The Business of Hospital Care of Diabetic Patients: 2. A New Model for Inpatient Support Services

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What is the ideal model for inpatient diabetes support services in the present environment? How should organizations and financial systems be structured for the educational, counseling, and other support services relevant to the self-care of diabetes?

At present, the only model that has official endorsement is the model for diabetes support services and education of the American Diabetes Association (ADA).[1] As noted in the first article in this series,[2] this model was designed for application in both the outpatient and inpatient environments. The changes that have occurred in the hospital care environment since the ADA Education Recognition Program (ERP) guidelines were originally designed in the early 1980s make this model inapplicable to today's inpatient environment. At present, no other model is available to serve as a reference.

One problem is a lack of definition regarding the characteristics and needs of diabetic inpatients. Available studies demonstrate that diabetic inpatients are usually hospitalized for complications of diabetes or for problems unrelated to their diabetes.[3] Only a minority of diabetic admissions are caused by problems with glycemic control. Nevertheless, all or most hospitalized diabetic patients may require or benefit from diabetes support services regardless of the cause of admission.[4] If the admission is related to issues with diabetes self-care or to problems in maintaining self-care for other related medical problems, such as hypertension, the need for diabetes support services is more clearly defined.

Studies do suggest that patients who are admitted for issues involving glycemic control do represent a subpopulation that often requires the vigorous application of a variety of diabetes support services. The majority of these admissions are attributable to a minority of patients, who have repeated and multiple admissions for problems with diabetic crisis.[5–7] Psychosocial, financial, and case management issues arise with these patients, as well as gaps in understanding of proper self-care techniques.[5–8] While the existing ERP guidelines do include references to all of these considerations, the clear focus of those guidelines is the adequacy and completeness of the process of diabetes patient education.[1]

The Formation of a New Model at Columbus Regional Medical Center

These issues in inpatient diabetes care became important concerns to Columbus Regional Medical Center in Columbus, Ga., in 1996. This was because the state of Georgia had cited diabetes and its complications as a high-priority health care issue for the service area of Columbus Regional.

A preliminary analysis of diabetes-related services and problems carried out by Columbus Regional demonstrated that diabetic admissions represented a large minority of all hospital admissions (Table 1) and that lengths of stay and rates of recidivistic admissions for inpatients with diabetes at that facility were unacceptably high (Table 2). The only personnel assigned to diabetes support services was a nurse who was a certified diabetes educator. However, her work hours were allocated such that she could only serve patients with diabetes for less than one-third of her work time. Therefore, the medical center decided to develop a new model of inpatient diabetes support services designed specifically to reduce lengths of stay and rates of recidivism.

A committee was formed, consisting of a diabetes nurse educator (WM), two staff endocrinologists (SBL and GLA), a statistician, the head of case management, a pharmacist, a staff dietitian, and a representative of administration. The committee directed a complete analysis of the characteristics of the inpatient diabetes population.

Inpatients with diabetes comprised 10% or more of the total inpatient population over a period of 3 years (Table 1). This confirmed the impressions of the preliminary analysis that the group of inpatients with diabetes had long lengths of stay (Table 2). Interestingly, the lengths of stay were prolonged for all patients with diabetes, whether hospital-

Table 1. Prevalence of Diabetic Admissions at Columbus Regional Medical Center

Year	Total Admissions	Diabetes Primary	Diabetes Secondary
1996	15,540	275 (1.8%)	1,274 (8.2%)
1997	15,384	279 (1.8%)	1,440 (9.4%)
1998	16,799	333 (2.0%)	1,648 (9.8%)

Table 2. Average Lengths of Stay (ALOS) and Recurrent Admissions for Patients With Diabetes at Columbus Regional Medical Center

Year	ALOS	Readmissions
1996	7.5	82
1997	6.7	73
1998	4.2	44
1999	4.3	29
2000	4.8	24
2001	4.2	22

ized for diabetic complications, for other conditions, or for problems with glycemic control. These data raised the question of whether addressing the needs of inpatients admitted because of problems in glycemic control would also benefit all other inpatients with diabetes. The prevalence of recidivistic admissions among this patient population was high. In the survey year, almost half of all patients admitted with diabetes had multiple admissions (Table 2). Some of these recidivistic admissions were caused by patients' inability to obtain diabetes medications or insulin.

