
DIABETES DISEASE MANAGEMENT AT LOVELACE HEALTH SYSTEMS: THEORY AND IMPLEMENTATION

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Ms. Herrera is a 53-year-old freelance journalist who recently moved to Albuquerque, NM. She has multiple medical problems, including a 7-year history of diabetes mellitus. In the 10 years prior to her relocation, Ms. Herrera had an indemnity insurance plan and saw several physicians for her varied medical complaints; as a result, her past records are scattered over several offices. Although she saw the same primary care physician (PCP) for most of her diabetes care, she had difficulty making appointments with the dietitian and following through with scheduled laboratory testing and special examinations because of the inconvenience of needing to travel to various locations.

Upon relocation, Ms. Herrera joined Lovelace Health Systems (LHS), a locally based integrated delivery system that includes a health maintenance organization (HMO). She comes to see Dr. Perez, a PCP, for the first time today with concerns that she is not maintaining her target blood glucose level. In taking a history, Dr. Perez learns that Ms. Herrera's diabetes therapy was initiated with a sulfonylurea agent but was changed 2 years ago to twice daily insulin. She has gained 20 lb since beginning insulin therapy. Despite self-monitoring, she reports that her preprandial blood glucose levels have ranged from 100 to 220 mg/dL and her office-measured glycosylated hemoglobin (HbA_{1c}) levels have been "too high." On today's visit, her HbA_{1c} is 11.5%.

Ms. Herrera expresses frustration that she is not getting good results on insulin therapy and is gaining weight. She admits to not adhering well to the dietary restrictions and exercise recommendations made by her previous PCP. However, she feels that she needs more support and encouragement for making these lifestyle changes. Furthermore, she wishes that her diabetes care could be better coordinated to fit into her hectic and unpredictable work schedule.

Why is Ms. Herrera's HbA_{1c} level so high after 7 years of diabetes management? What has gone wrong with her treatment? How has the health system failed this patient?

None of these questions has a simple answer. However, the problems underlying Ms. Herrera's case are quite common and are the focus of an increasing effort by health care providers and health plans to develop systematic and comprehensive programs for managing diabetes. Diabetes is a major health problem. This complex disease and its associated complications (eg, heart disease, stroke, blindness) affect approximately 16 million people in the United States and account for an estimated \$98 billion in annual health care costs [1]. Effective management of diabetes, therefore, is critical for avoiding potentially devastating complications and for decreasing utilization of vital health care resources.

Unequivocal evidence now exists regarding the benefits of tight glycemic control in patients with both type 1 [2] and type 2 [3] diabetes; every improvement in the HbA_{1c} level down to 6% is associated with a lowering of the risk of diabetic complications [3,4]. For example, the United Kingdom Prospective Diabetes Study (UKPDS) revealed that each 0.9% reduction in HbA_{1c} level was associated with a 25% reduction in the development of renal failure or vision-threatening retinopathy [3]. Unfortunately, however, the average HbA_{1c} level among treated diabetic patients in the United States is 9.5%, well above the American Diabetes Association (ADA) target level of 7% [5]. In addition, a 1-year study funded by the Agency for Health Care Policy and Research (AHCPR) revealed

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that fewer than 1 in 5 diabetic patients receives the minimum number of routine HbA_{1c} tests recommended by the ADA as an indicator of long-term effects of glycemic control [1]. Given what is known about improving outcomes for diabetic patients, there is clearly much room for improvement in actual clinical practice.

A major reason that the standard of care for diabetes is not being met is that achieving the best possible outcomes requires patients to be well educated about their disease and its appropriate management and committed to playing an active role in their own care. This requires a system designed to educate patients, to monitor them to ensure that they have the skills needed for effective self-management, and to provide a continuum of care [6]. Such a system of care differs from traditional health care delivery, which focuses on the diagnosis and treatment of an acute problem by a single provider in a single site, with expected resolution of the problem.

To date, providers, delivery systems, and health plans have employed a variety of strategies for identifying, communicating with, and systematically managing their populations of patients with complex chronic diseases such as diabetes. This article discusses how one integrated health care delivery system has endeavored to improve the care of its diabetic patients. Using LHS's diabetes disease management program as an example, the article reviews key steps in the design, development, and implementation of a new process of care as well as important principles for effective tracking and reporting outcomes once a disease management program is in place.

Overview of Disease Management at Lovelace Health Systems

LHS is an integrated health care delivery system owned by CIGNA Healthcare and based in Albuquerque, which provides services to the entire state of New Mexico. As a horizontally integrated organization, LHS contracts with PCPs and specialty care providers, some of whom are salaried physicians in a tightly run group practice (referred to as a *staff model*) and others of whom are under separate contract with the health plan as independent preferred providers (referred to as an *independent practice association [IPA] model*). LHS also is vertically integrated, in that it owns and provides a continuum of health care and management services including a health plan, a full-service hospital, care and case management, home health care units, and the staff model practices previously noted.

