Reimbursement for Pediatric Diabetes Intensive Case Management: A Model for Chronic Diseases?

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ABSTRACT. Objective. Current reimbursement policies serve as potent disincentives for physicians who provide evaluation and management services exclusively. Such policies threaten nationwide availability of care for personnel-intensive services such as pediatric diabetes. This report describes an approach to improving reimbursement for highly specialized, comprehensive pediatric diabetes management through prospective contracting for services. The objective of this study was to determine whether pediatric diabetes intensive case management services are cost-effective to the payer, the patient, and a pediatric diabetes program.

Methods. A contract with a third-party payer was created to reimburse for 3 key pediatric diabetes intensive case management components: specialty education, 24/7 telephone access to an educator (and board-certified pediatric endocrinologist as needed), and quarterly educator assessments of self-management skills. Data were collected and analyzed for 15 months after signing the contract. Within the first 15 months after the contract was signed, 22 hospital admissions for diabetic ketoacidosis (DKA) occurred in 16 different patients. After hospitalizations for DKA, all 16 patients were offered participation in the program. All were followed during the subsequent 1 to 15 months of observation. Ten patients elected to participate, and 6 refused participation. Frequency of rehospitalization, emergency department visits, and costs were compared between the 2 groups.

Results. Among the 10 participating patients, there was only 1 subsequent DKA admission, whereas among the 6 who refused participation, 5 were rehospitalized for DKA on at least 1 occasion. The 10 patients who participated in the program had greater telephone contact with the team compared with those who did not (16 crisis-management calls vs 0). Costs (education, hospitalization, and emergency department visits) per participating patient were approximately $1350 less than those for nonparticipating patients. Differences between participating and nonparticipating groups included age (participants were more likely to be from double parent households), and number of medical visits kept (participants kept more follow-up visits). No differences in duration of diabetes, months followed in the program, sex, or ethnicity were observed.

Conclusions. Contracting with third-party payers for pediatric diabetes intensive case management services reduces costs by reducing emergency department and inpatient hospital utilizations, likely a result of intensive education and immediate access to the diabetes health care team for crisis management. Such strategies may prove to be cost saving not only for diabetes management but also for managing other costly and personnel-intensive chronic diseases. Pediatrics 2004;113:e47–e50. URL: http://www.pediatrics.org/cgi/content/full/113/1/e47; diabetes, case management, cost savings.

Diabetes is a chronic disease that affects people of all ages, ethnic groups, and socioeconomic levels. Current estimates indicate that 17 million people in the United States have diabetes and another 10 million remain undiagnosed.1 Health care costs of diabetes are increasing dramatically, not only because of costs associated with disease management but also because the incidence of diabetes is increasing nationwide.2,3

Since completion of the Diabetes Control and Complications Trial in 1993, the standard goal for management of diabetes is the near normalization of blood sugars to reduce long-term complications of diabetes.4,5 Although attainment of such goals is realistic as a result of technologic advances and more aggressive self-management strategies, the team approach required is costly and poorly reimbursed. Poor reimbursement for diabetes education is attributable, in part, to reluctance by insurance carriers to invest in diabetes management strategies that take many years to show financial benefit (ie, cost savings from the prevention of diabetes complications).

Few studies have reported short-term financial benefit derived from increased reimbursement for extensive diabetes education and aggressive management. In an attempt to determine the financial impact of such an aggressive program, we examined the short-term costs associated with participation and nonparticipation in a diabetes management program for children who were enrolled in a large state-wide Medicaid program.

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A contract was signed between a large, statewide Medicaid program, Heartland Health Plan of Oklahoma, and the University of Oklahoma Children’s Diabetes Center to provide pediatric diabetes specialty services. This contract provided for 3 key pediatric diabetes intensive case management components: specialty education, 24/7 telephone access to an educator (and board-certified pediatric endocrinologist as needed), and quarterly educator assessments of self-management skills.