The annual caseload of inpatients with diabetes was far greater than the manpower allocated to serve it. Columbus Regional only assigned one-third of a single full-time nurse educator position to diabetic patients. Unless a patient was newly diagnosed, housed on the pediatric unit, or a woman with gestational diabetes, he or she was not eligible to receive diabetes educational and support services. These policies excluded the majority of patients. In the fiscal year just before the survey, only 10% of inpatients with diabetes received educational and support services.

To better understand the service needs of the inpatient diabetic population, the committee designed a survey to describe the primary support services required by the population. The survey assigned patients to a category of service based on an assessment of patient needs by two independent committee members (Table 3). Level 1 included patients who required comprehensive educational and support services, as described in the ADA's ERP guidelines. Level 2 included patients with admissions caused by or significantly influenced by economic or social service needs, e.g., inability to afford or obtain medications. Level 3 was for patients who had already had comprehensive diabetes educational services but required education on one or a few specific content areas. Level 4 was for patients who had been fully educated before hospitalization but who might desire follow-up instruction in an outpatient setting. Level 5 included patients who either refused educational intervention or had clinical problems that prevented participation in education, e.g., coma.

The survey was conducted by a member of the committee, and the impression was confirmed by the floor nurse caring for each patient. The screening including 357 consecutive admissions with diabetes as a primary or secondary diagnosis.

Survey results are shown in Table 4. The largest group of patients required social and economic services rather than diabetes education. The specific interventions they required are shown in Table 5. These interventions related more to discharge planning functions than to traditional diabetes education and nutritional counseling. Only a small minority of patients required complete diabetes education and support services as called for in the ERP guidelines.

The Model

Based on these findings, the committee recommended implementation of a new model for inpatient diabetes support services. Diabetes education and patient support was moved from the Department of Nursing to Discharge Planning. The number of personnel available to provide inpatient diabetes education and support was expanded from one-third of a full-time nurse educator position to two full-time nurse educator positions and a part-time secretary. The program was called "The Adjust Program." The services provided by staff were changed from only patient education to a mixture of patient education and discharge planning functions, as described below.

A protocol of service was established in which each patient was screened using the Categories of Service tool (Table 3) to determine primary diabetes education and support needs while in the hospital. Because recent reductions in hospital lengths of stay for diabetic patients often limit service time available, the committee instructed the Adjust Program staff to develop a "game plan" for each patient to facilitate as rapid a discharge as possible, while still reducing the risk that the patient would have recidivistic admissions.

The committee decided that reductions in lengths of stay (and associated reductions in costs per stay) without increasing recidivistic admissions would demonstrate the effectiveness of the program. The committee used these outcomes to determine whether inpatient service based on the Categories of

Table 3. The Adjust Program's Categories of Service Tool

Level 1	Comprehensive diabetes education required
Level 2	Social and economic supports required
Level 3	Focused diabetes education required
Level 4	Diabetes education review after discharge
Level 5	Unwilling or unable to participate in education

Table 4. Classification of 357 Consecutive Admissions With Diabetes by Categories of Service

Level 1	39 (11%)
Level 2	79 (22%)
Level 3	92 (26%)
Level 4	61 (17%)
Level 5	37 (10%)

Service tool would accomplish these goals.

The new model placed an enhanced emphasis on social service and financial issues in the services rendered to patients in Level 2. A diabetes educator was responsible for the interface between these patients and financial supports, when necessary. Since the diabetes nurse educator is a member of Discharge Planning, she was able to provide the interfaces with Medicaid, community social service programs, Meals on Wheels, community transportation programs, community health care clinics, or the Columbus Regional Pharmacy. The pharmacy provided medication to patients who were unlikely to obtain medications on their own and who had recidivistic admissions as a result.

Results

Implementation of the new model resulted in reductions in lengths of stay, cost per stay, and the rate of recidivistic admissions. Although the total diabetic caseload increased (or was more accurately recognized by the new methods of patient identification) during the first 2 years of the program (Table 1), the average length of stay declined significantly (Table 2). Recidivism was measured by total recidivistic admissions per year and by number of recidivistic admissions within 30 days of original discharge. These also declined significantly (Table 2). The decline in average length of stay and in readmissions within 30 days of discharge have remained at the reduced levels for the 6 years of program operation.

Financial analysis revealed that, despite the higher level of investment in the diabetes service (Adjust) program, Columbus Regional yielded significant financial advantages from the program. In the first full year of its operation, the program was served by two nurse educators and a half-time secretary. The net cost savings to the hospital from reduced lengths of stay and reduction in unreimbursed recidivistic admissions was $342,166. Savings actually increased after the first full year of operation because the average length of stay fell further between the program's first and second years. Total savings in the second full year of operation increased to more than $630,000.