LHS began developing disease management pro-

grams during the early 1990s, in response to competitive changes in the health care marketplace requiring improved care and outcomes for patients with chronic diseases. The first step was to identify clinical conditions in need of improved management. LHS analyzed claims data to identify diagnoses that accounted for the bulk of costs and resource utilization for its member population. LHS found that 30 conditions accounted for 80% of its costs and resource utilization. To minimize financial risk, optimize care management processes, and obtain best outcomes for patients with these conditions, LHS and Lovelace Healthcare Innovations (LHI), its disease management subsidiary, developed the Episodes of Care® model [7]. To date, LHS and LHI have developed and implemented 19 of these disease management programs. Each program describes the optimal process of care for an acute or chronic condition across the continuum of care, from diagnostic screening to long-term treatment.

One of the high-volume, high-cost conditions identified was diabetes mellitus. Diabetes is a growing problem in the Southwest, where a large percentage of the population are Native American and Hispanic. The incidence of type 2 diabetes and of diabetes-related complications (eg, renal failure) is increased in these ethnic groups [1]. In a community screening for the state health department, approximately 10% of the total population in the communities surveyed was found to have diabetes [Diabetes Advisory Council of New Mexico, unpublished data, 1993]. In addition, approximately one third of Hispanic members in the LHS Senior Plan have a diagnosis of diabetes. (The LHS Senior Plan is a capitated plan for Medicare patients, in which the health system bears the financial risk of treating patients.) LHS thus seeks to maintain the health of this population as much as possible to minimize utilization of essential resources.

After completing the history and physical examination on Ms. Herrera, Dr. Perez spends a few minutes explaining how he would like to proceed with her diabetes management. First, he acknowledges her frustration with the poor results she has obtained thus far and her request for help in making necessary lifestyle changes.

"A key component of our approach to diabetes care at LHS is to support patients with education and coordination of the efforts of all who are involved in managing your condition, including me, a diabetes educator, and a dietitian," Dr. Perez explains. "We also want to make it as easy as possible for you to receive the appropriate

medications and testing needed to track your condition and any changes that might occur."

As a first step, Dr. Perez refers Ms. Herrera to Lovelace Regional Diabetes Program for a series of visits. Dr. Perez's expectation is that Ms. Herrera will attend several small classes with other patients to learn about lifestyle changes she can make to help her control her blood glucose level, blood pressure, and cholesterol and triglyceride levels. She will also learn to use a new glucose meter that will store her capillary blood glucose levels so Dr. Perez can download this information to his computer for analysis on each visit. Once these steps have been taken, Dr. Perez will have a better idea how her medications are actually working and whether she will need new or additional medications. The diabetes educators will help with this evaluation and will monitor Ms. Herrera's progress by telephone. She will also be started on a regular long-term surveillance regimen with periodic eye, renal, blood pressure, and lipid evaluations.

After 12 weeks on her new diabetes management program, Ms. Herrera comes in for a follow-up visit with Dr. Perez. Her HbA_{1c} level has improved to 8%, her blood pressure has normalized, and her eye examination has revealed no diabetic damage. Her triglyceride levels are still high, but Dr. Perez hopes these will improve with further improvement of her blood glucose control. Nonetheless, he makes a note to consider adding a lipid-lowering agent at Ms. Herrera's next visit if her triglycerides remain high.

The LHS Diabetes Program: Development and Implementation

LHS actually began to address the needs of its diabetic members in 1981, when it initiated a diabetes education program. Although the program was very popular with many physicians and had led to improved control for many patients, by 1993 less than half of LHS members with diabetes had participated in the program. Coincidentally, in 1994 LHS completed its first HEDIS report. HEDIS (Health Plan and Employer Data Information Set) is a set of standardized performance measures that serves as a "report card" on health plans and a tool to compare effectiveness of measurable medical processes within and between health plans. It is one of several measurement packages that health plans can use to measure and track process and outcomes measures and that organizations such as the National Committee for Quality Assurance can use for accreditation of health plans. The HEDIS out-

comes measures initially chosen for diabetes care were measures of HbA_{1c} determination rates and frequency of diabetic retinal examinations. In 1994, LHS reported that 77% of members with diabetes had suboptimal control of HbA_{1c} (**Figure 1**) and that only 42% received the recommended yearly retinal examination.

Forming a Team and Developing a Vision

When evidence of suboptimal diabetes care processes and outcomes was shared with LHS providers, it motivated administrators and concerned physicians ("champions") to begin developing a diabetes disease management program. Physicians are very conscious of clinical outcomes, and sharing data can motivate them to become involved in programs that will help their patients. For the diabetes program, 2 physician champions emerged: a family practitioner and a medical director with expertise in endocrinology. The program development team also included family practitioners, nurse practitioners, an administrator, and quality improvement experts. Additional team members were brought in as needed to address specific issues requiring further expertise, such as an ophthalmologist to help develop the retinopathy guidelines.

