Methods to Measure Disease Management Cost Savings: The Approach Employed by Accordant Health Services

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Introduction

Before discussing the various methods to measure potential cost savings it is necessary to first ask the obvious question: what exactly is disease management? In a 1999 *American Medical News* article, Neal Friedman, medical director of Lovelace Healthcare Innovations, Albuquerque, NM, offered the following: "Disease management is an approach to health care that identifies the optimal processes for care of a patient with a specific condition and implements those processes while measuring the outcome to demonstrate improvement economically, humanistically and clinically."

While positive humanistic outcomes are a desired result, disease management in practice usually targets the most complicated and expensive chronic conditions where improved clinical outcomes and a good return on investment can be shown. For individuals suffering from a chronic disease, the value of a disease management program in improving clinical outcomes is seldom questioned. Lorig *et. al.* reported in a 1999 *Medical Care* article that 1,200 individuals in a Stanford University disease management study demonstrated significant improvements in several key self-management areas including:

- exercise,
- cognitive symptom management,
- communication with physicians,
- self-reported general health,
- health distress,
- fatigue,
- disability, and
- social/role activities limitations,

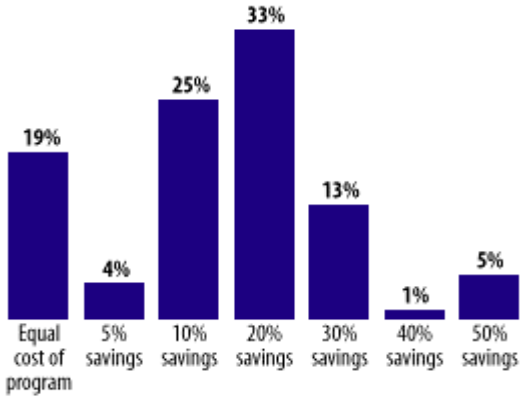
compared to individuals not engaged in a disease management program. They also spent fewer days in the hospital and reported fewer outpatient visits and hospitalizations. Many more examples of positive clinical results are found in the academic journal, *Disease Management and Clinical Outcomes* by Elsevier Publishing.

Disease management cost savings, however, are a different matter. While Lorig *et. al.* estimated a cost to savings ratio of approximately 1:10 over their three-year study period; others have questioned the economic benefits. Validating the cost savings of a disease management program from the perspective of a payer has been the subject of much discussion.

In 1997, data was collected from potential acquirers of disease management services by the National Managed Health Care Congress at the 2nd Annual Disease Management Conference. The results revealed an expectation by over half of the respondents that a return on investment of 20% or greater was required. In other words, net savings need to be 20% greater than the cost of a disease management program.

How big a return is expected?

Nineteen percent of respondents would implement a disease management program with a vendor if the expected return on investment equaled the cost of the program. Others want more.



Source: National Managed Health Care Congress

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Accordant Health Services, a disease management company founded in 1995 and located in Greensboro, NC, has recorded positive savings in its complex chronic disease management programs. (The appendix contains a listing of the diseases Accordant manages). Krause has previously quantified their program's positive economic outcomes for four health plans. The following is a brief explanation of the processes and methods they employ to calculate cost savings.

'Paid Claims' Methodology Employed

Accordant measures real savings based on paid claims data for the period they manage enrollees versus a baseline or pre-management period. They do not factor "soft dollar" savings into their measurement of economic outcomes. Soft dollar savings are considered by some disease management companies to be the health plan's reduced incremental costs associated with case management and other related overhead. Some companies consider these when computing their economic savings; however, these may or may not be real because it is extremely difficult to quantify actual internal plan cost savings.

Some disease management programs also attempt to employ proxy measures for economic savings. Drug prescriptions written and filled, hospital inpatient days, average length of stay, emergency room visits, and physician office visits are some of the measures used to approximate program savings. While these may initially make sense, utilization savings can also act a little bit like a balloon. Squeezing savings in one area might result in higher costs in another area. Accordant measures and reports utilization statistics, however, economic costs savings are based on total paid claims and not on selected proxy utilization measurements.

