

## Self Care Management of School Age Diabetic Children

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**Abstract:** Type 1 diabetes places major constraint on the lives of children and their families. The success of long term maintenance therapy for diabetes depends largely on the patient's compliance with self care management. This study aimed to assess self care management of school age diabetic children. Descriptive study was conducted on sixty children, with type 1 DM attending or admitted to Diabetic outpatient clinic, and Inpatient diabetic unit of Pediatric department. Their age ranged between 7 to 11 years old. Data were collected by interview questionnaire sheet that included biosocial data of children and their mothers, care that provided to their diabetic children, and self care management. Observational checklist to assess mothers and children performance score related to monitoring of blood glucose level, urine analysis, and insulin administration. The results of the present study revealed that, there was significant correlation between diabetic children age and their self care management regarding self monitoring of blood glucose level, urine analysis ,and insulin injection, as older children were more compliance to diabetes self care management than younger children .On the contrary there was no significant correlation between children gender ,their birth order and self care management. The current results also showed that, mothers who had university education ,and housewife were more compliance to provide much care to their children. On the light of the findings results, it is recommended to establish and implement a health educational program to improve diabetic children knowledge and practice regarding all aspects of diabetes self care and proper management.

[Azza Darwish, Ebtisam El-sayed, Thanaa El- Awany and Rasha El-Ashry. **Self Care Management of School Age Diabetic Children.** Nature and Science 2011;9(12):180-189]. (ISSN: 1545-0740). <http://www.sciencepub.net>. 25.

**Key words:** Self Care Management; School; Diabetic; Children

### 1. Introduction

Type 1 diabetes is the most common metabolic disease in childhood , and one of the most common chronic diseases in school age children, which characterized by disorder of carbohydrate ,protein, and fat metabolism, in which the body does not produce enough insulin<sup>(1,2)</sup> . It places major constraint on the lives of children and their families. Although it is a chronic incurable disease, yet it can be controlled by a set of self –management behaviors<sup>(3)</sup>.

It account for 5% to 10% of all people with diabetes. Annually some 76,000 children aged under 15 years develop type 1 diabetes worldwide<sup>(4)</sup>. Approximately 1 in every 800 children and adolescent in the U.S. is affected with type 1 diabetes<sup>(5)</sup> . In Egypt, Diabetes is an emerging public health problem .It affects nearly 3.9 million individuals with an expected increase by 2025 to nearly 9 million<sup>(6)</sup>. The frequency was higher among females than males and equal in urban and rural areas<sup>(7)</sup>.

The classical symptoms of type 1 diabetes include: polyuria, polydipsia, polyphagia , and weight loss. Other features include nocturnal enuresis, general weakness, tiredness, fainting attack due to hypoglycemia, nausea, vomiting, vulvovaginitis in girls, skin infection, and poor wound healing<sup>(8)</sup>. It has wide range of complications which include diabetic coma, hypoglycemia, diabetic

ketocidosis, growth failure, delayed sexual maturity, impaired neurological development, and poor psychological development, retinopathy, nephropathy and neuropathy<sup>(9)</sup>.

Diabetic children need care in team approach. Nursing personnel has a pivotal role in the management and educating children and their family members regarding different aspect of care<sup>(10)</sup> . Management of DM involves combination of insulin therapy, dietary management, physical exercise, prevention of complications, promotion of growth, emotional, and social development<sup>(11)</sup>.

Self care is the cornerstone for all individuals with diabetes and the essential component to the successful achievement of health –related out-comes<sup>(12)</sup>. The child's developmental stage and cognitive level influence his or her readiness to take on responsibility for self-care. Emotional support and health teaching to the family members and children are essential to update their knowledge and skill in long term care. Demonstration should be given about urine testing, blood testing (self monitoring), and administration of insulin and diet therapy. Information should be given regarding interpretation of signs and symptoms, need for follow up, and prevention of complication<sup>(13, 14)</sup> . Really, diabetes is a chronic illness that requires continuous care, patient self management and education to prevent

and reduce the risk of short and long term complications.

## 2. Subjects and Method

### Design:

This study was follow a descriptive design

### Setting:

This study was conducted at Diabetes outpatient clinic and inpatient diabetic unit of Pediatric department at Tanta University Hospital

### Subject:

Sixty children, with type 1 DM, who were attending or admitted to the previously mentioned setting. Their age ranged between 7-11 years old.

