Intensive Diabetes Education Program and Multidisciplinary Team Approach in Management of Newly Diagnosed Type 1 Diabetes Mellitus : A Greater Patient Benefit, Experience at Siriraj Hospital

SUPAWADEE LIKITMASKUL, M.D.*,
RENU WONGARN, B.A.***,
PORNPIMOL KIATTISAKTHAVEE, B.Sc.*,
SANGTONG PRAYONGKLIN, B.Sc.****,
DUANGKAMON MARKMAITREE,, B.N.S.****,
WANLA POOKPUN B.N.S.****,
KITTI ANGSUSINGHA, M.D.*,
JIRAPA WEKAWANICH, M.Sc.**,
KATHAREE CHAICHANWATANAKUL, B.Sc.*,
SAROJ NIMKARN, M.D. F.A.A.P.*,
LINDA WEERAKULWATTANA, M.Sc.*,
YUPIN RITJAREAN, B.N.S.****,
LUEPHORN PUNNAKANTA, M.D.*,
CHANIKA TUCHINDA, M.D., F.A.A.P.*

Abstract

It is accepted worldwide that an effective multidisciplinary management team is essential for providing comprehensive self-management training to type 1 diabetics and their families. Therefore, the authors developed an intensive multidisciplinary education team that included pediatric endocrinologists, a dietitian, a psychologist, nurses, scientists and volunteers in the Department of Pediatrics, Siriraj Hospital in August 1996. This study aimed to analyze twenty-four newly diagnosed diabetics who underwent this specified program and multidisciplinary team approach in comparison to twenty-eight diabetic patients who were diagnosed before the program and team were established in order to see whether the length of hospitalization had been reduced and to compare the readmission rates of recurrent DKA with previous patients.

The results demonstrated that by using the intensive program and multidisciplinary team the average length of admission was reduced from 36.04 days to 17.63 days (p value = 0.03). The readmission rate in the first year after diagnosis was also reduced from 17.8 per cent to 4 per cent. Concerning diabetes control, the average HbA_1c level showed significantly better control. Therefore, this study demonstrated a successful team and program for newly diagnosed Thai

childhood and adolescent diabetics and also emphasized that a multidisciplinary team approach with an effectively intensive education program is important in helping diabetics and families cope with their emerging problems and receive the long-term benefits of effective self-care.

Key word : Type 1 Diabetes Mellitus, Intensive Diabetes Education, Multidisciplinary, Childhood Diabetes

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* Division of Endocrinology and Metabolism,
** Division of Child Psychiatry,
*** Division of Nutrition,
**** Pediatric Nursing, Department of Pediatrics, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

Type 1 diabetes mellitus is a chronic disease in which the majority of cases are first diagnosed during childhood and adolescent periods. Management of type 1 diabetes patients includes multiple daily insulin injection regimens, dietary control to bring about a nutritional balance, adequate physical activity, self monitoring of blood glucose excursion and, of importance, diabetes self-management education. Goals and attitudes of the diabetes management team, together with those of the patients are paramount in determining management and outcome[1,2].

Primary goals of the treatment are preventing severe metabolic derangement such as symptomatic hypoglycemia, hyperglycemia and ketoacidosis, facilitating maintenance of the day to day clinical and psychological well being of the patient and promoting normal growth and development in children.

Further, providing the patients with every tool required to achieve the best possible glycemic control and preventing, delaying or arresting the microvascular complications while minimizing hypoglycemia and excessive weight gain are the secondary goals of therapy. The results of the Diabetes Complication Control Trial (DCCT)[3,4] revealed that the Type 1 diabetic patients in the intensive multiple insulin injection group achieved a 60 per cent reduction in the risks of diabetic complications (namely retinopathies, nephropathies and neuropathies). The hypoglycemic risk, however, was triple in these patients when compared to patients who received conventional insulin therapy. Therefore, to achieve the above-mentioned goals, it is accepted worldwide that a multidisciplinary diabetes management team, providing comprehensive self-management training, is the most essential part[2,5,6].

Many studies have shown that the incidence of type 1 diabetes in Thai populations is relatively low[7-9]. Hence, the total number of patients with this type of diabetes mellitus in Thailand is quite small. As a result, it has been difficult to develop such a multidisciplinary team of diabetes experts to provide care to the diverse patient population countrywide. The majority of type 1 diabetes management is essentially limited to individual physicians or endocrinologists, rather than a more comprehensive approach provided by a multidisciplinary team. Most diabetes education programs offered in the past have focused exclusively on the techniques for insulin injection and how to control diet far more than any other aspect of the entire education program. As such, the long-term outcomes were less than satisfactory[10].

