3M™ APR DRG Classification System

Version 26.1 (effective 10/01/2008)

Methodology Overview

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This manual was written, designed, and produced by the Clinical Research and Documentation Departments of 3M Health Information Systems, Wallingford, Connecticut and Murray, Utah.

Document number GRP–041
Version 26.1 10/08

ACKNOWLEDGEMENTS

The development of the 3M™ APR DRG Classification System, Version 26.1, involved the participation of many individual contributors. 3M HIS consultants Ruth Shaber, M.D., Warren Strauss, M.D., Stephen Wittenberg, M.D., David Earle, M.D., James Flink, M.D., James Slaughter, M.D., Robert Keller, M.D., Donald George, M.D., and Benjamin Gitterman, M.D. provided clinical input into the research. Data analysis support for the project was provided by Ana Tang, Julie-Anne Perry, Keith Boucher, Mano Rudravajhala, Sue Boucher, and Oleg Kostenko. The software was produced by Ronald Mills, Judy Switalski, and Laurence W. Gregg. It was tested by Kathy Bowen and Robyn Fernelius. Assistance in the design and production of the Definitions Manual for the APR DRG Classification System was provided by Kathy Blake and Chad Parkinson.

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History of the Development of the Diagnosis Related Groups (DRGs)

HISTORY OF THE DEVELOPMENT OF THE DIAGNOSIS RELATED GROUPS (DRGS)

Background

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 CMS DRGs, Medicare Severity DRGs (MS-DRGs), All Patient DRGs (AP-DRGs), and All Patient Refined DRGs (APR DRGs). The classic CMS DRGs (prior to FY 2008) and MS-DRGs (beginning in FY 2008) are used by the Centers for Medicare and Medicaid Services (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.

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 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 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 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.

Development of the original DRGs

The first operational set of DRGs was developed at Yale University in the early 1970s. The process of forming the original DRGs was begun 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 by the tree diagram in figure 1–1. 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, skin grafts and wound debridement, 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, bronchitis and asthma, respiratory symptoms and other respiratory diagnoses.

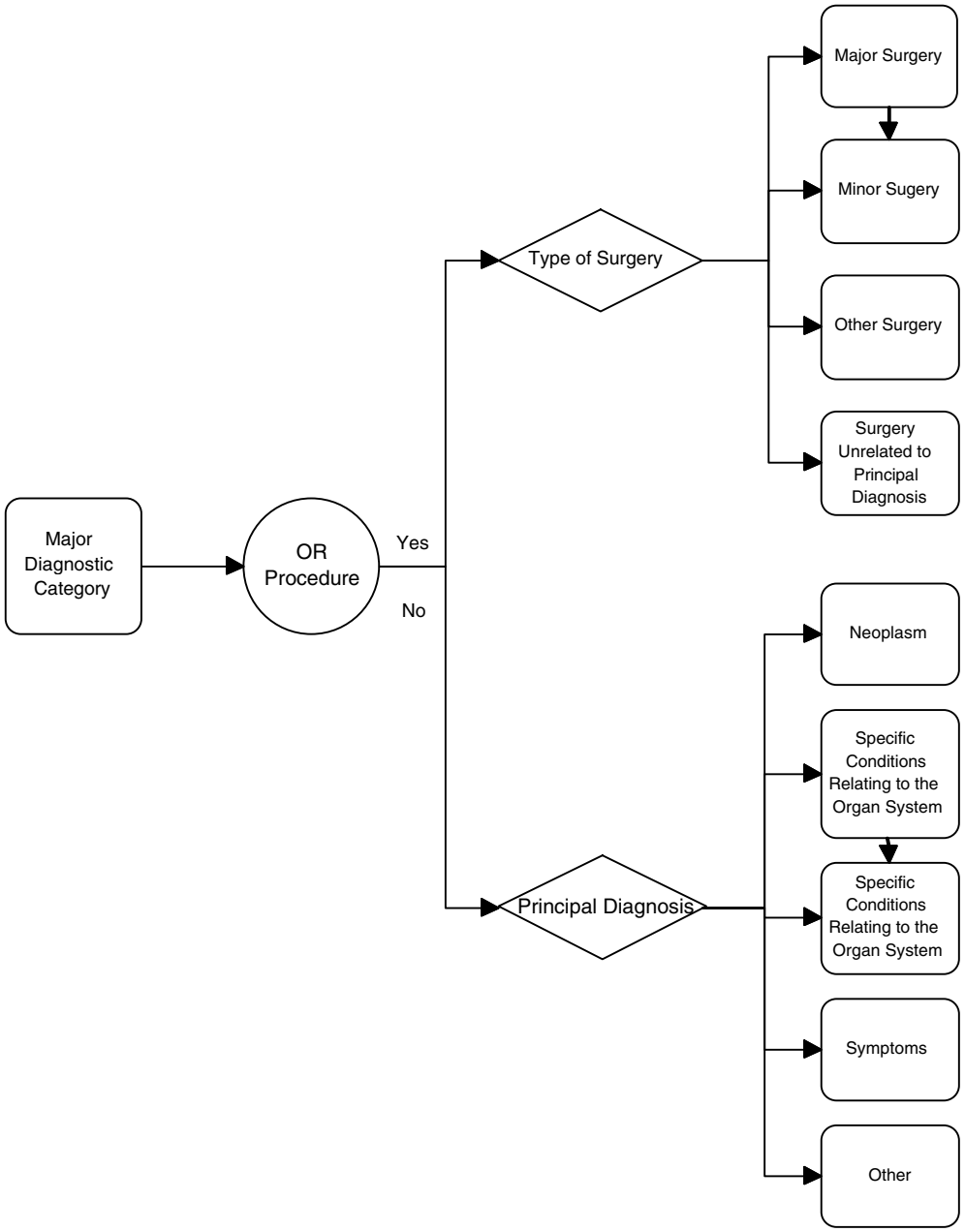

Figure 1–1. Typical DRG structure for a Major Diagnostic Category

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). This surgical group was then further divided based on whether the procedure performed was transurethral (i.e., organizing principle based on surgical approach).

Once the medical and surgical groups for an MDC were formed, each group of patients was evaluated to determine if complications, comorbidities, or the patient's age would consistently affect the consumption of hospital resources. Physician panels classified each diagnosis code based on whether the diagnosis, when present as a secondary condition, would be considered a substantial complication or comorbidity. A substantial complication or comorbidity was defined as a condition, that because of its presence with a specific principal diagnosis, would cause an increase in length of stay by at least one day for at least 75 percent of the patients. For example, sarcoidosis, chronic airway obstruction, and pneumococcal pneumonia are considered substantial complications or comorbidities for certain diseases, while simple goiter and benign hypertension are not. Each medical and surgical group within an MDC was tested to determine if the presence of any substantial comorbidities or complications would consistently affect the consumption of hospital resources. For example, the presence of complications or comorbidities was not significant for patients receiving a carpal tunnel release, but was very significant for patients with arrhythmia and conduction disorders. The same basic list of complications and comorbidities is used across most DRGs. However, depending on the principal diagnosis of the patient, some diagnoses in the basic list of complications and comorbidities may be excluded if they are closely related to the principal diagnosis. For example, urinary retention is a complication or comorbidity for a patient admitted for congestive heart failure, but not for a patient admitted for benign prostatic hypertrophy. In addition, in some cases, such as acute myocardial infarction patients, special complications and comorbidity definitions were used in defining the DRGs.

The patient's age was sometimes used in the definition of the DRGs. Pediatric patients (age 17 years or less) were often assigned to separate DRGs. For example, pediatric asthma patients were defined as a specific DRG.

The final variable used in the definition of the DRGs was the patient discharge status. Separate DRGs were formed for burn patients and newborns if the patients were transferred to another acute care facility. In addition, separate DRGs were formed for

patients with alcoholism or drug abuse who left against medical advice and for acute myocardial infarction patients and newborns who died.

For versions 2-24 of the DRGs, the further subdivisions of some medical and surgical DRGs was primarily based on the presence or absence of a CC or pediatric age (0-17). For example, in DRG version 24 there were 115 pairs of DRGs subdivided based on the presence or absence of a CC and 43 pediatric DRGs (age 0-17). Beginning with version 25 the use of CCs and patient age was completely revised. The revisions were so extensive that the version 25 DRGs were renamed to be the Medicare Severity DRGs (MS-DRGs).

Except for new diagnosis codes that were added to ICD-9-CM after FY1984 (e.g., HIV), the CC list of diagnoses used in the DRGs remained virtually identical to the original CC list used in FY1984. As a result of the changes that occurred in hospitals during the first 22 years of PPS, the CC list had lost much of its power to discriminate hospital resource use. Better coding of secondary diagnoses, stricter criteria for extended hospital stays, increased availability of post acute care services and the shift to outpatient care resulted in most patients (nearly 80 percent) admitted to hospitals having a CC. Therefore, in version 25 (MS-DRGs) the diagnoses comprising the CC list were completely redefined. The revised CC list is primarily comprised of significant acute disease, acute exacerbations of significant chronic diseases, advanced or end stage chronic diseases and chronic diseases associated with extensive debility. In general, most chronic diseases were not included on the revised CC list. For a patient with a chronic disease, a significant acute manifestation of the chronic disease was required to be present and coded for the patient to be assigned a CC. The revision of the CC list reduced the number of Medicare patients with a CC from approximately 80 percent to 40 percent.

In addition, to the revision of the CC list, each CC was also categorized as a major CC or a CC (i.e., non major CC) based on relative resource use. Approximately, 12 percent of all diagnoses codes were classified as a major CC, 24 percent as a CC and 64 percent as a non CC. Diagnoses closely associated with mortality (ventricular fibrillation, cardiac arrest, shock and respiratory arrest) were assigned as a major CC if the patient lived but as a non CC if the patient died.

The major CC, CC and non CC categorization was used to subdivide the surgical and medical DRGs into up to three levels with a patient being assigned to the most extreme level (e.g., a patient with an MCC and a CC is assigned to the MCC level). Before subdividing the medical and surgical DRGs into CC levels all the pediatric age distinctions were removed from the DRGs. To create the MS-DRGs, individual DRGs were subdivided into three, two or one level depending on the CC impact on resources used for that patient. The two way subdivision either created a separate level for just the major CC patients or a separate level for the non CC patients. The CC levels relate to the relative severity of illness of the patient. In the MS-DRGs, 152 DRGs have 3 CC levels, 106 DRGs have two CC levels and 78 DRGs have no CC levels resulting in 746 version 261 MS-DRGs which is a net increase of 208 DRGs over the 538 DRGs in version 24.

The actual process of forming the 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 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-9-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-9-CM code 64690 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-9-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.

Revisions of the DRGs for Medicare

The DRGs were originally developed at the Yale University School of Organization and Management during the 1970's under contract to the Centers for Medicare and Medicaid Services (formerly Health Care Financing Administration). The DRG definitions were intended to describe all the types of patients seen in an acute care hospital. Thus, the

DRGs encompassed both the elderly patient population as well as the newborn, pediatric, and adult populations. With the implementation of the Medicare prospective payment system (PPS) in October, 1983, the responsibility for the maintenance and modification of the DRG definitions became the responsibility of CMS. Since the inception of the Medicare PPS, the DRG definitions have been updated annually. Under contract with CMS, 3M Health Information Systems has performed all revisions of the DRG definitions, related software, and documentation. The focus of all DRG modifications instituted by CMS has been on problems relating to the elderly population. For example, limitations in the DRGs relating to the newborn and pediatric populations have never been addressed by the CMS modifications. The health care industry has utilized the DRGs across a wide array of applications. Hospitals have used DRGs as the basis of internal management systems. Medicaid programs and Blue Cross plans have used DRGs as the basis of payment systems. State data commissions have used DRGs as the basis for statewide comparative reporting systems. Most of these applications have utilized the DRGs across the entire patient population. Thus, the failure of the DRG update process to address DRG problems for the non-elderly population became a serious limitation for most applications of the DRGs.

Development of the AP-DRGs

In 1987, the state of New York passed legislation instituting a DRG-based prospective payment system for all non-Medicare patients. The legislation included a requirement that the New York State Department of Health (NYDH) evaluate the applicability of the DRGs to a non-Medicare population. In particular, the legislation required that the DRGs be evaluated with respect to neonates and patients with Human Immunodeficiency Virus (HIV) infections. NYDH entered into an agreement with 3M HIS to assist with the evaluation of the need for DRG modifications as well as to make the necessary changes in the DRG definitions and software. The DRG definitions developed by NYDH and 3M HIS are referred to as the All Patient DRGs (AP-DRGs).

Extensive research had been performed by the National Association of Children's Hospitals and Related Institutions (NACHRI) on alternative approaches to reformulating the DRG categories for neonates and other pediatric patients. The system developed by NACHRI is called the Pediatric Modified Diagnosis Related Groups or PM-DRGs. The PM-DRGs created many additional DRGs specifically for pediatric patients. For neonates, a total of 47 DRGs were created. Neonates were defined as newborns and all other patients of age less than 29 days at admission. As part of its evaluation effort, NYDH and 3M HIS examined the NACHRI neonatal definitions and adopted a modified version of the NACHRI system.

The NACHRI system introduced birth weight and duration of mechanical ventilation as two new variables for neonatal patients. The AP-DRGs include birth weight, but in place of the duration of mechanical ventilation use the non-OR procedures for continuous positive airway pressure and mechanical ventilation in the definitions of certain neonatal AP-DRGs. Except for neonates who die or are transferred within the first few days of life, the AP-DRGs define six ranges of birthweights that represented distinct demands on hospital resources:

- Less than 750 grams
- 750-999 grams
- 1000-1499 grams
- 1500-1999 grams
- 2000-2499 grams

- Greater than 2499 grams

The six birth weight categories are used as the primary variable in forming the neonatal AP-DRGs. Within each birth weight range, the neonates are first subdivided based on the presence of a significant OR procedure, and then further subdivided by the presence of multiple major problems, major problems, minor problems, or other problems. In addition, there are normal newborn categories for the 2,000–2,499 gram and over 2,500 gram birth weight ranges. The definitions for the major problem, minor problem, and other problem diagnoses used in the neonatal AP-DRGs are a modification of the definitions originally developed by NACHRI. In total there are 34 neonatal AP-DRGs. The differences in hospital resources across the different neonatal AP-DRGs is quite substantial. Based on New York hospital data, a neonate under 750 grams discharged alive costs over 159 times more than a normal newborn.