The team first formed a vision and mission statement to guide development of new care processes; they sought to create and maintain a system in which providers can help patients successfully self-manage their diabetes. The team used a method resembling classic quality improvement methodology as applied to modern medical practice. This methodology extends manufacturing and business concepts to the scientific method of practicing medicine and includes the following steps [8]:

- Identify and define program goals and objectives
- Determine optimal processes of care and compare them to current processes, thereby identifying opportunities for improvement
- Identify and overcome barriers to optimal processes
- Implement new processes
- Measure outcomes and re-evaluate the process

Setting Goals and Objectives

Before interventions can be designed, baseline information on current care processes must be collected. This data on current performance levels is compared with benchmarks to assess the degree to which current processes need to be improved. These comparisons may be internal (eg, the rate at which HbA_{1c} levels

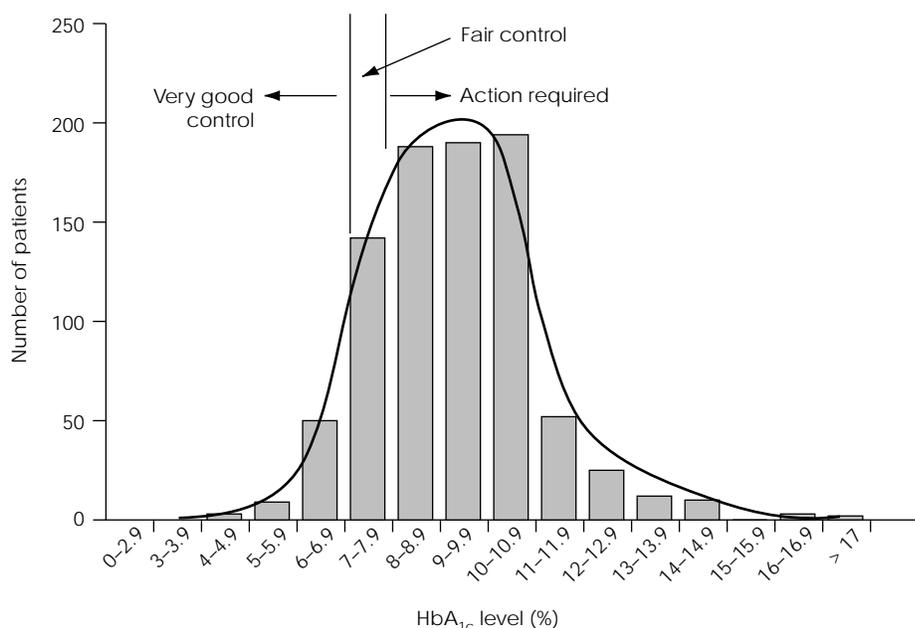


Figure 1. Distribution of glycosylated hemoglobin (HbA_{1c}) levels for Lovelace Health Systems diabetic members aged 31 to 64 years who received at least 1 test during 1993 (reported to HEDIS in 1994). Of the 954 patients tested, 76.94% had suboptimal glycemic control, 16.04% had “fair” control (HbA_{1c} 7%–8%), and 7.02% had “very good” control (HbA_{1c} < 7%), with the average HbA_{1c} level for all patients being 9.36% (standard deviation = 1.74).

were determined by the endocrinology department at LHS) or external (eg, the rate of HbA_{1c} level determination reported by other organizations in the literature). After the team determines the degree of improvement required, they identify specific performance areas that require improvement, and, within those areas, individual factors or process steps that are in need of greatest improvement and contribute most to suboptimal outcomes.

Defining Outcomes Measures

Care processes, outcomes, and surrogate outcomes are all components of the care system and frequently are referred to by the generic term *outcomes*. The measurement and tracking of outcomes is known as *outcomes research* or an *outcomes study*.

- A process of care is a series of steps or procedures that lead to a specific result. Process measures are frequently expressed as rates or percentages. The percentage of patients with diabetes who received an HbA_{1c} measurement within the past year is a process measure.
- An outcome is the result of a process of care. In diabetes care, the number of amputations, macrovascular events, and cases of renal failure, blindness, or neuropathy that occur in a 1-year period are outcomes measures.
- A surrogate outcome substitutes for an outcome that cannot be measured or that will occur so far in

the future it cannot be measured in time to be useful. For example, HbA_{1c} level is the result of the process of diabetes care and can be considered an outcome. Although the “true” outcomes of clinical interest (eg, renal failure, blindness, amputation) may not be measurable for up to 7 years, evidence from the literature shows that HbA_{1c} levels are predictive of such outcomes [2]. Therefore, the HbA_{1c} level is a surrogate outcome.

Outcomes measures selected for the LHS diabetes program. The development team for the LHS diabetes program chose the following outcomes measures based on their relevance to care of patients with diabetes, the ease of data collection, and the inclusion of some of the measures in HEDIS:

- Rates at which HbA_{1c} and lipid levels are measured
- Percentage of diabetic patients under “very good” control (HbA_{1c} < 7%) and percentage of patients under “fair” control (HbA_{1c} 7%–8%)
- Rates of evaluation for nephropathy based on rates at which urinary microalbumin levels are measured
- Rates at which patients with nephropathy are treated with angiotensin-converting enzyme (ACE) inhibitors or angiotensin II receptor blockers
- Rates at which yearly retinal examinations and documented foot examinations are performed

Identifying Barriers to Effective Care

An important early step in program development is to identify barriers to implementation and success within the system (Table 1). For example, LHS program developers found the location of the Lovelace Regional Diabetes Program—in the department of endocrinology at the main hospital and clinic site in Albuquerque—to be a barrier for both providers and patients. PCPs in practice sites around the city and state had little interaction with the diabetes educators and department of endocrinology, and many patients found it inconvenient to travel to receive diabetes education. PCPs felt “out of the loop” with regard to management of their patients following patient referral to the program (eg, treatment changes often were based on guidelines well-known to endocrinologists and diabetes educators but not shared formally with PCPs). Evidence from the literature shows that knowledgeable and motivated PCPs can care for diabetes patients as well as endocrinologists according to most measures [9]. However, patients frequently returned to PCPs from the diabetes program with more information about the current state of diabetes care than was known by their referring physician. Because over 90% of LHS patients with diabetes are followed by PCPs, an important disconnect in the LHS system was that PCPs were not receiving the information and support they needed but were still expected to provide “state of the art” care.

