



## Economic Value Evaluation in Disease Management Programs

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### Abstract

Chronic disease management has been a rapidly growing entity in the 21st century as a strategy for managing chronic illnesses in large populations. However, experience has shown that disease management programs have not been able to demonstrate their financial value. The objectives of disease management programs are to create quality benchmarks, such as principles and guidelines, and to establish a uniform set of metrics and a standardized methodology for evaluating them. In order to illuminate the essence of disease management and its components, as well as the complexity and the problematic nature of performing economic calculations of their profitability and value, we collected data from several reports that dealt with the economic intervention of disease management programs. The disease management economic evaluation is composed of a series of steps, including the following major categories: data/information technology, information generation, assessment/recommendations, actionable customer plans, and program assessment/reassessment. We demonstrate the elements necessary for economic analysis. Disease management is one of the most innovative tools in the managed care environment and is still in the process of being defined. Therefore, objectives should include the creation of quality measures, such as principles and guidelines, and the establishment of a uniform set of metrics and a standardized methodology for evaluating them.

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Chronic conditions are the leading cause of illness, death and disability in the United States each year. The costs of treating chronic illnesses have been rising constantly and today comprise 70–80% of the total cost of health care. Moreover, the quality of life of patients with chronic illnesses has decreased [1,2]. In the USA, approximately 100 million individuals have one chronic illness and about 88% of the population aged 65 and older suffer from two or more chronic illnesses [3]. A recent study revealed the prevalence of multi-morbidity to be 69% in 18–44 year olds, 93% in those aged 45–64, and 98% in people older than 65; the number of chronic conditions varied from 2.8 in the youngest to 6.4 in the oldest [4,5].

Disease management programs began to evolve as an extension of case management for patients at high risk to permit the utilization of many services based on the patient's particular situ-

ation and past patterns of resource utilization. This is a process of intentionally managing a disease. Management goes well beyond the case management of patients with a specific condition, and encompasses all settings in which aspects of the disease may be addressed [6,7]. In other words, case management is a collaborative process of assessment, planning, facilitation and advocacy for options and services to meet an individual's health needs through communication and available resources to promote quality cost-effective outcomes.

The most common chronic illnesses that are appropriate for disease management are: diabetes, cardiac diseases, cancer, stroke, asthma, mental diseases (including depression), and hypertension [6,8].

### The aims of disease management

In a disease management model, the focus changes from being reactive when illness occurs to pro-actively focusing on managing the patient across the continuum of care. A variety of programs and resources are integrated in order to provide intense management of a particular disease [9]. Examples of resources include patient education programs, case management, self-care management, establishment of self-management goals, use of clinical guidelines, and a multidisciplinary team approach.

The success of the program depends first and foremost on the commitment of management to the continuous process and on the consolidation of an initiating and professional team. Patients and their medical needs form the basis of the program (information, availability, accessibility, quality of treatment). As a rule, an integrated program that is adapted to the patient provides a better chance of improving indices of clinical quality, of satisfaction, and of the educated use of resources.

In his article from 2006 [10], Linden explores the experience in the USA with disease management programs by tailored structured programs to identify and modify health behaviors of patients with chronic illness.

Studies on disease management have difficulty showing economic implications and aspects [11-16] because of adherence to the method of gathering information from several databases

(economic-financial, costs of an interventional program with a variety of services, costs of management and administration) and the ineffectiveness of the types of statistical analyses [17]. The programs try to exhibit analysis of cost-benefit in terms of return on investment. In this study, we will review the method of analysis and economic assessment of a disease management program, as well as the components and parameters that should be considered for its profitability.