The state of New York had collected birthweight as a standard variable in its statewide hospital database. However, most hospital databases have not historically collected birthweight as a standard variable. In October of 1988, the newborn ICD-9-CM codes were modified to include a fifth digit specifying the birthweight. The birthweight ranges used in ICD-9-CM correspond directly to the birthweight categories used in the AP-DRGs. Thus, the neonatal AP-DRGs can be used with databases which do not explicitly collect the birthweight variable.

The first step in the determination of the DRG had always been the assignment of the appropriate MDC based on the principal diagnosis. The AP-DRGs for neonates represent a first departure from the use of principal diagnosis as the initial variable in DRG assignment. Assignment to the AP-DRG neonatal MDC is based on the patient's age. The CMS DRGs use the principal diagnosis to assign patients to the neonatal MDC. Unfortunately, some diagnoses usually associated with neonates can also be used as principal diagnosis for non-neonate patients (e.g., neonatal diabetes mellitus). Thus, in the original DRGs, some patients who were not neonates could be assigned to the neonatal MDC. The AP-DRGs assign a patient to the neonatal MDC when the age of the patient at admission is less than 29 days, regardless of the principal diagnosis of the patient. Patients with age over 28 days are assigned to the MDC most appropriate to the principal diagnosis. Patients with age over 28 days with a principal diagnosis that is strictly a neonatal diagnosis (e.g., V3000-single live born in hospital) are assigned to AP-DRG 469.

When the original DRGs were developed, HIV infections were not recognized as a separate disease category. Indeed, there were no ICD-9-CM codes available to identify explicitly HIV infections. In October of 1986, ICD-9-CM was expanded to include a series of codes identifying patients with an HIV infection. The increasing number and associated high cost of HIV infection patients required that AP-DRGs for HIV infection patients be created. In the AP-DRGs MDC 24 was created for HIV infection patients. There are many different complications (e.g., Kaposi's sarcoma) of an HIV infection. The ICD-9-CM coding rules for HIV infections do not specify a standard way of coding an HIV infection. The HIV infection may be coded as principal diagnosis with the complication of the HIV infection as a secondary diagnosis. Alternatively, the HIV complication may be coded as principal diagnosis and the HIV infection as a secondary diagnosis. In order to overcome this lack of standardization in coding, it was necessary to make assignment to MDC 24 dependent on both the principal and secondary diagnoses.

Assignment to MDC 24 is based on a principal diagnosis of an HIV infection, or a principal diagnosis of an HIV related complication combined with a secondary diagnosis of an HIV infection (e.g. principal diagnosis of pneumocystosis and a secondary diagnosis of an HIV

infection). If a patient has an HIV infection as a secondary diagnosis and a principal diagnosis that is unrelated to the HIV infection (e.g., cholecystitis), then the patient is not assigned to MDC 24 but is assigned to the MDC associated with the principal diagnosis. MDC 24 consists of 17 AP-DRGs.

The initial HIV AP-DRG consists of all HIV patients who had a tracheostomy. The HIV tracheostomy AP-DRG consists primarily of patients who require long term mechanical ventilation. The HIV AP-DRGs are then subdivided based on the presence or absence of an OR procedure into surgical and medical groups. Both the surgical and medical patients are further subdivided based on the following:

- Presence or absence of ventilator support or nutritional support
- Multiple HIV related major infections
- Major HIV related diagnoses

Major HIV related infections were subdivided into 12 mutually exclusive categories (e.g., pneumocytosis, septicemia, etc.). A patient was considered to have a multiple major infection when a diagnosis was present from two or more different major infection categories. Major HIV related diagnoses include the major infections as well as other major problems, such as central nervous system problems. In addition, medical patients were further subdivided based on the following:

- Discharged against medical advice
- Multiple significant HIV related diagnoses
- Presence or absence of Tuberculosis
- Significant HIV related diagnoses
- Other HIV related diagnoses

Significant HIV related diagnoses were subdivided into an additional 31 mutually exclusive categories (e.g., Kaposi's sarcoma, malnutrition, etc.) that were used to identify patients with multiple significant HIV related diagnoses. Other HIV related diagnoses were relatively minor diagnoses such as dermatophytosis and noninfectious gastroenteritis. Medical patients with no HIV-related diagnoses are assigned to a separate AP-DRG.

The database used in the initial development of the AP-DRGs was an all payor database of 722,626 discharges from 85 New York hospitals. In addition to length of stay, the database contained patient cost computed using departmental cost-to-charge ratios.

The initial release of the AP-DRGs consisted of the additions of MDC 24 and the restructuring of the newborn MDC. For the purpose of consistency with the CMS DRGs, the initial AP-DRGs were referred to as version 5.0 and were effective in New York state beginning on January 1, 1988. Since the initial release, the AP-DRGs have been updated every one to two years.

The treatment of trauma patients has become highly specialized. Selected hospitals are often designated as trauma centers. Because of the high degree of specialization, it is particularly important that the AP-DRGs identify the different types of multiple trauma patients. MDC 25 was added to the AP-DRGs for multiple trauma patients. All trauma diagnoses were reviewed and divided into eight body site categories (head, chest, abdomen, kidney, urinary, pelvis and spine, lower limb, and upper limb). Within each

body site, the traumas that were considered significant were identified (e.g., in the chest body site, a flail chest is a significant trauma while a single fractured rib is not). Patients are assigned to the multiple trauma MDC if they have at least two significant trauma diagnoses (as either principal or secondary) from different body sites. The multiple trauma MDC is divided based on the presence of an operating room procedure. Medical and surgical patients with major nontraumatic complications or comorbidities are assigned to separate AP-DRGs. There are five OR procedure AP-DRGs and three medical AP-DRGs in the multiple trauma MDC. Based on New York cost data, a patient assigned to the multiple trauma MDC will cost on average twice as much as trauma patients who do not have multiple traumas.

MDC 20 (Alcohol/Drug Use & Alcohol/Drug Induced Organic Mental Disorders) for alcohol and drug abuse was also completely restructured. Patients were differentiated based on the substance being abused:

- Opioid abuse
- Alcohol abuse
- Cocaine and other drug abuse

Each category of substance abuse was then further subdivided based on whether the patient left against medical advice, and the presence of complications and comorbidities. There are a total of nine AP-DRGs in MDC 20.

Patients who are on long-term mechanical ventilation are extremely expensive. Long-term ventilation patients require that a tracheostomy be performed. Across all MDCs, patients with a tracheostomy were put into one of two tracheostomy AP-DRGs. Patients with certain mouth, larynx, or pharynx diseases are not patients on long-term ventilation support, but are patients who are having the tracheostomy performed for therapeutic reasons as treatment for the mouth, larynx, or pharynx problem. These patients are assigned a separate AP-DRG while all other patients with a tracheostomy represent long-term ventilation patients and are assigned to a different AP-DRG.

Liver transplants, bone marrow transplants, heart transplants, kidney transplants, and lung transplants are very expensive and can be performed for diagnoses in different MDCs (e.g., a liver transplant can be performed for certain poisonings as well as for certain liver diseases). All liver, bone marrow, heart, kidney, lung and simultaneous kidney/pancreas transplant patients are assigned to an AP-DRG independent of the MDC of the principal diagnosis.

Table 1–1. Major Diagnostic Categories

1	Diseases and Disorders of the Nervous System
2	Diseases and Disorders of the Eye
3	Ear, Nose, Mouth, Throat, and Craniofacial Diseases and Disorders
4	Diseases and Disorders of the Respiratory System
5	Diseases and Disorders of the Circulatory System
6	Diseases and Disorders of the Digestive System
7	Diseases and Disorders of the Hepatobiliary System and Pancreas
8	Diseases and Disorders of the Musculoskeletal System and Connective Tissue

Table 1–1. Major Diagnostic Categories *(continued)*

9	Diseases and Disorders of the Skin, Subcutaneous Tissue and Breast
10	Endocrine, Nutritional and Metabolic Diseases and Disorders
11	Diseases and Disorders of the Kidney and Urinary Tract
12	Diseases and Disorders of the Male Reproductive System
13	Diseases and Disorders of the Female Reproductive System
14	Pregnancy, Childbirth and the Puerperium
15	Newborns and Other Neonates with Conditions Originating in the Perinatal Period
16	Diseases and Disorders of Blood, Blood Forming Organs and Immunological Disorders
17	Lymphatic, Hematopoietic, Other Malignancies, Chemotherapy and Radiotherapy
18	Infectious and Parasitic Diseases, Systemic or Unspecified Sites
19	Mental Diseases and Disorders
20	Alcohol/Drug Use and Alcohol/Drug Induced Organic Mental Disorders
21	Poisonings, Toxic Effects, Other Injuries and Other Complications of Treatment
22	Burns
23	Rehabilitation, Aftercare, Other Factors Influencing Health Status and Other Health Service Contacts
24	Human Immunodeficiency Virus (HIV) Infections
25	Multiple Significant Trauma

Major complications and comorbidities

Some complications and comorbidities (CC) will have a greater impact on hospital resource use than other CCs. For example, a secondary diagnosis of septicemia will in general be more resource intensive than a CC of chronic ulcer. The AP-DRGs designate a subset of the CCs as major CCs.

The impact of the presence of a major CC was evaluated for each MDC. In many MDCs, the presence of a major CC tended to have a dominate effect on the resources used by the patient. In recognition of the impact of major CCs and in order to avoid significantly increasing the number of DRGs, a single major CC AP-DRG across all surgical patients within an MDC and a single major CC AP-DRG across all medical patients within an MDC were formed for some MDCs. It was not always possible to form a single major CC AP-DRG for the medical or surgical portion of an MDC. For example, in MDC 1, it was necessary to form two major CC AP-DRGs for surgical patients consisting of patients with a craniotomy versus patients with any other nervous system procedure. At least two major CC AP-DRGs were created for each MDC with the exception of MDCs 14, 15, 19, 20 and 22–24 in which no major CC AP-DRGs were created. In total, there are 60 major CC AP-DRGs.

AP-DRG hierarchy

The departure in the AP-DRGs from the use of principal diagnosis as the initial variable in DRG assignment made it necessary to form a hierarchy of all the exceptions to the principal diagnosis based assignment to an MDC. The hierarchy for assigning patients to an AP-DRG is shown in table 1–2. For example, based on this hierarchy, if a patient has a tracheostomy and multiple trauma, the patient is assigned to the appropriate tracheostomy AP-DRG.

Table 1–2. AP-DRG Hierarchy

Exception Hierarchy	MDC/AP-DRG Assignment
Liver Transplant and/or Intestinal Transplant	Assign to AP-DRG 480
Lung Transplant	Assign to AP-DRG 795
Simultaneous Kidney/Pancreas Transplant	Assign to AP-DRG 805
Pancreas Transplant for Diabetes and Renal Failure	Assign to AP-DRG 829
Heart Transplant and/or Heart Assist System	Assign to AP-DRG 103
Kidney Transplant	Assign to AP-DRG 302
Allogeneic Bone Marrow Transplant	Assign to AP-DRG 803
Autologous Bone Marrow Transplant	Assign to AP-DRG 804
Age less than 29 days	Assign to MDC 15
Principal diagnosis of HIV or secondary diagnoses of HIV and principal diagnosis of HIV related condition	Assign to MDC 24
ECMO	Assign to AP-DRG 877
Tracheostomy	Assign to AP-DRG 482, 877, 878
Principal diagnosis of trauma and at least two significant traumas from different body sites	Assign to MDC 25
Principal Diagnosis	Assign to MDCs 1–14, 16–23

Pediatric and other AP-DRG modifications

The AP-DRGs introduce many other changes to the CMS DRGs. Some of these primarily affect pediatric patients while others affect patients of all ages. The pediatric modifications include some of the recommendations originally developed by NACHRI. In the following areas either additional AP-DRGs were created or significant modifications were made:

- Pediatric ventricular shunts
- Pediatric cystic fibrosis
- Lead poisoning
- Spinal fusion
- Compulsive nutritional disorders
- Infant aftercare for weight gain
- High-risk obstetric care
- Tertiary aftercare for multiple trauma
- Acute leukemia
- Multiple channel cochlear implants
- Hemophilia factor VIII and IX diseases
- Traumatic stupor, coma, concussion and intracranial injuries
- Bronchopulmonary dysplasia

- Congenital anomalies
- Sickle cell crisis

In addition, the AP-DRGs subdivide many of the pediatric groups based on CCs, whereas the MS-DRGs do not. The AP-DRGs also modified many of the basic components of the CMS DRGs. For example, diagnoses were deleted from the CC list (e.g., allergic urticaria), the CC exclusion list was modified (e.g., postoperative anemia is not a CC with a principal diagnosis of postoperative hemorrhage) and the surgical hierarchies were modified (e.g., Arthroscopy was moved lower in the surgical hierarchy for MDC 8). There are 684 AP-DRGs in version 26.1, two of which are error DRGs. There are 746 MS-DRGs in version 26.1, two of which are error DRGs.

Some of the DRG modifications originally developed in the AP-DRGs have subsequently been adopted in the MS-DRGs. For example, in version 8.0 of the CMS DRGs, an HIV infection MDC was added. However, the MS-DRG HIV infection MDC consists of three base DRGs and does not discriminate among HIV infection patients at the level of detail contained in the AP-DRGs.

Other related research

CMS funded a project at Yale University to revise the use of CCs in the DRGs. The Yale project categorized all secondary diagnoses that were considered a CC in the CMS DRGs into distinct levels. For surgical patients there were four levels of secondary diagnoses, (minor or non-CC, moderate CC, major CC and catastrophic CC). For medical patients there were three levels of secondary diagnoses (minor or non-CC, moderate or major CC and catastrophic CC). All age splits and CC splits in the existing CMS DRGs were eliminated and replaced by four subclasses for surgical patients, or three subclasses for medical patients.

A patient is assigned to the subclass corresponding to the highest level secondary diagnosis. Thus, a surgical patient with two moderate CCs and one major CC is assigned to the major CC subclass. The number of secondary diagnoses has no effect on the subclass assigned to the patient (i.e., multiple secondary diagnoses at one level do not cause the patient to be assigned to a higher subclass). Thus, although a surgical patient may have four moderate CCs present, the patient is still assigned to the moderate CC subclass. The result of the applications of the Yale research was the creation of a total of nearly 1200 DRGs.

While the original Yale research demonstrated that significant improvement in the prediction of hospital cost could be achieved by the addition of CC subclasses, there were several major limitations of the Yale research.

- The base DRGs were the CMS DRGs and, therefore, the non-Medicare population was not adequately addressed.
- Death was used to define the base DRGs and, therefore, the system could not be used for any type of mortality analysis.
- The subclasses were formed based on resource intensity and did not address severity of illness or risk of mortality.
- There was no recognition of the impact of multiple secondary diagnoses.