To overcome this barrier, the team defined the following objectives for the diabetes disease management program:

- To facilitate and encourage PCP management of diabetes patients
- To improve communication among PCPs, the department of endocrinology, and the Lovelace Regional Diabetes Program
- To establish treatment guidelines that are readily available and understandable to all providers
- To improve patient access to diabetes education and encourage patient self-management

As a first step, the diabetes educators were moved into the primary care sites and began traveling to see patients at neighborhood clinics. As a result, patient satisfaction, the number of patient referrals, and the relationship between PCPs and educators all improved. Communication channels between educators and providers opened, patients remained under the care of their PCP, and the consistency of care improved.

Table 1. Systemic Barriers to Implementation and Success of a Disease Management Program

Lack of a standardized program for disease management
Confusion about the definition of disease management
Lack of a vision of integrated care delivery (ie, focusing on acute care episodes rather than a continuum of care)
Conflict over making a long-term financial investment
Resistance to change (physician, management, patient)
Technical barriers (limited information systems and data collection capability)

Developing Practice Guidelines and Useful Tools

Practice guidelines. Guidelines can help PCPs more effectively manage chronic conditions such as diabetes and, if consistent with national recommendations, can avoid confusion for providers who may contract with multiple health plans. LHS bases its diabetes guidelines on those published each January by the ADA [10]. However, LHS constructs its own guidelines for the use of drug therapy, as adequate national guidelines do not exist in this area. Drug therapy for diabetes is rapidly evolving; availability of the most cost-effective agent depends on the system’s formulary and the price it contracts to pay for each drug. A managed care organization (MCO) or health care delivery system does not pay list price for drugs but, instead, contracts with pharmaceutical companies for the best price within therapeutic classes. The choice of therapeutic agents then may be limited to this group of agents (referred to as a *closed formulary*). Because the MCO or delivery system is financially accountable for the cost of pharmaceutical products, closed formularies can help them manage pharmacy costs.

Useful tools for practice. Practice guidelines are not an end in themselves. Past efforts at developing exhaustive guidelines at LHS did not appear to change provider behavior or improve care. Interviews with LHS providers revealed that classic algorithms are often too long and cumbersome to use during office visits when they are most needed. Busy physicians in clinical situations needed simple tools to help them “do the right thing” as efficiently as possible. Therefore, the most important information from practice guidelines (eg, information to inform key clinical decisions) was used to create tools that can be easily used in the patient care setting.

For example, prominent foot care posters in the examination rooms of all LHS providers remind

medical assistants and patients to prepare for diabetic foot examinations (ie, remove shoes and socks) at each office visit. Based on studies of foot examination rates, LHS found that physicians are more likely to examine a naked pair of feet than a clothed pair [unpublished data from internal LHS medical record review protocol]. In addition, patients often inquire about the message of the poster, thus creating an opportunity for patient education.

Another example of a tool that provides for more effective case management and patient self-management is the Diabetes Care Card (**Figure 2**). This card was developed to educate patients about standards of care and what should be expected from their providers at each office visit. Many patients carry this card, especially those most motivated to self-manage. At the time of the office visit, the provider updates the card with the patient's current information. This creates a "teachable moment" in the provider-patient relationship and triggers the provider to access the diabetes patient profile on the electronic medical record and update the patient.

Importance of Communication

Effective communication with providers is critical to successful implementation of disease management programs. Multiple modes of communication and repeated messages must occur to ensure that the majority of the target audience is reached. For example, a flyer on a bulletin board may reach nurses but may not be noticed by physicians. Staff meetings reach only those people in attendance. E-mail, voice mail, newsletter articles, and Intranet or Internet postings may also prove useful. Hallway conversations and word of mouth provide teachable moments and may be most influential to the busy provider and senior administrator [11]. Continuing medical education offerings are effective for disseminating information, introducing practice guidelines, outlining referral criteria, and presenting supportive tools, but they must be followed up with hands-on, interactive programs (eg, problem-based learning sessions) that help facilitate behavioral changes.

The LHS Diabetes Program: Outcomes Evaluation and Reporting

Outcomes measures selected prior to implementing a disease management program must be tracked to assure that the program is achieving its goals. Outcomes tracking involves data gathering, analysis, and reporting as well as evaluation of program results and ongoing refinement of program interventions (**Table 2**). Reporting outcomes in the form of constructive and meaningful feedback to providers helps

reinforce changes in behavior and can identify additional opportunities for improvement.

