Quality Improvement and Cost Reduction Realized by a Purchaser Through Diabetes Disease Management

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ABSTRACT

This report documents the clinical improvements and costs experienced by a purchaser after introduction of a diabetes disease management program. A purchaser contracted with American Healthways, a disease management organization, to initiate a diabetes disease management program called Diabetes Decisions. Started in 1998, the program grew to include 662 participants. The results reported are based on the continuously participating population (12 months of participation in the program for the reporting year). Participants were entered into American Healthways’ clinical information system and risk-stratified, and an individualized treatment plan was devised. Outbound telephone calls by specially trained nurses were a key intervention. Data were collected on key process measures, financial parameters, and participant satisfaction. By year 3, there were 422 continuously participating participants. From baseline to the third year of the program, significant increases in frequency of A1C testing (21.3% to 82.2%), dilated retinal exams (17.2% to 70.7%), and performance of foot exams (2.0% to 75.6%) were noted. For 166 participants with five A1C determinations, A1C values dropped from 8.89% to 7.88%. Participants experienced a 36% drop in inpatient costs. Without adjustment for medical inflation, total medical costs decreased by 26.8% from the baseline period, dropping to $268.63 per diabetes participant per month (PDPPM) by year 3, a gross savings of $98.49 PDPPM. After subtracting the fees paid to Diabetes Decisions, a net savings of $986,538 was realized. This yielded a return on investment of 3.37. By investing in a diabetes disease management program, a purchaser was able to realize significant improvements in clinical care, substantial cost savings, and a favorable return on investment. (Disease Management 2003;6:xxx–xxx.)

INTRODUCTION

DIABETES IS A COSTLY DISEASE and a major health problem in the United States. It is also a condition that can be managed by strict adherence to guidelines or standards of care.¹ Despite widespread agreement on and dissemination of these guidelines throughout the U.S. health care system, major gaps exist in diabetes care.²–⁴ Many patients are not adequately monitored, nor is their glycemic control as tight as it should be.

Recent studies⁵–¹⁰ suggest that these gaps in clinical performance can be closed by developing a team approach to diabetes care that combines elements typically regarded as disease management.
state management. A nurse usually leads this team in the role of care manager and educator. The team is supported by an information system that registers and stratifies each participant to a specific risk level, and an individualized treatment plan is devised. This approach has been associated with impressive results in terms of clinical indicators and outcomes.

This paper describes a program procured by a purchaser for their participants with diabetes. The service provided disease state management for people with diabetes in close cooperation with primary care physicians and a widely dispersed network of other providers. The program was successful at all levels by demonstrating improvements in clinical care, satisfaction of involved patients and providers, and a return on investment.

**SUBJECTS AND METHODS**

*Population*

The Teachers Health Trust (THT) administers and manages health benefits for all active and retired educators in Clark County, Nevada. THT had 23,574 total participants during the baseline period (May 1, 1997 to April 30, 1998) and grew to 27,680 participants by the third year of the program (November 1, 2000 to October 31, 2001). THT, in turn, contracts with a local integrated health care delivery company for access to its network of providers and health care facilities. Currently, this network includes 535 primary care physicians. In addition, THT entered into an agreement with American Healthways in 1998 for a disease management program to provide additional services to participants with diabetes. This program, called Diabetes Decisions, was launched in 1998 with 351 participants. This number grew to 662 by 2001.

*Methods*

American Healthways is a publicly traded disease management company. Diabetes Decisions adopted American Healthways’ diabetes disease management standard operating procedures. Once participants with diabetes were identified, an engagement process was used with proactive outreach to potential participants. Once enrolled, they were classified according to American Healthways’ proprietary four-tier population risk stratification model. Each risk level is associated with a different frequency and intensity of interventions. Claims data from the baseline period supplemented by information from the member’s primary care provider and participant assessments were used to stratify the population. The level of risk can change over time based on the member’s response to interventions, the development of complications, and/or comorbid conditions.

Diabetes Decisions used American Healthways’ clinical information system (CIS) to track program participants. The CIS notifies Diabetes Decisions personnel when interventions are needed and tracks them as they are delivered. It also records medical claims data, laboratory results, and prescription utilization for each participant.

The core of the program is the outbound telephone calls or “care calls.” These calls are personal communications between a specially trained nurse and the participant. Initial calls include a welcome to the program followed by a detailed health assessment and depression screening. Knowledge deficits are identified, and individualized self-care goals are established. Subsequent calls focus on education, progress toward goals, standards of care reminders, adherence to treatment plans, and identification of new problems. The frequency of calls varies from daily to quarterly based on the risk stratification level and the patient’s needs. Throughout this process, communication with the participant’s primary care provider is maintained by mail, telephone, and personal contact with program staff.

