

## Population Risk Management: Identifying High-Risk Members to Reduce Costs

by Ian Duncan

All health insurers are familiar with the “80/20” rule: 80% of the costs in any given population usually come from only 20% of its members. For years, health care organizations worked to control costs on that 20% base—through network contracting, case management and utilization review, and disease management programs, for example, that provide high-level interventions for high cost patients. However, these programs fail to distinguish between “high cost” and “high risk” members. “High cost” members are those who have already incurred dramatic costs—the diabetic currently in crisis, or the patient with a heart condition, or an End-stage renal disease patient. “High risk” members are the true ticking time bombs—the unseen, unrecognized, inexpensive member of today—who are going to become tomorrow’s high cost members.

In many of these cases, the most frustrating aspect to the health insurer is that those costs (and health complications) were often preventable: the diabetes patient who could have avoided the health crisis if he/she had taken insulin as prescribed, or the at-risk heart condition patient who could have benefited dramatically from using a beta blocker. The Centers for Disease Control and Prevention believes that up to half of all morbidity and mortality can be prevented with simple interventions. Until recently, there has been no way to efficiently identify these members. These are the members for whom a carefully-timed inter-

vention can make a real difference—both in health care and in health costs.

### Targeting Risks: Finding “High Cost” Members Before The Problems Start

If members became “high cost” or “low cost” and stayed that way, controlling their costs would be simpler. But the truth is that a patient’s status as “high cost” or “low cost” fluctuates. High cost members become low cost when their diseases are controlled and

low cost members become high cost when conditions flare up. Focusing on “high cost” members with intervention strategies is, in many respects, similar to closing

the barn door after the horse gets out: in many cases, the cost has already been incurred. The medical intervention has begun. And, inevitably, the patient’s cost will decline: the diabetic crisis will be resolved, the heart attack patient will get bypass surgery. Sick people, in other words, get better. And the “high cost” member will subside into the “low cost” range again. Just less than one-half of high-cost members, left to themselves, will become low-cost in the following year—the concept of “Regression to the Mean.” From this statistic it follows that half of a health plan’s case-management dollars will be wasted....the trick is finding out which half.

On the other hand, in any given database, at any time a substantial

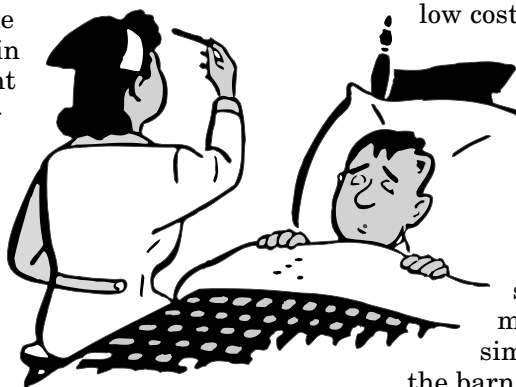
percentage of members are currently “low cost” but are at risk to become high cost patients in the near future. A recent analysis of one 350,000-member regional HMO showed that 14% of “low cost” members in 1999 became high cost in 2000. This is the basis of population risk management: identifying, targeting and treating members of a health care database based not on their current disease state—but on their likelihood to incur costs. This allows population health management to identify individuals at risk before their disease develops into an acute episode(s) of care, avoiding both human suffering and accelerated health care costs.

### Population Risk Management

Population-based analysis refers to members as “low cost, high risk” when they have risk markers (indicating either disease or behaviors, or both). Locating these members, and intervening before the high cost event occurs, is where health care organizations can achieve substantial savings. Although prediction includes disease markers in its algorithms, it differs in two respects: (1) not everybody has a traditional disease; there are at-risk patients who may otherwise “slip through the cracks of traditional Disease Management” (2) not everybody who has a disease needs management, currently. There are plenty of cardiac, diabetic, and asthmatic patients (the three traditional DM diseases) who are not presently at risk of becoming high-cost future consumers.

How does it work? Prediction follows a simple, four-step process:

(continued on page 8)



## Population Risk Management..

continued from page 7

### 1. Find the members that represent the target population for risk management.

This population could range from “all diabetics” to “members who have disease markers but who were low-cost in the prior 12 months”. These members are found from the traditional sources of medical claims and pharmacy data, together (sometimes) with self-reported data (Health Risk Assessments). The key to the data is operationalizing it, because the database needs to be updated regularly. Disease definitions are widespread in the industry, or can be obtained from vendors.

**2. Identify risk factors.** Some risk factors are well-known to actuaries (age, gender, geographic region, plan of benefits, etc.). Other risk factors are behavioral: is the member who has a heart condition on the appropriate treatment regimen, for example, and does the member comply with the treatment regimen (as evidenced by prescription fills and regular physician visits)? What makes this area of analysis so exciting is the volume of transactional data collected about members (and providers) by the average health plan. To date, this data has tended to be used for risk management in aggregate, rather than granular form. Nevertheless, there is considerable scope, limited only by the creativity of the user, to link different data and variables to create a profile of the member.

**3. Relate the dependent (predicted) variable to the independent variables.** At its most simple, this could be an application of a technique that every actuary is familiar with: multiple regression. In a simple

model, the member’s propensity to consume resources in the following period, (Paid Claims) is related to independent variables age, gender, number of co-morbidities, and number of therapeutic classes (of prescription drugs). Standard multiple regression techniques will assign significance values, as well as coefficients, to the independent variables.

**4. Apply the model to an independent data set.** Based on the values of the independent variables, each member is “scored” or assigned a relative risk rank for the predicted variable (in this case, total cost in the following period). If test data sets are available, then different models can be tested against actual data and models can be optimized.

### Typical results

Consider a recent case study. For this study, we evaluated members of

‘**One objective of risk management is reducing costs, so identification must be followed by an effective intervention.**’

a 270,000-member regional HMO over a two-year period, to identify those who are currently low-cost consumers but who were at risk of becoming high cost in the future. For this HMO, we identified approximately 60% of the members who met two criteria: members were continuously enrolled over the two-year period, and were “low cost” (less than \$2,000 of expense in the base period). The result of the analytical process (similar to that above) was a ranking of members

according to their probability of experiencing high costs in the projection year. When tested against actual plan data for the target year, approximately 40% of the highest-ranked members (0.5% of the database) experienced the predicted event. The incidence of high-cost events in the entire low-cost population, by comparison, was 8%.

The low cost/high risk members identified in the database had a total of 160 bed days per thousand members per year in 1999—their “low cost” year. In the year 2000, the year that they were predicted to be at high risk for becoming high cost, that same patient population had a total of 1,400 bed days per thousand members, an increase of over 700%.

Of course, identification is only the first step in an effective population risk management program. One objective of risk management is reducing costs, so identification must be followed by an effective intervention. Knowing that John Doe is at high risk for a diabetes crisis in 2002 is useless, unless we can take action to prevent that crisis from occurring. The critical first step, however, is to identify those members who are at-risk for incurring high health costs. The second step in population risk management is determining effective and efficient intervention strategies to prevent the crisis – and the costs, both financial and human, that such a crisis entails. We will follow up this initial article with a second on intervention results in a future issue.

*Ian G. Duncan, FIA, FCIA, MAAA, is Partner of Lotter Actuarial Partners. He can be reached at 212 529 8600*

### Footnotes

1) Example data are from a typical healthplan; all commercial members; high-cost is defined as claims incurred in excess of \$5,000 annually—approximately four times the plan average. Approximately 1% - 2% of members fit the definition.