LHS developed an infrastructure to manage the high volume of clinical and financial data in its information system produced by its various integrated components. This infrastructure has been used to monitor and measure processes of care as well as clinical (physiologic) outcomes, humanistic outcomes (eg, patient satisfaction, functional status), and economic outcomes (eg, cost of care per outcome, return on investment).

Data Gathering and Analysis

The ability to share electronic data is an important and powerful tool for both providers and health plans. The LHS diabetes program development team focused on tracking outcomes that can be captured electronically. Electronic data capture facilitates ongoing tracking of outcomes and is less labor-intensive and more cost-effective than performing manual chart audits. For example, results of laboratory examinations and records of billed procedures (eg, retinal examinations) that can be accessed electronically are easier to retrieve and track than are results of foot examinations and patient education efforts, which require data collection through chart audit.

Designating personnel with appropriate skills to analyze data and report outcomes is integral to implementing and maintaining disease management programs. Based on data analysis, the LHS diabetes program development team regularly refines program goals, outcomes and process measures, and interventions to overcome identified inadequacies. For example, from 1994 to 1998 LHS observed gradual but inadequate improvements in retinal examination rates, thus highlighting an opportunity for further improvement. After trying multiple interventions (eg, letters and phone calls to remind patients to schedule examinations), all with minimal success, LHS was able to re-evaluate the barriers to achieving appropriate retinal examination rates. The greatest barrier identified is that working patients do not want to take the time off from work to have a dilated eye examination. LHS is still exploring potential interventions to overcome this problem.

Outcomes data should also be routinely reported to senior administrators and providers. Reporting outcomes data to senior administrators helps to maintain the effort and to drive needed process changes, which could lead to improved outcomes.

Patient-Centered Feedback

Feedback to providers can help to both maintain patient outcomes and modify provider behavior. Most

LOVELACE REGIONAL DIABETES PROGRAM



Diabetes Care Card

DIABETES CARE CARD

Name: _____
 Doctor: _____ Ph: () _____
 Diabetes Educator: _____ Ph: () _____
 Other Info: _____
 _____ Ph: () _____
 _____ Ph: () _____

I HAVE DIABETES

- If I am acting strangely or cannot be awakened, my blood sugar may be low.
- If I can swallow, give me 1/2 cup of a regular soft drink, fruit juice or other sugar sauce.
- If I do not recover in 10-15 minutes, repeat above and call 911.
- If I cannot be awakened or cannot swallow, **do not** try to give me anything by mouth. Call 911.

MEDICATION	DOSAGE	TIME

Allergies _____

FORM # DBT-031 8/94 Qg

YOU CAN BE IN CHARGE OF YOUR DIABETES. This card is your checklist for good diabetes care. Take this card to your doctor and diabetes educator when you visit them.

Blood Sugar Goals _____
 Fasting & Pre Meal _____
 2 Hours After Meals _____
 Bedtimes _____
 GlycoHb _____

TESTS	DATE			
GlycoHb (3-12 months)	/	/	/	/
Weight	/	/	/	/
Foot Exam (every visit)				
Blood Pressure (every visit)	/	/	/	/
Cholesterol/LDL (per MD)	/	/	/	/
HDL (per MD)	/	/	/	/
Triglycerides (per MD)	/	/	/	/
Urine Protein (6-12 months)	/	/	/	/
Dilated Eye Exam (once a year)				
Dental Exam (once a year)				
Flu Shot (once a year)				

DIABETES EDUCATION

TOPIC	DATE	TOPIC	DATE
General Facts		Exercise	
Food/Ex/Meds		Preventing Complications	
Nutrition		Skin & Foot Care	
Monitoring		Stress Mgmt.	
Meds/Insulin		Sick Days	
Hypo/Hyperglycemia		Community Resources	

Figure 2. The Lovelace Health Systems Diabetes Care Card. This self-care card folds to fit in a wallet. Information appearing on the outside of the card is shown on the *left*; information contained on the inside of the card is shown on the *right*.

providers strive for excellence and believe that they are ordering appropriate routine testing for patients with chronic conditions. Even the most careful clinicians, however, can overlook details of a particular patient's care when they are faced with the demands of a busy practice or clinical schedule. Regular (eg, quarterly)

reports afford providers easy access to patient information and can remind them to follow up with individual patients in need of particular maintenance services.

Use of electronic medical records, although not readily available in most practice settings, can facilitate implementation and follow-up of disease management

Table 2. Component Steps of Outcomes Tracking, Reporting, and Process Improvement

Gather preliminary data
Select outcomes (ie, identify appropriate and measurable processes, outcomes, and surrogate outcomes)
Design outcomes studies (ie, decide how to measure program results)
Design measurement strategies for implementation (eg, how to collect results of HbA _{1c} measurements from all patients in question)
Design reports for all stakeholders (physicians, nurses, clinical and administrative managers)
Evaluate results
Refine program interventions
Maintain goals or achievements

HbA_{1c} = glycosylated hemoglobin.

programs. Providers in the LHS staff model use a text-based electronic medical record. The LHS electronic record provides users with access to patient-specific information, including dictations, laboratory and radiology results, health plan demographics (eg, age, sex, family status, insurance coverage, employer), and referrals to providers outside the system. Many newer systems also recommend appropriate care protocols to providers. For example, in response to a provider accessing a patient's record, some systems determine whether the patient has chronic conditions, review surveillance data and compare it with benchmarks, and prompt the provider to provide services appropriate for that patient. To facilitate implementation of the diabetes disease management program, LHS added a Diabetes Patient Profile Screen that contains specific standard of care procedures and allows the provider instant access to electronic data and reminders about surveillance procedures that should be performed (Figure 3).