### Tools of the study:

Two tools were used to collect the required data:

**Tool I: A structured interview questionnaire sheet;** to obtain biosocial data of children and their mothers.

**Tool II:** it was comprised of three parts.

**Part I; Checklist to assess;** performance of children and their mothers while checking blood glucose level, performing urine analysis for sugar and acetone, and insulin injection

### Scoring system of the checklist:

- Each item in the previously procedures was classified into two levels; done, and not done.
- If the mother or the child performed the steps correctly, one point was given, if incorrectly or didn't do it at all, zero point was given.

Then the total score of each procedure was calculated and the level of the performance was categorized as the following:

- The performance considered (good) if the total score was (75%)
- The performance considered (fair) if the total score was (60%- < 75%)
- The performance considered (poor) if the total score was (< 60%)

### Part II; questionnaire sheet to assess;

(a)- Mothers care provided to their diabetic children, which includes:(dietary intake , physical activity, personal hygiene, foot care, monitoring for complications, follow up care, school achievement and peers relationship).

(b)- Self care management of diabetic children, which includes;

1- Monitoring for symptoms of glucose deregulations,

and developing any complication.

2-Medication adherence

3-Life style changes; which include, foot care, eating habits, physical activities, and stress reduction

### Part III:

Review of the child health file to obtain the necessary data such as: weight, height, vital signs, fasting blood sugar, complete blood count, erythrocyte sedimentation rate, Lactate dehydrogenase.

### 3. Results:

Table (1) showed sociodemographic characteristics of diabetic children.

It was found that nearly three quarters of diabetic children (70%) was in the age group 9-11 years while the rest was in the age group 7-< 9 years, with a mean age of  $9.68 \pm 1.63$  years. It was noticed that nearly two-thirds of the sample (60%) was females, while the rest (40 %) was males, and three quarters of them were living in rural areas.

Regarding to medical and family history of diabetic children, it was noticed that 41.7% of diabetic children reported that polyuria was the first symptoms that lead them to seek medical advice, followed by loss of body weight and polydipsia (36.7% and 30% respectively), while occurrence of coma represent 18.3%. It was found also that more than half of diabetic children (56.7 %) had positive family history of diabetes (Table 2)

More than half of diabetic children (58.3 %) checked their blood glucose level, 28.3 % performed self urine analysis, and only one quarter of them (25%) injected themselves with insulin (Table 3).

Table (4): presented the relationship between demographic characteristics of diabetic children and their self care regarding monitoring blood sugar level, urine analysis, and insulin administration.

The result revealed that there was significant correlation between age of diabetic children and their self care management regarding the previously mentioned items ,as older children were more compliance to diabetes self management than younger children . Although, there was no significant correlation between self care management of diabetic children and their birth order, gender. It was observed that females were more compliance to diabetes self management than males, with no statistical significant differences. In addition ,there was significant correlation between duration of disease and self urine analysis of diabetic children, as children who diagnosed with diabetes for 3 years and more were more compliance to their urine testing for sugar and acetone (47.8%) compared to children who diagnosed for one year or less (27.3%, 12.5%

respectively) ,with statistical significant differences as  $P=0.047\%$ .

Regarding to the effect of type 1 D.M on children's scholar achievement, peer relationship, it was found that type 1 diabetes has bad effect on scholar achievement of more than one third of them and interfere with their peer relationship (Table 5).

Table (6): Presented the relationship between demographic characteristics of mothers and care provided to their children regarding monitoring of blood sugar, urine analysis and insulin administration

It was clear that mothers who were from urban area were more compliance regarding checking their children blood sugar level, recording results of analysis, performing urine analysis, and injecting their children with insulin (80%, 66.7%, 33.33%, 93.33 %, respectively) than mothers from rural areas (57.8%, 40%, 31.1%, 68.9%) with no statistical significant differences between them. It was noticed that all mothers who had university education were more compliance regarding checking of blood sugar level for their children, recording the results of analysis and injecting their children with insulin, compared to (50%, 50%, 62.5%) of mothers who had primary education. Housewife mothers were more compliance regarding checking of blood sugar level for their children, recording the results of analysis and injecting their children with insulin (66.7%, 33.3%, 77.1%, respectively), compared to working mothers (50%, 25%, 66.7%), with no statistical significant difference between them.

