

# 3M HIS

## **APR<sup>TM</sup>-DRG Classification Software -Overview**

The All Patient Refined Diagnosis Related Groups (APR-DRGs) expand the basic DRG structure by adding two sets of subclasses to each base APR-DRG. Each subclass set consists of four subclasses: one addresses patient differences relating to severity of illness and the other addresses differences in risk of mortality. Severity of illness is defined as the extent of physiologic decompensation or organ system loss of function. Risk of mortality is defined as the likelihood of dying.

Although severity of illness and risk of mortality are highly correlated for many conditions, they often differ because they relate to distinct patient attributes. For example, a patient with acute cholelithiasis (acute gallstone attack) may be considered a major (level 2) 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 cholelithiasis. However, it is unlikely that the acute episode alone will result in death and therefore the risk of mortality for this patient is minor (level 1).

If additional, more serious diagnoses are also present, severity of illness and risk of mortality may increase. For example, if peritonitis complicates the acute cholelithiasis, the patient will be considered to have extreme (level 4) severity of illness and major (level 3) risk of mortality.

Each patient is assigned three distinct descriptors in the APR-DRG system:

- 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, and 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.<sup>1</sup>

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<sup>1</sup> 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 principles of APR-DRGs are that both severity of illness and risk of mortality are highly dependent on the patient's underlying clinical problems, and that patients with high severity of illness or risk of mortality are usually characterized by multiple serious diseases or illnesses. The assessment of the severity of illness or risk of mortality, based on the patient's complicating or comorbid conditions, is specific to the patient's base APR-DRG. In other words, the determination of the severity of illness and risk of mortality is disease-specific. 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 and 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. An in-depth description of the clinical logic of the APR-DRGs and the severity of illness and risk of mortality subclass is available to all users.

## **Development**

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 314 reasons for admission, in which the risk factors that impact the severity of illness and risk of mortality were identified. (In the APR-DRG methodology the 314 different reasons for admissions are referred to as 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. Patients with a high severity of illness are, in general, expected to incur greater costs and patients with a higher risk of mortality are expected to die more frequently. Historical data was used to review clinical hypotheses. If there were unexplained discrepancies between clinical expectations and the data results, the clinical expectations were always utilized as the basis of the APR-DRGs. An expert panel of clinicians from various specialties reviewed all logic for clinical accuracy. Updates of APR DRGs rely on customer feedback and regular clinician review and validation. Thus, the APR-DRGs use a *clinical model* that has been extensively reviewed and regularly updated as new data becomes available.

## **APR-DRG Developers**

APR-DRGs are a joint development of 3M Health Information Systems (3M HIS) and the National Association of Children's Hospitals and Related Institutions (NACHRI). APR-DRGs are a proprietary product of 3M HIS. NACHRI is responsible for the pediatric portion of APR-DRGs. The pediatric portion of any severity of illness system is critical if non-Medicare data is included in the provider comparisons. APR-DRGs have the most comprehensive and complete pediatric logic of any severity of illness system.

## **Access to APR-DRG Logic**

Although the APR-DRGs are proprietary, 3M HIS provides users access to the APR-DRG clinical logic. The APR-DRG Definitions Manual provides a complete description of the APR-DRG logic. The detailed overview of the logic of the APR-DRGs has been made available publicly and is available from many sources. All users are provided a copy of the Definitions Manual which includes a specification of all aspects of the clinical logic. In addition, in order to further facilitate users having access to the APR-DRG logic, 3M HIS is establishing a web site that will allow users to assign the APR-DRG and obtain a detailed explanation of how the severity of illness subclass was assigned. The use of the web site requires a password provided by 3M HIS and is volume limited. The intent of the web site is not to allow the APR-DRGs to be assigned on an ongoing basis, but to provide an explanation of the APR-DRG assignment for specific patients. *Thus, while the APR-DRG logic is proprietary, all users have complete access to the logic.*

## **APR-DRG Data Requirements**

In order to insure wide applicability with minimal burden on providers, the data elements used to determine patient risk factors used by the APR-DRGs are limited to standard UB-02 data elements. Specifically, the data elements used by the APR-DRGs are:

- Principal Diagnosis coded in ICD-9-CM
- Secondary Diagnoses coded in ICD-9-CM
- Procedures Coded in ICD-9-CM
- Age
- Sex
- Discharge Disposition

These data elements are combined together on a patient-specific basis to determine patient severity of illness and risk of mortality. Thus, APR-DRGs do not require hospitals to do any dual coding. APR-DRGs are assigned using the same ICD-9-CM diagnosis and procedure codes used to assign the CMS DRGs.