Provider-Centered Feedback

In addition to reports of information specific to individual patients, data that track provider performance across a patient panel and in comparison to physician peers are also useful to disease management implementation. Most providers do not wish to provide suboptimal care compared with their colleagues, and, in LHS's and LHI's experience, feedback to providers has been found to be one of the most effective means of facilitating behavioral change [12]. It has been the experience of many in medical education and quality improvement that one-time interventions rarely lead to

long-term changes [13]. Continuous feedback provides motivation for providers to maintain changes in their practice patterns and to improve upon the gains accomplished.

To supplement patient-centered reports, LHS and LHI have developed a tool—the Provider Support Report (PSR)—to profile PCPs and their patient panels (Figure 4). PSRs are generated quarterly and identify patients in each provider's panel who are diagnosed with certain conditions. For diabetes, the PSR is used to track whether patients have received routine maintenance examinations (eg, retinal examinations; determinations of lipid, urinary microalbumin, and HbA_{1c} levels) and whether they are filling prescriptions for ACE inhibitors and angiotensin II receptor blockers. Patients who have not received appropriate surveillance and treatment are clearly visible at the bottom of the report. Each provider's results are compared with those of peers at their clinic site and within their department. The measures and comparisons contained in the PSR can help to convince providers that their behavior can be improved and that improvements resulting from disease management programs can be maintained.

Although many providers respond positively to feedback that is presented properly [8], provider profiling has been criticized for several reasons [14]. Many physicians are threatened by the use of “report cards” because health plans may use them as punitive indications of poor performance rather than as opportunities for improvement. In fact, providers have reportedly been disenrolled from health plans because of poor utilization profiles, although in some of those cases the utilization data were not shared with the providers.

Also, many providers have little experience with performance measurements and do not understand the sources of the data. For example, during implementation of a pediatric asthma disease management program, LHS experienced difficulty obtaining buy-in from general pediatricians, all of whom believed that they were already “doing the right thing” for their patients. In response, LHS and LHI created a PSR that tracked the ratio of anti-inflammatory to bronchodilator inhalers filled by patients in the pharmacy. Through this report, LHS and LHI demonstrated to providers that their patients were filling more prescriptions for bronchodilators than for anti-inflammatory medications. This ratio was exactly opposite the ratio of medications recommended in the national asthma guidelines, with which the providers had previously agreed. To help support providers, rather than simply pass along negative data, LHS and LHI provided them with the names of patients who were using more

Diabetes Care—Treatment Summary								
	HbA _{1c}	Micro-albumin	Retinal exam	CDE	T chol	HDL	LDL	TRG
Due						X	X	X
7/13/99	7.8	32			150			
1/23/99	8.4				185			
8/24/98				X				
9/14/97			X					

REMEMBER FOOT EXAM
If microalbumin is high consider ACE inhibitor

Figure 3. The Lovelace Health Systems Diabetes Patient Profile Screen. Part of a patient’s electronic medical record, this tool provides a summary of interventions required and reported for a given patient. An “X” in the *due* row of the screen indicates the patient should be referred for the appropriate service or have the appropriate test performed. The actual laboratory values (test results) or an X (service) is posted on the screen with the date on which the test or service was performed. ACE = angiotensin-converting enzyme; CDE = education by a certified diabetes educator; HbA_{1c} = glycosylated hemoglobin; HDL = high-density lipoprotein; LDL = low-density lipoprotein; T chol = total cholesterol; TRG = triglyceride.

bronchodilators than anti-inflammatory medications. Providers used this information to help patients improve self-care behaviors and to improve their own performance. Therefore, LHS and LHI appropriately call their reports *provider support reports* rather than *report cards*.

Finally, providers who initially respond negatively to profiles may claim that the data do not accurately reflect their management strategies or patients. Such inaccuracies may occur because claims and administrative data used to create profiles sometimes contain errors resulting from coding mistakes or misreported laboratory results. However, responding to a provider’s complaints may also provide opportunities to involve resistant physicians in the disease management process. For example, one LHS internist was particularly critical of attempts to use claims data for clinical purposes. To address this physician’s resistance, LHS and LHI asked him to evaluate the PSRs before they were released to all providers. Not only was this internist’s feedback used to refine report design, but he also became a champion of the PSR process, selling other physicians on the validity of the data and its importance in helping to improve care.

LHS saw the greatest improvement in diabetes care process and outcomes after distribution of the PSRs [12]. The most important outcomes correlated with the PSRs are the continuing decrease in HbA_{1c} levels (Figure 5) and the gradual increase in the rates at which retinal examinations are performed.