In addition, participants can visit the Diabetes Decisions’ office for face-to-face encounters, group visits, and/or education. The frequency of these visits varies based on the member’s risk stratification, personal needs, and communication with program nurses.

To promote physician support, Diabetes Decisions established a Physician Advisory Board made up of a network of primary care and specialty care providers servicing the participants. This board was informed of all intervention strategies and program goals. Physician feed-
back was elicited on a regular basis. In addition, Diabetes Decisions’ staff visited primary care providers’ offices to discuss their patients’ progress in the program and to promote adherence to American Diabetes Association’s standards of care.

Data collection

The reporting period extended from May 1, 1997 to October 31, 2001. Chart reviews and claims data during the baseline period of May 1, 1997 to April 30, 1998 identified the participants with diabetes and helped establish the database for comparison. Diabetes Decisions was evaluated yearly, with the first reporting period from November 1, 1998 to October 31, 1999, the second from November 1, 1999 to October 31, 2000, and the third from November 1, 2000 to October 31, 2001. Data collection was enhanced with the additional data from American Healthways’ CIS and the laboratory data available from a primary supplier of laboratory services in the Las Vegas area.

A continuously participating program member was any participant active in Diabetes Decisions for the entire reporting period (12 months of membership). Population participants were defined as any participant in Diabetes Decisions for at least 1 day during the reporting period. As part of the contractual requirements, Diabetes Decisions reported on the rate of eye exams, foot exams, A1C monitoring, and level of participation. Additional reporting included the distribution of A1C values and degree of improvement, along with levels of participant satisfaction with the program. Detailed financial performance measures were also tracked and provided the basis for incentive payments to Diabetes Decisions to supplement base fees for providing the program. Utilization measures tracked included inpatient costs, bed days per 1,000 participants, inpatient admits per 1,000 participants, and total medical costs per participant per month. Total medical costs included all costs, except pharmacy, paid by the Trust after accounting for co-payments, coinsurance, deductibles, and coordination of benefits. The “per 1,000 participants” standardizes the actual utilization numbers so that a valid comparison can be made from the baseline period to the reporting period.

Diabetes Decisions measured participant satisfaction with the program annually using a 5-point rating scale. An unaffiliated, independent market research organization administered the surveys telephonically. To be eligible for a survey, participants had to be continuously enrolled in the program for the reporting period, have a valid telephone number, and have received at least one successful completed outbound call.

Diabetes Decisions measured physician satisfaction with the program each year by mailed surveys. Primary care providers with members in Diabetes Decisions were asked to rate the program for ease of use, effectiveness, and overall satisfaction with the program.

Statistical analyses

$\chi^2$ and paired-samples $t$ tests were used to determine the significance of the changes from the baseline period to the current reporting period. $\chi^2$ tests were used for diabetes-related compliance measures (i.e., clinical measures). Paired-samples $t$ tests were used to evaluate the change in average A1C values. All tests were performed using a 95% confidence level. The independent market research organization that administered the participant satisfaction instrument surveyed participants until a statistically significant number of respondents was measured.

RESULTS

In the base period, 351 participants (of 23,574) were identified as having diabetes. Because of the growth of THT’s membership, that number increased to 662, with 422 continuously participating in the third reporting year. Less than 1% of participants (five) opted out of the program during the third year. The Diabetes Decisions program achieved significant improvements in the key process measures for continuously participating participants (Table 1). Members who received at least one A1C test in year 3 increased 286% from the baseline period ($p < 0.05$). The number of participants
over age 31 who received a dilated retinal examination increased by 3,680% from baseline. For the entire cohort, regardless of age, the dilated retinal examination compliance rate was 66.8%, or 282 of the 422 participants, in year 3 ($p < 0.05$). Foot exam rates increased 311% over baseline rates during the third reporting period ($p < 0.05$).

Program participants also experienced significant improvement in A1C values. Figure 1 shows the lowering of A1C values in 166 participants who had at least five A1C determinations from baseline through the third year of data collection. A1C values dropped just over 1% point, an 11.4% improvement, statistically valid at $p < 0.05$. A significant decrease was also found when comparing these members’ first A1C value average (mean = 8.54, SD = 2.63, $n = 364$) against their second A1C value average (mean = 7.90, SD = 1.89, $n = 364$). For 364 participants who had at least two A1C values recorded, the mean decrease was 0.64% in A1C value ($p < 0.05$). The mean starting value for these 364 participants was 8.54% (SD 2.63), dropping to 7.9% (SD 1.89).