- The only secondary diagnoses that were utilized in the assignment of a patient to a CC subclass were the secondary diagnoses that were considered a CC in the CMS DRGs.
- The formation of four subclasses for surgical patients and three subclasses for medical patients was inconsistent and confusing.

Despite these limitations, the Yale research team demonstrated that meaningful CC subclasses could be created within DRGs.

CHAPTER 2

Development of the 3M™ All Patient Refined Diagnosis Related Groups (APR DRGs)

DEVELOPMENT OF THE ALL PATIENT REFINED DRGS (APR DRGS)

Expanding the scope of the DRG system

The original objective of the 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. The CMS DRGs (formerly the HCFA DRGs) and the AP-DRGs have remained focused on this limited objective. 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. As previously defined, these patient attributes have the following meaning:

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 DRGs expand 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 DRGs 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 ICD-9-CM 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. The historical data used in the development of version 20.0 of the APR DRGs was a nationwide database of 8.5 million discharges, which included all payer discharges from 1,000 general hospitals from 10 states, and all payer discharges from 47 children's hospitals in the United States. For version 24.0, testing of new diagnosis and procedure codes was conducted using Healthcare Cost and Utilization Project (HCUP) 2003 data which contained over seven million discharges.

Development of the base APR DRG

The AP-DRGs (see chapter 1) were initially used as the base DRGs in the formation of the initial APR DRGs. A series of consolidations, additions, and modifications were then made to these initial APR DRGs to create the base APR DRGs. Similar to the Yale research, the first step in forming the APR DRGs was to consolidate all age, CC and major CC splits. The APR DRGs also consolidated all splits based on discharge status of death. This was necessary so that death as an outcome variable could be examined across all the APR DRGs.

In addition to these uniform consolidations, the APR DRG system introduced an extensive set of consolidations, additions, and refinements to the initial APR DRG categories. This includes the diagnoses and procedures and birthweight ranges (for newborns) that define an APR DRG, the procedure codes that are considered OR procedures, and the placement of surgical APR DRGs in their respective MDC surgical hierarchies. The APR DRG system has also introduced numerous changes to the definition of MDCs and the pre-MDC hierarchies and categories. Finally, the APR DRG system has introduced a new kind of logic referred to as "rerouting logic," that reassigns a patient to a new MDC and APR DRG in certain circumstances where the principal diagnosis is overly broad or the sequencing of principal and secondary diagnosis is unclear. Altogether these changes result in a set of base APR DRGs that are very different from those of other DRG classification systems. Following is a summary description of these changes.

Consolidate APR DRGs based on complicated principal diagnosis

APR DRGs that were defined based on complicated principal diagnoses were consolidated. For example, in the initial version of APR DRGs, appendectomies with a complicated principal diagnosis (e.g., appendicitis with peritonitis) were assigned to a different APR DRG than uncomplicated appendectomies. The APR DRGs for appendectomies were consolidated and recognition of the complicated principal diagnosis was subsequently incorporated into the subclass assigned within the APR DRG. Other examples of this kind of consolidation include vaginal delivery with complicating diagnoses and other antepartum diagnoses with complicating diagnoses.

Consolidate APR DRGs based upon complicated OR procedures

The APR DRG system consolidated certain surgical categories that, in both the CMS DRGs and AP-DRGs, are subdivided based upon more complicated types of OR procedures. Examples of surgical category consolidations are cholecystectomy with common duct exploration versus cholecystectomy without common duct exploration, and total mastectomy versus subtotal mastectomy. Surgical procedures were consolidated when the different procedures represented fundamentally the same type of patient and the difference in complexity could be captured through the APR DRG severity of illness and risk of mortality subclasses.

Consolidate APR DRGs based on case volume

The general trend toward outpatient surgery made some of the initial APR DRGs extremely low in volume. Such APR DRGs were consolidated into other similar APR DRGs. For example, carpal tunnel releases are now rarely performed on an inpatient basis. Thus, the APR DRG for carpal tunnel release was consolidated into the APR DRG for nervous system procedures for peripheral nerve disorders, which includes procedures such as tarsal tunnel

release, and, subsequently, all of these procedures were consolidated into the APR DRG for other nervous system and related OR procedures. Since the early 1990's when the APR DRGs were first developed, there have been many areas where hospitalization rates have decreased. This is examined carefully and in each subsequent update of the APR DRG classification system, there have been a number of further consolidations for low volume APR DRG categories for both medical and surgical patients.

Pediatric additions

While the AP-DRGs incorporated some of the pediatric modifications from the PM-DRGs (see chapter 1), the APR DRGs incorporated the remaining significant pediatric modifications in the PM-DRGs. In addition, in conjunction with NACHRI, the APR DRGs were reviewed with a national pediatric database. As a result of this review, additional APR DRGs were created. For example, scoliosis (curvature of the back) is one of the primary reasons spinal fusions are performed on pediatric patients. Spinal fusions for scoliosis tend to be more complex than spinal fusions for other clinical reasons such as a herniated disk. Thus, the APR DRG for spinal fusions was subdivided based on a principal diagnosis of scoliosis. Another example is the creation of an APR DRG for major cardiothoracic repair of heart anomaly.

Restructure newborn APR DRGs

The base APR DRGs for newborns were completely restructured. Age was used instead of principal diagnosis to define the newborn MDC; birthweight ranges were used as the starting point framework for newborn APR DRGs; surgical APR DRGs were created within each birthweight range; and medical hierarchies were created within birthweight ranges that have more than one medical APR DRG. A medical hierarchy is necessary because newborns do not have a principal diagnosis in the usual sense. Most newborns have a live newborn status code as their principal diagnosis. This does not permit assignment to a medical APR DRG based on principal diagnosis. Thus, it was necessary to create a medical hierarchy for newborns.

As in the AP-DRGs, the APR DRG newborn MDC was initially defined to include all neonates, with age 0–28 days at time of admission. For version 20.0 APR DRGs, the age definition for MDC 15 was redefined and narrowed to be more consistent with its title, "Newborns & Other Neonates with Conditions Originating in the Perinatal Period." MDC 15 is now defined to include patients age 0–7 days and a subset of patients age 8–14 days who are low birthweight patients and may still have perinatal complications during this time period necessitating transfer to another hospital. This removes from MDC 15 virtually all readmissions to the hospital for community acquired infections and other problems that occur after the first week of life. The new age definition for MDC 15 increases the clinical similarity of MDC 15 patients, better aligns MDC 15 patients with the organization of patient care units and physician specialties, allows for the elimination of certain low volume APR DRGs in MDC 15, and places the older neonatal patients (8–28 days) in other MDCs where they can be assigned to more disease specific APR DRGs.

Initially, the newborn MDC was organized into six birthweight ranges—the same as in AP-DRGs. For version 20.0 APR DRGs, the number of birthweight ranges was expanded to eight and the number of different APR DRG categories within each birthweight range was decreased. The net effect of all APR DRG category changes in MDC 15 was a reduction in the number of base APR DRGs from 35 in version 15.0 to 28 in version 20.0.

Version 20.0 of APR DRGs also incorporated the use of gestational age codes that were introduced into ICD-9-CM in October 2002. Gestational age is used as part of the severity of illness and risk of mortality subclass assignment for newborns.

Add APR DRGs for mortality

The same base APR DRGs are used in conjunction with both the severity of illness subclasses and risk of mortality subclasses. Thus, some new APR DRGs were necessary in order to reflect differences in mortality. For example, initial APR DRG 45 (Specific Cerebrovascular Disorders Except TIA) was subdivided into APR DRG 45 (CVA With Infarct) and APR DRG 44 (Intracranial Hemorrhage) as a result of the significantly higher mortality rate for intracranial hemorrhage patients. In version 20.0 APR DRGs, neonates <500 grams (1.1 pounds) were placed in a new APR DRG separate from neonates 500–749 grams (1.1–1.6 pounds) because the mortality rates are so much higher for neonates <500 grams.

Other APR DRG additions and refinements

Chapter 1 of the APR DRG Definitions Manual explains that the process of defining the medical and surgical categories in an MDC requires that each category be based on some organizing principle. The end goal is to create categories that are clinically coherent and have sufficient case volume to be useful. Following are examples of ways in which version 20.0 APR DRG modifications improve clinical coherence:

- Consolidate APR DRGs if there aren't meaningful clinical differences; e.g., combine APR DRG 202 Angina Pectoris and APR DRG 198 Coronary Atherosclerosis.
- Improve the clinical distinction between related APR DRGs; e.g., redefine APR DRGs 301 and 302 for joint replacement to be based on the joint replaced (i.e., hip versus knee) instead of the etiology (i.e., trauma versus non trauma).
- For MDC 22 (Burns), re-conceptualize the APR DRGs to give further emphasis to third degree burns.
- For MDC 24 (Human Immunodeficiency Virus Infections), refine the list of major HIV related conditions and significant HIV related conditions.
- For MDC 25 (Multiple Significant Trauma), redefine the APR DRGs giving more emphasis to the surgical categories.
- Throughout the MDCs, consistently define APR DRGs for which the reason for the hospitalization is a complication of treatment. These APR DRGs now exist in MDCs 5, 6, 8, 11, 18, and 21.
- Throughout the MDCs, refine and make more consistent the definition of Other Related OR Procedures APR DRGs.
- Substantially redefine the three APR DRGs for OR Procedures Unrelated to Principal Diagnosis so that each is defined by a distinct level of surgical complexity.

Reclassification of OR Procedures

The APR DRG system has reevaluated the procedure codes considered OR procedures which in turn affects whether a patient will be assigned to a surgical or medical APR DRG.

Version 20.0 APR DRGs removed 62 procedure codes from the APR DRG list of OR procedures, leading to two-and-a-half percent fewer patients classified into surgical APR DRGs. The highest impact reclassified procedure is excisional debridement. Next most common is endoscopic lung biopsy followed by certain other biopsies of bone, soft tissue, blood vessel, cervix, uterus, and bladder. Other reclassified procedures with volume are interruption of vena cava and linear repair eyelid laceration. The APR DRGs most affected by these procedure code reclassifications are the APR DRGs previously defined on the basis of skin graft or excisional wound debridement in MDCs 8, 9, 10, and 21 and the "other OR procedure" APR DRGs throughout the various MDCs.

Revise MDC definitions

The APR DRG system has introduced numerous changes to MDC definitions, especially with version 20.0 APR DRGs.

- The age definition for MDC 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period) was narrowed as described previously.
- MDC 25 (Multiple Significant Trauma) was updated with respect to the lists of significant trauma diagnoses and the introduction of OR procedures to clarify whether certain diagnoses represent significant trauma. The net effect was to decrease the number of MDC 25 medical patients and increase the number of MDC 25 surgical patients.
- MDC 24 (Human Immunodeficiency Virus Infections) was updated with respect to the definition of HIV related diagnoses, leading to somewhat fewer patients assigned to MDC 24.
- MDC 21 was redefined and had its title changed from "Injuries, Poisonings & Toxic Effects of Drugs" to "Poisonings, Toxic Effects, Other Injuries and Other Complications of Treatment." The title change reflects that most of the injury diagnoses previously in MDC 21 have been moved to other body system specific MDCs, namely MDCs 1, 3, 5, 8, and 9. "Other Complications of Treatment" was added into the title of MDC 21 since these diagnoses have always been in MDC 21.
- Cranial and face bone diagnoses, previously dispersed across MDCs 3, 8, and 21, were consolidated into MDC 3 which is reflected in the revised title for MDC 3, "Ear, Nose, Mouth, Throat and Craniofacial Diseases and Disorders."
- Prematurity diagnoses (for older neonates and infants) and orthopedic aftercare diagnoses were moved to MDC 23 (Rehabilitation, Aftercare, Other Factors Influencing Health Status & Other Health Service Contacts).

In addition, other individual diagnoses were assigned to different MDCs.

Revise MDC surgical hierarchies

The APR DRG system has introduced a number of changes to the MDC surgical hierarchies. Version 20.0 introduced changes to the surgical hierarchies for MDCs 1, 3, 5, 6, and 8. To illustrate, in MDC 6 (Diseases & Disorders of the Digestive System), APR DRG 224 (Peritoneal Adhesiolysis) was moved lower in the surgical hierarchy following the APR DRGs for appendectomy, anal procedures, and hernia procedures because the peritoneal adhesiolysis is usually adjunct to these procedures and not the patient's primary

surgical procedure. Most of the patients who remain in APR DRG 224 are having peritoneal adhesiolysis performed for intestinal obstruction.

A similar example in MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue), is APR DRG 312 Skin Graft, Except Hand for Musculoskeletal and Connective Tissue Diagnoses, which was moved lower in the surgical hierarchy. It now follows the APR DRGs for knee/lower leg procedures, foot & toe procedures, and shoulder, upper arm & forearm procedures because the skin graft is usually an adjunct to these procedures and not the patient's primary surgical procedure. The skin graft procedure is indicative of the complexity of the procedure and is taken into consideration in the severity of illness and risk of mortality logic that deals with select combinations of OR procedures.

Revise Pre-MDC hierarchies and categories

The initial APR DRGs started with the same pre-MDC hierarchies and categories as AP-DRGs: MDC 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period), MDC 24 (Human Immunodeficiency Virus Infections), Transplants, two Tracheostomy APR DRGs and MDC 25 (Multiple Significant Trauma). For version 20.0 APR DRGs, this was reordered as follows: Transplants, MDC 15, Tracheostomy APR DRGs, MDC 25, and MDC 24. The reordering of the pre-MDC hierarchies provided a clearer focus for classifying the most defining aspects of the hospitalization for these patients.

Version 20.0 APR DRGs redefined and narrowed the definition of the two pre-MDC Tracheostomy APR DRGs. The previous approach included virtually all tracheostomy patients with separate APR DRGs based on whether the principal diagnosis pertained to the face, mouth, or neck, implying that the tracheostomy was a therapeutic treatment for an upper airway problem versus all other principal diagnoses, which implies that the tracheostomy was performed to allow the patient to be on extended mechanical ventilation. The new approach requires that all patients assigned to the tracheostomy APR DRGs receive mechanical ventilation 96+ hours and subdivides the tracheostomy APR DRGs based on whether there is an extensive OR procedure. The new approach in effect narrows the definition to patients on extended mechanical ventilation and classifies other tracheostomy patients to the regular APR DRG categories—particularly in MDC 3 (Ear, Nose, Mouth, Throat & Craniofacial Diseases and Disorders).

Rerouting logic

The basic organizing approach to classification in the APR DRG 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 and results in the patient being assigned to the MDC and APR DRG that best describes the reason for the hospitalization.

