

# Compliance and administration methods in management of Type 1 Diabetes

*Fortunato Lombardo, G. Salzano, Maria Francesca Messina, Filippo De Luca*

Department of Pediatrics, University of Messina, Messina, Italy

**Abstract.** One of the toughest aspects which health-care workers have to face in the management of diabetes is informing the family. Thanks to specialized teams of pediatric diabetologists, specialized diabetes nursing staff, dieticians and psychologists, many of these problems have by now been solved. Over the past ten years, scientific research has made it possible to identify some “critical points” which arise as the child passes through the various developmental phases. Based on this research there has been an increasing tendency to highlight contact points between diabetic patient and family management of the illness, aimed at preventing incorrect behaviour during the different growth phases. The diabetological team should not only intervene when necessary, but also work with an eye to prevention so as to improve the quality of life of the child and its family, making it possible that a diabetic child quality of life is the same of a non-diabetic child. Team work is necessary so as to get to know and, where possible, improve, compliance in every family. This is obtained also through the acquisition and subsequent carrying out of questionnaires, which help in making the family understand that there is no difference between diabetic children and non-diabetic children. Data in literature, fortunately, seems to confirm this. Clear progress has also been made in the methods of administration thanks to the introduction of devices such as pens and microinfusors (CSII). Pen devices have greatly improved compliance of young diabetic patients, making them better able to manage administration on their own. Microinfusors, on the other hand, have not only improved metabolic control, bringing it closer to the physiological model, but have also had a positive effect on the quality of life of young people, and, as a consequence, of their families. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** Compliance, insulin dependent diabetes mellitus, administration methods, quality of life

## Discussion

Insulin dependent diabetes mellitus, or type 1 diabetes is the most frequent metabolic illness in pediatric age. It is rising sharply, in particular in children under 2 years of age. The reasons are not clear.

Dealing with the illness is extremely difficult as to inform the family about the diagnosis. A diagnosis

of Type 1 diabetes means a radical change in life style for a family.

It is necessary to consider not only the psychological state of the patient, but that of the entire family; in certain ways this is a really tough task for the doctor, who must have the help of a specialized team which includes, apart from the doctor himself, a psychologist, a dietician, specialized nurses and, where possible, also volunteer associations. It is only through the

combined help of all of these elements that diabetes can be faced.

There are three fundamental reasons why a team approach may be a determining factor in treating children and teenagers affected by Type 1 diabetes mellitus;

1. In order to inform and guide the patient and his/her family in the treatment of diabetes, it is vital that health care workers dedicate patients a lot of their time. Given that the treatment of diabetes involves every aspect of a child's life, as well as that of his/her family's, it is necessary to verify that many changes take place in the family life style.
2. To organize the so-called areas of competence. Guidelines on treatment should be exhaustive, indicating behavioural changes and taking educational, practical and psychological aspects into consideration.
3. As the availability of a multi-disciplinary health-care assistance greatly increases the possibility that interactions and/or interpersonal links between children/family and the health-care system are encouraging and fulfilling, compliance will certainly be greater.

The fundamental task of the team is to evaluate the compliance of each individual family group; the team must find out what needs to be done to improve the family's quality of life. It is well known that each patient differs in his/her approach to his/her condition, this is why the team must all work together in harmony until the children's future is assured. The educational programme on diabetes is based on the skills of each component of the diabetological team. Each of them helps the child and his/her family to learn about the disease, to follow the most adequate therapy regimen, to inject insulin, to make regular physical exercise, to carefully respect meals and above all frequently perform the monitoring of blood sugar levels. The programme is modified and often discussed with the family and changes according to the age and development of the child. It includes all the phases, from neonatal (<2 years) up to adult age (>18 years), going from pre-school (2-6 years), pre-adolescent (6-11 years), to adolescent (12-18 years).

In the past few years much research has focused on the comparison between diabetic and non-diabetic children, to evaluate the presence of possible differences in the quality of life. Results obtained through the use of standardized questionnaires evaluating physical, psycho-social and family areas have been very encouraging: no important differences in life quality were reported between newly diagnosed patients and healthy subjects, 1-2 years after diagnosis of the illness, nor family influence on the management of the illness (5, 6). Unfortunately, data regard a very short period of time, but we are certain that only through a regular education programme based on direct contact between the team and the family group can even more encouraging results be obtained to improve the quality of life of young diabetic patients.

The DCCT has radically changed diabetic world, bringing to light news and discoveries that have certainly improved the quality of life of young patients. If, on the one hand, the use of intensive or personalized insulin therapy has remarkably reduced the risk of compliance, on the other hand there was the problem of insulin multi-administrations (up to 4-5 times per day) in small children which could lead to many mistakes (3). Thanks to the introduction of pen devices the risk of mistakes depending on insulin type choice (regular or zinc) and administration dosage has been notably reduced. The number of secondary hyperglycemic episodes due to dosage error has greatly diminished. The pen is a good example of a portable, user-friendly device, available in a pre-mixed dose. Using pre-mixed insulin cartridges is of course much easier than mixing on the spot with a syringe risking to make mistakes. The pen is handling and makes injections easier. But the main advantage of the pen is surely the reduction in pain and the decrease in rashes occurring on the injection site (7).

