Measuring risk, managing care

with the Solventum™ Clinical Risk Groups (CRGs) Classification System

Overview

The Solventum Clinical Risk Groups (CRGs) Classification System uses inpatient and ambulatory diagnosis and procedure codes, pharmaceutical data and functional health status to assign patients into a clinically meaningful group of individuals who require similar amounts and types of resources. Solventum CRGs can be used both to predict future healthcare utilization and cost (prospective) and explain past healthcare utilization and cost (retrospective).

Solventum CRGs apply expert clinical logic to assign each individual to a single risk group. Depending on how granular you want your data, the grouping results can be aggregated into predefined or user-defined Solventum CRGs that maintain clinical significance and severity adjustment.

Using abstracted data from standard claims, Solventum CRGs can cover a longitudinal period of time (typically a year) and provide a comprehensive and clinically specific classification for a full range of populations: low income, elderly, pediatric, commercially insured and employer-sponsored populations, as well as people with disabilities, mental illness and chronic diseases.

Solventum CRGs describe the health status and burden of illness of individuals in a population and can help identify medically complex individuals within a population. Because Solventum CRGs are patient-centric, they do not focus on specific diseases or services; rather, they account for comorbidities and measure the health status of an individual over time. By assigning less significance to time-limited acute diseases, Solventum CRGs can better represent how chronic disease affects post-acute resource use.

Finally, Solventum CRGs create a bridge between the clinical and financial aspects of healthcare. An organization can assign appropriate relative payment weights to Solventum CRGs by severity level, corresponding to the expected level of resources the condition requires. Although payment weights correspond to the severity level, they are calculated separately from the clinical model.

Thus, any changes to the relative weights — brought on by healthcare reform initiatives, practice pattern shifts or technology changes — do not impact the clinical model. Regardless of reimbursement changes, Solventum CRGs remain a consistent clinical model.

Solventum CRGs create a bridge between the clinical and financial aspects of healthcare. However much the financial side of healthcare may change, Solventum CRGs remain a stable and consistent clinical model.

Risk groups and SOI levels

With Solventum CRGs, an individual is assigned to both a retrospective and a prospective severity risk group. The five-digit classification code (see Figure 1 for an example) contains numeric representations of these concepts:

- The first digit represents the core health status group, which ranges from 1 (healthy) to 9 (catastrophic)

- The second through fourth digits represent the base Solventum CRG

- The fifth digit identifies the severity of illness (SOI) level, which is typically classified as 1 (minor), 2 (moderate), 3 (major) and 4 (extreme)

Status 6: Pairs   Severity level

Base group

6   313   4
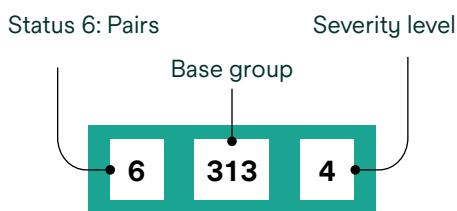
Figure 1. Sample of the Solventum CRG for diabetes and hypertension and its component parts

The underlying clinical principles of Solventum CRGs indicate that SOI depends on the number and severity of the individual's underlying chronic diagnoses.

Individuals with high SOI usually have multiple serious chronic diseases or illnesses; as the number and types of serious chronic diagnoses increase, the SOI may increase. For example, if asthma, congestive heart disease and diabetes are all present, the individual may be considered in the "extreme" SOI level.

Hierarchy and characteristics

After assigning each individual to single, mutually exclusive retrospective and prospective severity risk groups, Solventum CRGs draw from standard demographic, diagnostic and procedural data to assign a core health status group. Figure 2 (below) shows the statuses and how each is subdivided into Solventum CRGs. For chronic illnesses and conditions, a Solventum CRG is further subdivided into explicit SOI levels.

Figure 2. The nine core health status groups described by Solventum CRGs

Solventum CRG core health status group (1-9)	Base Solventum CRGs (total = 330)	Description/example of base Solventum CRG	Severity level	Number of Solventum CRGs (total = 1,408)
9 - Catastrophic condition status	10	History of major organ transplant	4	40
8 - Dominant and metastatic malignancies	30	Colon malignancy — under active treatment	4	120
7 - Dominant chronic disease in three or more organ systems (triplets)	28	Diabetes mellitus, congestive heart failure (CHF) and chronic obstructive pulmonary disease (COPD)	6	168
6 - Significant chronic disease in multiple organ systems (pairs)	78	Diabetes mellitus and CHF	6	468
5 - Single dominant or moderate chronic disease	125	Diabetes mellitus	4	500
4 - Minor chronic disease in multiple organ systems	1	Migraine and benign prostatic hyperplasia (BPH)	4	4
3 - Single minor chronic disease	50	Migraine	2	100
2 - History of significant acute disease	6	Chest pains	None	6
1 - Healthy/non-users	2	Healthy (no chronic health problems)	None	2

Key differentiators

The logic of Solventum CRGs is completely transparent, thanks to the Solventum CRG definitions manual, which every licensed Solventum CRG user receives. For example, this detailed reference describes exactly which conditions relating to diabetes increase the SOI level of diabetes. Such risk stratification transparency contrasts sharply with the "black box approach" taken by other systems on the market.