There are several different kinds of situations, however, where using the principal diagnosis as the starting point for establishing the MDC and APR DRG needs to be supplemented by additional information to yield the most useful classification of the patient. One such situation occurs when there is a clear patient characteristic that should take priority, such as for a patient with an organ transplant or a tracheostomy in the absence of an ENT problem. This situation is handled by Pre-MDC assignment logic mentioned above. Another situation occurs when the principal diagnosis is overly broad,

or the sequencing of principal diagnosis and secondary diagnosis is unclear, or a surgical procedure provides clarification of the principal diagnosis. These situations are handled through what is referred to as APR DRG "rerouting logic" which considers secondary diagnoses, procedures, and sometimes age, most often in conjunction with the principal diagnosis, 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.

An example of a medical rerouting within an MDC is a patient with a principal diagnosis of chest pain and a secondary diagnosis of angina pectoris or coronary atherosclerosis. The chest pain diagnosis is a symptom of the angina or coronary atherosclerosis and should have been recorded as a secondary diagnosis. The rerouting logic will assign this patient to APR DRG 198 Angina Pectoris & Coronary Atherosclerosis instead of APR DRG 203 Chest Pain, and will resequence the diagnosis of angina or coronary atherosclerosis as the principal diagnosis so that these diagnoses do not make a redundant contribution to the severity of illness and risk of mortality subclass assignment.

An example of a medical patient rerouting across MDCs is a patient with a principal diagnosis of hypovolemia (dehydration) and a secondary diagnosis of gastroenteritis. There is some ambiguity in the sequencing of principal and secondary diagnosis, while the patient fundamentally is a gastroenteritis patient who has some level of dehydration. So, in this example there would be a rerouting from MDC 10, APR DRG 422 Hypovolemia to MDC 6, APR DRG 249 Non-Bacterial Gastroenteritis, Nausea & Vomiting.

An example of a surgical patient rerouting across MDCs is amputation. In previous versions of APR DRGs and other DRG systems, there are distinct amputation DRGs in MDCs 5, 8, and 10. Starting with version 20.0, most of these patients are rerouted to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) and grouped according to the MDC 8 surgical hierarchy. The end result is that clinically similar amputation patients are grouped together rather than dispersed into separate lower volume amputation groups.

The sequencing of principal diagnosis and secondary diagnosis on the patient discharge records is not altered by any of these resequencing processes. Rather, the APR DRG grouper is redesignating principal diagnosis and secondary diagnosis for specified steps that are part of its logic. In the example of principal diagnosis hypovolemia and secondary diagnosis gastroenteritis, the APR DRG grouper resequences principal diagnosis and secondary diagnosis 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 principal diagnosis of hypovolemia, which is ordinarily assigned to MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders). A fuller explanation of the APR DRG rerouting logic and a more extensive set of illustrations is in chapter 4.

The end result of the consolidation and refinement process for version 12.0 of the APR DRG classification system released in 1995 was the creation of 382 base APR DRGs (plus two ungroupable or invalid APR DRGs). This was further consolidated to 355 base

APR DRGs for version 15.0 released in 1998 and to 314 base APR DRGs (plus two ungroupable or invalid APR DRGs) for version 20.0 released in 2003. For version 26.1, the base APR DRGs remain at 314. The modifications to the base APR DRGs were sufficiently extensive that a complete renumbering of the base APR DRGs was included as part of the version 15.0 update.

There were many changes to the APR DRG category definitions introduced as part of version 20.0 of the APR DRG system. Overall, this reduced the number of base APR DRGs by 41 from 357 to 316 as a result of the elimination of 55 base APR DRGs and the addition of 14 new base APR DRGs. In addition, 66 base APR DRGs had major definitional changes and 102 base APR DRGs had moderate definitional changes. Version 20.0 reduced the number of final APR DRG severity of illness and risk of mortality subclass categories from 1,422 to 1,258 (including two ungroupable or invalid APR DRGs that do not have subclasses).

Once the definition of the base APR DRGs was completed, four severity of illness subclasses and four risk of mortality subclasses for each of the APR DRGs were evaluated and updated for each new release of the APR DRGs.

Since the release of All Patient Refined DRG (APR DRG) v20.0, secondary diagnosis codes that relate to "complications of care" have not contributed to the assignment of the severity of illness or risk of mortality subclass. These diagnosis codes are generally associated with events that are potentially preventable and occur during a hospital stay (e.g., iatrogenic pneumothorax). Because standard claims data did not specify whether these diagnosis codes were present at admission, the APR DRG classification system did not take them into account in the assignment of the severity of illness or risk of mortality subclass. This was done to prevent relatively clear quality of care failures from increasing the severity of illness and risk of mortality subclass.

Beginning with v26.1 standard claims data includes a specification of whether each secondary diagnosis was present at admission. This allows the determination of both an admission and discharge severity of illness and risk of mortality subclass. "Complications of care" codes contribute to the assignment of both the admission and discharge severity of illness and risk of mortality subclass only when they are specified as being present at admission. Otherwise, they will be excluded from the determination of the admission and discharge severity of illness and risk of mortality subclass.

When using APR DRG v26.1 with data that does not contain a specification of whether each secondary diagnosis was present at admission, the "complications of care" codes will continue to be excluded from the assignment of the severity of illness or risk of mortality subclass.

Overview of APR DRG subclass assignment

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 procedures and non-OR procedures. The subdivision of each of the 314 APR DRGs into the four subclasses, combined with the two error APR DRGs (955, 956), which are not subdivided, results in 1,258 APR DRGs.

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 three-phase process of determining the severity of illness subclass is summarized in figure 2–1. There are six steps to Phase I, three steps to Phase II, and nine steps to Phase III for a total of 18 steps.

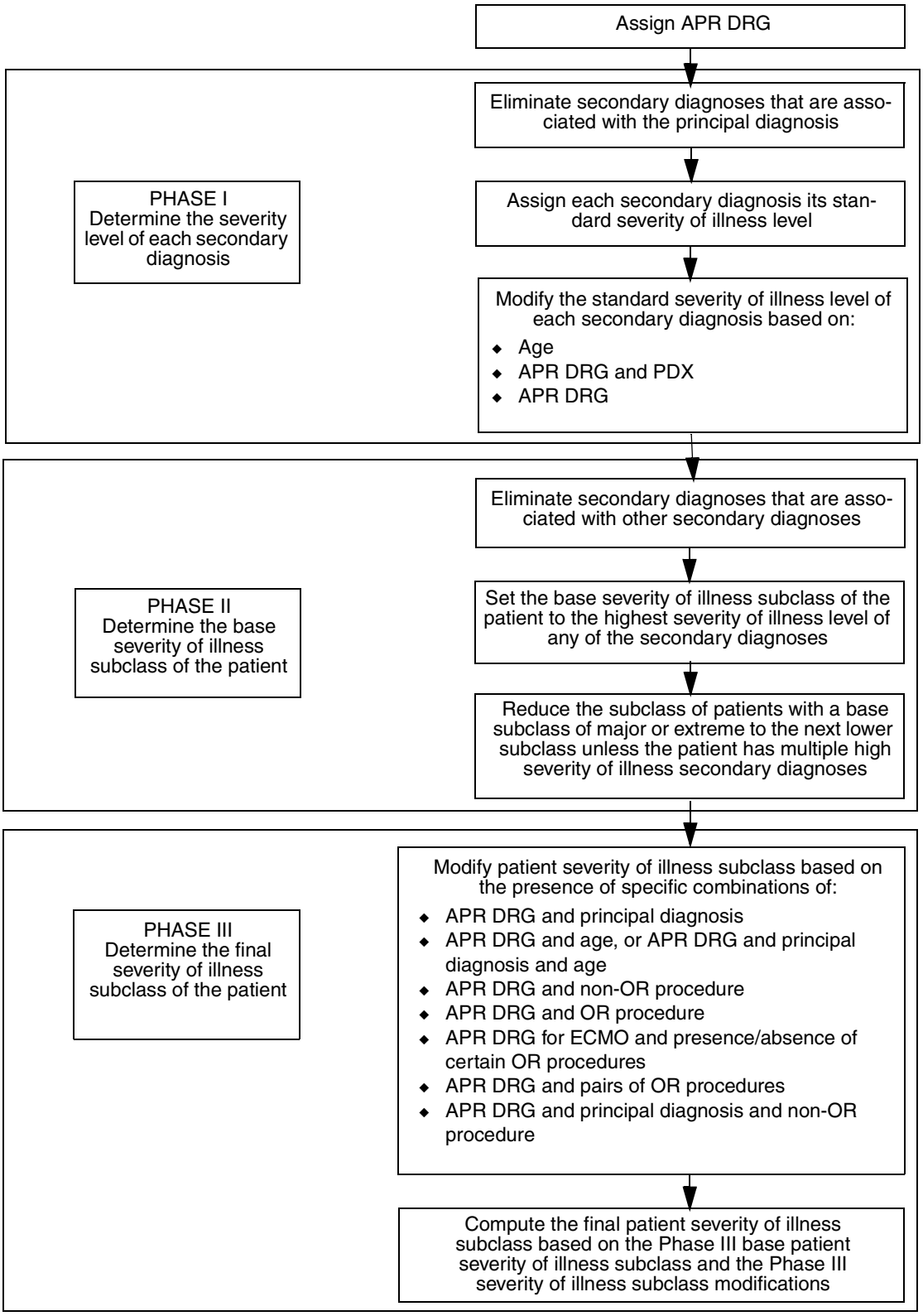

Figure 2–1. Three-phase process for determining patient severity of illness subclass

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

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. For version 26.1, the list was only updated.

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. Examples of the different severity of illness levels are contained in table 2–1.

Table 2–1. Examples of severity of illness levels

Severity of Illness Level	Examples	
Minor	Uncomplicated Diabetes	Bronchitis
Moderate	Diabetes with Renal Manifestations	Asthma with Status Asthmaticus
Major	Diabetes with Ketoacidosis	Viral Pneumonia
Extreme	Diabetes with Hyperosmolar Coma	Respiratory Failure

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.

For version 20.0 APR DRGs, the standard severity of illness level was comprehensively reviewed for all secondary diagnoses codes. There were a number of revisions introduced—the majority of which were to lower the standard severity of illness level. In situations where there was a great deal of variability within an ICD-9-CM diagnosis code, the approach was to lower the standard severity of illness level and then in later steps of Phase I, consider whether modifications to the standard severity of illness level are indicated based upon specific age ranges, APR DRGs, or non-OR procedures. For example, the secondary diagnosis code 51882 Other pulmonary insufficiency NEC includes a very specific and severe condition such as adult respiratory distress syndrome, but is sufficiently broad to include other much less severe forms of pulmonary insufficiency. Beginning with version 20.0, and continuing with 25.0, the secondary diagnosis lowers from extreme to moderate, but then in a later Phase I step adjusts the severity of illness level up to major if the patient receives mechanical ventilation <96 hours, and up to extreme if the patient receives mechanical ventilation 96+ hours. The mechanical ventilation is an indicator of more severe pulmonary insufficiency and is often needed for patients with adult respiratory distress syndrome.

For version 26.1 APR DRGs there are a total of 14,025 ICD-9-CM diagnoses codes. These codes are assigned to the following severity of illness levels: 8,934 minor, 3,208 moderate, 1,009 major, 874 extreme.

The relatively large number of diagnoses moved to the minor severity of illness level was in part due to the decision to assign to the minor severity of illness level most secondary diagnoses related to pregnancy that were coded with an unspecified episode of pregnancy care (e.g., ICD-9-CM code 65100 Twin pregnancy without an indication of whether the encounter was for antepartum care, post partum care, or delivery). The only exceptions were diabetes mellitus, venous complications in pregnancy, and obstetrical pyemic and septic embolism, which were assigned to a higher severity of illness level. Another reason is that the APR DRG system has assigned to the minor severity of illness level most diagnoses that are described as complications of treatment. While complications of treatment are sometimes unavoidable and not due to poor quality of care, the APR DRG system has been very conservative in allowing these diagnoses to contribute to the patient's severity of illness level (the same is true for risk of mortality). Most of the ICD-9-CM complications of treatment diagnosis codes in the 990 series and the obstetrical complications of the administration of anesthesia were changed to minor severity of illness level in the version 15.0 APR DRGs. In addition, there are some other complications of treatment diagnosis codes that were changed to minor severity of illness level in version 20.0 APR DRGs (e.g., tracheostomy, gastrostomy, colostomy complications, and iatrogenic pneumothorax).

There are some secondary diagnoses that can have different meanings or implications in different circumstances and these received special attention in version 20.0 APR DRG through the various Phase I steps. To illustrate, there are circumstances where secondary diagnosis code 3481 Anoxic brain damage may be part of the patient's acute presenting condition (e.g., major trauma, poisoning, major neurological, respiratory, cardiac or infectious condition) and an indicator of high severity of illness. There are other instances where anoxic brain damage is not ordinarily expected and may represent the use of code 3481 for long standing anoxic brain damage (from a prior event), or possibly an unexpected complication of treatment. To take into account these different circumstances, version 20.0 APR DRGs lowered the standard severity of illness level for anoxic brain damage from extreme to minor, but then, in a later Phase I step, adjusts the severity level back up to extreme for selected APR DRGs where it is reasonable to expect that the anoxic brain damage may be part of the patient's presenting condition. (This was handled the same way for risk of mortality.)

Another set of secondary diagnoses that received special attention is the secondary diagnoses of cardiac arrest, ventricular fibrillation and ventricular flutter. In version 15.0 APR DRGs, these diagnoses were all assigned a severity of illness level of extreme (likewise for risk of mortality.) These secondary diagnoses unquestionably represent very extreme acute diagnoses. At the same time, there is a unique aspect to these diagnoses in that they can potentially be coded for most patients who die and whose admitting condition is not cardiac or cardiac related. If this was to occur, the subclass assignment logic, especially for risk of mortality, could become somewhat circular. To avoid this possibility, the standard severity of illness level (and standard risk of mortality level) in version 20.0 APR DRGs was changed from extreme to minor, and then for a small subset of APR DRGs adjusted back up to extreme. The subset includes APR DRGs for major neurological, respiratory, cardiovascular, and infectious conditions, and poisonings. For these APR DRGs, the patients are at a clear risk of having a cardiac arrest, ventricular fibrillation, or ventricular flutter and so these secondary diagnoses contribute to the

severity of illness (and risk of mortality) assignment. This is different from other APR DRGs where the patient is not at an apparent risk of a cardiac arrest, ventricular fibrillation, or ventricular flutter. Patients in these other APR DRGs could still have a cardiac arrest, ventricular fibrillation, or ventricular flutter as part of the course of their hospitalization, but since their principal diagnosis is not cardiac or cardiac related, there is the concern for potential overcoding of these secondary diagnoses for patients who die. Versions 20.0 to 26.1 APR DRGs do not let these occurrences contribute to the patient's severity of illness level or risk of mortality level.