The contract agreed to provide the above 3 components to member patients, and patients were enrolled into the Pediatric Diabetes Intensive Case Management (PDICM) program over the subsequent several months. Sixteen patients were enrolled immediately after hospitalization for an episode of diabetic ketoacidosis (DKA) and constitute the patient population of the current study. All 16 patients were offered the same 3 contractual components, and no member patients who were hospitalized during this time period were excluded from analysis. Our program was established immediately before the initiation of this contract; thus, patients previously diagnosed with diabetes had not received the extensive education or other PDICM services described. The amount of diabetes self-management instruction received by patients whose diabetes had previously been diagnosed was minimal. Reported initial instruction was limited to that provided by a staff nurse at the time of diabetes diagnosis. Oklahoma University Children’s Diabetes Center is recognized by the American Diabetes Association for their pediatric diabetes self-management education program.6 Our center has approximately 1100 outpatient diabetes clinic visits per year. More than 500 children and adolescents are cared for by the center with 65 new patients per year entering the program. Certified diabetes educators (CDEs), full-time employee equivalents of 2.75, provide the diabetes education services. A multidisciplinary team (pediatric endocrinologists, diabetes educators from various disciplines, child life specialists, social workers, and pediatric psychologists) provides pediatric diabetes care. Child life specialists incorporate age-appropriate interventions using medical play therapy to help patients and families adjust to health care experiences. Education services include initial education provided immediately after the diagnosis of diabetes or referral to our center, as well as ongoing educational services. Consistent with American Diabetes Association diabetes self-management standards,7 key educational components include instruction on insulin injections, finger-stick blood glucose determinations, dietary counsel, self-management of blood glucose values outside of target, management of diabetes emergencies and crisis management (hypoglycemia, hyperglycemia, “sick day,” etc). These services are typically provided over an 8- to 10-hour period shortly after diagnosis of diabetes. Ongoing “refresher” sessions are also provided, as part of the contracted services, both in the form of targeted education sessions at routine follow-up medical visits and as a series of group education classes addressing both medical and psychological challenges of living with diabetes.

One of the critical components of the contract was agreement to provide immediate 24/7 telephone access to a CDE and a board-certified pediatric endocrinologist. After initial education, all patients were asked to call the CDE daily for the first week after discharge from the hospital to ensure proper home management and to fine-tune insulin regimens once the child was at home. Subsequently, patients’ families were encouraged to access the team during business hours for nonurgent diabetes medical concerns and at all times for urgent diabetes concerns. Previous analysis (J.K.B., unpublished data, 2002) has documented an average of 3.5 to 4.5 hours of telephone communication per patient with a CDE during the first 3 months after the diagnosis of diabetes. Other centers have also described nonreimbursed telephone care provided by various team members.8–10 Telephone contact shortly after initial education typically consists of pattern management of blood glucose values necessitating insulin dose changes, treatment of hypoglycemia or hyperglycemia, “sick-day” management, and other diabetes-related medical concerns. After the first year of diabetes, telephone contact with the team averages 5 to 6 hours per patient per year (J.K.B., unpublished data, 2002).

When a caregiver calls with a sick child, the educator communicates management instructions, including supplemental insulin per protocol, usually every 2 hours until the problem is resolved or the clinical condition worsens and the child is sent to the emergency department (ED). Many of these children are experiencing ketonuria at the time of the telephone encounter and are in mild to moderate DKA but able to take fluids by mouth without vomiting. For purposes of data analysis, an entire day or night of communication with the team was counted as a single sick-day encounter.

The third component of the contract was CDE quarterly assessment of diabetes self-management skills at regularly scheduled medical visits. Patients and their families were contacted and encouraged to keep routine medical visits for optimal diabetes management after hospitalization. When patients were not seen for medical or education visits, attempts were made to contact them and PDICM services were offered again. Characteristics of the participant and nonparticipant groups are shown in Table 1.

Frequency of rehospitalization, ED visits, sick-day encounters, and total costs were compared between the groups of participants and nonparticipants. The costs included contracted charges for education and costs related to subsequent ED visits and hospitalizations after enrollment for 16 patients who had a DKA admission during our analysis. Physician fees and outpatient laboratory costs were not included in the contract or in the cost analysis. \( \chi^2 \) analysis was used for assessing rehospitalizations and sick-day encounters between participants and nonparticipants and for comparing double-versus single-parent households. The 2-tailed \( t \) test was used to analyze age differences, number of medical visits, duration of diabetes, costs, and member months between participants and nonparticipants. Multiple regression analysis was used to predict costs, and multiple logistic regression was used to predict whether the patient was subsequently rehospitalized for DKA, as a function of program participation and other measured variables.

### RESULTS

Data were collected and analyzed for the first 15 months after signing the contract. During these 15 months, there were 22 hospital admissions for DKA by patients of this third-party payer, none of whom had previously undergone full education or had established avenues of communication with the diabetes team. Five cases occurred when a child’s diabetes was newly diagnosed. Seventeen DKA hospital admissions were for patients who had previously received a diagnosis of diabetes. Among these 22 admissions, there were 16 different Heartland patients. Ten patients elected to participate, and 6 refused participation.