Outcomes Tracking in Carve-in versus Carve-out Programs

Disease management programs can be developed internally by health plans or delivery systems to support both PCPs and specialists (referred to as *carve-in programs*), or patients may be enrolled into programs purchased from external, for-profit vendors (referred to as *carve-out programs*). Carve-in programs, such as the LHS diabetes program, engage and track an entire population of patients (also referred to as a *population health model*), and the health system assumes responsibility and reports outcomes for all patients. Many carve-out programs track outcomes only for enrolled patients. These patients may be more motivated to self-manage their conditions than are the general population of patients and thus may not represent the universe of patients who utilize the largest percentage of resources the following year.

For example, in patients with CHF who are contacted to participate in a program, the PCP and the patient must agree for enrollment to occur. Anecdotal evidence from LHS providers indicates that some especially non-compliant patients may not agree to participate, whereas patients who enroll in the program may remain at a lower acuity level. In addition, new patients with CHF (eg, patients at a low acuity level the previous year, newly diagnosed patients) initially utilize a large percentage of resources. Thus, enrollment must occur on a continuous, rolling basis. In LHS’s experience, patients who are

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DIABETES Provider Support Report For the Quarter Q3 – 1998

A rolling calendar year = Oct 1, 1997 - Sept 31, 1998

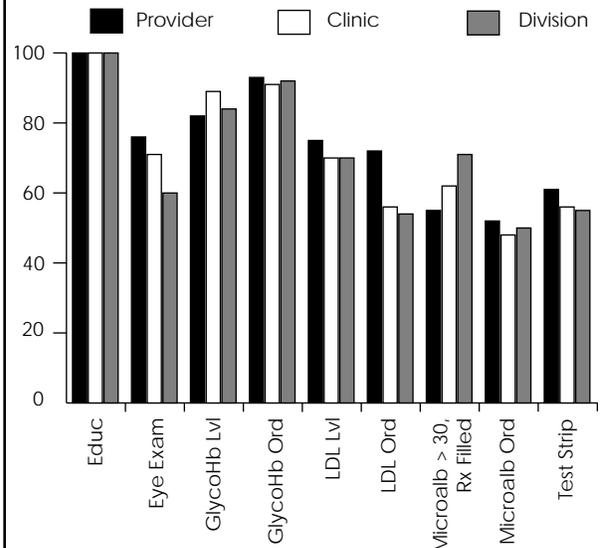
PCP:
Clinic:
Division:

I. Provider-Specific Data

Criteria	Standards	Pts	Tested	Within Std	Percent
Education	Rolling 2 yr	56	56	56	100%
Eye Exam	Rolling 1 yr	56	42	42	75.00%
GlycoHb Ordered	Within 1 yr	56	52	52	92.86%
GlycoHb Level	≤ 10.5	56	52	44	84.62%
Microalb Ordered	Within 1 yr	56	31	31	55.36%
Microalb > 30	Rx Filled	10	10	5	50.00%
LDL Ordered	Rolling 2 yrs	56	41	41	73.21%
LDL Result	≤ 130	56	40	30	75.00%
Test Strips	2x Within 1 yr	56	36	36	64.29%

- Patients in this report have had at least 2 diagnoses of diabetes in the past year.
- This report can be used with the Diabetes EOC Medical Profile.

II. Percentage of Patients Within Standards



III. High Risk Patient Detail (Patients Outside Standards in Current Quarter)

Criteria (1 or more of the following): 1) no educ in the last 2 yrs; 2) no eye exam in the last 1 yr; 3) GlycoHb > 10.5 or no GlycoHb ordered in last yr; 4) no Microalb in last 1 yr; 5) Microalb > 30 and no Rx filled; 6) no LDL in past 2 yrs; or 7) did not receive 2 test strip Rx fills in the last year.

Patient Name	MRN	Educ	Eye Exam	GlycoHb Ordered	GlycoHb Level	Microalb Ordered	Microalb > 30, Rx Filled?	Lipids Ordered	Lipids Result	Test Strips
			N		8.70	N			134	
			N		10.00	N			76	
					11.40			N		
			N		7.80	N			131	N
					7.40	N			119	
					7.60	N			105	N
					10.90	N			86	N
					6.80	N		N		
					7.60	N		N		N
					11.10			N		
					9.90				133	N
					8.40	N			152	N
					8.10	N		N		
					9.50		N		100	
				N		N			102	N

Thursday, December 10, 1998

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Figure 4. The Lovelace Health Systems Provider Support Report. MRN = medical record number; N = service or test not performed at appropriate frequency.

not enrolled may still change some of their behavior as a result of having been contacted by the disease management program, and physicians who do not participate

may still alter their behavior to some degree. Thus, there is a generalized increase in the quality of care for all patients (a phenomenon known as a *halo effect*).

Factors That Influence Implementation

Contracting with Multiple Health Plans

Implementing disease management is more difficult in a network of independent physicians compared with a staff model or group practice. For example, physicians in the LHS staff model see LHS patients almost exclusively and therefore must contend primarily with LHS guidelines and procedures. However, providers who contract with multiple health plans may be faced with using various and potentially incongruent guidelines and paperwork systems. Physicians forced to perform additional charting or to use forms applicable only to one health plan can become resentful of the disease management process, especially when multiple guidelines are presented. Therefore, guidelines that are consistent with nationally recognized standards of care are most useful to such physicians.