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.

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.

4. Modify the standard severity of illness level of a secondary diagnosis based on the APR DRG 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.

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. Altogether, there are 3,787 modifications of the standard severity of illness level of a secondary diagnosis depending upon the APR DRG. 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.

Some examples of APR DRG modifications are shown in table 2–2. 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.

Table 2–2. Examples of modification of standard Severity of Illness level based on APR DRG

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. For version 20.0 APR DRGs, there were a substantial number of additions and modifications made on this basis.

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 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.

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.

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.

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 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.

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. The ICD-9-CM coding system will sometimes include in a single diagnosis code both the underlying disease and an associated manifestation of the disease. For example, if the principal diagnosis code is 25020 Diabetes with hyperosmolar coma, the patient is assigned to the APR DRG for diabetes. Ordinarily, if the patient had no secondary diagnoses then the severity of illness subclass would be minor. Since the principal diagnosis includes not only the underlying diagnosis but also a major manifestation, the diabetic patient with hyperosmolar coma should be assigned to a higher patient severity of illness subclass. In order to accommodate this idiosyncrasy of ICD-9-CM, if the principal diagnosis is an ICD-9-CM diagnosis code that represents multiple diagnoses, or a diagnosis as well as a high severity manifestation, the severity of illness subclass of the patient is increased by a specified increment up to a specified maximum subclass. For example, if diabetes with hyperosmolar coma is the principal diagnosis, the severity of illness subclass of the patient is increased by one up to a maximum subclass of major. Other examples of principal diagnoses that include an important manifestation include: head trauma with prolonged or deep coma, intractable epilepsy, ruptured aortic aneurism, acute stomach

ulcer with perforation and obstruction, acute appendicitis with peritonitis, and open fracture of the femur shaft.

Within specific 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.

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.

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 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.

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 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.

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 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.

15. Modify the severity of illness subclass for the patient based upon combination of APR DRG for ECMO and presence/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 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 one of the major neonatal surgeries have their severity subclass decreased by one.

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 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.

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 ICD-9-CM diagnosis codes were classified into either one of the 83 core secondary diagnosis categories applicable to all patients except 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 83 core secondary diagnosis categories are shown in table 2–3. 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 table 2–3 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.

Table 2–3. Categories of Secondary Diagnoses

	Secondary Diagnosis Category
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
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

	Secondary Diagnosis Category
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
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

	Secondary Diagnosis Category
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 secondary diagnosis categories for MDC 15 are shown in table 2–4. 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.

Table 2–4. Categories of Secondary Diagnoses for MDC 15

MDC 15 Secondary Diagnosis Category	
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

As summarized in table 2–5 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.

Table 2–5. Combinations of Secondary Diagnosis Categories

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	Extreme (4)
13	Specified combinations of two moderate categories	At least one additional secondary diagnosis of moderate	Major (3)
15	Specified combinations of two minor categories	At least one additional secondary diagnosis of minor	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 version 20.0 of the APR DRG system. 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).

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 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 Phase III severity subclass modification hierarchy is contained in table 2–6. 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 table 2–6 the 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.

Table 2–6. Phase III Severity Modification Hierarchy

Phase III 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	11	Actual Increase	Base severity subclass minus maximum Phase III decrease plus one

Table 2–6. Phase III Severity Modification Hierarchy *(continued)*

Phase III Severity Modification		Phase III Severity Modification		Final Severity Subclass
10	Actual or Tried Decrease			Base severity subclass minus maximum Phase III decreases
11	Actual or Tried Increase			Base severity subclass plus maximum of phase III increases
11	Actual or Tried 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 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

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

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

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

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).

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

6. Modify the standard severity of illness level of each secondary diagnosis based on the presence of certain non-OR procedures.

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

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

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

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

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

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

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

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

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

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.

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.

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

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 three-phase process of determining the risk of mortality subclass is summarized in figure 2–2. 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 procedures, certain non-OR procedures, multiple OR procedures, and combinations of categories of secondary diagnoses.

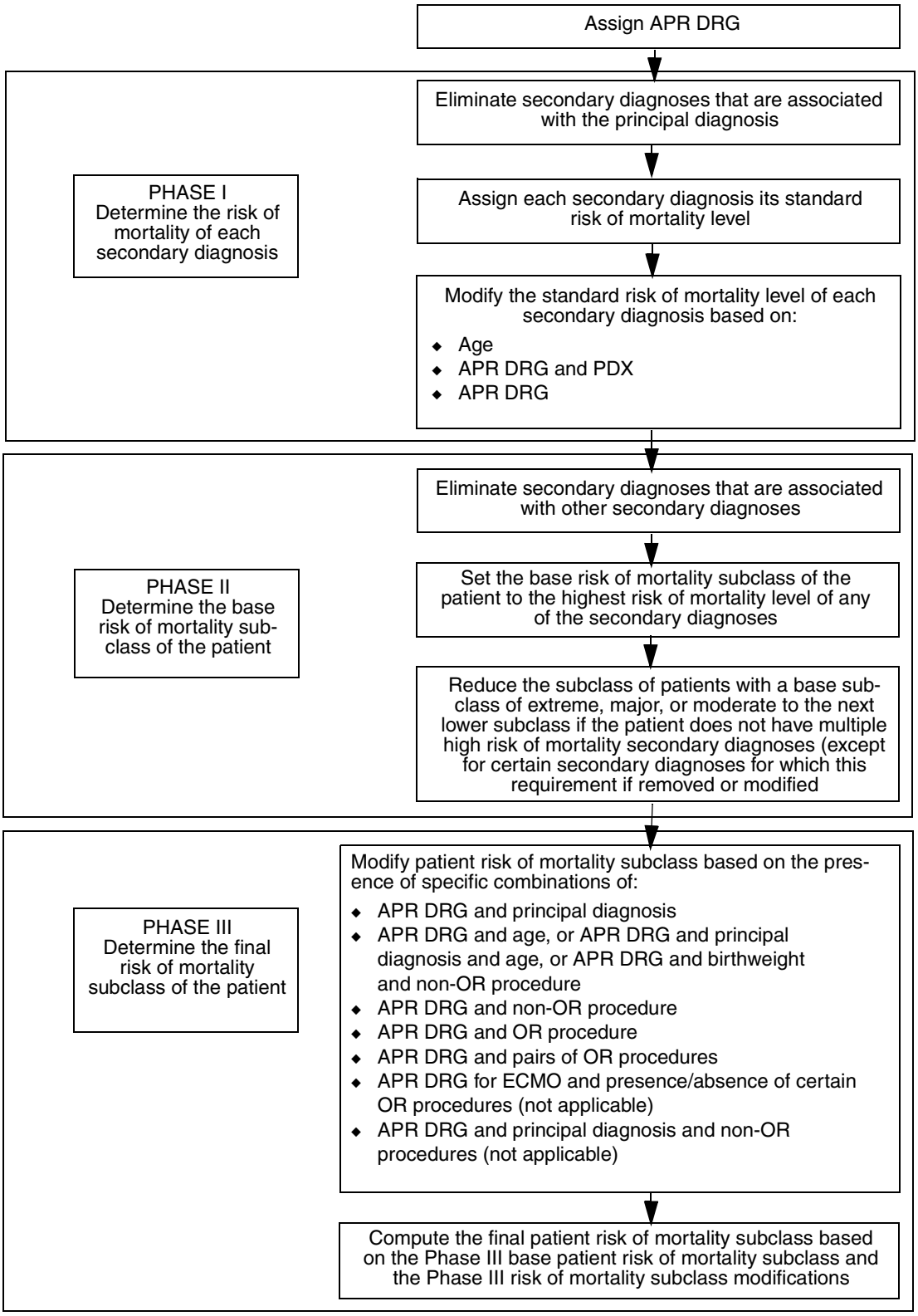

Figure 2–2. Three-phase process for determining patient risk of mortality subclass

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

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.

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.

For version 20.0 APR DRGs, the standard risk of mortality level was comprehensively reviewed for all secondary diagnoses codes. There were a number of revisions introduced, the majority of which were to lower the standard risk of mortality level. In situations where there was a great deal of variability within an ICD-9-CM diagnosis code, the approach was to lower the standard risk of mortality level and then in later steps of Phase I, consider whether modifications to the standard risk of mortality level are indicated based upon specific age ranges, APR DRGs, or non-OR procedures.

For version 26.1 APR DRGs, there are a total of 14,025 ICD-9-CM diagnosis codes. These codes are assigned to the following risk of mortality levels: 11,194 minor, 1,837 moderate, 630 major, 364 extreme. For version 25.0 APR DRGs, there are 2,681 secondary diagnosis codes that are assigned a standard risk of mortality level of moderate, major, or extreme. This is just slightly more than half the 4,884 secondary diagnosis codes that are assigned a standard severity of illness level of moderate, major, or extreme.

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.

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 and 25.0, 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.

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. Altogether, there are 1,474 modifications of the standard risk of mortality level of secondary diagnosis depending on the APR DRG. 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.

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

Certain non-OR 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, APR DRG and principal diagnosis, APR DRG, and certain non-OR 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.

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.

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.

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 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.

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.

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-9-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.

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 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.

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 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.

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 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.

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.

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.

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 table 2–3). 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 table 2–5). 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.

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 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 Phase III ROM subclass modification hierarchy is contained in table 2–7. 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 table 2–7 the 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.

Table 2–7. Phase III Risk of Mortality (ROM) Modification Hierarchy

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

The Phase III step highest in the hierarchy is step 11C which relates to extremely premature neonates. Any neonate that meets the criteria for step 11C will have their base ROM subclass increased 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 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

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

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

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

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).

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

6. Modify the standard risk of mortality level of each secondary diagnosis based on the presence of certain non-OR procedures.

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

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

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

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

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

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.

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

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

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

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).

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).

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

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-9-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)

DETERMINATION OF ADMISSION ALL PATIENT REFINED DRGS (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. Unless the diagnosis code explicitly states that it was present on admission it will not be included in 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 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 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 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-9-CM the acute exacerbation and the underlying chronic disease are sometimes included in a single code. When a single ICD-9-CM code representing an acute exacerbation of an underlying chronic disease is reported as not POA, an ICD-9-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-9-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 indicator in APR DRG Version 26, 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.

5. Use procedures to identify diagnoses present on admission.

The occurrence of certain non OR 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 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 3M™ All Patient Refined Diagnosis Related Groups (APR DRGs), Version 26.1

BACKGROUND AND EXPLANATION OF APPROACH FOR REROUTING LOGIC IN VERSION 26.1 APR DRGS

Background

The basic organizing approach to classification in the APR DRG 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, which is described in detail in chapter 2 of the APR DRG Definitions Manual. 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 SDX is unclear, or in some instances the OR 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. Version 20.0 of the APR DRG system incorporated a number of updates to the previously existing Within MDC Reroutings and introduced for the first time, Across MDC Reroutings.

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. Attached is a table summarizing all of the APR DRG reroutings. For code level specifications, please see the full version 26.1 APR DRG Definitions Manual.

Need for APR DRG Rerouting Logic

Within MDC Reroutings: This is the situation where the PDX provides sufficient information for MDC assignment but does not provide sufficient information for assignment to the most appropriate DRG. It also includes the situation where the OR procedure is unclear. For example:

- The PDX provides no information about the patient's health status but the SDXs do. For example, the V3000–V3921 live newborn codes accurately describe the reason for admission to the hospital (being born), but provide no information as to whether the

neonate has any medical problems. To assign these patients to a meaningful APR DRG, it is necessary to examine the SDXs for various possible problems and to create a hierarchy amongst these problems in the event the neonate has multiple problems.

- The PDX is imprecise but Age clarifies. For example, PDX aftercare not elsewhere classified and Age < 90 days clarifies that the admission is for neonatal aftercare.
- There is ambiguity in sequencing of PDX and SDX, but either way the same patient is being described. For example, PDX pneumonia and SDX cystic fibrosis.
- A symptom code has been missequenced as the PDX. For example, PDX chest pain and SDX angina pectoris or coronary atherosclerosis.
- The OR procedure is imprecise but the PDX clarifies. For example, bone ostectomy not elsewhere classified (includes vertebra) and PDX back/neck disorder clarifies that the patient would better be assigned to an APR DRG for other back/neck procedures than other musculoskeletal procedures.

Across MDC Reroutings: This is the situation where the PDX does not provide sufficient information for assignment to either the most appropriate MDC or APR DRG. This includes many of the same PDX ambiguities as the Within MDC Reroutings except that the PDX ambiguity affects MDC assignment as well as APR DRG assignment. For example:

- The PDX describes body system more broadly than the MDCs of the APR DRG system. For example, PDX 9961 mechanical complication of other vascular devices (MDC 5) includes both peripheral vascular devices (MDC 5) and renal dialysis shunt (MDC 11).
- The PDX does not describe the specific body system manifestation. For example, PDX 25080–25083 diabetes with manifestations not elsewhere classified (MDC 10) includes manifestations that affect other body systems—skin ulcer (MDC 9), bone involvement in other diseases (MDC 8), and osteomyelitis (MDC 8).
- The sequencing of PDX and SDX is ambiguous. For example, PDX hypovolemia (MDC 10) and SDX gastroenteritis (MDC 6). This is fundamentally a gastroenteritis patient with hypovolemia (dehydration), which is common to patients hospitalized for gastroenteritis.
- A symptom code is missequenced as the PDX. For example, PDX fever (MDC 18) and SDX agranulocytosis/neutropenia (MDC 16). Another example is PDX pulmonary edema (MDC 4) and SDX congestive heart failure (MDC 5).
- The PDX spans several MDCs but the OR procedure differentiates. For example, PDX abdominal pain (MDC 6) and hepatobiliary OR procedure (MDC 7).
- The PDX or the PDX and SDX together identify that the patient has diabetes with circulatory (MDC 5) and possibly other related manifestations (MDCs 1, 8, 9) and the patient receives a lower limb or toe amputation procedure. This is the most frequent and important surgical rerouting.