### TABLE 1. Group Characteristics Between Participants and Nonparticipants

<table>
<thead>
<tr>
<th></th>
<th>Participants (n = 10)</th>
<th>Nonparticipants (n = 6)</th>
<th>No. of Medical Visits After Enrollment</th>
<th>Months Followed After Enrollment</th>
<th>Duration of Diabetes (y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>11.5 ± 2.7 (6–16)</td>
<td>15.3 ± 3.4 (10–19)</td>
<td>3.7 ± 1.9 (1–8)</td>
<td>10.1 ± 4.7 (1–15)</td>
<td>3.5 ± 3.3 (0.5–10)</td>
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<td>Double-Parent Households</td>
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<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P value</td>
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<td>.018</td>
<td></td>
<td>.525</td>
<td>.405</td>
</tr>
<tr>
<td>t</td>
<td>2.52</td>
<td>1.67</td>
<td></td>
<td>0.65</td>
<td>0.85</td>
</tr>
</tbody>
</table>

* Data are mean ± 1 standard deviation (range).
Effects on Frequency of Hospitalizations and ED Visits

Among the 10 participating patients, there was only 1 subsequent ED visit or DKA admission, whereas among the 6 who refused participation, 5 were rehospitalized for DKA ($\chi^2 = 4.27, P = .039$). Participants had greater telephone contact with the team compared with those who did not (16 crisis-management calls vs 0; $P = .001$; Table 2). In a stepwise (forward) multiple logistic regression predicting whether the patient was subsequently rehospitalized for DKA, only lack of participation in the program predicted rehospitalization. Patient age, living in a single-parent household, and duration of diabetes were not included in the model because of their lack of relationship with costs.

Financial Impact of Program Participation

Total costs to Heartland incurred for the entire cohort of 16 patients during the period of observation were $25,004. Costs included were contractual fees for each Heartland patient enrolled and hospitalization and ED costs to Heartland. Calculated overhead costs reimbursed to the center by the contract agreement included educator salary and benefits, educator office equipment, and educator secretarial support. Other centers might encounter additional overhead costs such as rent and building utilities, costs not considered in the current analysis because these services are provided by the state in our institution. Total costs incurred by the 10 participants were $10,629 compared with $14,375 for the 6 nonparticipants. The cost per participating patient was almost $1350 less than that for nonparticipants ($t = 3.09, P = .008$); phrased differently, nonparticipation cost the payer 125% more per patient (Fig 1).

In a stepwise multiple regression analysis predicting patient costs, only lack of participation in the program predicted higher costs. Patient age, living in a single-parent household, and duration of diabetes were not included in the model because of their lack of relationship with costs.

DISCUSSION

Despite reports suggesting short-term cost savings associated with diabetes medical and educational programs,9–14 many diabetes programs struggle to secure financial compensation for diabetes services provided by nonphysician team members. The current reimbursement system is crisis oriented, reimbursing well for illness but poorly or not at all for illness prevention, education, or telephone contact. Significant portions of diabetes management services can be delivered by telephone communication, particularly in established patients. However, few insurance payers recognize the medical value of such contact, and these services are poorly reimbursed.10

This analysis indicated significant cost savings to the third-party payer but most likely underestimates the magnitude of the cost savings. Because the analysis considered only the impact on 16 of its approximately 75 members (those having an episode of DKA during the first 15 months of the contract), it is possible that the group reported reflects those with suboptimal diabetes management compared with the group at large. It is not clear whether additional cost savings might be anticipated had the entire Heartland diabetes patient population been analyzed. Conversely, the total costs related to ED and hospitalization charges described in the current analysis are lower than those reported in the literature for average DKA hospital admissions by an endocrinolog.
The patients in this report self-selected participation versus nonparticipation and thus were not randomized. It is probable that some factors that led to refusal of PDICM services also were contributing factors that led to more difficult or severe diabetes illnesses. Those who refused PDICM services were more likely to be from single-parent households, be older, and keep fewer medical visits. Our program was established the year immediately before the initiation of this contract; thus, patients who had been in our system previously may have perceived that they had received full and adequate education already and that additional contact with the new program was not needed. We did not find differences in duration of diabetes, months followed, sex, or ethnicity. We did not observe a difference regarding the time of enrollment in relationship to time since diagnosis.

CONCLUSIONS

This study demonstrated that participation in a program of intensive diabetes management is associated with fewer hospitalizations and total costs relative to nonparticipation. Prospective contracting with third-party payers for such services has the potential to reduce the financial burden associated with state-of-the-art pediatric diabetes care and might be applicable to other pediatric chronic disease management services as well.

REFERENCES

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