The program’s financial performance was studied in detail. To account for rising healthcare costs, benefit structure changes, and changes in provider contracting (factors outside the control of Diabetes Decisions) experienced by THT over the 4-year reporting period, the performance of participants with diabetes was compared with all non-diabetes participants. The inpatient costs for all non-diabetes participants did not change over the more than 4-year period of data collection (Fig. 2). In contrast, Diabetes Decisions program participants achieved a 36% drop in inpatient costs. This drop in inpatient costs was obtained through a reduction in both admissions and bed days. In the baseline period, admissions per 1,000 were 401. There was little change in year 1, with 428 admissions per 1,000 participants. However, very significant drops were noted in year 2 (238 of 1,000) and year 3 (243 of 1,000). Likewise, bed days per 1,000 noted similar trends, with

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*aThe number of participants identified with diabetes and in the Diabetes Decisions measurement cohort.

**FIG. 1.** Improvement in A1c values. The results of 166 members with at least five hemoglobin A1c determinations obtained from baseline through the third year of data collection are shown. A paired-samples $t$ test was used to compare the participant’s first A1C value average (mean = 8.89, SD = 3.18, $n = 166$) against their fifth A1C value average (mean = 7.88, SD = 1.65, $n = 166$). Program participants noted a drop in A1c of 1.01%.
bed-day rates of 1,629 in the baseline year, 1,522 in year 1, 943 in year 2, and 1,066 in year 3. The medical costs for program participants are shown in Figure 3. These data are not adjusted for medical inflation or for the increase in medical costs experienced by all non-diabetes participants. Even without such adjustments, total medical costs decreased 26.8% from the baseline period, dropping to $268.63 per diabetes participant per month (PDPPM) by year 3 of program operation. This represents a gross savings of $98.49 PDPPM. During this period, medical costs for the non-diabetes participants increased by 24.7%, or $15.76 per participant per month (PPPM). Adjusting for the non-diabetes participants’ medical costs trend
yields a 41.3% decrease in costs PDPPM from baseline, or a gross savings of $189.29 PDPPM. To calculate the net cost savings to the health plan, the fees paid to Diabetes Decisions were subtracted from gross savings. Using the adjusted net savings of $189.29 PDPPM and the total participant months of 7,407, THT had gross savings of $1,402,071 and net savings of $986,538. This yields a return on investment of 3.37.

The participants who responded to the survey rated the program highly: 94% rated the program as excellent, very good, or good, and only 6% rated the program fair or poor.

**DISCUSSION**

Why doesn’t everyone offer this type of care to patients with diabetes? The answer is usually cost—both in terms of resources to set up this system of care and in the ongoing costs of maintaining this level of close follow-up and contact with patients. A doctor in a single practice or small group may work within a capitated system and receive no reward for adding to his overhead and providing outstanding care. Health plans may provide the resources but are often uncertain of the return on investment. Some studies suggest savings in terms of hospital bed days but greater pharmacy and laboratory costs in addition to the direct program costs—personnel, space, and other support costs. Although aware of the health benefits of disease management programs, employers remain hesitant to purchase such programs because of their inability to monitor and document increased workplace productivity gains that are the direct results of these programs in part due to employee confidentiality issues or concerns.

However, the health care landscape keeps changing. After years of modest price escalation, employers are once again facing double-digit annual increases in their health premiums. Targeting specific high-cost conditions like diabetes for increased investment in prevention and treatment has been one means of controlling costs. In the past, most of these efforts originated with the health plan or provider group, and most formal cost-effectiveness studies took the clinical (provider) rather than the employer (purchaser) perspective.

Employers and benefits managers are now taking a broader view. As premiums increase, all forms of potential return are being considered. A healthier employee is often a more productive employee. Under the umbrella of productivity are related issues such as absenteeism, disability, on-the-job performance, employee satisfaction, and retention. Given the right incentive, some purchasers may choose to purchase a disease management program directly, as THT did. THT was convinced that the disease management program would improve the service provided to the covered members and save costs, on both medical claims and worksite expenses.

Diabetes has been recognized for years as a major contributor to excess medical costs. More recently, its contribution to absenteeism, restricted activity, and diminished productivity in the workplace has also been documented. In 1997, for example, the American Diabetes Association estimated that diabetes caused over $37 billion in disability losses; on average in the United States, people with diabetes lost 8.3 days of work compared with 1.7 days for people without diabetes. Other authors have documented diabetes as a major contributor to temporary and permanent disability, as a cause of increased premature retirement rates, and as a factor in how workers relate to co-workers and function at work.