Therefore, the authors gathered experienced professionals in all related fields to contribute the expertise essential in designing an intensive thera-

peutic education program for newly diagnosed type 1 diabetes patients. Formed in August 1996, this is the first time such a team has existed in the Department of Pediatrics at Siriraj Hospital. The team includes pediatric endocrinologists, diabetes nurses, dietitians (who have experience with children as well as diabetes), an expert clinical psychologist, scientists and finally, many volunteers. This team developed an intensive education program formulated to provide basic but crucial knowledge about diabetes mellitus, to improve patient/family management skills and to foster the development of strong motivation which is needed by the patient to incorporate self-management of diabetes into daily life. The patient and at least one other family member are required to attend the program during the first hospital admission, when recovery from diabetic ketoacidosis takes place, and for a period of 10 to 12 days or until the family feels comfortable. An evaluation test is given when the patient begins the education program and another upon completion to evaluate the patient's and caretaker's performance and improvement. Meet-the-Staff sessions are held on Friday afternoon, or as requested and before discharge. All type 1 diabetics who attend the entire program initially learn how to interpret and manage abnormal blood and urine sugar and subsequently learn how to detect and correct symptomatic hypoglycemia (which they would usually experience at least once during the hospital stay). After discharge a 24-hour hotline is available to patients for telephone consultation to handle emergency problems. The patients and families are instructed to perform self-monitoring at home, either from blood or urinary glucose, at least twice a day. They are all required to have a follow-up visit at the diabetes education clinic to see the multidisciplinary team once a month during the first 3 months and then routinely every 3 months thereafter to reinforce the necessary components of what they have learned and provide an opportunity for feedback in both individual and group sessions.

In this study, the aim was to analyze the outcomes of newly diagnosed diabetic youngsters who, with their parents, underwent this specified program *via* a multidisciplinary team approach. The authors' intention was to detect whether a reduction in the length of hospitalization and readmission rates due to recurrent DKA followed our incorporation of an intensive diabetes education program and whether this intervention improved patient self-care and diabetes control compared with that of diabetic patients who were diagnosed and received conventional management before this program and team was established. The authors demonstrated the in-patient education program as an outline for the management of type 1 diabetes mellitus patients during the first hospital stay.

MATERIAL AND METHOD

Between August 1996 and August 1999, twenty-four type 1 diabetic patients and their families attended the diabetes education program, they were all enrolled in this study (study group or group A). The other twenty-eight type 1 diabetic patients and their families who were diagnosed prior to August 1996 (a conventional control group or group B) served as the histological comparison. Anthropometric data at the time of diagnosis such as age, sex, initial HbA_1C, lipid profiles, height and weight were collected to demonstrate the background of the two groups. Furthermore, in order to show the difference in the outcomes between the two groups after our intervention, the length of hospital stay during initial diagnosis, readmission rate in the first and second year after diagnosis was recorded, and parameters determining diabetes control such as changes in weight, height, HbA_1C and lipid profiles were collected for comparison. These data for the control group were recorded at their last visits just before August 1996 and for the study group were recorded at their last visit just before December 2001. The schedule of this intensive education program after diagnosis is shown in Table 1. Informed consents were obtained from the patients and their families for this analysis.

Laboratory and data analysis

All data were analyzed in percentage and were compared by using a standard student *t*-test method. Height and weight were shown as standard deviation score (SDS) by calculating from the Thai standard growth chart[11].

RESULTS

General anthropometric data of both study and control groups are demonstrated in Table 2; mean age of the study group was 7.07 years whilst that of the control group was 8.4 years; HbA_1C were 12.4 per cent *versus* 13.6 per cent, these did not show a statistical difference, as well as the total cholesterol and triglycerides, height and weight SDS.

Table 1. Schedule for intensive diabetes education program designed by a multidisciplinary diabetes education team, Department of Pediatrics, Faculty of Medicine Siriraj Hospital in August 1996.