Figure (1): diabetic children's performance score regarding blood glucose monitoring, urine analysis and insulin administration.

It was found that more than one third of diabetic children (35%) had moderate performance score regarding checking of blood glucose level, while nearly one fifth (13.3%) had good performance score regarding self insulin administration.

Tables (7,8): Showed the relationship between demographic characteristics of diabetic children and their performance score regarding self monitoring of blood glucose level and self insulin administration .

There was significant correlation between diabetic children's age and their performance score regarding self monitoring of blood glucose level, and self administration of insulin. ( $P=0.017$ ,  $0.036$ , respectively).

**Table (1): Sociodemographic characteristics of diabetic children**

Sociodemographic data		The studied diabetic children (n=60)	
		N	%
<b>Children:</b>			
	7-<9	18	30%
	9-11	42	70%
	Mean $\pm$ SD	9.68 $\pm$ 1.63	
<b>Sex:</b>			
	Males	24	40.0
	Females	36	60.0
<b>Birth order:</b>			
	First	17	28.3
	Second	18	30.0
	Third	17	28.3
	Fourth	8	13.3
<b>Residence:</b>			
	Urban	15	25.0
	Rural	45	75.0

**Table (2): Medical and family history of diabetic children**

Medical and family history	The studied diabetic children (n=60)	
	n	%
<b>#Symptoms lead to seeking of medical advice :</b>		
Polyuria	25	41.7
Polydipsia	18	30.0
Polyphagia	1	1.7
All the above	25	41.7
Loss of body weight	22	36.7
Coma	11	18.3
<b>Duration of diabetes:</b>		
< one year	16	26.7
One year	11	18.3
Two years	10	16.7
Three years and more	23	38.3
<b>Family history of diabetes:</b>		
Negative	26	43.3
Positive	34	56.7
<b>Degree of relationship:</b>	(n=34)	
Father/mother	9	36.6
Sister/brother	4	15.4
Grandfather/grandmother	16	61.5
Uncle/Aunt	5	19.2

**Table (3): Self care of diabetic children regarding monitoring of blood glucose level, urine analysis and self insulin injection**

Items	(n=60)	
	n	%
<b>•Self monitoring of blood glucose level :</b>		
Yes	35	58.3
No	25	41.7
<b>Perform self urine analysis :</b>		
Yes	17	28.3
No	43	71.7
<b>• Self insulin injection :</b>		
Yes	15	25
No	45	75

**Table (4): Relationship between demographic characteristics of diabetic children and their self care regarding monitoring blood sugar level, urine analysis, and insulin administration**

Children's data	The studied diabetic children (n=60)					
	Blood glucose monitoring (n=36)		Urine analysis (n=17)		Insulin administration (n=35)	
	n	%	n	%	n	%
<b>Age (years):</b>						
7-<9 (n=18)	6	33.3	1	5.6	3	16.7
9-11 (n=42)	30	83.3	16	38.1	32	76.2
<b>X<sup>2</sup></b>	7.619*		6.570*		18.367*	
<b>P</b>	0.006*		0.010*		0.0001*	
<b>Sex;</b>						
Males	14	58.3	5	20.8	12	50.0
Females	22	61.1	12	33.3	23	63.9
<b>X<sup>2</sup></b>	0.046		1.108		1.143	
<b>P</b>	0.830		0.293		0.285	
<b>Birth order</b>						
First	10	58.8	5	29.4	12	70.6
Second	11	61.1	9	50.0	11	61.1
Third	11	64.7	2	11.8	8	47.1
Fourth	4	50.0	1	12.5	4	50.0
<b>X<sup>2</sup></b>	0.509		7.457		2.225	
<b>P</b>	0.917		0.059		0.527	
<b>Duration of diabetes (Years):</b>						
< 1	6	37.5	2	12.5	5	31.3
1	8	72.7	3	27.3	8	72.7
2	5	50.0	1	10.0	7	70.0
3 & more	17	73.9	11	47.8	15	65.2
<b>X<sup>2</sup></b>	6.389		7.941*		6.775	
<b>P</b>	0.094		0.047*		0.079	

\*Significant (P&lt;0.05)

