear, nose, mouth, throat, cranial/facial malignancies
03	M	111	Vertigo & other labyrinth disorders
03	M	113	Infections of upper respiratory tract
03	M	114	Dental & oral diseases & injuries
03	M	115	Other ear, nose, mouth,throat & cranial/facial diagnoses
04	P	120	Major respiratory & chest procedures
04	P	121	Other respiratory & chest procedures
04	M	130	Respiratory system diagnosis w ventilator support 96+ hours
04	M	131	Cystic fibrosis - pulmonary disease

MDC	Med/Surg	Code	Code description
04	M	132	BPD & oth chronic respiratory diseases arising in perinatal period
04	M	133	Pulmonary edema & respiratory failure
04	M	134	Pulmonary embolism
04	M	135	Major chest & respiratory trauma
04	M	136	Respiratory malignancy
04	M	137	Major respiratory infections & inflammations
04	M	138	Bronchiolitis & RSV pneumonia
04	M	139	Other pneumonia
04	M	140	Chronic obstructive pulmonary disease
04	M	141	Asthma
04	M	142	Interstitial & alveolar lung diseases
04	M	143	Other respiratory diagnoses except signs, symptoms & minor diagnoses
04	M	144	Respiratory signs, symptoms & minor diagnoses
05	P	160	Major cardiothoracic repair of heart anomaly
05	P	161	Cardiac defibrillator & heart assist implant
05	P	162	Cardiac valve procedures w cardiac catheterization
05	P	163	Cardiac valve procedures w/o cardiac catheterization
05	P	165	Coronary bypass w cardiac cath or percutaneous cardiac procedure
05	P	166	Coronary bypass w/o cardiac cath or percutaneous cardiac procedure
05	P	167	Other cardiothoracic procedures
05	P	169	Major thoracic & abdominal vascular procedures
05	P	170	Permanent cardiac pacemaker implant w AMI, heart failure or shock
05	P	171	Perm cardiac pacemaker implant w/o AMI, heart failure or shock
05	P	173	Other vascular procedures
05	P	174	Percutaneous cardiovascular procedures w AMI
05	P	175	Percutaneous cardiovascular procedures w/o AMI
05	P	176	Cardiac pacemaker & defibrillator device replacement
05	P	177	Cardiac pacemaker & defibrillator revision except device replacement

MDC	Med/Surg	Code	Code description
05	P	180	Other circulatory system procedures
05	M	190	Acute myocardial infarction
05	M	191	Cardiac catheterization w circ disord exc ischemic heart disease
05	M	192	Cardiac catheterization for ischemic heart disease
05	M	193	Acute & subacute endocarditis
05	M	194	Heart failure
05	M	196	Cardiac arrest
05	M	197	Peripheral & other vascular disorders
05	M	198	Angina pectoris & coronary atherosclerosis
05	M	199	Hypertension
05	M	200	Cardiac structural & valvular disorders
05	M	201	Cardiac arrhythmia & conduction disorders
05	M	203	Chest pain
05	M	204	Syncope & collapse
05	M	205	Cardiomyopathy
05	M	206	Malfunction,reaction,complication of cardiac/vasc device or procedure
05	M	207	Other circulatory system diagnoses
06	P	220	Major stomach, esophageal & duodenal procedures
06	P	221	Major small & large bowel procedures
06	P	222	Other stomach, esophageal & duodenal procedures
06	P	223	Other small & large bowel procedures
06	P	224	Peritoneal adhesiolysis
06	P	225	Appendectomy
06	P	226	Anal procedures
06	P	227	Hernia procedures except inguinal, femoral & umbilical
06	P	228	Inguinal, femoral & umbilical hernia procedures
06	P	229	Other digestive system & abdominal procedures
06	M	240	Digestive malignancy
06	M	241	Peptic ulcer & gastritis
06	M	242	Major esophageal disorders
06	M	243	Other esophageal disorders

