

LONGITUDINAL STUDY OF IRISH CHILDREN AND ADOLESCENTS ON CONTINUOUS SUBCUTANEOUS INSULIN INFUSION (CSII).

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Background

The goal of Type 1 Diabetes Mellitus (T1D) management is to achieve optimal metabolic control without an increase in adverse events i.e. severe hypoglycaemia and diabetic ketoacidosis. Early establishment of good metabolic control with intensive insulin therapy can reduce the incidence and delay the progression of complications in T1D [1].

Insulin pump therapy is a more physiological form of insulin replacement with a variable basal rate infused over 24 hours with a supplemental bolus component titrated to carbohydrate intake.

Insulin pump therapy is considered for all children with T1D in Temple St. CUH.

Aims & Methods

Aim & Objectives:

To assess the long-term safety and efficacy of continuous subcutaneous insulin infusion (CSII) in all children and adolescents commenced on CSII in Temple St CUH.

Methods:

We conducted a retrospective review of all children who had commenced insulin pump therapy in Temple Street and had at least 12 months follow up data.

Glycosylated haemoglobin (HbA1c) levels, insulin requirements, adverse events, and anthropometric data was collected pre CSII, at 6 months follow up, and annually thereafter.

Severe Hypoglycaemia was defined as hypoglycaemia requiring assistance from another person (glucagon/iv dextrose) or associated with seizure +/- loss of consciousness. Diabetic Ketoacidosis was defined as the presence of hyperglycaemia, ketosis and acidosis (pH < 7.3).

Subgroup analysis was carried by age: ≤ 5 years old, 6-10.99 years old, and > 11 years old.

Follow up data was obtained for 60% (38/63) of patients who had transitioned on to adult services.

Exclusions:

- 42 patients - current duration on CSII was <12 months.
- 2 patients - commenced CSII abroad.

Results

Patient Characteristics:

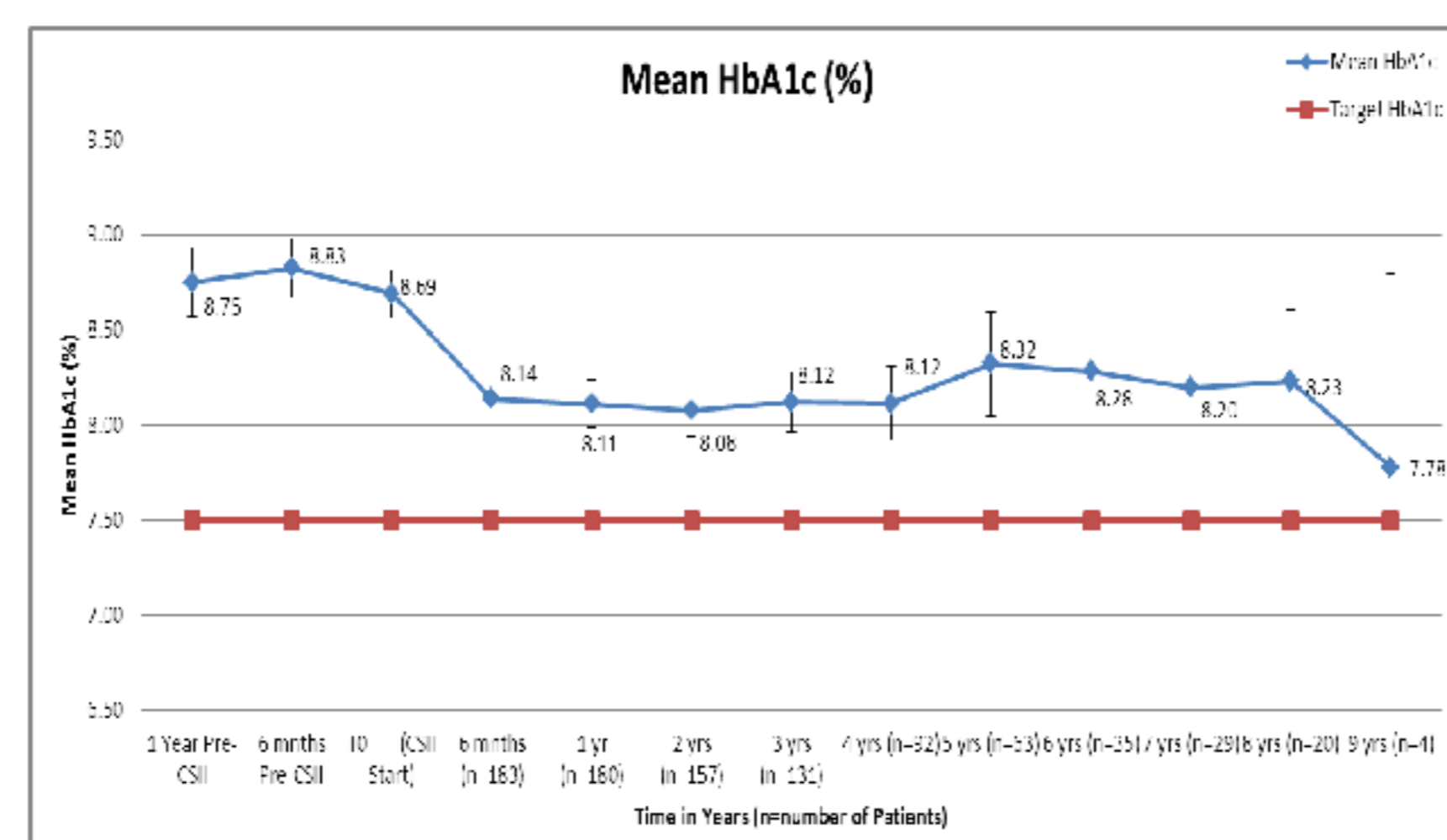
- 229 children underwent pump initiation in Temple St of which 185 patients (89 male) have 12 months follow up data.
- Mean age (SD) was 14.1 (5.4) years, mean (SD) duration of diabetes was 8.1(4.2) years and mean (SD) duration of CSII therapy was 4.86 (2.3) years.