Benefits managers are aware that managing a chronic condition like diabetes is difficult and that it rarely responds to simple improvement efforts. Resources for diabetes disease management programs need to be allocated wisely and with certainty that performance standards can be met. Concerns about participant privacy are paramount, and safeguards need to be in place. THT was attracted to a disease management vendor because policies and procedures were available for review, and the arrangement was conducive to a precise contract.

Participant satisfaction with the program was very high. Participants recognized the extra benefits and resources available to them compared with others in the community with
diabetes. Coverage and financial issues do contribute to how well people take care of their disease. For example, several studies have suggested that the cost of strips and supplies are directly related to patients’ willingness to perform blood glucose self-monitoring.\textsuperscript{22–24} Also, although not specifically measured in this study, compliance with prescribed medications appeared high. Some limited data suggest that efforts to boost worker compliance with medications for diabetes may help lower absenteeism and other productivity costs.\textsuperscript{25} In general, greater compliance with treatment is correlated with improved clinical and economic outcomes.\textsuperscript{26}

Significant improvements in glycemic control were noted, with average A1C values dropping just over 1%. Based on UKPDS (United Kingdom Prospective Diabetes Study) data, this 1% decline will translate over time to a 37% reduction in microvascular complications and a 14–21% reduction in various manifestations of macrovascular disease.\textsuperscript{27} Although not specifically measured in this study, more immediate benefits might be expected in terms of workplace productivity. Testa and Simonson\textsuperscript{28} found that poor glycemic control was associated with a higher rate of absenteeism, lower productive capacity, more bed days, and more days of restricted activity.

Providers were satisfied with the program as well. Many physicians resent having outsiders involved in or making suggestions about their practice and remain leery of any new programs, especially those initiated by insurers or purchasers. There are major hurdles to overcome in terms of physician support and behavior change.\textsuperscript{29,30} It is difficult for some physicians to embrace team care with shared responsibility.\textsuperscript{31} To help overcome this resistance, the advisory board of key primary care providers within the network met regularly, shared ideas about how the programs should be conducted, received regular performance updates as the data were generated, and “celebrated” in the successes.

For the baseline period, THT noted a cost of $367 per member with diabetes per month in medical claims, or $4,404 per year. In contrast, the non-diabetes population cost was $64 per member per month, or $768 per year, meaning that a diabetes member was 5.73 times more expensive. In other studies, the excess per-person diabetes-related cost has been calculated as two and one-half- to threefold higher in U.S. health maintenance organizations\textsuperscript{32,33} and 1.7 times higher in a U.S. Medicare population.\textsuperscript{34} Different methodologies and populations lead to different estimates. In this particular study, the cost of the diabetes population was still higher than the non-diabetes population after 3 years of operation. The message is clear: Diabetes substantially increases health care costs.

The disease management program reduced the cost of the diabetic participants by 41.3% when adjusted for the non-diabetes cost increases, and 26.8% without adjustment. The net savings per member was $133 per month, or $1,596 per year. The total net savings achieved during the third year of operations was $986,538. Although this analysis did not include pharmacy costs, it is unlikely that the inclusion of pharmacy costs would change the impact on the bottom line. Studies that have included pharmacy claims have demonstrated pharmacy costs for non-diabetic members increase in a similar manner as pharmacy costs for diabetic members.\textsuperscript{18} Furthermore, a simple tally of pharmacy costs does not reflect the full impact of a disease management program. Correcting underutilization through improved adherence to guidelines may increase pharmacy costs, but eliminating inappropriate use of drugs, substitution of generics, and use of regimens of equal efficacy but less cost help to reduce costs.

Many reviewers have addressed the savings possible with comprehensive diabetes care.\textsuperscript{35–37} These savings, of course, require an upfront investment. For purchasers, do these extra costs translate into cost savings over a relatively short period of time? The current study strongly suggests that the extra cost is well worth the investment. This work adds to other studies that have demonstrated positive return on investment over a relatively short time frame.\textsuperscript{38–41} The magnitude of the return is substantially greater in the current study. Because this program also improved retinal screening rates, glycemic control, and nephropathy screening and management, the long-term benefits can be predicted as well.\textsuperscript{42} Systems can
be designed and implemented that provide excellent diabetes care and benefit all stakeholders—purchaser, disease management vendor, physician, and, most importantly, the employee/patient with diabetes.

REFERENCES


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