Day	Knowledge	Practice
Monday	- Introduction to the hospital - Pretest	Adjustment
Tuesday	- What is diabetes ?	Psychosocial approach
Wednesday	- Insulin, how to use it	Observation for urine, finger prick blood monitoring, insulin injection and exercise
Thursday	- Diet and exercise	Wednesday plus self urine test done
Friday	- Monitoring of DM	Thursday plus self diet caloric calculation
Saturday & Sunday		All of the above and self preparation of insulin, self finger prick blood monitoring (at least once)
Monday	- Interpretation and initial self management of hypoglycemia, hyperglycemia, DKA, ketone	Practice all of the above
Tuesday	- Care on special occasions	Practice all of the above
Wednesday	- Acute and chronic complications	Practice all of the above, experience of treatment hypoglycemia (at least once)
Thursday	- Questions and answers, review and post-test	Practice all of the above
Friday	- Discharge if family feels confident	

Table 2. General data of type 1 diabetic children who attended the intensive program, study group (A) compared to control group (B).

	A (1996-1999)	B (1990-1996)	
Total	24	28	
B, G	M 11, F13	M 10, F 18	
Mean age	7.07 ± 3.87	8.4 ± 3.26	p = 0.08
HbA_1C	12.4 ± 2.7	13.6 ± 5.4	p = 0.18
Chol	210.7 ± 42	186.3 ± 67	p = 0.12
TG	135.4 ± 93	116.3 ± 68	p = 0.27
HTSDS	-0.13 ± 0.9	-0.31 ± 1.1	p = 0.27
WTSDS	-0.35 ± 1.6	-0.4 ± 1.4	p = 0.47

The family members who attended the program mainly were mothers (100%), and in five families more than one family member attended the program. The average length of the first admission in the study group was 17.63 ± 9.5 days which was much shorter than 36.04 ± 46.5 days as seen in the control group (p value = 0.03). 20.8 per cent of the study group were admitted for more than 21 days, which represents one third of the admissions from the control group (60.7%) for the same period of time, as shown in Table 3. The readmission rate for recurrent DKA, or a milder hyperglycemia, related to acute illnesses during the first year was 4 per cent (representing only one case who was diagnosed at the age of 1 year and 6 months and developed acute gastroenteritis induced DKA that required admission) in the study group compared to 17.8 per cent (5 cases) in the control group. During the second year, the readmission rate remained at only 4 per cent in the study group compared to over ten times more or 42.8 per cent in the control group (data shown in Table 4). However, in the intensive education group, two patients had severe hypoglycemia which presented as seizure, occurring at 11 months after initial diagnosis in one patient and at 23 months after initial diagnosis in the other. This was in contrast to the conventional group where none had such a disaster. Of interest, both patients who developed hypoglycemic seizure were under five years of age and the incidents took place when

Table 3. Length of hospitalization after initial diagnosis.

	A		B	
	No	%	No	%
≤ 14 days	10	41.7	9	32.2
14-21 days	9	37.5	2	7.1
> 21 days	5	20.8	17	60.7
Mean	17.63 ± 9.5*		36.04 ± 46.5*	

* p value = 0.03

Table 4. Readmission rate for DKA or hyperglycemia during acute illness.

Year after diagnosis	A		B	
	No of cases	%	No of cases	%
1 year	1/24	4.2	5/28	17.8
2 year	1/24	4.2	12/28	42.8
3 year	1/24	4.2	13/28	46.42
4 year	1/24	4.2	15/28	53.07

Table 5. Long term diabetes control in both groups.

	Study group (A)		Control group (B)		P value
	At diagnosis	At last visit (Dec 2001)	At diagnosis	At last visit (Aug 1996)	
HbA_1C	17.42	9.19	13.56	11.52	p = 0.03
Chol	210.67	194.8	186.37	174.29	p = 0.04
TG	135.4	64.7	116.33	56.43	-
HTSDS	-0.13	-0.33	-0.31	-0.43	-
WTSDS	-0.35	0.42	-0.39	-0.03	-
Duration of treatment	43.5 ± 13.1		39.9 ±26.8		p = 0.28

they entered their elementary schools. For long-term outcome in view of diabetes control, the study group fared much better. HbA_1C levels were lower in the study group (9.19%) than in the other (11.52%), (p = 0.03). Even though weight and height SDS at the last visit were not different between the two groups, there was a tendency of more catch up weight in the study group than the controls. Average time of follow-up was similar, 43.4 months (13-64 months) in the study group and 39.9 months (2-101 months) in the control group.

DISCUSSION

Sub-optimal medical management not only leads to poor diabetes control which may impair growth and delay pubertal maturity but also plays a role in irreversible long-term diabetic complications originating from microvascular diseases such as retinopathy, neuropathy and nephropathy[1,3,4]. The importance of a positive attitude, comprehensive education and expert care at the time of diagnosis cannot be over-emphasized. Subsequent re-hospitalization rates, poor metabolic controls and psychological disturbances have all been found to be indicators of poor adjustment to diabetes[12]. Although a variety of reasons can lead to tragic consequences for diabetic patients, many are potentially preventable.