Probably the real innovation in insulin administration is the microinfusor (CSII), a device which since 1960, when it was first used, has radically improved the therapeutic approach to diabetes, leading to improvement in family compliance (8-10). The advantages of the microinfusor can be summarised as follows:

1. Administration of insulin similar to the physiological model.

2. Higher precision in dosage of administered insulin.
3. More attention to self-management and self-control.
4. More freedom and independence in the management of diabetes.

Thus, microinfusors are requested by patients and families because:

- A. They allow more flexibility in life-style.
- B. They give more freedom.
- C. They can also be used during physical activity.
- D. They reduce the number of daily insulin picks.

Much research reports on the use of microinfusors in pediatric and adolescent age and the results are very encouraging. They can be summarised as follows:

1. Improvement in glycometabolic control.
2. Reduction of hypoglycemic episodes.
3. Reduction in the number of insulin doses administered.
4. A reduction of Hb<sub>a1c</sub>, in some cases.

However, along with the advantages and encouraging results which have been reported in literature, we must also point out the negative aspects and possible risks which a patient may encounter using microinfusors, which are:

- Non-acceptance of the new therapeutic schedule.
- Lack of motivation and bad compliance of the patient and the family.
- Ketoacidosis due to malfunction of the device.
- Skin rash.
- Lipohypertrophy in the affected area.
- Possible weight gain.

In conclusion, the quality of life of young diabetic patients over the years has notably improved, thanks to a team approach where the patient is the focus of the work group. Being the focus of the group helps the patient to acquire the necessary skills to solve problems which were previously unknown to him/her, to cope with his/her new situation and learn to live with the illness (11). Given that there are constantly emerging educational technologies and that therapeutic techniques (such as inhaled insulin) are rapidly improving, the prospects for a better quality of life are practically guaranteed.

## Comments

Today, in an era characterized by increased health-care resources, it is more and more important that the philosophy of "doing less is better" does not make us take a step backwards in the treatment of diabetes. Now, more than ever, the multi-disciplinary approach plays a front-line role in assuring that advices given by the DCCT are put into practice both to prevent problems such as hypoglycemia, and to cope with situations which could lead to disastrous events for children and their families.

The basic task of doctors and non-medical staff is to lessen the trauma of management of a chronic illness such as diabetes. It is essential to establish not only a relationship built on trust between patient and health-care worker, but, above all, a real 'friendship'. The patient should come to consider the diabetological team as his/her second family, should be willing to confide them problems and perplexities. It is only through reaching this co-operative level of harmony that compliance and quality of life can be improved for children and teenagers with insulin dependent diabetes mellitus.

## References

1. American Diabetes Association. Standard of medical care for patients with diabetes mellitus. *Diabetes Care* 1994; 17: 616-23.
2. Wolfsdorf JL, Laffel LMB. Diabetes in childhood: Predicting the future. *Pediatr Ann* 1994; 23: 306-12.
3. Diabetes Control and Complications Trial Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993; 329: 977-86.
4. Hamburg BA, Inoff GE. Predictable crises of diabetes. *Diabetes Care* 1983; 6: 409-16.
5. Hoey H, Aanstoot HJ, Chiarelli F, et al. Good metabolic control is associated with better quality of life in 2,101 adolescents with type 1 diabetes. *Diabetes Care* 2001; 24: 1923-8.
6. Laffel LMB, Connell A, Vangsness L, et al. General quality of life in youth with type 1 diabetes. *Diabetes Care* 2003; 26: 3076-3.
7. Lteif AN, Schwenk WF. Accuracy of pen injectors versus insulin syringes in children with type 1 diabetes. *Diabetes Care* 1999; 22: 137-40.

8. Pickup J, Mattock M, Kerry S. Glycaemic control with continuous subcutaneous insulin infusion compared with intensive insulin injections in patients with type 1 diabetes: meta-analysis of randomised controlled trials. *BMJ* 2002; 324: 1-6.
9. Kaufman RF, Halvorson M, Fisher L, et al. Insulin pump therapy in Type 1 pediatric patients. *J Pediatric Endocrinology & Metabolism* 1999; 12: 759-64.
10. American Diabetes Association. Standards of medical care for patients with diabetes mellitus. *Diabetes Care* 2001; 24 (suppl 1): S33-S43.
11. Greenfield S, Kaplan SH, Ware JE, et al. Patient's participation in medical care: Effects on blood sugar control and quality of life in diabetes. *J Gen Intern Med* 1988; 3: 448-57.

---

Correspondence: Dr. Fortunato Lombardo  
Department of Pediatrics,  
University Hospital of Messina  
98123 Messina, Italy  
Tel: 00.39.0902213172  
Fax: 00.39.0902212143  
E-mail: Fortunato.Lombardo@unime.it