Provider Benefits and Incentives

The benefits of using disease management programs should be made clear to providers who must implement them. Program tools should allow for more efficient and effective patient care and should be simple, direct, and appropriate for any patients with the condition. In addition, educational offerings should be easily accessible and relevant to the needs of the clinician (eg, provided in person or via teleconference).

Consumer Education

Informed consumers are influential in changing provider behavior. As demonstrated by direct to consumer advertising by pharmaceutical companies, an aggressive patient education effort can have a positive impact on increasing patient demand for services. Anecdotal evidence at LHS suggests that aggressive patient education (eg, to increase the rate of appropriate laboratory tests and screening rates) can have a similar effect.

In addition, requests to providers to follow best practices that come from patients, rather than from the health plan, may be received more favorably but may have a negative financial impact on resource utilization. Therefore, the program must have administrative support prior to implementation. For example, it was necessary to confirm that additional HbA_{1c} testing and increased rates of retinal examinations were consistent with LHS's organizational goals. Although such quality improvements may save money in the long run, in the short term they may cost more than they save. At LHS, administrators have recognized the value of improved outcomes that result from disease management programs (ie, they can be used as a marketing

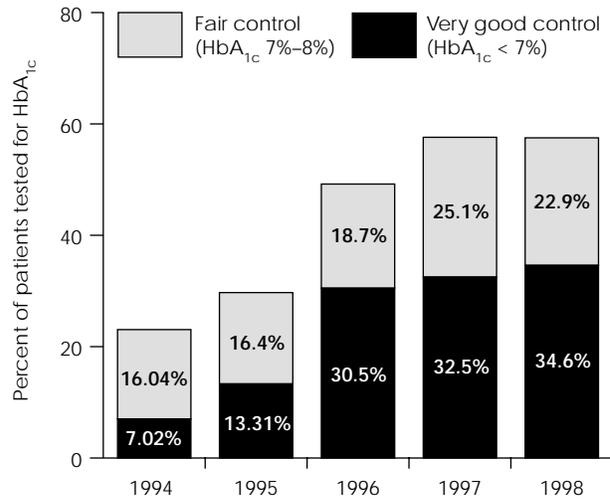


Figure 5. Percentage of diabetic patients managed by Lovelace Health Systems (LHS) staff model physicians with “fair” or “very good” control of glycosylated hemoglobin (HbA_{1c}) levels. In 1994, approximately the time the LHS diabetes disease management program was initiated, more than 75% of patients had suboptimal glycemic control. In 1998, this number had decreased to less than 43%.

tool to attract potential purchasers, thus increasing enrollment and income).

It is 1 year later, and Ms. Herrera comes to Dr. Perez for a routine check-up. She has seen Dr. Perez 4 times over the past year. In addition, she has been to the Lovelace Regional Diabetes Program to see a diabetes educator and a dietitian, services to which she was not previously exposed. Ms. Herrera and Dr. Perez are especially pleased today because her HbA_{1c} level has finally decreased to the agreed upon goal of 7%. Furthermore, she has lost 10 lb. She feels confident that she and Dr. Perez are finally in charge of her diabetes.

As Ms. Herrera has noted in her visits, the disease management program at LHS provides a support system for her and Dr. Perez and makes it convenient for her to follow through with his recommendations for her care. The program reaches out to her with frequent calls, reminders, and other help that makes it easy for her to “do the right thing.” In considering her previous experience, Ms. Herrera knows that the health care system is systematically addressing her needs. Now, when she goes to see her diabetes educator, the information she receives matches what Dr. Perez has been telling her. All providers in the system

can access the information needed to ensure that she receives appropriate testing (eg, quarterly HbA_{1c} measurements; yearly retinal examinations, urinary microalbumin levels, and lipid measurements), and all have complete access to and can monitor her medication history. Importantly, she sees that this system of communicating allows Dr. Perez to spend more time with her, evaluating her needs and concerns rather than searching for test results and their meaning.

Conclusion

Disease management is a term that encompasses a variety of new programs that re-engineer the health care delivery process for chronic conditions and may improve the outcomes of patient care [15]. Successful implementation of a disease management program begins with a plan that incorporates patient education, communication, outcomes measurement, and maintenance of gains over time.

Communication and educational efforts too often are aimed only at providers, although nonphysician providers, nurses, ancillary personnel, and office staff are crucial to achieving the goals and should also be included. Senior administrators and managers of departments and clinics are an additional target audience who must be addressed. All targeted groups must clearly understand their specific roles and responsibilities as well as the desired outcomes. Patients are the ultimate disease managers who should be involved in the planning and implementation of disease management programs. The physician has a central role in engaging and educating patients not only about their role in managing disease, but also about the way in which a program can improve patient health and help physicians track and improve outcomes.

Maintaining improvement gains is always a challenge, and the effort should not be discontinued after initial improvements. In addition, all members of the organization may not automatically adopt and maintain the new, successful methodologies. Therefore, every disease management team should develop a plan to sustain and even increase its gains. Every intervention in the process of caring for patients will produce other changes. It is important to continuously re-evaluate the processes and outcomes in order to sustain the improvement, not only in the health of the population but also in the life and health of each individual patient.

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