The disease management economic evaluation is composed of a series of steps, including the following major categories [Figure 1]:

- Data/information technology
- Information generation
- Assessment/recommendations
- Actionable customer plans
- Program assessment/reassessment

**Data/Information technology**

Data, both historical and current, initially enter disease management programs in a variety of forms. Sources of information are input from a variety of locations:

- Medical claims data
- Pharmacological data
- Employer or health plan eligibility data
- Health risk appraisal questionnaires
- Laboratory values
- Eligibility files
- Utilization review files
- Operating systems and call center-generated data
- Telemedicine data
- Other external data sources

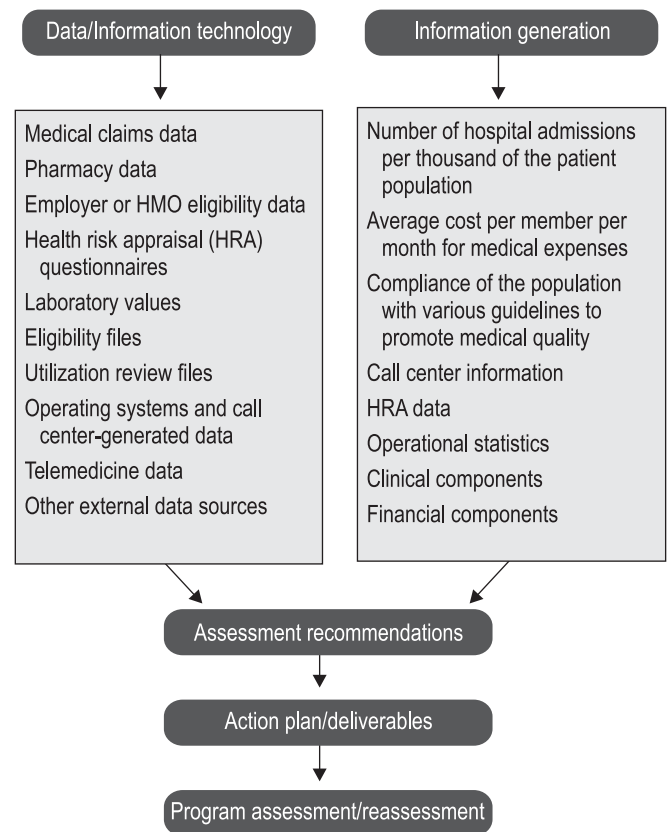
Sources of this information are not concentrated in one system. Some data derive from organizational billing systems, which take several months to be updated. Other databases are not always “communicative,” i.e., some structures are not uniform, and lack codes and prices, such as systems that concentrate information on medications [18].

It is most important that all information be given a common denominator and a uniform structure. After a method of gathering information is consolidated to a method accepted by all decision-makers in the organization, it should be tested over a designated period to ensure that it is, indeed, reliable and that it provides logical information.

Some organizations combine information with these data that might be more available and easier to control, such as incentives for employees, and costs of maintaining systems, particularly information systems.

**Information generation**

The construction of key indicators and other more structured information from the processed raw data is the progressive evolution of client-based intelligence. Raw claims data convert to useful statistics, such as the number of hospital admissions per thousand for the patient population, the average cost per



**Figure 1.** Categories for the economics evaluation

member per month for medical expenses, or the compliance of the population with various medical quality program guidelines. The initial generation of information can typically also include call center information, health risk appraisal data and other sources of information. Key statistics and calculated metrics emerge at this point and capture baseline statistics in managed populations, provide temporal sequencing for trend reports, and define overall comparative benchmark data.

The data also include a variety of transformations to create a structured approach to developing knowledge for the clinical management programs. Population segmentation and the development of target interventions are important early information output of the raw claims data, created with proprietary data-mining and predictive modeling algorithms [19].

The components of information produced from the utilization claims data allow multi-dimensional analysis of disease management programs. These components include:

- *operational statistics* – used to confirm participant baseline demographics and define operational performance metrics for the disease management programs generally
- *clinical components* – including those focused on quality improvement (e.g., compliance with HEDIS measurement requirements), clinical testing rate, improving and utilizing management (day per 1000 hospitalization rates per member per month, pharmacy costs)

- *financial components* – in a variety of formats including basic estimates of return on investment and comparisons of population, financial performance using ratios of clinical illness costs to normal individual consumption, predictive modeling projections, non-parametric analysis and changes in various per man per month trends, rate saving and ratios
- *“intangible” components* – for which no clear financial linkage exists (e.g., patient satisfaction, success stories, SF36 score, and quality of life indicators).