To explain this last example further, diabetes is a complex disease with many manifestations, several of which relate to the possible need for lower limb or toe amputation. These patients may be admitted with many different principal diagnoses, including diabetes with circulatory manifestation, diabetes with neuropathy, or diabetes with manifestations not elsewhere classified (includes skin ulcer, bone involvement in other disease, and osteomyelitis). They may also be admitted with principal diagnoses of peripheral vascular disease, gangrene, skin ulcer, or osteomyelitis and a secondary diagnosis of diabetes. All of these patients who receive a lower limb or toe amputation

and who do not have another more defining surgical procedure (e.g., major cardiovascular procedure) are clinically similar patients and it is more helpful to group them together than to let them be dispersed across different MDCs and APR DRGs.

Following is a further description of the methodology for the APR DRG reroutings. All of the reroutings have the same objective, to group together clinically similar patients. The exact logic and technical details vary from one rerouting to another. To make the reroutings easier to understand they are organized into various types or a typology.

Methodology for APR DRG Rerouting Logic

As identified earlier, the assignment of patients to an MDC is usually very straightforward based upon the PDX. Likewise, the assignment to an APR DRG is usually straightforward based upon the PDX for medical patients and OR 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, 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 version 20.0 APR DRG 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. This logic existed in version 15.0 APR DRGs for APR DRGs in MDCs 4, 15, 20, and 24. Version 15.0 APR DRGs also contained one instance of #7, PDX and SDX and Medical (PDX head trauma and SDX head trauma with coma > 1 hour or hemorrhage) and a surgical rerouting for certain MDC 11 patients receiving a prostate procedure for benign prostatic hypertrophy. All the rest of the combinations of factors were new for version 20.0 APR DRGs.

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.

The rerouting type numbers have no special significance in and of themselves. They are just a way to organize and explain the three elements to APR DRG rerouting logic. The best way to fully understand the APR DRG rerouting is to review specific examples.

Following are detailed examples of all of these different types of APR DRG reroutings. The examples illustrate the specific rerouting approach and logic used. For full code level specifications, please see the full version 26.1 APR DRG Definitions Manual.

Detailed Examples of Within MDC Reroutings:

W0S: PDX or SDX and Medical → Occurrence of specified diagnosis as either PDX or SDX determines APR DRG assignment within same MDC in accordance with medical APR DRG hierarchies for that MDC; since the specified diagnosis defines the APR DRG, it is resequenced as the PDX for SOI/ROM purposes regardless of whether it is recorded as PDX or SDX.

This is the most frequently used rerouting logic and existed in version 15.0 of the APR DRGs. It affects the following types of patients: MDC 4 cystic fibrosis patients and bronchoplumonary dysplasia patients; many MDC 15 medical neonatal APR DRGs; all MDC 20 alcohol and substance abuse APR DRGs; and all MDC 24 HIV APR DRGs. Examples are provided for each of these areas.

- If medical patient in MDC 4 (Diseases & Disorders of the Respiratory System) other than those with mechanical ventilation 96+ hours has a PDX or SDX of cystic fibrosis, then assign patient to APR DRG 131 Cystic Fibrosis and rescreens cystic fibrosis as the PDX for SOI/ROM purposes unless the patient has another PDX or SDX that is higher in the MDC 4 medical hierarchy. (Note, APR DRG 132 Bronchopulmonary Dysplasia is the only other MDC 4 APR DRG defined this way and it is lower in the MDC 4 medical hierarchy).
- If medical patient in MDC 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period) is > 2,499 grams and has a PDX or SDX from a list of congenital/perinatal infections, then assign patient to APR DRG 636 Neon BWT > 2499G W Congenital/Perinatal Infection and resequence the congenital/perinatal infection diagnosis as the PDX for SOI/ROM purposes unless the patient has a PDX or SDX that is higher in the MDC 15 medical hierarchy (e.g., major anomaly, respiratory distress syndrome).
- If medical patient in MDC 20 (Alcohol/Drug Use & Alcohol/Drug Induced Organic Mental Disorders) has a PDX or SDX from a list of cocaine abuse diagnoses, then assign patient to APR DRG 774 Cocaine Abuse & Dependence and resequence the cocaine abuse diagnosis as the PDX for SOI/ROM purposes unless there is a PDX or SDX higher in the MDC 20 medical hierarchy (e.g., opioid abuse). MDC 20 patients are often admitted for multiple alcohol and drug abuse problems and so patients are assigned to a specific APR DRG based upon a pre-existing medical hierarchy that examines all principal and secondary diagnoses.

— If medical patient in MDC 24 (Human Immunodeficiency Virus Infections) has a PDX of major HIV related condition and SDX of HIV Infection, then assign patient to APR DRG 892 HIV With Major HIV Related Condition and resequence HIV Infection as the PDX for SOI/ROM purposes. The sequencing of PDX and SDX for HIV patients is somewhat ambiguous and so this approach assures consistency in assignment to APR DRG category and SOI/ROM levels.

Note, if there exists more than one secondary diagnosis from the specified diagnosis list for this type of rerouting logic, then the APR DRG system provides additional selection logic for designation of the PDX for SOI/ROM purposes. The selection logic is specific to each APR DRG. In most instances, the logic selects the diagnosis with the highest severity level to capture the PDX that most fully describes the reason for hospitalization, e.g., intermediate coronary syndrome (unstable angina) would be selected over coronary atherosclerosis NOS. The main exception to this approach is MDC 15 (Newborns & Other Neonates with Conditions Originating in the Perinatal Period) APR DRGs. These APR DRGs tend to be defined more broadly and can include patients with multiple problems at birth. In order to ensure that neonates with multiple problems have their most serious problems considered in the SOI/ROM algorithms, the diagnosis with the lowest severity is selected as the designated PDX (e.g., neonate with multiple anomalies).

W1X: PDX and Age and Medical → Age clarifies PDX and assignment to new APR DRG within same MDC.

— If medical patient in MDC 23 (Rehabilitation, Aftercare, Other Factors Influencing Health Status & Other Health Service Contacts) has PDX Aftercare NEC and Age < 90 days, then assign patient to APR DRG 863 Neonatal Aftercare instead of APR DRG 862 Other Aftercare & Convalescence.

W3X: PDX and OR Procedure → PDX and OR Procedure together clarify APR DRG assignment within same MDC in accordance with the MDC's surgical hierarchy.

— If surgical patient in MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) has a PDX of back/neck disorder and one of a designated set of musculoskeletal procedures not elsewhere classified (which includes back procedures), then reassign patient to APR DRG 310 Intervertebral Disc Excision & Decompression unless the patient has another OR procedure that is higher in the MDC 8 surgical hierarchy.

W6S: PDX and SDX and Medical → Occurrence of PDX-SDX determines APR DRG assignment within same MDC; since the SDX is primarily responsible for the APR DRG assignment, it is resequenced as the PDX for SOI/ROM purposes.

— If a medical patient in MDC 1 (Diseases & Disorders of the Nervous System) has a PDX of head trauma and an SDX of head trauma with coma >1 hour or hemorrhage, then assign patient to APR DRG 55 Head Trauma W Coma >1 Hour or Hemorrhage and resequence the SDX of head trauma with coma >1 hour or hemorrhage as the PDX for SOI/ROM purposes.

— If medical patient in MDC 5 (Diseases & Disorders of the Circulatory System) has a PDX of angina pectoris, coronary atherosclerosis or chest pain, and an SDX of acute myocardial infarct, then assign to APR DRG 190 Acute Myocardial Infarct instead of APR DRG 198 Angina Pectoris & Coronary Atherosclerosis or APR DRG 203 Chest Pain, and resequence the acute myocardial infarct as the PDX for SOI/ROM purposes.

— If medical patient in MDC 5 (Diseases & Disorders of the Circulatory System) has a PDX of chest pain and an SDX of angina pectoris or coronary atherosclerosis, then assign patient to APR DRG 198 Angina Pectoris & Coronary Atherosclerosis instead of APR DRG 203 Chest Pain and resequence the diagnosis of angina pectoris or coronary atherosclerosis as the PDX for SOI/ROM purposes.

— If medical patient in MDC 23 (Rehabilitation, Aftercare, Other Factors Influencing Health Status & Other Health Service Contacts) has a PDX of Aftercare NEC and an SDX of Prematurity, then assign patient to APR DRG 863 Neonatal Aftercare instead of APR DRG 862 Other Aftercare & Convalescence, and resequence the diagnosis of prematurity as the PDX for SOI/ROM purposes.

Note, if there exists more than one secondary diagnosis from the specified diagnosis list for this type of rerouting, then the APR DRG system provides additional selection logic for designation of the PDX for SOI/ROM purposes. The selection logic is specific to each APR DRG. It is the same kind of selection logic as that described for APR DRG rerouting type W0S.

W6X: PDX and SDX and Medical → SDX clarifies PDX and assignment to new APR DRG within same MDC; there is no need to resequence PDX and SDX.

— If medical patient in MDC 7 (Diseases & Disorders of the Hepatobiliary System and Pancreas) has a PDX of liver disease and an SDX of alcoholic liver disease, then assign patient to APR DRG 280 Alcoholic Liver Disease instead of APR DRG 283 Other Disorders of Liver.

Detailed Examples of Across MDC Reroutings:

A2X: PDX and Non-OR Procedure and Medical → PDX and Non-OR Procedure together clarify assignment to new MDC and APR DRG.

— If medical patient in MDC 1 (Diseases & Disorders of the Nervous System) has PDX brain neoplasm and non-OR procedure Stereotactic Radiosurgery, then reassign patient to MDC 17 (Lymphatic, Hematopoietic, Other Malignancies, Chemotherapy and Radiotherapy), APR DRG 693 Radiotherapy.

— Same logic and specifications apply to medical patients in MDC 10 with pituitary neoplasms.

A3X: PDX and OR Procedure → PDX and OR Procedure together clarify assignment to new MDC and APR DRG assignment is made based upon the surgical hierarchy of the new MDC.

— If surgical patient in MDC 5 (Diseases & Disorders of the Circulatory System) has PDX peripheral vascular disease and a lower limb amputation procedure except toe and no major cardiovascular OR procedure, then reassign patient to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) where APR DRG assignment will be made based upon the MDC 8 surgical hierarchy. Note, all or nearly all of these patients will be assigned to APR DRG 305 Amputation Of Lower Limb Except Toe.

— If surgical patient in MDC 5 (Diseases & Disorders of the Circulatory System) has PDX peripheral vascular disease and a toe amputation and no other MDC 5 surgical procedures except those in APR DRG 180 Other Circulatory System

Procedures, then reassign patient to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) where APR DRG assignment will be made based upon the MDC 8 surgical hierarchy. Note, most of these patients will be assigned to APR DRG 314 Foot & Toe Procedures.

A4X: PDX and Only OR Procedure Except Related OR Procedures → PDX and OR procedure together clarify MDC and APR DRG assignment is made based upon the surgical hierarchy of the new MDC.

— If surgical patient in MDC 11 (Diseases & Disorders of the Kidney & Urinary Tract) has PDX complication of genitourinary device and penile prosthesis procedure and no other OR procedure except related penile procedures, then reassign patient to MDC 12 (Diseases & Disorders of the Male Reproductive System) where APR DRG assignment is made based upon the surgical hierarchy of MDC 12.

A5X: SDX and OR Procedure → OR Procedure clarifies assignment to new MDC and APR DRG assignment is made based upon the surgical hierarchy of the new MDC.

— If surgical patient in MDC 9 (Diseases & Disorders of the Skin, Subcutaneous Tissue & Breast) has SDX diabetes and lower limb amputation procedure, then reassign to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) where the patient will be assigned to a specific APR DRG based upon the MDC 8 surgical hierarchy. Note, most of these patients have a PDX of chronic skin ulcer or cellulitis.

A6P: PDX and SDX and Medical → Resequence PDX-SDX for APR DRG grouping purposes and assign patient to new MDC and APR DRG.

— If medical patient in MDC 18 (Infectious & Parasitic Diseases, Systemic or Unspecified Sites) has a PDX of fever or viral infection NOS and an SDX of agranulocytosis/neutropenia, then for APR DRG grouping purposes, resequence the PDX-SDX so agranulocytosis/neutropenia is the PDX and assign patient to MDC 16 (Diseases & Disorders of Blood, Blood Forming Organs & Immunological Disorders) and APR DRG 660 Major Hematologic/Immunologic Diag Exc Sick Cell Crisis & Coagul.

Note, if there exists more than one secondary diagnosis from the specified diagnosis list for this type of rerouting, then the APR DRG grouper provides additional selection logic to designate a PDX for grouping purposes. The approach is to select the diagnosis with the highest severity level to capture the PDX that most fully describes the reason for the hospitalization. If there are several secondary diagnoses from the diagnosis list and they have the same severity level, the APR DRG grouper selects the first one occurring in ICD-9-CM code order. This selection logic also applies to rerouting types 18A, 19A and 20A, which involve resequencing of PDX and SDX for grouping purposes.

A6X: PDX and SDX and Medical → SDX clarifies PDX and assignment to new MDC and APR DRG; there is no need to resequence PDX and SDX.

— If medical patient in MDC 5 (Diseases & Disorders of the Circulatory System) has a PDX of complication of other vascular device, implant and graft and an SDX of renal failure without heart failure, then reassign the patient from MDC 5, APR DRG 206 Malfunction, Reaction, Complication of Cardiac/Vascular Device or Procedure to MDC 11 (Diseases & Disorders of the Kidney & Urinary Tract), APR DRG 466 Malfunction, Reaction, Complication of Genitourinary Device or Procedure.

A7P: PDX and SDX and whether Surgical or Medical → Resequence the PDX-SDX for APR DRG grouping purposes and assign patient to new MDC and appropriate surgical or medical APR DRG based upon the hierarchies and logic of the new MDC.

— If patient in MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders) has a PDX of diabetes manifestation not elsewhere classified and an SDX of osteomyelitis, then for APR DRG grouping purposes, resequence the PDX-SDX so that osteomyelitis is the PDX and patient is assigned to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue) and to the appropriate surgical or medical APR DRG per MDC 8 logic.

— If patient in MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders) has a PDX of diabetes manifestation not elsewhere classified and an SDX of skin ulcer, then for APR DRG grouping purposes resequence the PDX-SDX so that skin ulcer is the PDX and patient is assigned to MDC 9 (Diseases & Disorders of the Skin, Subcutaneous Tissue & Breast) and to the appropriate surgical or medical APR DRG per MDC 9 logic.

— If a patient in MDC 10 (Endocrine, Nutritional & Metabolic Diseases and Disorders) has a PDX of diabetes manifestation not elsewhere classified and SDXs of both osteomyelitis and skin ulcer, then regroup with osteomyelitis resequenced as the new PDX and assign patient to MDC 8 (Diseases & Disorders of the Musculoskeletal System and Connective Tissue).