Like the Centers for Medicare & Medicaid Services (CMS) Medicare Severity DRGs (MS-DRGs), Solventum CRGs use a categorical model rather than a regression (i.e., a statistical or mathematically based) approach. In a categorical model, an individual may be assigned to one, and only one, category in the classification process. Solventum researchers primarily chose this approach for the following reasons:

- **Specificity:** A categorical model allows highly conditional and complex clinical relationships to be specified at a level of detail that is not possible in statistical models. Every patient can be placed in a clear hierarchy.

- **Consistency:** A categorical model allows a stable clinical model to be established independent of the resource weights an organization may choose to use for cost prediction. When reimbursement models change, the Solventum CRG clinical model remains unchanged and stable. By contrast, in statistical or mathematically driven models, resource weights are intertwined with the clinical model, requiring complete reformulation when practice patterns or reimbursement models change.

- **Clinical foundation:** Because Solventum CRGs are clinically meaningful, clinicians can understand why and how the methodology stratifies risk and use the data to change practice patterns and improve patient care. Solventum CRGs are also patient-centric, focusing on the total burden of illness and not on a specific disease or service. This means with Solventum CRGs, providers and researchers can drill down into patient data to see what is really going on with any given patient's health status.

Figure 3. Differences between categorical Solventum CRGs and statistical models

Issue	Categorical Solventum CRGs	Statistical model
Development method	Clinical model developed by clinicians	Statistical model developed with regression analysis
Structure of model	Clinically meaningful categories of enrollees subdivided into explicit SOI levels	Additive mathematical formula that computes a score for a beneficiary
Use for rate setting	Each clinical category has a payment weight that is converted into a payment amount	Numeric score is converted to a payment amount
Calculation and replication of payment amounts	Arithmetic average that can be easily calculated for each Solventum CRG independent of developers	Requires regression analysis, which can be difficult to perform independent of developers
Communication value to providers	Creates a language understood by providers because each Solventum CRG has an explicit clinical definition	Numeric score with minimal meaning or communication value
Update process	Selected clinical areas can be refined without affecting entire clinical model	Requires respecification of statistical model
Changes to practice patterns or technology	Clinical model is stable but payment weights can change	Requires respecification of statistical model
Pharmacy and/or health status information	Clinical model is stable	Requires respecification of statistical model
Carve-outs	Clinical model is stable but payment weights can change	Requires respecification of statistical model

Model resource use and payment rates

Solventum CRGs were explicitly designed for clinical management, but they can also establish managed care payment rates. This classification system can simultaneously explain variation in care costs and provide the clinical detail needed to design effective cost-control incentives in a value-based payment environment. Additional advantages include:

Independent relative weights: Organizations derive their relative weights from actual historical expenditures archived by real payers to accurately reflect actual practice patterns. When you license Solventum CRGs, you can associate appropriate relative payment weights that are calculated separately from the clinical model. Best of all, changes to these weights or reimbursement models do not impact the Solventum CRG clinical model.

Outlier identification: Outliers are individuals whose resource use substantially exceeds expected levels; they can distort profiles or cause large payment losses. Thresholds are established for each Solventum CRG clinical category so outliers can be capped. Some risk calculation models are based on projected cost, exclude members with high outlier costs and utilization, and don't consider individuals with chronic disease who are not using enough services. By contrast, Solventum CRGs calculate risk based on projected cost *and* gaps in care; the calculation includes those with high outlier levels of cost and utilization as well as those with chronic diseases who are under utilizing services.

Comparing Solventum CRGs with CMS HCCs

CMS uses hierarchical condition categories (HCCs) to risk adjust Medicare capitation payments for Medicare Advantage plans (Part C). HCCs are based on the health expenditure risk of enrollees and use a risk-adjusted score that includes patient diagnosis and demographic information.

The commercial payer market uses the CMS HCC methodology with modifications to account for the different age ranges of a commercial patient population. HCCs are also used as a factor in calculating the total performance score under the CMS Hospital Value-Based Purchasing (VBP) Program.

The HCC algorithm is derived from a regression — or statistical — equation. This means members assigned to an HCC are statistically similar, but do not necessarily share clinical characteristics.