Discussion

In the current fiscal environment, institutional management is skeptical of programs that do not generate enhanced revenue. The notion that a program may be supported fiscally by cost savings seems more difficult to prove. Inpatient diabetes education and support services have rarely been sources of income for hospitals. These services have been justified by the expectation that they would save money; however, until now, these assumptions have not been substantiated. Also, it has been assumed, without substantial data, that educational services would yield savings in both inpatient and outpatient costs for diabetes care.[9,10] Therefore, for both programmatic and institutional benefits, the same model has been advocated for both environments.

Previous studies have suggested that only a minority of hospitalizations in diabetic patients occur because of problems of glycemic control. However, a majority of these admissions may be recidivistic and may occur in a minority of patients. Issues other than inadequate education, such as social or economic problems, may influence these admissions. Thus, the subgroup of diabetic inpatients who are admitted for problems of glycemic control may be a "special needs" population with service issues not directly related to diabetes education.

There have been previous studies of novel organization of inpatient support services for diabetic people with specific needs.[11,12] At least two of these have demonstrated improved outcomes with reduced lengths of stay for specific services that serve diabetic ketoacidosis. One earlier study demonstrated that the application of a diabetes education team may reduce lengths of stay for inpatients with uncontrolled diabetes; however, the diabetes team had no effect on the lengths of stay for inpatients admitted for reasons other than diabetes.[13] No other, recent study is available that demonstrates an approach that may be applied comprehensively to all inpatients with diabetes and yield positive outcomes in all patients.

For these reasons alone, the present study may be important. It was conducted on diabetic inpatients in a general hospital that clearly lacked adequate services for 90% of its diabetic clients. Therefore, to a large extent, the "pretreatment" data represent a control group that demonstrates how the lack of diabetes support services may affect lengths of stay, cost per stay, and the rate of readmission.

The Categories of Services tool (Table 3) illustrates what, if any, diabetes support services this population required. The smallest minority needed comprehensive diabetes education, as described in national guidelines. The largest minority required social and eco-

Table 5. Interventions Required by Diabetic Inpatients in Level 2

- Assessment and improvement of home care resources
- Assessment of competence of caregivers
- Assessment of daily schedule
- Assessment of financial constraints to carry out diabetes self-care (includes acquisition of diabetes supplies and drugs or insulin)

nomic supports not clearly emphasized in current guidelines. Based on initial data, an intervention program was designed that emphasized the generation of a "game plan" of support for diabetic patients. The Adjust Program was intended to provide whatever assistance was necessary to facilitate a rapid but effective discharge as quickly as possible. Because a reduction in the rate of recidivistic admissions was one goal of the program, the intervention plan could not force a discharge prematurely. Such an invalid approach to reducing lengths of stay would have resulted in an increase in the rate of readmissions.

The Adjust Program's design deviated from the customary organization of diabetes education programs. Its personnel were included in the Discharge Planning Department rather than in the Department of Nursing or any specific patient education activity. Therefore, discharge planning arrangements for home health care, financial assistance for health care, and the acquisition of necessary medications and diabetes supplies was as important as traditional diabetes patient education. The development of an understanding about social or economic factors that contributed to hospital admissions, especially in cases of recidivism, was as important as an assessment of the content areas patients required for the enhancement of their diabetes self-care.

The results demonstrated that effective diabetes support and education services designed in this manner would reduce lengths of stay, cost per stay, and rate of readmissions of all patients with diabetes in a general hospital. The fiscal savings more than justified the investment in time and money to organize and support the program.

Therefore, this model strongly suggests the benefits for patients, treating health professionals, and hospitals of a diabetes support service that focuses on patients' requirements to avoid hospitalizations. The experience at Columbus Regional suggests that it is no longer reasonable for hospitals to restrict such services on either a fiscal or programmatic basis. However, the experience also suggests that personnel involved in inpatient diabetes support services should view their role as involving not only patient education, but also effective discharge planning and case management. The Adjust Program at Columbus Regional Medical Center is presented as a possible model for broader application.

ACKNOWLEDGMENT

This article was presented in part at the American Diabetes Association's 58th Annual Meeting and Scientific Sessions in Chicago, Ill., in June 1998.

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