**Table (5): The effect of type 1 D.M on children's scholar achievement, and peer relationship**

Items	(n=60)	
	n	%
<b>Scholar achievement</b>		
- <b>School attendance:</b>		
Regular	25	41.7
Irregular	35	58.3
<b>#Causes of irregular attendance:</b>	(n=35)	
Hospitalization	24	68.6
Go to diabetes out clinic	12	34.3
Suffering from hypoglycemia or hyperglycemia	5	14.3
<b>#Effect on scholar achievement</b>	(n=25)	
•lack of concentration	16	64.0
•had Low marks	7	28.0
•Frequent failing in school exams.	10	40.0

**Table (6): Relationship between demographic characteristics of mothers and care provided to their children regarding monitoring of blood sugar, urine analysis and insulin administration**

Mothers' data	Mother's care of their diabetic children (n=60)							
	Monitoring blood sugar level (n=38)		Recording the results of analysis (n=28)		Perform urine analysis (n=19)		Administration of insulin (n=45)	
	n	%	n	%	n	%	n	%
<b>Age (years):</b>								
25-<35 (n=24)	19	79.2	16	66.7	6	25.0	21	87.5
35-<45 (n=27)	14	51.9	9	33.3	11	40.7	17	63.0
45-52 (n= 9)	5	55.6	3	33.3	2	22.2	7	77.8
<b>X<sup>2</sup></b>	4.358		6.429*		1.891		4.123	
<b>P</b>	0.113		0.040*		0.388		0.127	
<b>Residence:</b>								
Urban	12	80.0	10	66.7	5	33.3	14	93.3
Rural	26	57.8	18	40.0	14	31.1	31	68.9
<b>X<sup>2</sup></b>	2.392		3.214		0.026		3.585	
<b>P</b>	0.122		0.073		0.873		0.058	
<b>Educational level:</b>								
Illiterate	17	68.0	12	48.0	6	24.0	19	76.0
Primary education	4	50.0	4	50.0	1	12.5	5	62.5
Secondary education	13	56.5	8	34.8	11	47.8	17	73.9
University education	4	100	4	100	1	25.0	4	100
<b>X<sup>2</sup></b>	3.622		5.930		4.895		2.028	
<b>P</b>	0.305		0.115		0.180		0.567	
<b>Mother's occupation :</b>								
Worker	6	50.0	7	58.3	3	25.0	8	66.7
Housewife	32	66.7	21	43.8	16	33.3	37	77.1
<b>X<sup>2</sup></b>	1.148		0.820		0.308		0.556	
<b>P</b>	0.284		0.365		0.579		0.456	

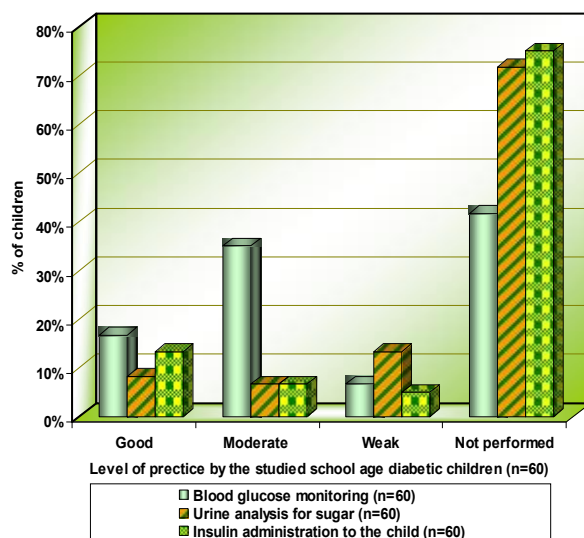


Figure (1): Children’s performance score regarding blood glucose monitoring, urine analysis and insulin administration.

Table (7): Relationship between demographic characteristics of children and their performance score regarding self monitoring of blood glucose level.