A8P: PDX and SDX and Only OR Procedure Except Related OR Procedures → Resequence the PDX-SDX for APR DRG grouping purposes and assign patient to new MDC and APR DRG assignment is made based upon the surgical hierarchy of the new MDC.

— If surgical patient in MDC 6 (Diseases & Disorders of the Digestive System) has a PDX of abdominal pain and an SDX of cholecystitis and a cholecystectomy procedure and no other OR procedures except related procedures, then resequence for APR DRG grouping purposes the PDX-SDX so that cholecystitis is the PDX and reassign the patient to MDC 7 (Diseases & Disorders of the Hepatobiliary System and Pancreas) where the patient will be assigned to a specific APR DRG based upon the MDC 7 surgical hierarchy.

A9P: PDX and SDX and Only OR Procedure → Resequence PDX-SDX for APR DRG grouping purposes and assign patient to new MDC and APR DRG assignment is made based upon surgical hierarchy of the new MDC.

— If surgical patient in MDC 11 (Diseases & Disorders of the Kidney & Urinary Tract) has a PDX from a select list of kidney & urinary diagnoses (e.g., retention of urine) and an SDX of benign prostatic hypertrophy and a prostate procedure and no other OR procedure, then resequence the PDX-SDX for APR DRG grouping purposes so that benign prostatic hypertrophy is the PDX, and reassign the patient to MDC 12 (Diseases & Disorders of the Male Reproductive System) where the patient will be assigned to a specific APR DRG based upon the MDC 12 surgical hierarchy.

APPENDIX A

List of All Patient Refined DRGs, Version 26.1

APPENDIX A – LIST OF ALL PATIENT REFINED DRGS, VERSION 26.1

Appendix A contains a list of each APR DRG with a specification of the MDC and whether the APR DRG is medical or surgical. Some APR DRGs which contain patients from multiple MDCs (e.g., 3 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.

APPENDIX A – LIST OF ALL PATIENT REFINED DRGS, VERSION 26.1

001	P		LIVER TRANSPLANT &/OR INTESTINAL TRANSPLANT
002	P		HEART &/OR LUNG TRANSPLANT
003	P		BONE MARROW TRANSPLANT
004	P		TRACHEOSTOMY W MV 96+ HOURS W EXTENSIVE PROCEDURE OR ECMO
005	P		TRACHEOSTOMY W MV 96+ HOURS W/O EXTENSIVE PROCEDURE
006	P		PANCREAS TRANSPLANT
020	P	01	CRANIOTOMY FOR TRAUMA
021	P	01	CRANIOTOMY EXCEPT FOR TRAUMA
022	P	01	VENTRICULAR SHUNT PROCEDURES
023	P	01	SPINAL PROCEDURES
024	P	01	EXTRACRANIAL VASCULAR PROCEDURES
026	P	01	OTHER NERVOUS SYSTEM & RELATED PROCEDURES
040	M	01	SPINAL DISORDERS & INJURIES
041	M	01	NERVOUS SYSTEM MALIGNANCY
042	M	01	DEGENERATIVE NERVOUS SYSTEM DISORDERS EXC MULT SCLEROSIS
043	M	01	MULTIPLE SCLEROSIS & OTHER DEMYELINATING DISEASES
044	M	01	INTRACRANIAL HEMORRHAGE
045	M	01	CVA & PRECEREBRAL OCCLUSION W INFARCT
046	M	01	NONSPECIFIC CVA & PRECEREBRAL OCCLUSION W/O INFARCT
047	M	01	TRANSIENT ISCHEMIA
048	M	01	PERIPHERAL, CRANIAL & AUTONOMIC NERVE DISORDERS
049	M	01	BACTERIAL & TUBERCULOUS INFECTIONS OF NERVOUS SYSTEM
050	M	01	NON-BACTERIAL INFECTIONS OF NERVOUS SYSTEM EXC VIRAL MENINGITIS
051	M	01	VIRAL MENINGITIS
052	M	01	NONTRAUMATIC STUPOR & COMA
053	M	01	SEIZURE
054	M	01	MIGRAINE & OTHER HEADACHES
055	M	01	HEAD TRAUMA W COMA >1 HR OR HEMORRHAGE
056	M	01	BRAIN CONTUSION/LACERATION & COMPLICATED SKULL FX, COMA < 1 HR OR NO COMA
057	M	01	CONCUSSION, CLOSED SKULL FX NOS,UNCOMPLICATED INTRACRANIAL INJURY, COMA < 1 HR OR NO COMA
058	M	01	OTHER DISORDERS OF NERVOUS SYSTEM
070	P	02	ORBITAL PROCEDURES
073	P	02	EYE PROCEDURES EXCEPT ORBIT
080	M	02	ACUTE MAJOR EYE INFECTIONS
082	M	02	EYE DISORDERS EXCEPT MAJOR INFECTIONS
089	P	03	MAJOR CRANIAL/FACIAL BONE PROCEDURES
090	P	03	MAJOR LARYNX & TRACHEA PROCEDURES
091	P	03	OTHER MAJOR HEAD & NECK PROCEDURES
092	P	03	FACIAL BONE PROCEDURES EXCEPT MAJOR CRANIAL/FACIAL BONE PROCEDURES
093	P	03	SINUS & MASTOID PROCEDURES
095	P	03	CLEFT LIP & PALATE REPAIR
097	P	03	TONSIL & ADENOID PROCEDURES
098	P	03	OTHER EAR, NOSE, MOUTH & THROAT PROCEDURES
110	M	03	EAR, NOSE, MOUTH, THROAT, CRANIAL/FACIAL MALIGNANCIES
111	M	03	VERTIGO & OTHER LABYRINTH DISORDERS
113	M	03	INFECTIONS OF UPPER RESPIRATORY TRACT
114	M	03	DENTAL & ORAL DISEASES & INJURIES
115	M	03	OTHER EAR, NOSE, MOUTH,THROAT & CRANIAL/FACIAL DIAGNOSES
120	P	04	MAJOR RESPIRATORY & CHEST PROCEDURES
121	P	04	OTHER RESPIRATORY & CHEST PROCEDURES
130	M	04	RESPIRATORY SYSTEM DIAGNOSIS W VENTILATOR SUPPORT 96+ HOURS
131	M	04	CYSTIC FIBROSIS - PULMONARY DISEASE
132	M	04	BPD & OTH CHRONIC RESPIRATORY DISEASES ARISING IN PERINATAL PERIOD
133	M	04	PULMONARY EDEMA & RESPIRATORY FAILURE
134	M	04	PULMONARY EMBOLISM
135	M	04	MAJOR CHEST & RESPIRATORY TRAUMA
136	M	04	RESPIRATORY MALIGNANCY
137	M	04	MAJOR RESPIRATORY INFECTIONS & INFLAMMATIONS
138	M	04	BRONCHIOLITIS & RSV PNEUMONIA
139	M	04	OTHER PNEUMONIA
140	M	04	CHRONIC OBSTRUCTIVE PULMONARY DISEASE

141	M	04	ASTHMA
142	M	04	INTERSTITIAL LUNG DISEASE
143	M	04	OTHER RESPIRATORY DIAGNOSES EXCEPT SIGNS, SYMPTOMS & MINOR DIAGNOSES
144	M	04	RESPIRATORY SIGNS, SYMPTOMS & MINOR DIAGNOSES
160	P	05	MAJOR CARDIOTHORACIC REPAIR OF HEART ANOMALY
161	P	05	CARDIAC DEFIBRILLATOR & HEART ASSIST IMPLANT
162	P	05	CARDIAC VALVE PROCEDURES W CARDIAC CATHETERIZATION
163	P	05	CARDIAC VALVE PROCEDURES W/O CARDIAC CATHETERIZATION
165	P	05	CORONARY BYPASS W CARDIAC CATH OR PERCUTANEOUS CARDIAC PROCEDURE
166	P	05	CORONARY BYPASS W/O CARDIAC CATH OR PERCUTANEOUS CARDIAC PROCEDURE
167	P	05	OTHER CARDIOTHORACIC PROCEDURES
169	P	05	MAJOR THORACIC & ABDOMINAL VASCULAR PROCEDURES
170	P	05	PERMANENT CARDIAC PACEMAKER IMPLANT W AMI, HEART FAILURE OR SHOCK
171	P	05	PERM CARDIAC PACEMAKER IMPLANT W/O AMI, HEART FAILURE OR SHOCK
173	P	05	OTHER VASCULAR PROCEDURES
174	P	05	PERCUTANEOUS CARDIOVASCULAR PROCEDURES W AMI
175	P	05	PERCUTANEOUS CARDIOVASCULAR PROCEDURES W/O AMI
176	P	05	CARDIAC PACEMAKER & DEFIBRILLATOR DEVICE REPLACEMENT
177	P	05	CARDIAC PACEMAKER & DEFIBRILLATOR REVISION EXCEPT DEVICE REPLACEMENT
180	P	05	OTHER CIRCULATORY SYSTEM PROCEDURES
190	M	05	ACUTE MYOCARDIAL INFARCTION
191	M	05	CARDIAC CATHETERIZATION W CIRC DISORD EXC ISCHEMIC HEART DISEASE
192	M	05	CARDIAC CATHETERIZATION FOR ISCHEMIC HEART DISEASE
193	M	05	ACUTE & SUBACUTE ENDOCARDITIS
194	M	05	HEART FAILURE
196	M	05	CARDIAC ARREST
197	M	05	PERIPHERAL & OTHER VASCULAR DISORDERS
198	M	05	ANGINA PECTORIS & CORONARY ATHEROSCLEROSIS
199	M	05	HYPERTENSION
200	M	05	CARDIAC STRUCTURAL & VALVULAR DISORDERS
201	M	05	CARDIAC ARRHYTHMIA & CONDUCTION DISORDERS
203	M	05	CHEST PAIN
204	M	05	SYNCOPE & COLLAPSE
205	M	05	CARDIOMYOPATHY
206	M	05	MALFUNCTION,REACTION,COMPLICATION OF CARDIAC/VASC DEVICE OR PROCEDURE
207	M	05	OTHER CIRCULATORY SYSTEM DIAGNOSES
220	P	06	MAJOR STOMACH, ESOPHAGEAL & DUODENAL PROCEDURES
221	P	06	MAJOR SMALL & LARGE BOWEL PROCEDURES
222	P	06	OTHER STOMACH, ESOPHAGEAL & DUODENAL PROCEDURES
223	P	06	OTHER SMALL & LARGE BOWEL PROCEDURES
224	P	06	PERITONEAL ADHESIOLYSIS
225	P	06	APPENDECTOMY
226	P	06	ANAL PROCEDURES
227	P	06	HERNIA PROCEDURES EXCEPT INGUINAL, FEMORAL & UMBILICAL
228	P	06	INGUINAL, FEMORAL & UMBILICAL HERNIA PROCEDURES
229	P	06	OTHER DIGESTIVE SYSTEM & ABDOMINAL PROCEDURES
240	M	06	DIGESTIVE MALIGNANCY
241	M	06	PEPTIC ULCER & GASTRITIS
242	M	06	MAJOR ESOPHAGEAL DISORDERS
243	M	06	OTHER ESOPHAGEAL DISORDERS
244	M	06	DIVERTICULITIS & DIVERTICULOSIS
245	M	06	INFLAMMATORY BOWEL DISEASE
246	M	06	GASTROINTESTINAL VASCULAR INSUFFICIENCY
247	M	06	INTESTINAL OBSTRUCTION
248	M	06	MAJOR GASTROINTESTINAL & PERITONEAL INFECTIONS
249	M	06	NON-BACTERIAL GASTROENTERITIS, NAUSEA & VOMITING
251	M	06	ABDOMINAL PAIN
252	M	06	MALFUNCTION, REACTION & COMPLICATION OF GI DEVICE OR PROCEDURE
253	M	06	OTHER & UNSPECIFIED GASTROINTESTINAL HEMORRHAGE
254	M	06	OTHER DIGESTIVE SYSTEM DIAGNOSES
260	P	07	MAJOR PANCREAS, LIVER & SHUNT PROCEDURES
261	P	07	MAJOR BILIARY TRACT PROCEDURES