Outcomes are known to be much better where multidisciplinary management teams and specialist children's diabetes clinics operate[2,13]. This study demonstrated better results from type 1 diabetic children and their families who attended the intensive education program under the multidisciplinary team compared to those from the control group who unfortunately did not have such opportunities. As demonstrated in the present study, during the first admission when the diagnosis was made, the length of hospital stay was approximately half with intervention (from 36 days to 17 days). Improvements between the groups were sustained for many years after diagnosis, as the rate of readmission in the first to fourth year was significantly reduced in the study group. The obstacles of the program were in some cases the impatience of the parents and in other cases the inability of the parents to attend the entire course of education. This was apparent when the insulin injection technique was the only skill some patients and parents acquired by the (premature) time of discharge, without full comprehension

of all the other necessary aspects of diabetes care. It is the authors' opinion that professionals who initially give the diagnosis to the patient play the most significant role in emphasizing the necessity of comprehensive education. Greater interest and better ability to foster enthusiasm for diabetes education are more commonly found in families whose children are newly diagnosed than in those who are referred to diabetes education long after diagnosis. Two more valid points could be made from this study. Firstly, a substantial increased risk of hypoglycemic seizure that typifies intensive diabetes management affected the study population. This finding made the team aware of and very meticulous about the hypoglycemic management part of the education. The importance of very careful observation of this possibility and prompt management of the alarming clinical evidence of hypoglycemia, especially in children at a younger age, should be stressed to parents and caretakers. Secondly, there has been concern about the expense of home glucose monitoring that can, to some extent, make a difference in the self-care of diabetic patients. The authors encourage them to do either urine or finger-prick blood sugar home monitoring at least twice a day. This expense could inevitably become a big problem in families with low social-economic status. It can also be a significant force in moving non-cooperative patients away from regular compliance. From the authors' experience these two problems accounted for almost 60% of the non-compliance. Interestingly, families who understand and realize the true value of intensive self care, have more frequent home monitoring even though they are in the low educated, low socio-economic class.

Due to the overall low incidence of type 1 diabetes mellitus in Thailand, it is difficult to establish as many experienced multidisciplinary teams as are needed countrywide. Unfortunately only a limited number of diabetic children are able to attend the handful of programs that are located in the capital city. However, this study emphasized that our type 1 diabetic children receive more benefit in controlling their diabetes under a multidisciplinary team management that is in line with what has been repeatedly shown and recommended by many experts worldwide. Every child and adolescent with diabetes deserves the right to have access to optimal medical management. Definitely, a child alone cannot fight for this supposed basic right. Therefore, healthcare professionals serving these children must make advocacy for the child one of their key responsibilities. Attempts to establish a multidisciplinary team to approach a child with diabetes mellitus has proven worthwhile and can be a model for management of other chronic pediatric diseases.

SUMMARY

Management for a chronic disease such as childhood and adolescent diabetes requires medication, education and psychosocial support. A multidisciplinary team approach with an effectively intensive education program is important in helping diabetics and families cope with their emerging problems and receive the long-term benefits of effective self-care. This study demonstrated a successful team and program for newly diagnosed Thai childhood and adolescent diabetics in institution.

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ผลการดูแลรักษาโรคเบาหวานในเด็กและวัยรุ่นที่วินิจฉัยใหม่ ที่เข้ารับการให้ความรู้โรคเบาหวานโดยทีมสหสาขาวิชาชีพควบคู่กับการรักษาโรค, ประสบการณ์ในโรงพยาบาลศิริราช

สุภาวดี ลิขิตมาศกุล, พ.บ., จิราภา เวคะวนิชย์, วท.ม.**, เรณู วงษ์อาน, ศศ.บ.***,*
คัทรี ชัยชาญวัฒนากุล, วท.บ. (ชีวเคมี), พรพิมล เกียรติศักดิ์ทวี, วท.บ.*,*
สาโรช นิมกาญจน์, พ.บ., แสงทอง ประยงค์กลิ่น, วท.บ. (พยาบาล)****,*
ลินดา วีรกุลวัฒนา, วท.ม. (ชีวเคมี), ดวงกมล มากไมตรี, พย.บ.****,*
*ยุพิน ฤทธิ์เจริญ, พย.บ.****, วรรณา ผูกพันธ์, พย.บ.*****
เหลือพร ปุณณกันต์, พ.บ., กิตติ อังศุสิงห์, พ.บ.*, ชนิกา ตู้จินดา, พ.บ.**

