MERCY HEALTH CENTER

Case Study

Mercy Health Center's Telemedicine Diabetes Disease Management Program Shows Significant Savings with Health Buddy® and Health Hero® iCare Desktop™

Executive Summary

Mercy Health Center in Laredo, Texas, a member of the Sisters of Mercy Health System-St. Louis Region, has shown significant reductions in hospital-based utilization with its Telemedicine Diabetes Disease Management Program. Mercy's program was implemented to determine the impact of low cost, web-based, patient interface technology as part of an overall diabetes disease management program. The program features use of the Health Hero® iCare Desktop™, a web-based patient management tool, and the Health Buddy® appliance.

Mercy Health Center, in collaboration with The University of Texas Health Science Center at San Antonio (UTHScC-SA), was awarded a $300,000 grant from the Telecommunications Infrastructure Fund Board of the State of Texas in 1999. The study, partially funded by this grant and sponsored by Mercy Health Center of Laredo with support from UTHScC-SA, aims to improve the health status of indigent border residents with chronic disease through the use of telemedicine technology. Mercy has utilized the grant to develop a telemedicine disease management program to monitor Laredo's indigent congestive heart failure and diabetic patients. This program achieved all of its goals: decreased hospital-based resource utilization, improved patient compliance with treatment plans, improved level of satisfaction with health care services, and improved patients' perceived quality of life.

Analysis of the financial and clinical impact of Mercy's Telemedicine Diabetes Disease Management Program after one year showed reductions in overall utilization and charges, as well as improvements in quality of life as measured by the SF-12. Patients in the program showed reduced overall charges of $747 per patient per year (PPPY). Inpatient admissions were reduced 32%, ER encounters were reduced 34%, and outpatient visits were reduced 49%.

The significant reductions in hospital-based utilization and improvement in perceived quality of life can likely be attributed to the patient's enhanced ability to self-manage their chronic disease state using the Health Hero intervention. Without remote monitoring, patient care is based on episodic encounters between patients and their care providers. This program bridged the gap between office visits by providing a platform for daily monitoring of information from the patient, allowing patients and care providers to identify problems and intervene early. Early intervention can ultimately reduce the cost of care to the health care provider, payer and patient while increasing the overall well-being and quality of life for the patient.

HEALTH HERO NETWORK

Diabetes Mellitus

Diabetes is a chronic disease in which the body does not produce or properly use insulin, a hormone that is needed by the body to convert sugar, starches and other food into energy. The cause of diabetes is not completely understood, although both genetics and environmental factors such as obesity and lack of exercise appear to play roles.

The American Diabetes Association reports there are 15.7 million people in the United States who have diabetes. According to the American Heart Association (2000) the total annual economic cost of diabetes in 1997 was estimated to be $98 billion. That includes $44 billion in direct medical and treatment costs and $54 billion for indirect costs attributed to disability and mortality. In 1997, total health expenditures incurred by people with diabetes amounted to $77.7 billion including health care costs not resulting from diabetes. The per capita costs of health care for people with diabetes averaged $10,071, while health care costs for people without diabetes averaged $2,699 in 1997. Approximately $27.5 billion was spent for inpatient hospital care of diabetic patients in 1997. Diabetes-related hospitalizations totaled 507,000 and the mean length of stay for hospitalization was 5.4 days.

Outpatient treatment rates were extremely high in 1997 as well, and there were 30.3 million physician office visits to treat people with diabetes. According to the National Institute of Diabetes and Digestive and Kidney Disease, diabetes is the seventh leading cause of death (sixth-leading cause of death by disease) in the United States. In 1997, 622,636 Americans (55% female) died from complications associated with diabetes.

There are two main types of diabetes. Type 1 diabetes, which usually occurs during childhood or adolescence, is a disease that results from the body's failure to produce insulin. Type 2 diabetes, the most common form of the disease, usually occurs after age 45. Of the nearly 16 million Americans with diabetes, 90-95% (14.9 million) have Type 2 diabetes. Type 2 diabetes results from insulin resistance (a condition in which the body fails to properly use insulin), combined with relative insulin deficiency. Often Type 2 diabetes can be controlled through losing weight and improving nutrition and exercise alone, but many people need oral medications and/or insulin injections to maintain glycemic control.