262	P	07	CHOLECYSTECTOMY EXCEPT LAPAROSCOPIC
263	P	07	LAPAROSCOPIC CHOLECYSTECTOMY
264	P	07	OTHER HEPATOBILIARY, PANCREAS & ABDOMINAL PROCEDURES
279	M	07	HEPATIC COMA & OTHER MAJOR ACUTE LIVER DISORDERS
280	M	07	ALCOHOLIC LIVER DISEASE
281	M	07	MALIGNANCY OF HEPATOBILIARY SYSTEM & PANCREAS
282	M	07	DISORDERS OF PANCREAS EXCEPT MALIGNANCY
283	M	07	OTHER DISORDERS OF THE LIVER
284	M	07	DISORDERS OF GALLBLADDER & BILIARY TRACT
301	P	08	HIP JOINT REPLACEMENT
302	P	08	KNEE JOINT REPLACEMENT
303	P	08	DORSAL & LUMBAR FUSION PROC FOR CURVATURE OF BACK
304	P	08	DORSAL & LUMBAR FUSION PROC EXCEPT FOR CURVATURE OF BACK
305	P	08	AMPUTATION OF LOWER LIMB EXCEPT TOES
308	P	08	HIP & FEMUR PROCEDURES FOR TRAUMA EXCEPT JOINT REPLACEMENT
309	P	08	HIP & FEMUR PROCEDURES FOR NON-TRAUMA EXCEPT JOINT REPLACEMENT
310	P	08	INTERVERTEBRAL DISC EXCISION & DECOMPRESSION
312	P	08	SKIN GRAFT, EXCEPT HAND, FOR MUSCULOSKELETAL & CONNECTIVE TISSUE DIAGNOSES
313	P	08	KNEE & LOWER LEG PROCEDURES EXCEPT FOOT
314	P	08	FOOT & TOE PROCEDURES
315	P	08	SHOULDER, UPPER ARM & FOREARM PROCEDURES
316	P	08	HAND & WRIST PROCEDURES
317	P	08	TENDON, MUSCLE & OTHER SOFT TISSUE PROCEDURES
320	P	08	OTHER MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE PROCEDURES
321	P	08	CERVICAL SPINAL FUSION & OTHER BACK/NECK PROC EXC DISC EXCIS/DECOMP
340	M	08	FRACTURE OF FEMUR
341	M	08	FRACTURE OF PELVIS OR DISLOCATION OF HIP
342	M	08	FRACTURES & DISLOCATIONS EXCEPT FEMUR, PELVIS & BACK
343	M	08	MUSCULOSKELETAL MALIGNANCY & PATHOL FRACTURE D/T MUSCSKEL MALIG
344	M	08	OSTEOMYELITIS, SEPTIC ARTHRITIS & OTHER MUSCULOSKELETAL INFECTIONS
346	M	08	CONNECTIVE TISSUE DISORDERS
347	M	08	OTHER BACK & NECK DISORDERS, FRACTURES & INJURIES
349	M	08	MALFUNCTION, REACTION, COMPLIC OF ORTHOPEDIC DEVICE OR PROCEDURE
351	M	08	OTHER MUSCULOSKELETAL SYSTEM & CONNECTIVE TISSUE DIAGNOSES
361	P	09	SKIN GRAFT FOR SKIN & SUBCUTANEOUS TISSUE DIAGNOSES
362	P	09	MASTECTOMY PROCEDURES
363	P	09	BREAST PROCEDURES EXCEPT MASTECTOMY
364	P	09	OTHER SKIN, SUBCUTANEOUS TISSUE & RELATED PROCEDURES
380	M	09	SKIN ULCERS
381	M	09	MAJOR SKIN DISORDERS
382	M	09	MALIGNANT BREAST DISORDERS
383	M	09	CELLULITIS & OTHER BACTERIAL SKIN INFECTIONS
384	M	09	CONTUSION, OPEN WOUND & OTHER TRAUMA TO SKIN & SUBCUTANEOUS TISSUE
385	M	09	OTHER SKIN, SUBCUTANEOUS TISSUE & BREAST DISORDERS
401	P	10	PITUITARY & ADRENAL PROCEDURES
403	P	10	PROCEDURES FOR OBESITY
404	P	10	THYROID, PARATHYROID & THYROGLOSSAL PROCEDURES
405	P	10	OTHER PROCEDURES FOR ENDOCRINE, NUTRITIONAL & METABOLIC DISORDERS
420	M	10	DIABETES
421	M	10	MALNUTRITION, FAILURE TO THRIVE & OTHER NUTRITIONAL DISORDERS
422	M	10	HYPOVOLEMIA & RELATED ELECTROLYTE DISORDERS
423	M	10	INBORN ERRORS OF METABOLISM
424	M	10	OTHER ENDOCRINE DISORDERS
425	M	10	ELECTROLYTE DISORDERS EXCEPT HYPOVOLEMIA RELATED
440	P	11	KIDNEY TRANSPLANT
441	P	11	MAJOR BLADDER PROCEDURES
442	P	11	KIDNEY & URINARY TRACT PROCEDURES FOR MALIGNANCY
443	P	11	KIDNEY & URINARY TRACT PROCEDURES FOR NONMALIGNANCY
444	P	11	RENAL DIALYSIS ACCESS DEVICE PROCEDURE ONLY
445	P	11	OTHER BLADDER PROCEDURES
446	P	11	URETHRAL & TRANSURETHRAL PROCEDURES
447	P	11	OTHER KIDNEY, URINARY TRACT & RELATED PROCEDURES

460 M 11 RENAL FAILURE
461 M 11 KIDNEY & URINARY TRACT MALIGNANCY
462 M 11 NEPHRITIS & NEPHROSIS
463 M 11 KIDNEY & URINARY TRACT INFECTIONS
465 M 11 URINARY STONES & ACQUIRED UPPER URINARY TRACT OBSTRUCTION
466 M 11 MALFUNCTION, REACTION, COMPLIC OF GENITOURINARY DEVICE OR PROC
468 M 11 OTHER KIDNEY & URINARY TRACT DIAGNOSES, SIGNS & SYMPTOMS
480 P 12 MAJOR MALE PELVIC PROCEDURES
481 P 12 PENIS PROCEDURES
482 P 12 TRANSURETHRAL PROSTATECTOMY
483 P 12 TESTES & SCROTAL PROCEDURES
484 P 12 OTHER MALE REPRODUCTIVE SYSTEM & RELATED PROCEDURES
500 M 12 MALIGNANCY, MALE REPRODUCTIVE SYSTEM
501 M 12 MALE REPRODUCTIVE SYSTEM DIAGNOSES EXCEPT MALIGNANCY
510 P 13 PELVIC EVISCERATION, RADICAL HYSTERECTOMY & OTHER RADICAL GYN PROCS
511 P 13 UTERINE & ADNEXA PROCEDURES FOR OVARIAN & ADNEXAL MALIGNANCY
512 P 13 UTERINE & ADNEXA PROCEDURES FOR NON-OVARIAN & NON-ADNEXAL MALIG
513 P 13 UTERINE & ADNEXA PROCEDURES FOR NON-MALIGNANCY EXCEPT LEIOMYOMA
514 P 13 FEMALE REPRODUCTIVE SYSTEM RECONSTRUCTIVE PROCEDURES
517 P 13 DILATION & CURETTAGE FOR NON-OBSTETRIC DIAGNOSES
518 P 13 OTHER FEMALE REPRODUCTIVE SYSTEM & RELATED PROCEDURES
519 P 13 UTERINE & ADNEXA PROCEDURES FOR LEIOMYOMA
530 M 13 FEMALE REPRODUCTIVE SYSTEM MALIGNANCY
531 M 13 FEMALE REPRODUCTIVE SYSTEM INFECTIONS
532 M 13 MENSTRUAL & OTHER FEMALE REPRODUCTIVE SYSTEM DISORDERS
540 P 14 CESAREAN DELIVERY
541 P 14 VAGINAL DELIVERY W STERILIZATION &/OR D&C
542 P 14 VAGINAL DELIVERY W COMPLICATING PROCEDURES EXC STERILIZATION &/OR D&C
544 P 14 D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY FOR OBSTETRIC DIAGNOSES
545 P 14 ECTOPIC PREGNANCY PROCEDURE
546 P 14 OTHER O.R. PROC FOR OBSTETRIC DIAGNOSES EXCEPT DELIVERY DIAGNOSES
560 M 14 VAGINAL DELIVERY
561 M 14 POSTPARTUM & POST ABORTION DIAGNOSES W/O PROCEDURE
563 M 14 THREATENED ABORTION
564 M 14 ABORTION W/O D&C, ASPIRATION CURETTAGE OR HYSTEROTOMY
565 M 14 FALSE LABOR
566 M 14 OTHER ANTEPARTUM DIAGNOSES
580 M 15 NEONATE, TRANSFERRED <5 DAYS OLD, NOT BORN HERE
581 M 15 NEONATE, TRANSFERRED < 5 DAYS OLD, BORN HERE
583 P 15 NEONATE W ECMO
588 P 15 NEONATE BWT <1500G W MAJOR PROCEDURE
589 M 15 NEONATE BWT <500G
591 M 15 NEONATE BIRTHWT 500-749G W/O MAJOR PROCEDURE
593 M 15 NEONATE BIRTHWT 750-999G W/O MAJOR PROCEDURE
602 M 15 NEONATE BWT 1000-1249G W RESP DIST SYND/OTH MAJ RESP OR MAJ ANOM
603 M 15 NEONATE BIRTHWT 1000-1249G W OR W/O OTHER SIGNIFICANT CONDITION
607 M 15 NEONATE BWT 1250-1499G W RESP DIST SYND/OTH MAJ RESP OR MAJ ANOM
608 M 15 NEONATE BWT 1250-1499G W OR W/O OTHER SIGNIFICANT CONDITION
609 P 15 NEONATE BWT 1500-2499G W MAJOR PROCEDURE
611 M 15 NEONATE BIRTHWT 1500-1999G W MAJOR ANOMALY
612 M 15 NEONATE BWT 1500-1999G W RESP DIST SYND/OTH MAJ RESP COND
613 M 15 NEONATE BIRTHWT 1500-1999G W CONGENITAL/PERINATAL INFECTION
614 M 15 NEONATE BWT 1500-1999G W OR W/O OTHER SIGNIFICANT CONDITION
621 M 15 NEONATE BWT 2000-2499G W MAJOR ANOMALY
622 M 15 NEONATE BWT 2000-2499G W RESP DIST SYND/OTH MAJ RESP COND
623 M 15 NEONATE BWT 2000-2499G W CONGENITAL/PERINATAL INFECTION
625 M 15 NEONATE BWT 2000-2499G W OTHER SIGNIFICANT CONDITION
626 M 15 NEONATE BWT 2000-2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM
630 P 15 NEONATE BIRTHWT >2499G W MAJOR CARDIOVASCULAR PROCEDURE
631 P 15 NEONATE BIRTHWT >2499G W OTHER MAJOR PROCEDURE
633 M 15 NEONATE BIRTHWT >2499G W MAJOR ANOMALY
634 M 15 NEONATE, BIRTHWT >2499G W RESP DIST SYND/OTH MAJ RESP COND
636 M 15 NEONATE BIRTHWT >2499G W CONGENITAL/PERINATAL INFECTION

639	M	15	NEONATE BIRTHWT >2499G W OTHER SIGNIFICANT CONDITION
640	M	15	NEONATE BIRTHWT >2499G, NORMAL NEWBORN OR NEONATE W OTHER PROBLEM
650	P	16	SPLENECTOMY
651	P	16	OTHER PROCEDURES OF BLOOD & BLOOD-FORMING ORGANS
660	M	16	MAJOR HEMATOLOGIC/IMMUNOLOGIC DIAG EXC SICKLE CELL CRISIS & COAGUL
661	M	16	COAGULATION & PLATELET DISORDERS
662	M	16	SICKLE CELL ANEMIA CRISIS
663	M	16	OTHER ANEMIA & DISORDERS OF BLOOD & BLOOD-FORMING ORGANS
680	P	17	MAJOR O.R. PROCEDURES FOR LYMPHATIC/HEMATOPOIETIC/OTHER NEOPLASMS
681	P	17	OTHER O.R. PROCEDURES FOR LYMPHATIC/HEMATOPOIETIC/OTHER NEOPLASMS
690	M	17	ACUTE LEUKEMIA
691	M	17	LYMPHOMA, MYELOMA & NON-ACUTE LEUKEMIA
692	M	17	RADIOTHERAPY
693	M	17	CHEMOTHERAPY
694	M	17	LYMPHATIC & OTHER MALIGNANCIES & NEOPLASMS OF UNCERTAIN BEHAVIOR
710	P	18	INFECTIOUS & PARASITIC DISEASES INCLUDING HIV W O.R. PROCEDURE
711	P	18	POST-OP, POST-TRAUMA, OTHER DEVICE INFECTIONS W O.R. PROCEDURE
720	M	18	SEPTICEMIA & DISSEMINATED INFECTIONS
721	M	18	POST-OPERATIVE, POST-TRAUMATIC, OTHER DEVICE INFECTIONS
722	M	18	FEVER
723	M	18	VIRAL ILLNESS
724	M	18	OTHER INFECTIOUS & PARASITIC DISEASES
740	P	19	MENTAL ILLNESS DIAGNOSIS W O.R. PROCEDURE
750	M	19	SCHIZOPHRENIA
751	M	19	MAJOR DEPRESSIVE DISORDERS & OTHER/UNSPECIFIED PSYCHOSES
752	M	19	DISORDERS OF PERSONALITY & IMPULSE CONTROL
753	M	19	BIPOLAR DISORDERS
754	M	19	DEPRESSION EXCEPT MAJOR DEPRESSIVE DISORDER
755	M	19	ADJUSTMENT DISORDERS & NEUROSES EXCEPT DEPRESSIVE DIAGNOSES
756	M	19	ACUTE ANXIETY & DELIRIUM STATES
757	M	19	ORGANIC MENTAL HEALTH DISTURBANCES
758	M	19	CHILDHOOD BEHAVIORAL DISORDERS
759	M	19	EATING DISORDERS
760	M	19	OTHER MENTAL HEALTH DISORDERS
770	M	20	DRUG & ALCOHOL ABUSE OR DEPENDENCE, LEFT AGAINST MEDICAL ADVICE
772	M	20	ALCOHOL & DRUG DEPENDENCE W REHAB OR REHAB/DETOX THERAPY
773	M	20	OPIOID ABUSE & DEPENDENCE
774	M	20	COCAINE ABUSE & DEPENDENCE
775	M	20	ALCOHOL ABUSE & DEPENDENCE
776	M	20	OTHER DRUG ABUSE & DEPENDENCE
791	P	21	O.R. PROCEDURE FOR OTHER COMPLICATIONS OF TREATMENT
811	M	21	ALLERGIC REACTIONS
812	M	21	POISONING OF MEDICINAL AGENTS
813	M	21	OTHER COMPLICATIONS OF TREATMENT
815	M	21	OTHER INJURY, POISONING & TOXIC EFFECT DIAGNOSES
816	M	21	TOXIC EFFECTS OF NON-MEDICINAL SUBSTANCES
841	P	22	EXTENSIVE 3RD DEGREE BURNS W SKIN GRAFT
842	P	22	FULL THICKNESS BURNS W SKIN GRAFT
843	M	22	EXTENSIVE 3RD DEGREE OR FULL THICKNESS BURNS W/O SKIN GRAFT
844	M	22	PARTIAL THICKNESS BURNS W OR W/O SKIN GRAFT
850	P	23	PROCEDURE W DIAG OF REHAB, AFTERCARE OR OTH CONTACT W HEALTH SERVICE
860	M	23	REHABILITATION
861	M	23	SIGNS, SYMPTOMS & OTHER FACTORS INFLUENCING HEALTH STATUS
862	M	23	OTHER AFTERCARE & CONVALESCENCE
863	M	23	NEONATAL AFTERCARE
890	M	24	HIV W MULTIPLE MAJOR HIV RELATED CONDITIONS
892	M	24	HIV W MAJOR HIV RELATED CONDITION
893	M	24	HIV W MULTIPLE SIGNIFICANT HIV RELATED CONDITIONS
894	M	24	HIV W ONE SIGNIF HIV COND OR W/O SIGNIF RELATED COND
910	P	25	CRANIOTOMY FOR MULTIPLE SIGNIFICANT TRAUMA
911	P	25	EXTENSIVE ABDOMINAL/THORACIC PROCEDURES FOR MULT SIGNIFICANT TRAUMA
912	P	25	MUSCULOSKELETAL & OTHER PROCEDURES FOR MULTIPLE SIGNIFICANT TRAUMA
930	M	25	MULTIPLE SIGNIFICANT TRAUMA W/O O.R. PROCEDURE

950	P	EXTENSIVE PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
951	P	MODERATELY EXTENSIVE PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
952	P	NONEXTENSIVE PROCEDURE UNRELATED TO PRINCIPAL DIAGNOSIS
955		PRINCIPAL DIAGNOSIS INVALID AS DISCHARGE DIAGNOSIS
956		UNGROUPABLE