MDC	Med/Surg	Code	Code description
06	M	244	Diverticulitis & diverticulosis
06	M	245	Inflammatory bowel disease
06	M	246	Gastrointestinal vascular insufficiency
06	M	247	Intestinal obstruction
06	M	248	Major gastrointestinal & peritoneal infections
06	M	249	Non-bacterial gastroenteritis, nausea & vomiting
06	M	251	Abdominal pain
06	M	252	Malfunction, reaction & complication of GI device or procedure
06	M	253	Other & unspecified gastrointestinal hemorrhage
06	M	254	Other digestive system diagnoses
07	P	260	Major pancreas, liver & shunt procedures
07	P	261	Major biliary tract procedures
07	P	262	Cholecystectomy except laparoscopic
07	P	263	Laparoscopic cholecystectomy
07	P	264	Other hepatobiliary, pancreas & abdominal procedures
07	M	279	Hepatic coma & other major acute liver disorders
07	M	280	Alcoholic liver disease
07	M	281	Malignancy of hepatobiliary system & pancreas
07	M	282	Disorders of pancreas except malignancy
07	M	283	Other disorders of the liver
07	M	284	Disorders of gallbladder & biliary tract
08	P	301	Hip joint replacement
08	P	302	Knee joint replacement
08	P	303	Dorsal & lumbar fusion proc for curvature of back
08	P	304	Dorsal & lumbar fusion proc except for curvature of back
08	P	305	Amputation of lower limb except toes
08	P	308	Hip & femur procedures for trauma except joint replacement
08	P	309	Hip & femur procedures for non-trauma except joint replacement
08	P	310	Intervertebral disc excision & decompression
08	P	312	Skin graft, except hand, for musculoskeletal & connective tissue diagnoses

MDC	Med/Surg	Code	Code description
08	P	313	Knee & lower leg procedures except foot
08	P	314	Foot & toe procedures
08	P	315	Shoulder, upper arm & forearm procedures
08	P	316	Hand & wrist procedures
08	P	317	Tendon, muscle & other soft tissue procedures
08	P	320	Other musculoskeletal system & connective tissue procedures
08	P	321	Cervical spinal fusion & other back/neck proc exc disc excis/decomp
08	M	340	Fracture of femur
08	M	341	Fracture of pelvis or dislocation of hip
08	M	342	Fractures & dislocations except femur, pelvis & back
08	M	343	Musculoskeletal malignancy & pathol fracture d/t muscskel malig
08	M	344	Osteomyelitis, septic arthritis & other musculoskeletal infections
08	M	346	Connective tissue disorders
08	M	347	Other back & neck disorders, fractures & injuries
08	M	349	Malfunction, reaction, complic of orthopedic device or procedure
08	M	351	Other musculoskeletal system & connective tissue diagnoses
09	P	361	Skin graft for skin & subcutaneous tissue diagnoses
09	P	362	Mastectomy procedures
09	P	363	Breast procedures except mastectomy
09	P	364	Other skin, subcutaneous tissue & related procedures
09	M	380	Skin ulcers
09	M	381	Major skin disorders
09	M	382	Malignant breast disorders
09	M	383	Cellulitis & other bacterial skin infections
09	M	384	Contusion, open wound & other trauma to skin & subcutaneous tissue
09	M	385	Other skin, subcutaneous tissue & breast disorders
10	P	401	Pituitary & adrenal procedures
10	P	403	Procedures for obesity

MDC	Med/Surg	Code	Code description
10	P	404	Thyroid, parathyroid & thyroglossal procedures
10	P	405	Other procedures for endocrine, nutritional & metabolic disorders
10	M	420	Diabetes
10	M	421	Malnutrition, failure to thrive & other nutritional disorders
10	M	422	Hypovolemia & related electrolyte disorders
10	M	423	Inborn errors of metabolism
10	M	424	Other endocrine disorders
10	M	425	Electrolyte disorders except hypovolemia related
11	P	440	Kidney transplant
11	P	441	Major bladder procedures
11	P	442	Kidney & urinary tract procedures for malignancy
11	P	443	Kidney & urinary tract procedures for nonmalignancy
11	P	444	Renal dialysis access device procedure only
11	P	445	Other bladder procedures
11	P	446	Urethral & transurethral procedures
11	P	447	Other kidney, urinary tract & related procedures
11	M	460	Renal failure
11	M	461	Kidney & urinary tract malignancy
11	M	462	Nephritis & nephrosis
11	M	463	Kidney & urinary tract infections
11	M	465	Urinary stones & acquired upper urinary tract obstruction
11	M	466	Malfunction, reaction, complic of genitourinary device or proc
11	M	468	Other kidney & urinary tract diagnoses, signs & symptoms
12	P	480	Major male pelvic procedures
12	P	481	Penis procedures
12	P	482	Transurethral prostatectomy
12	P	483	Testes & scrotal procedures
12	P	484	Other male reproductive system & related procedures
12	M	500	Malignancy, male reproductive system
12	M	501	Male reproductive system diagnoses except malignancy