Quantifying savings is also challenging due to the time factor. With changes in health plan enrollment and membership eligibility over time, the ability to quantifiably measure savings is a formidable task. Many individuals switch plans frequently. Not all members eligible for disease management are enrolled on the same date adding another challenge to the process of measuring true savings. Others enrollees enter, leave, and re-enter plans.

Accordant measures paid claim savings from its program beginning on the first day of the month following an individual member's enrollment in the program. While the impact of Accordant's program is likely to increase through time, as reported by Krause, selecting a consistent approach to establishing the beginning date for each enrollee allows for a method that is dependable and comparable from plan to plan and period to period. The company presents its economic outcomes based on the period of time an individual has been actively enrolled in the Accordant disease management program.

The chart on the following page shows the first year economic results of a single health plan's enrollees managed by Accordant during the 1998-99 time period. The paid claim savings are grouped and reported by the number of months the individuals were enrolled in the program. The downward sloping line shows improved savings through time with Accordant's disease management program. This type of time series or trending analysis quantifies the actual savings and also reveals if the savings were the only result of initial 'cost avoidance' procedures that would become evident through time.

Measuring Savings – Baseline versus Actual Paid Claims

Different approaches exist regarding how to measure savings with paid claims. Most require the establishment of a baseline (before) period that is compared with the actual paid claims during the program period (after). The challenge faced by analysts is to compare program results on an "apples to apples" basis. In most cases this is easier said than done. The most common of these difficulties are summarized below.

- **Group Comparability**. The disease acuity or severity stage can differ significantly from enrollee to enrollee and from period to period. Additionally, some diseases follow a natural progression becoming more acute or severe as the individual ages. It is therefore important to compare the paid claims of the before and after groups by controlling for such important characteristics as disease severity and progression, age, gender, and geographic location.

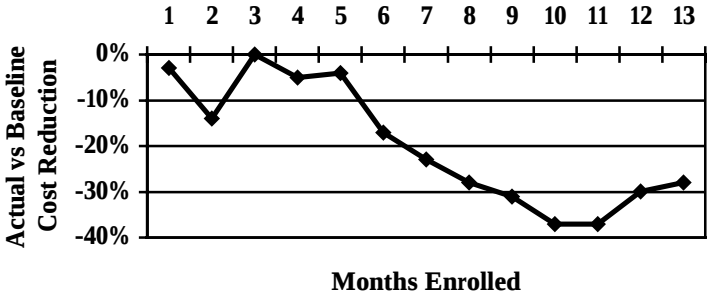
• **Self-Selection**. The specter of self-selection bias has been cited in connection with some disease management program evaluations. It has been argued that individuals who enroll voluntarily may be more likely to follow prescribed practices and procedures than those who don't enroll as willingly, so that the former group might be expected to have better outcomes than the later. On the other hand, to the extent that individuals may be driven to enroll because of a recent manifestation of their disease caused by lack of proper self-monitoring, the enrolled population could also be biased in favor of less compliant enrollees. A way to circumvent the self-selection problem is by randomly pre-assigning individuals to a study group before the program is implemented, however, this is not always feasible since health plan enrollment practices vary.

• **Small Sample Sizes**. If the analysis is restricted to only matched pairs or is broken up into too many sub-groups (i.e. by disease or health plan location), the study will likely contain a relatively small number of subjects. Analyses with less than thirty members are subject to significant statistical variation and lack of reliable results.

• **Exogenous Variables**. A number of exogenous events outside the control of program may have a short-term economic impact on the ability to assess economic impact. These include an individual's family and social relationships, demographic and economic trends, current climatic conditions, and new therapies and technologies that affect the individual's perceptions about the future – and may influence their willingness to comply with a disease management program. Through time, these 'white noise' events tend to even out.

• **Inflation**. The regional medical cost inflation index needs to be incorporated into any before and after analysis in order to fairly evaluate the cost effectiveness of a disease management program. Adjusting data to present values is a standard and straightforward economic practice.

