

Improved Quality of Life in Unselected Insulin Pump-Treated Children with Type 1 Diabetes in Eastern Nebraska

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Introduction

Continuous subcutaneous insulin infusion (CSII) via pump injectors first became a treatment option for patients with type 1 diabetes in the 1970s and has had increasing use. Several studies have demonstrated a clinically important improvement in hemoglobin A1c levels and a reduction in blood glucose variability as well as in hypoglycemic episodes in patients treated with CSII as compared with multiple daily injections (MDI).¹⁻³ Several studies that explored quality of life (QOL) suggested that patients undergoing CSII are significantly more satisfied with treatment than those receiving MDI.⁴⁻¹⁰ These studies have used prospective comparisons in defined groups, typically from a single research center during the transition of patients to insulin pump therapy, thus representing potentially biased samples. There is little information about the QOL perceptions of insulin pump therapy in unselected children with type 1 diabetes in a community setting.¹¹⁻¹⁵ We used a World Health Organization survey instrument that was modified and adapted to address areas related specifically to diabetes, using the Community Assessment Instrument Pre-Test 17 and WHOQOL-BREF¹⁶ at Camp Floyd Rogers, a 1-week summer camp for children with diabetes (ages 8–18 years old). The camp is located in Eastern Nebraska, a region that encompasses both urban and rural areas, thereby providing an unselected community sample.

Fifty-three children (33 females and 20 males) participated in the survey. Their ages ranged from 9 to 17 years old, with an average age of 12.6 ± 2.2 for all participants. More children used pumps (34) as compared with those who received conventional injections.¹⁷ Thirty-three of the 34 children in the CSII group were European American, and 1 child was African American. The conventional group included 1 Native American child, 2 Latino children, and 1 African American child. The results are summarized in **Table 1**. Comparisons between the insulin pump group and the conventional injection group were most remarkable because of the lack of significant separation of variables. The two groups were comparable in parental education, frequency of intensive glucose testing (75–80%), visits to an endocrinologist and ophthalmologist; emergency room visits, and hospitalizations. The families of insulin pump users did have a moderately higher overall income, but health insurance was equivalent. The difference in average hemoglobin A1c in the insulin pump-treated children (8.1 ± 0.2) as compared with that of the conventional insulin group (8.8 ± 0.5) did not reach statistical significance.

The subjective QOL child questionnaire demonstrated similar rankings on most measures, with the exception of three areas: perceived self-efficacy, perceived personal safety, and frequency of negative feelings (**Table 1**). Children receiving MDI reported more frequent negative feelings and felt less safe and less confident than children with insulin pumps.

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Abbreviation: (CSII) continuous subcutaneous insulin infusion, (MDI) multiple daily injections, (QOL) quality of life

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Table 1.
Comparison of Diabetes Care in Insulin Pump-Treated Children and Those Receiving Multiple Daily Injections^a

Variable	Insulin pump	Multiple daily injections
Highest grade completed	6.7 ± 0.5	6.5 ± 0.7
Duration diabetes, years	6.3 ± 0.4	5.4 ± 0.6
Age developed diabetes, years	6.5 ± 0.4	8.0 ± 0.7
How many times do you test daily?	6.6 ± 0.4	5.5 ± 0.3
How many shots daily?	3.4 ± 0.8	3.0 ± 1.0
Hemoglobin A1c	8.1 ± 0.2	8.8 ± 0.5
Care by an endocrinologist	79%	76%
Pediatrician primary physician	51%	59%
Annual ophthalmologist visit	89%	79%
Parental college education	42%	28%
Annual family income, \$	79,000 ± 5000	56,000 ± 7000 ^b
Private or PPO insurance, %	95%	81%
Quality of Life Measures		
1. How much do you enjoy life?	4.6 ± 0.6	4.4 ± 1.0
2. Are you satisfied with your health?	3.7 ± 0.9	3.8 ± 1.3
3. To what extent do you feel that you can do what you need to do?	4.1 ± 0.9	3.2 ± 1.7 ^c
4. Do you feel that daily habits can keep diabetes symptoms under control?	3.8 ± 1.2	3.8 ± 1.2
5. How informed are you about type 1 diabetes and treatment?	4.4 ± 0.8	4.2 ± 1.0
6. How do you rate your care from your doctor?	4.6 ± 0.6	4.4 ± 1.0
7. How comfortable do you feel discussing questions or concerns with your health provider?	3.8 ± 1.1	3.7 ± 1.4
8. How safe do you feel in everyday life?	4.4 ± 0.7	3.8 ± 1.0 ^c
9. Do you have energy for everyday life?	4.4 ± 0.7	3.9 ± 1.3
10. How often do you have negative feelings?	4.0 ± 0.9	3.1 ± 1.2 ^c
^a The above data represent the composite of adult and children's responses. The average responses for participants using CSII versus MDI for the respective categories are shown on a scale of 1–5. For questions 1–9, "5" represents "very much" and "1" represents "not at all." For question 10, "5" represents "never" and "1" represents "always." As the table indicates, participants using CSII reported better QOL on several measures. ^b $p < 0.01$ ^c $p < 0.05$		

Discussion

We believe that our study represents a valid attempt to evaluate insulin pump usage in an unselected cross-section of a pediatric diabetes population with no ties to any particular health care provider groups. Although the patient population was drawn from a relatively limited geographic area, Eastern Nebraska is a reasonably heterogeneous community with two large urban centers (Lincoln and Omaha) as well as rural areas.

One of the most significant observations was the high frequency of insulin pump usage. About 60% of the children used insulin pumps. This is surprising because the best estimate of insulin pump usage in the type 1 diabetes population varies from 15 to 20%.^{18,19} Our QOL survey did expose a potential trend toward greater satisfaction in the insulin pump group, providing reassurance as insulin pump usage continues to broaden in the United States.

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