MDC	Med/Surg	Code	Code description
13	P	510	Pelvic evisceration, radical hysterectomy & other radical GYN procs
13	P	511	Uterine & adnexa procedures for ovarian & adnexal malignancy
13	P	512	Uterine & adnexa procedures for non-ovarian & non-adnexal malig
13	P	513	Uterine & adnexa procedures for non-malignancy except leiomyoma
13	P	514	Female reproductive system reconstructive procedures
13	P	517	Dilation & curettage for non-obstetric diagnoses
13	P	518	Other female reproductive system & related procedures
13	P	519	Uterine & adnexa procedures for leiomyoma
13	M	530	Female reproductive system malignancy
13	M	531	Female reproductive system infections
13	M	532	Menstrual & other female reproductive system disorders
14	P	540	Cesarean delivery
14	P	541	Vaginal delivery w sterilization &/or D&C
14	P	542	Vaginal delivery w complicating procedures exc sterilization &/or D&C
14	P	544	D&C, aspiration curettage or hysterotomy for obstetric diagnoses
14	P	545	Ectopic pregnancy procedure
14	P	546	Other O.R. proc for obstetric diagnoses except delivery diagnoses
14	M	560	Vaginal delivery
14	M	561	Postpartum & post abortion diagnoses w/o procedure
14	M	563	Preterm labor
14	M	564	Abortion w/o D&C, aspiration curettage or hysterotomy
14	M	565	False labor
14	M	566	Other antepartum diagnoses
15	M	580	Neonate, transferred <5 days old, not born here
15	M	581	Neonate, transferred < 5 days old, born here
15	P	583	Neonate w ECMO
15	P	588	Neonate bwt <1500g w major procedure
15	M	589	Neonate bwt <500g or GA <24 weeks

MDC	Med/Surg	Code	Code description
15	M	591	Neonate birthwt 500-749g w/o major procedure
15	M	593	Neonate birthwt 750-999g w/o major procedure
15	M	602	Neonate bwt 1000-1249g w resp dist synd/oth maj resp or maj anom
15	M	603	Neonate birthwt 1000-1249g w or w/o other significant condition
15	M	607	Neonate bwt 1250-1499g w resp dist synd/oth maj resp or maj anom
15	M	608	Neonate bwt 1250-1499g w or w/o other significant condition
15	P	609	Neonate bwt 1500-2499g w major procedure
15	M	611	Neonate birthwt 1500-1999g w major anomaly
15	M	612	Neonate bwt 1500-1999g w resp dist synd/oth maj resp cond
15	M	613	Neonate birthwt 1500-1999g w congenital/perinatal infection
15	M	614	Neonate bwt 1500-1999g w or w/o other significant condition
15	M	621	Neonate bwt 2000-2499g w major anomaly
15	M	622	Neonate bwt 2000-2499g w resp dist synd/oth maj resp cond
15	M	623	Neonate bwt 2000-2499g w congenital/perinatal infection
15	M	625	Neonate bwt 2000-2499g w other significant condition
15	M	626	Neonate bwt 2000-2499g, normal newborn or neonate w other problem
15	P	630	Neonate birthwt >2499g w major cardiovascular procedure
15	P	631	Neonate birthwt >2499g w other major procedure
15	M	633	Neonate birthwt >2499g w major anomaly
15	M	634	Neonate, birthwt >2499g w resp dist synd/oth maj resp cond
15	M	636	Neonate birthwt >2499g w congenital/perinatal infection
15	M	639	Neonate birthwt >2499g w other significant condition
15	M	640	Neonate birthwt >2499g, normal newborn or neonate w other problem
16	P	650	Splenectomy
16	P	651	Other procedures of blood & blood-forming organs