Children's data	Performance score of blood glucose monitoring (n=60)							
	Good		Fair		Poor		Not performed	
	n	%	n	%	n	%	n	%
<b>Age (years):</b>								
7-<9 (n=18)	1	5.6	3	16.7	1	5.6	13	72.2
9-11 (n=42)	9	21.4	18	42.9	3	7.1	12	28.6
<b>X<sup>2</sup></b>	10.184*							
<b>P</b>	0.017*							
<b>Sex:</b>								
Males	3	12.5	9	37.5	1	4.2	11	45.8
Females	7	19.4	12	33.3	3	8.3	14	38.9
<b>X<sup>2</sup></b>	1.030							
<b>P</b>	0.794							
<b>Birth order:</b>								
First	3	17.6	6	35.3	2	11.8	6	35.3
Second	3	16.7	5	27.8	2	11.1	8	44.4
Third	3	17.6	8	47.1	0	0	6	35.3
Fourth	1	12.5	2	25.0	0	0	5	62.5
<b>X<sup>2</sup></b>	5.367							
<b>P</b>	0.801							
<b>Duration of diabetes (Years):</b>								
< 1	1	6.3	6	37.5	0	0	9	56.3
1	1	9.1	5	45.5	0	0	5	45.5
2	0	0	3	30.0	1	10.0	6	60.0
3 & more	8	34.8	7	30.4	3	13.0	5	21.7
<b>X<sup>2</sup></b>	18.051							
<b>P</b>	0.110							

**Table (8): Relationship between demographic characteristics of children and their performance score regarding self administration of insulin.**

Children's data	performance score of insulin administration (n=60)							
	Good		Fair		Poor		Not performed	
	n	%	n	%	n	%	n	%
<b>Age (years):</b>								
7-<9 (n=18)	0	0	0	0	0	0	18	100
9-11 (n=42)	8	19.0	4	9.5	3	7.1	27	64.3
<b>X<sup>2</sup></b>	8.571*							
<b>P</b>	0.036*							
<b>Sex:</b>								
Males	2	8.3	2	8.3	0	0	20	83.3
Females	6	16.7	2	5.6	3	8.3	25	69.4
<b>X<sup>2</sup></b>	3.287							
<b>P</b>	0.349							
<b>Birth order:</b>								
First	2	11.8	0	0	1	5.9	14	82.5
Second	4	22.2	0	0	0	0	14	77.8
Third	2	11.8	3	17.6	2	11.8	10	58.8
Fourth	0	0	1	12.5	0	0	7	87.5
<b>X<sup>2</sup></b>	11.795							
<b>P</b>	0.225							
<b>Duration of diabetes (Years):</b>								
< 1	1	6.3	1	6.3	0	0	14	87.5
1	1	9.1	1	9.1	1	9.1	8	72.7
2	0	0	1	10.0	1	10.0	8	80.0
3 & more	6	26.1	1	4.3	1	4.3	15	65.2
<b>X<sup>2</sup></b>	8.620							
<b>P</b>	0.684							

#### 4. Discussion

Type 1 diabetes is a chronic illness that requires continuous care, patient self management and education to prevent and reduce the risk of short and long term complications. The success of long term maintenance therapy for diabetes depends largely on the patient's compliance with self care management<sup>(1)</sup>. Self care-management of type 1 diabetes in children and adolescents consists of varied and many activities related to giving insulin, monitoring metabolic control, regulating diet and exercise, to name just a few<sup>(12)</sup>.

The finding of the present study shows that almost two third of the studied children were females while the rest were male. These finding was in agreement with the epidemiological study on diabetes in Egypt which found that frequency of diabetes was higher among females than males<sup>(6)</sup>.

Type 1 D M is not inherited, but hereditary is a prominent factor in the etiology. The finding of the current study found that more than half of the studied children had positive family history of diabetes.<sup>(15)</sup> There was a positive history of diabetes in first degree relatives for more than one third of the

sample, while almost two third of the sample had positive history of diabetes in second degree relatives. These finding was supported by the finding of *Mahmod*,<sup>(16)</sup> who found that, more than half of both studied and control group had positive family history of diabetes, also this finding was inline with *Abdel-ghafar*<sup>(17)</sup>, who reported that more than one fifth of the sample had history of diabetes among their first degree relatives while more than one quarter had history of the disease among their second degree relatives. *Bahgat*<sup>(18)</sup> found some positive history of diabetes in first degree relatives.