CHART 1. Time Series Health Plan Cost Reduction Based on Months Enrolled in Accordant Health Services Disease Management Program



Source: AHS Health Plan Reporting (1998-1999)

Some of the issues discussed above become less significant through time with larger sample sizes and more observations. For instance, the variations caused by 'white noise' will tend to average out through time. Disease management companies are aware of the risks of early reporting and prefer to report on a year-to-year basis. Some programs quantify their results by looking at a specific population at the time of program initiation and then track the changes across time. This type of approach is referred to as a "match pair" analysis.

Matched pair analysis works fine for experiments testing large controlled groups on a before and after basis (i.e. the cavity reducing capability of a new toothpaste). However, because of disease progression and small sample sizes, the use of matched pair analysis is less than ideal to evaluate a complex chronic disease management program. Since the number of individuals with specific chronic diseases within a plan is relatively small (in some cases 1/10th of 1%), the number of matched pair sets could be unacceptable from a statistical point-of-view. Through time with plan turnover, the number of matched pair sets could become too small to statistically analyze the impact of a disease management program.

Other issues with matched pair analysis deal with the potential increasing costs associated with new technologies and treatments strategies. A new drug or devices could cause the cost of caring for a disease to rise rapidly despite a program's best efforts to control expenditures. Also, because of the relatively small number of enrollees with complex chronic diseases and the progression of disease severity it is difficult to employ a 'statistically fair' matched pair analysis.

Accordant utilizes a "before and after" technique that is different from a pure matched-pair approach. An economic and demographic baseline of the health plan's chronically ill population is obtained before the program is implemented. This snapshot contains the average per enrolled member per month (PEMPM) paid claims cost by disease, as well as a profile of other key factors, such as age, gender, disease severity stage, and geographic location.

All eligible health plan enrollees are contacted and encouraged to enroll in Accordant's program. However, because of health plan turnover, an individual's desire to not enroll into the program, or new enrollees with a disorder joining the health plan, the actual enrolled population served by Accordant may differ from the baseline population. A comparison of the similarity of the two sets is conducted and adjustments are made to compensate for significant differences in disease and/or severity mix, age, gender, and geographic mix. The baseline PEMPM costs are then adjusted for inflation and the two groups are analyzed statistically in a manner similar to a traditional matched pair study.

The technique employed by Accordant allows for cost savings to be evaluated for the entire group of individuals managed versus a representative baseline. The problems discussed in this article are minimized with this approach and economic trends in the managed population can be fairly examined over time. This approach is similar to methods used to evaluate clinical outcomes and utilization trends. Finally, this method attempts to remove the subjective elements found in some disease management program evaluations.

Summary

Disease management is still in its infancy; however, programs such as Accordant's are producing real cost savings. This paper has pointed out some of the difficulties in evaluating the cost effectiveness of disease management programs and it has described a method to minimize potential reporting problems and biases.

There is a strong belief among the industry's professionals that disease management programs will aid in alleviating large amount of healthcare dollars -- three-quarters of all healthcare dollars, by some estimates -- that are targeted toward chronic illnesses. In order for these programs to become more widespread, consistent and statistically valid economic outcomes must be generated. This paper has discussed these issues and presented the approach employed by Accordant Health Services to accurately measure cost savings associated with its disease management program.

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Appendix

COMPLEX CHRONIC DISEASES MANAGED BY ACCORDANT HEALTH SERVICES

Neurology/Rheutmatology Diseases

Autoimmune Diseases

- CIDP - Chronic Idiopathic Demyelinating Polyneuropathy
- Systemic Lupus Erythematosus
- Multiple Sclerosis
- Myasthenia Gravis
- Rheumatoid Arthritis
- Scleroderma
- Dermatomyositis
- Polymyositis

Other Neurological Diseases

- ALS
- Parkinson's Disease

Hematology Diseases

- Sickle Cell Anemia
- Hemophilia
- Gaucher disease

Pulmonology Diseases

- Cystic Fibrosis