Traditional disease management programs seek to improve patient care and reduce hospital-based utilization through the use of dedicated case management services. Usually a health care professional oversees the care of the home based patient through assessment and education – working to improve compliance with medical regimens. Case management that encompasses behavioral change, knowledge building and symptom monitoring plays a key role in optimizing medical management of chronic diseases such as diabetes. Common diabetic complications include blindness, kidney disease, heart disease, stroke, nerve disease, amputations, and impotence which are often manifested later in life. Nurturing the necessary skills of self-management improves the health of patients and reduces overall healthcare utilization. However, the use of a health care professional to effect such change with individual patients is usually a lengthy and expensive proposition.

Through the use of a remote telemedicine disease management program, the case manager can detect early and repeated symptoms and intervene quickly with multiple patients simultaneously. The care manager is able to focus on those patients most in need. In this process, the case manager monitors daily patient symptoms (e.g., changes in weight, blood sugar, and fatigue) using the

electronically transmitted health values of his/her assigned patient population and intervenes in a timely and appropriate fashion. These timely and appropriate interventions may be as simple as obtaining syringes, filling prescriptions for diabetes medications, educating patients on diet modifications, or making physician referrals. In contrast to costly crisis management through ER encounters and inpatient hospitalizations, timely detection and response to patient symptoms provides the opportunity for early, cost-effective, more appropriate intervention. Use of the Health Buddy and Health Hero iCare Desktop allows for the care management to be automated, relying less on the nurse's intervention and more on the patient's ability to "self-manage" their condition.

Mercy Health Center

Mercy Health Center (MHC) is located in Laredo, Texas along the U.S.-Mexico border. MHC serves Webb County, one of the poorest counties in Texas. One in every three families lives at or below poverty level. There are 40-60 colonias, unincorporated areas with grossly sub-standard housing, in the Laredo area with an estimated 12,000 residents. Many residents speak only Spanish. The National Association of Community Health Centers ranked Webb as 7th in the nation as a "double jeopardy" county, that is chronically disadvantaged in both the overall health of its residents and in the extreme shortage of primary care physicians.

Laredo is 94% Hispanic. Hispanics are more likely than any other ethnic group in the nation to be without health insurance. Approximately 50% of Laredo's area residents are uninsured. MHC is the safety net for Laredo area residents in need of healthcare, providing millions of dollars of charity care annually. Given Laredo's proximity to the border and its poverty rate, MHC is actively exploring ways to improve quality of life while reducing its risk as the primary provider to indigent residents. This telemedicine disease management program has allowed MHC to improve care by focusing on maintenance and prevention rather than crisis management and achieve overall reduced costs in the process.

The Health Hero Technology Service

Health Hero provides its customers with access to a browser-based care management tool, the Health Hero® iCare Desktop™, and the patient communication appliance, the Health Buddy. The Health Hero technology platform provides healthcare professionals with an integrated, web-based solution that improves efficiency and effectiveness in managing the health of their chronically ill patients. The Health Hero iCare Desktop provides care managers with an integrated set of patient enrollment, scheduling and monitoring tools enabling the care manager to quickly communicate with and stay abreast of their patients' day-to-day conditions and prevent critical situations by providing early intervention. The care manager is able to access this daily patient information on a secure website. The Health Buddy assists the patient in monitoring their disease through education, reinforcement and prompts to action if indicated by daily values. The Health Hero technology platform is based on the following design elements:

* Flexibility is key in targeting and addressing the needs of sub-populations

* Simplicity is essential to user compliance

* Timeliness in data collection is required for managing disease progress

* Cost is a critical issue in the practical application of disease management systems

The Health Buddy connects to any existing patient phone line, much like an answering machine. It has a large easy to read screen and four large blue buttons for responses. Patients answer personalized daily questions in English or Spanish that monitor their disease symptoms, medication compliance and disease knowledge as well as providing education about their condition(s). Patients' responses are sent via a telephone line to Health Hero's secure data center. Patients are not required to have internet access to use this system. Daily responses sent by patients can be categorized and prioritized to alert case managers to the most serious outcomes first.