โรคเบาหวานชนิดที่ 1 เป็นโรคเรื้อรังที่ต้องการดูแลรักษาอย่างต่อเนื่องและสม่ำเสมอ เพื่อป้องกันภาวะแทรกซ้อน ในปัจจุบันเป็นที่ยอมรับทั่วโลกว่า แนวทางการดูแลโดยทีมบุคลากรสหสาขาวิชาชีพ และการให้ความรู้เพื่อให้ผู้ป่วยและครอบครัวดูแลตนเองที่บ้านได้ มีความสำคัญเป็นอย่างมาก ดังนั้นคณะผู้ศึกษาซึ่งได้รวบรวมบุคลากรประกอบด้วย กุมารแพทย์หน่วยต่อมไร้ท่อ นักโภชนาการ นักจิตวิทยา พยาบาล นักวิทยาศาสตร์ และอาสาสมัครร่วมกันพัฒนาโปรแกรมตารางการให้ความรู้แก่ผู้ป่วยเด็กวัยรุ่น โรคเบาหวานชนิดที่ 1 และครอบครัว ของภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาล โดยเน้นการให้ความรู้ที่สามารถนำไปปฏิบัติได้ควบคู่กับการรักษา ซึ่งเริ่มใช้ตั้งแต่เดือนสิงหาคม 2539 การศึกษานี้ได้รวบรวมข้อมูลผู้ป่วยเบาหวานในเด็กและวัยรุ่นที่วินิจฉัยใหม่และเข้ารับการรักษา โดยทีมสหสาขาดังกล่าวข้างต้น จำนวน 24 ครอบครัวเปรียบเทียบกับ ผู้ป่วยเบาหวานในเด็กและวัยรุ่น 28 ครอบครัว ที่ได้รับการวินิจฉัยและรักษาในภาควิชากุมารเวชศาสตร์ คณะแพทยศาสตร์ศิริราชพยาบาลก่อนเดือนสิงหาคม 2539 ผลพบว่าผู้ป่วยทั้ง 2 กลุ่มมีข้อมูลพื้นฐานที่ใกล้เคียงกัน ผู้ป่วยที่รักษาโดยทีมบุคลากรสหสาขาวิชาและได้รับความรู้ตามตารางร่วมกับการรักษาทั่วไปสามารถกลับบ้านได้เร็วกว่าอย่างมีนัยสำคัญคือ ลดลงจากเฉลี่ย 36.04 ± 46.5 วัน เป็น 17.63 ± 9.5 วัน (p value = 0.03) อุบัติการณ์เข้ารักษาซ้ำในช่วง 1 ปี แรกลดลงจาก 17.8% เป็น 4% ผลการควบคุมเบาหวานพบว่า ค่าเฉลี่ย HbA_1C ต่ำในกลุ่มที่ดูแลโดยสหสาขาวิชาชีพ ดังนั้น การศึกษานี้ได้แสดงความสำคัญของทีมสหสาขาวิชาชีพและตารางการให้ความรู้ที่สามารถนำไปใช้ได้ที่มีผลช่วยให้การดูแลตนเองเรื่องเบาหวานในเด็กและวัยรุ่นได้ดีขึ้น ลดระยะเวลาเข้าอยู่โรงพยาบาล พ่อแม่สามารถปรับตัวได้ดีขึ้น และยังเป็นตัวอย่างของทีมสหสาขาวิชาชีพที่มีส่วนช่วยในการรักษาผู้ป่วยโรคเรื้อรังได้เป็นอย่างดี

คำสำคัญ : เบาหวานชนิดพึ่งอินสุลิน, การให้ความรู้, ทีมสหสาขาวิชาชีพ, เบาหวานในเด็กและวัยรุ่น

สุภาวดี ลิขิตมาศกุล, จิราภา เวคะวนิชย์, เรณู วงษ์อาน, และคณะ
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* หน่วยต่อมไร้ท่อและเมตาบอลิสม,
** หน่วยจิตเวชเด็ก,
*** หน่วยโภชนาการ,
**** งานการพยาบาลกุมารเวชศาสตร์, ภาควิชากุมารเวชศาสตร์, คณะแพทยศาสตร์ศิริราชพยาบาล, มหาวิทยาลัยมหิดล, กรุงเทพ ฯ 10700