Type 1 diabetes has classical signs and symptoms which include ; polyuria ,polydypsia and ,polyphagia with significant weight loss .the symptoms can progress quite rapidly, so that ,in two to four weeks the child become thin and dehydrated, progressively weaker, with deep rapid respiration, and if untreated ,coma occurred.<sup>(9)</sup> The finding of this study showed that polyuria, polydypsia, polyphagia reported by 41.7% of children as the early symptoms that lead to seeking of medical advice, while coma reported by more than one fifth of the sample. These findings were consistent with

**Abdel-ghafar**,<sup>(17)</sup> **Okasha et al.** <sup>(3)</sup> and **El-Samman**<sup>(19)</sup> who demonstrated that discovery of the disease for the majority of children was mainly through the manifestation of diabetes, while the minority discovered it through occurrence of acute complication of diabetes such as diabetic ketoacidosis <sup>(19-23)</sup>. This may related to the mothers knowledge and experience in living with diabetes as more than half of the sample has positive family history of diabetes <sup>(3, 17, 19)</sup>.

**Cynthia**<sup>(20)</sup> reported that children demonstrated higher levels of self care abilities, independence, precision and ability to manage blood glucose level as they aged. In this respect, the finding of the present study revealed that there was significant correlation between diabetic children's age and their self care practice regarding self monitoring of blood glucose level, self urine analysis and self injection of insulin. It was clear that children in the age group from 9-11 years old performed significantly more blood glucose tests, urine analysis, and self administration of insulin than did children in the age group 7 to less than 9 years old. In addition, There was statistically significant difference between diabetic children's age and their performance score regarding self monitoring of blood glucose level, and self injection with insulin. We expected that, as children got older, their responsibility for diabetes management tasks increase and subsequently their self care activities and management of illness actually increase. These finding was supported by **Soutor et al.** <sup>(21)</sup> who found that adolescents performed significantly more blood glucose tests independently than did preadolescents, **Okasha et al.** <sup>(3)</sup> reported that children's self administration of insulin was related to age ( $X^2 = 16.6$ ). In controversy to these results, **Dashiff et al.** <sup>(22)</sup> found that age was not a significant predictor of universal self care.

The present work revealed that Female was more compliance than males regarding self monitoring of blood glucose level, self urine analysis and self administration of insulin, but with no significant correlation. We think this occurred because girls learned skills earlier and were more independent in diabetes –related self care. In consistence with others<sup>(20, 23,24)</sup> whom reported that, female exhibit better self care than males. In addition, other studies found that female was better than male regarding self urine analysis, but male was better than female regarding self administration of insulin. <sup>(3)</sup> In controversy to these results, two studies conducted by **Denyes**<sup>(25)</sup>, **Hanna and Guthrie** <sup>(26)</sup> indicated that boys are better self care managers than females.

Type I diabetes had bad effect on children's scholar achievement. The finding of this study

revealed that more than one third of the studied children had irregular scholar attendance, in addition almost two third of children suffered from lack of concentration during studying, while more than one third frequently failing in school exam. Similar finding was supported by **Carroll and Marrero**<sup>(27)</sup> who demonstrated that diabetes has impact on school life and this was due to absenteeism from school.

The finding of the current study showed that diabetes affected on children's relation with their peers. These finding was confirmed and agree by other studies which found that almost one third of the studied children felt isolated or rejected by peers, and one quarter stated peer annoyments <sup>(3, 28)</sup>.

Although there was no significant correlation between mother's care to their diabetic children and their age, educational level, occupation, or residence, the finding of the present study revealed that house wife mothers were more compliance to perform blood glucose tests, urine analysis and insulin injection for their children than working mothers. This may related to the longer time the housewife mothers spend with their children, and hence their opportunities to take care of them. All mothers who had university education checked blood glucose level for their children, recorded the results of analysis and injected their children with insulin compared to mothers who were illiterate or had primary education. It may be due to the understanding of educated mothers about the importance of home blood glucose monitoring in management of diabetes and prevention of disease complications.

### Conclusions and Recommendations

Based on the findings of the present study, it can be concluded that: there was significant correlation between diabetic children age and their self care management regarding self monitoring of blood glucose level, self urine analysis, and self injection of insulin, as older children were more compliance to diabetes self management than younger children

### Recommendation

On the light of the findings of the current study, the following recommendation are derived and suggested:-

- Health education should be provided to all diabetic children and their families to increase their knowledge and practice regarding all aspects of diabetes self care and proper management.
- Educational material such as pamphlets, booklets and videos should be carefully prepared in each



diabetic unit according to the educational level of diabetic children

- Diabetic support groups for school children need to be established.

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12/15/2011