**Assessment recommendations**

As a general assessment of clients’ particular health care needs emerges from the comprehensive collection of information and data, trained staff work internally on potential actions that can be taken at the level of the employer or health plan to effect real change in the health care cost and quality of the client’s members. Operational effectiveness, clinical quality, utilization change and productivity impacts are viewed in addition to estimates of financial impact to present a broader, more comprehensive view of the program.

Typically, programs must run for at least one year to avoid seasonally driven variation issues, and have at least 3 to 6 month claims run out for full claim completion.

Many methods exist for performing and presenting economic assessments. There is also a variety of methods for performing return on investment analyses. Some economic analyses and assessments examine future medical costs using predictive models, genetic algorithms, or estimates developed from call center-driven models of economic impact.

Most of the studies examine the same group of patients before intervention and one year later; however, one cannot relate only to the effect of the change or the intervention alone because other aspects are also involved; for instance, the combination of an innovative technology that influences the costs, a change in compensation, co-payment, and changes in the contract. These influences can be overcome by using a control group with identical demographic characteristics, to which this program is not offered. In addition, it should be ensured that this group does not also contain patients who are motivated to improve their health conditions [20].

**Action plan/deliverables**

These are based on the assessment obtained from a detailed and robust analysis, and staff make recommendations in the form of a specific action plan for each client. The program should be committed to the principle intervention to create a long-lasting behavior change in health enhancement. Interventions may include a number of activities, such as:

- Regular meetings for approaching and analyzing data with the account representatives
- Addressing risk pool issues
- Potential benefit design changes

- Internal medical management infrastructure changes, such as the creation of a wellness committee, to enhance promotion of the program.

The knowledge accumulated from the process must be formatted into a series of goals, objectives and tactics in the account plan management.

**Program assessment/reassessment**

Many programs present several ways of making assessments, for example: program participants received excellent treatment, took their medication properly for a long period, the cost of their medical treatment decreased.

Cousins and Liu [19] presented cost-saving data in programs for treating asthma and diabetes in comparison to a control group. Their findings show a reduction in general expenses (referrals, hospitalization days, consultations) except for medication, and a return of investment in the range of \$1–2.8 per participant per month. Kaiser Permanente reported that in the first years of activating the program for disease management (1996–2002) an improvement was noted in patients’ health, but the saving was small [20]. Others claimed that the main outcome of these programs is to reduce the cost of admissions to hospitals and referrals to emergency rooms.

Other studies in the economic field deal with the advisability of activating programs with various alternatives, such as home visits by nurses; services provided by video, which were found to be effective both in improving service as well as economically [21]; the use of intravenous administration, which was also found to be beneficial and cost effective in diabetic patients [22]; and the improvement of contracts with hospitals (bonuses given for good assessment and performance – pay for performance) [23].

In his study from 2007, Bodenheimer [24] summarizes studies that dealt with programs for treating asthma, diabetes and

**Table 1.** Categories of disease management program costs

<b>Member identification (periodic)</b>
Data extraction
<b>Actual member identification</b>
<b>Program administration</b>
Monitor enrollment and disenrollment from plan and program
Provide information about program to health plan staff and others (medical directors, Legal staff, senior management)
Develop program implementation processes
Monitor program delivery
<b>Program delivery</b>
Program development
Program delivery costs (mailing, phone, calls, consults, classes, medical and non-medical consults, and home health)
Coordination of program services with other health plan activities (provider relations, authorizations)
Program modifications
<b>Program evaluation</b>

Source: O’Connell M, Kauffman DL. [ref. 18]

cardiac insufficiency according to the model for treating chronic illnesses specified above – from aspects relating to the use of medical services and the consumption of costs. In each of the programs, he found at least one element that affected the reduction in costs [Table 1].

## Conclusion

Disease management is one of the most innovative tools in the managed care environment and is still in the process of being defined. Accumulated evidence supports the success of this type of patient management, but continued review of programs and the success of various strategies are necessary. Therefore, objectives should include the creation of quality benchmarks, such as principles and guidelines, and the establishment of a uniform set of metrics and a standardized methodology for evaluating them.

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