Methods and Program Implementation

To qualify for participation in the study, patients must have been indigent or economically disadvantaged adults. All patients had to be competent, have a telephone, be able to read or have someone willing to assist them daily, have a physician/clinic in the service area and reside in the service area. The Health Buddy component of the intervention was delivered in both English and Spanish. Patients were referred to the program through the hospital, support groups, clinics, and doctors' offices. In addition to receiving the Health Buddy, diabetes patients received a glucometer, testing strips, and lancets for the duration of the study free of charge. Patients answer daily questions about their disease on their Health Buddy. The telemedicine case managers review patient answers Monday through Friday. If the values are alarming, or chronically outside of designated parameters, the patient is contacted. If warranted, the physician or clinic is notified. If it is known when a patient's next appointment is, the collected information is forwarded to the physician or clinic prior to the appointment. A focus of this study was to measure the effect of the technology on patient behavior. Consequently, no protocols were established to adjust medications or treatments, and patients are referred to their doctor's office when needed.

Mercy incorporated Health Hero's patient communication service in January of 2000. As of January 2001, approximately 169 patients had been enrolled in and remained in the telemedicine program. Patients enrolled in the Health Hero program received a Health Buddy appliance to receive and respond to daily sessions of questions and educational information from their care manager. The disease management program provided patients with 12 months of coaching, education, and reinforcement of self-care management skills. The critical program components were educational support, in-home daily monitoring and timely physician notification. The in-home daily monitoring and much of the reinforcement of self-care management was done through the Health Buddy. The Health Hero iCare Desktop enabled tracking of patients by Mercy's telephonic support staff and nurses and involved regular communication with physicians.

Results

The utilization measures included inpatient, outpatient, post-discharge care (PDC), emergency room (ER) encounters, and charges. The data analysis compared 1999 hospital-based utilization data, dur-

ing which time patients were receiving standard care (care before enrollment in the disease management program), with 2000 utilization data during the time patients were enrolled in the Mercy Telemedicine Disease Management Program powered by Health Hero. Results from the analysis showed reduction in utilization in inpatient hospitalizations, outpatient visits and ER encounters.

A 1999 comparative diabetic sample (standard care) was utilized to assess the changes in utilization and charge data when compared to the 2000 Health Hero interventional population. The populations analyzed included 169 patients enrolled in the telemedicine disease management program in the period 1/00 through 12/00. There were 130 females and 39 males in this population with an average age of 53 for both sexes.

Summaries of reductions in utilization and charges are shown in Tables 1 and 2 and Figure 1. Hospitalizations for diabetes-related causes were reduced 32% for patients enrolled in the telemedicine disease management program. The number of diabetes-related inpatient hospitalizations was 0.73 per patient per year (PPPY) for the standard care period and 0.50 PPPY during the program (Table 1, Z=1.80). Outpatient encounters for diabetes-related causes significantly decreased by 49% ($Z = 8.02$, $p < 0.001$). The number of outpatient encounters was 5.34 PPPY for the standard care period and 2.75 PPPY during the program (Table 1). ER encounters for diabetes-related causes decreased by 34%. The number of diabetes-related ER encounters was 0.61 PPPY for the standard care period and 0.40 PPPY during the program (Table 1, Z=1.87).

Analysis of the charge data between the 1999 diabetic sample and the 2000 intervention group indicated charge reductions of $747 (PPPY) (Table 2). As the effects of uncontrolled diabetes are long-term, Mercy plans to continue to measure changes in overall charges associated with patients enrolled in this program.

Utilization Measure	Standard Care	Health Hero	Utilization Reduction	Z[1] p-value
Inpatient Admissions PPPY	0.73	0.50	32%	Z=1.80 n.s.
Emergency Room Visits PPPY	0.61	0.40	34%	Z=1.87 n.s.
PDC Visits PPPY	0.18	0.10	44%	Z=1.07 n.s.
Outpatient Visits PPPY	5.34	2.75	49%	Z=8.02 p<0.001
Reporting Period (approx.)	01/99-12/99	01/00-12/00		

Table 1. Utilization of Healthcare Services: Health Hero compared to Standard Care

Notes: [1] Z test for Proportions used

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