MDC	Med/Surg	Code	Code description
16	M	660	Major hematologic/immunologic diag exc sickle cell crisis & coagul
16	M	661	Coagulation & platelet disorders
16	M	662	Sickle cell anemia crisis
16	M	663	Other anemia & disorders of blood & blood-forming organs
17	P	680	Major O.R. procedures for lymphatic/hematopoietic/other neoplasms
17	P	681	Other O.R. procedures for lymphatic/hematopoietic/other neoplasms
17	M	690	Acute leukemia
17	M	691	Lymphoma, myeloma & non-acute leukemia
17	M	692	Radiotherapy
17	M	693	Chemotherapy
17	M	694	Lymphatic & other malignancies & neoplasms of uncertain behavior
18	P	710	Infectious & parasitic diseases including HIV w O.R. procedure
18	P	711	Post-op, post-trauma, other device infections w O.R. procedure
18	M	720	Septicemia & disseminated infections
18	M	721	Post-operative, post-traumatic, other device infections
18	M	722	Fever
18	M	723	Viral illness
18	M	724	Other infectious & parasitic diseases
19	P	740	Mental illness diagnosis w O.R. procedure
19	M	750	Schizophrenia
19	M	751	Major depressive disorders & other/unspecified psychoses
19	M	752	Disorders of personality & impulse control
19	M	753	Bipolar disorders
19	M	754	Depression except major depressive disorder
19	M	755	Adjustment disorders & neuroses except depressive diagnoses
19	M	756	Acute anxiety & delirium states
19	M	757	Organic mental health disturbances

MDC	Med/Surg	Code	Code description
19	M	758	Childhood behavioral disorders
19	M	759	Eating disorders
19	M	760	Other mental health disorders
20	M	770	Drug & alcohol abuse or dependence, left against medical advice
20	M	772	Alcohol & drug dependence w rehab or rehab/detox therapy
20	M	773	Opioid abuse & dependence
20	M	774	Cocaine abuse & dependence
20	M	775	Alcohol abuse & dependence
20	M	776	Other drug abuse & dependence
21	P	791	O.R. procedure for other complications of treatment
21	M	811	Allergic reactions
21	M	812	Poisoning of medicinal agents
21	M	813	Other complications of treatment
21	M	815	Other injury, poisoning & toxic effect diagnoses
21	M	816	Toxic effects of non-medicinal substances
22	P	841	Extensive 3rd degree burns w skin graft
22	P	842	Full thickness burns w skin graft
22	M	843	Extensive 3rd degree or full thickness burns w/o skin graft
22	M	844	Partial thickness burns w or w/o skin graft
23	P	850	Procedure w diag of rehab, aftercare or oth contact w health service
23	M	860	Rehabilitation
23	M	861	Signs, symptoms & other factors influencing health status
23	M	862	Other aftercare & convalescence
23	M	863	Neonatal aftercare
24	M	890	HIV w multiple major HIV related conditions
24	M	892	HIV w major HIV related condition
24	M	893	HIV w multiple significant HIV related conditions
24	M	894	HIV w one signif HIV cond or w/o signif related cond
25	P	910	Craniotomy for multiple significant trauma
25	P	911	Extensive abdominal/thoracic procedures for mult significant trauma

MDC	Med/Surg	Code	Code description
25	P	912	Musculoskeletal & other procedures for multiple significant trauma
25	M	930	Multiple significant trauma w/o O.R. procedure
	P	950	Extensive procedure unrelated to principal diagnosis
	P	951	Moderately extensive procedure unrelated to principal diagnosis
	P	952	Nonextensive procedure unrelated to principal diagnosis
		955	Principal diagnosis invalid as discharge diagnosis
		956	Ungroupable