So how do Solventum CRGs stack up against HCCs in risk adjustment and predictive ability? CMS asked Solventum researchers to compare the two methodologies, and their report[1] concluded:

1	When it came to predicting costs after patient discharge, Solventum CRGs predicted charges substantially better than HCCs
2	Solventum CRGs also better predicted payments for post-acute care bundles with hospital outpatient, physician and other Part B, durable medical equipment and home health expenses
3	Although HCCs use surrogate variables in addition to clinical variables, HCCs do not perform better than Solventum CRGs

1. Jon Eisenhandle et al., "A Comparison of the Explanatory Power of Two Approaches to the Prediction of Post Acute Care Resources Use," Centers for Medicare & Medicaid Services, Solventum, 2011, https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Reports/Research-Reports-Items/Comparing_CRGs_and_HCCs_V2_12-19.

Validation in the real world

Solventum CRGs have undergone extensive independent validation and have been used in population health initiatives by several state data commissions, health departments and commercial payers. They are currently deployed in many states across the U.S. and globally.

Here are a few examples of how Solventum CRGs have been put to work:

Quality outcomes and total cost-of-care management for managed care and accountable care organizations (ACOs) in state Medicaid programs, such as Texas and New York

Outcomes-based payment programs used by commercial payers and regional/national health plans, including many Blue Cross® Blue Shield® organizations

Public performance reporting and all payer claims database analysis by state agencies, including the Utah Department of Health and the Texas Health and Human Services Commission

Population health and episodes-of-care analyses for the Medicare Payment Advisory Commission (MedPAC)
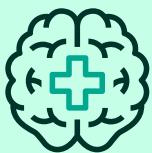
Comparisons of quality and utilization in special needs delivery programs, such as HIV, mental health and substance abuse

Solventum CRGs are an integral component of the Solventum™ Patient-focused Episodes (PFEs) Classification System and Solventum™ Population-focused Preventables (PFPs) Classification System. They also form the risk adjustment foundation for numerous Solventum analytics products.

Getting started with Solventum CRGs

Solventum CRGs were designed to run on readily available data so healthcare payers, providers and researchers can apply them easily and cost effectively to their projects and data analysis.

All the data elements that Solventum CRGs require to determine individual risk factors are available in standard claims forms for both inpatient and outpatient care. The data needs to be linkable over time to a single individual who has a unique identifier. Specifically, the data elements used by Solventum CRGs are:

- Principal diagnosis and secondary diagnoses coded in ICD-10-CM and ICD-10-CA (Canadian diagnoses)

- Procedures coded in ICD-10-CM, HCPCS (including CPT®), CCI (Canadian Classification of Health Interventions), CCP (Canadian Classification of Diagnostic, Therapeutic and Surgical Procedures) and Alberta Health System Codes

- Age

- Sex

In addition, if pharmaceutical data and functional health status data elements are also available, Solventum CRGs can use them to stratify SOI. This is especially important for illnesses in which a diagnosis code is not overly informative (e.g., stroke patients). These data elements from all sites of care over a defined longitudinal timeframe are combined on an individual basis to determine the base Solventum CRG and individual SOI level.

Solventum CRGs are proprietary to Solventum, but once your organization licenses the Solventum CRG Classification System, you receive the current edition of the Solventum CRG definitions manual and regular software updates to incorporate ICD code modifications.

Additional insights into Solventum CRGs

Solventum CRGs were originally developed in the late 1990s as a proprietary product by the Solventum Clinical and Economic Research (CER) team. The first formal release of the methodology occurred in October 2000, followed by multiple updates over the years.

Continuing today, the Solventum CER team maintains Solventum CRGs through an iterative process of formulating clinical hypotheses and then testing the hypotheses with historical data. First, separate clinical models are developed for each base Solventum CRG, and the risk factors that impact the SOI are identified. Next, historical data is used to review each clinical hypothesis. Individuals with a high SOI are generally expected to incur higher costs. However, if discrepancies are detected between clinical expectations and data results, the clinical expectations are always used as the basis of the Solventum CRGs.

Finally, an expert panel of clinicians from various specialties reviews all logic for clinical accuracy. Customer feedback and the results of constant clinician review and validation are embedded in the Solventum CRG development process, so the methodology exists as a constantly evolving clinical model that is also extensively reviewed and updated using historical data.

The Solventum CER team also understands the importance of including pediatric content in Solventum CRGs (or any other SOI system) given the unique needs of children's hospitals caring for highly complex pediatric patients. For the pediatric content contained in early Solventum CRGs, Solventum partnered with an organization then called the National Association of Children's Hospitals and Related Institutions (NACHRI).

Today, the Children's Hospital Association (CHA) uses Solventum CRGs as its measurement of choice and also collaborates with Solventum to further develop and refine the Solventum CRG Classification System. As a result, Solventum CRGs have a chronic disease based SOI system with comprehensive and complete pediatric logic.

Contact Solventum today

For more information on how our software and services can assist your organization, contact your Solventum sales representative, call us at 800-367-2447, or visit us online at **Solventum.com**.

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