Age	0-5.99 years	6-11.99 years	≥12 years
Mean (S.D.)			
N = 185	14	49	122
Females = 96	6	27	63
Age at diabetes diagnosis (years)	1.5 (±0.9)	3.4 (±1.7)	7.5 (±3.5)
6.0 (±3.7)			
Duration of pump use (years)	2.3 (±0.9)	3.8 (±1.8)	5.6 (±2.3)
4.86 (±2.3)			

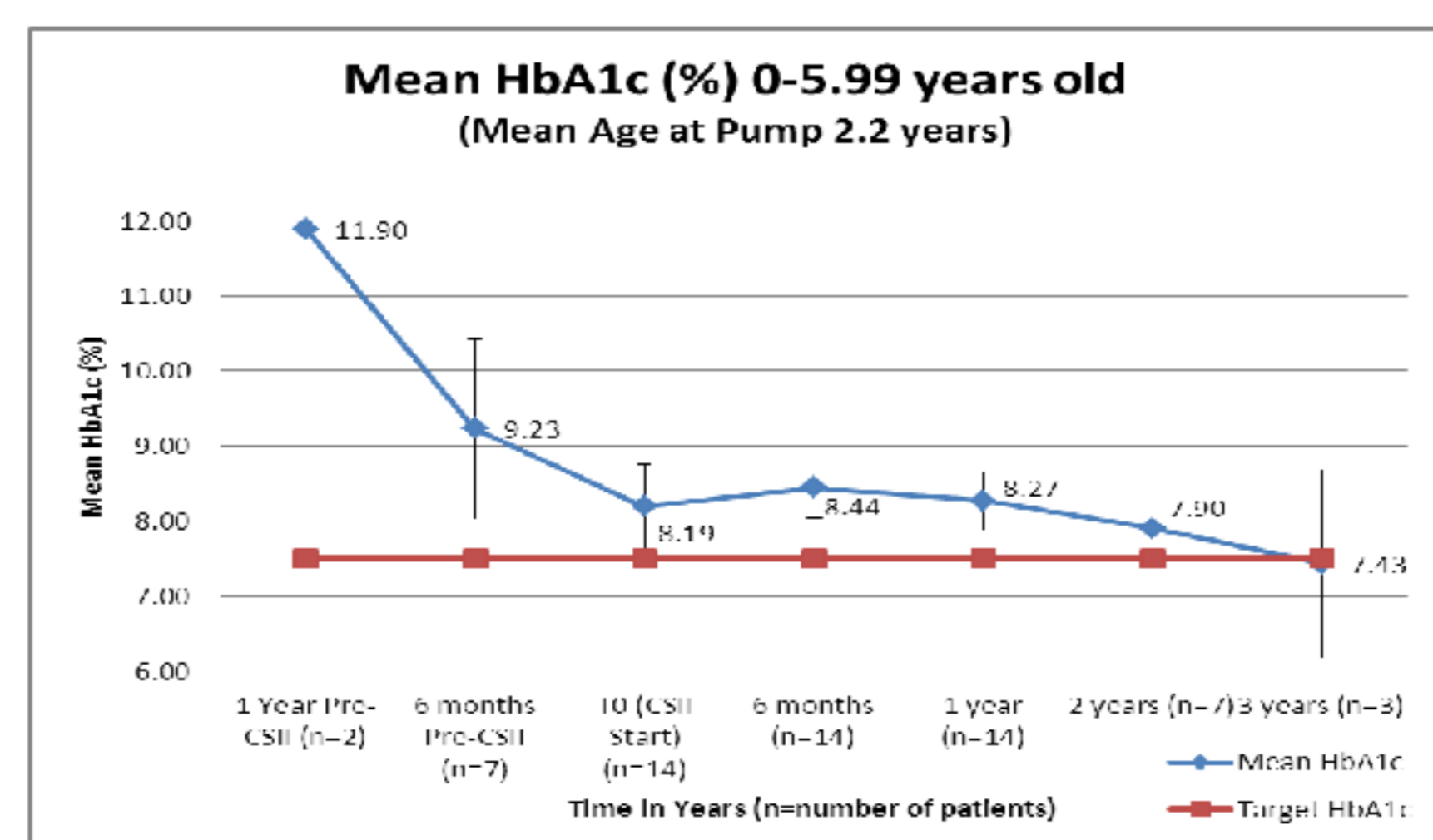
Table 1. Patient Characteristics

Metabolic Control (Mean HbA1c):

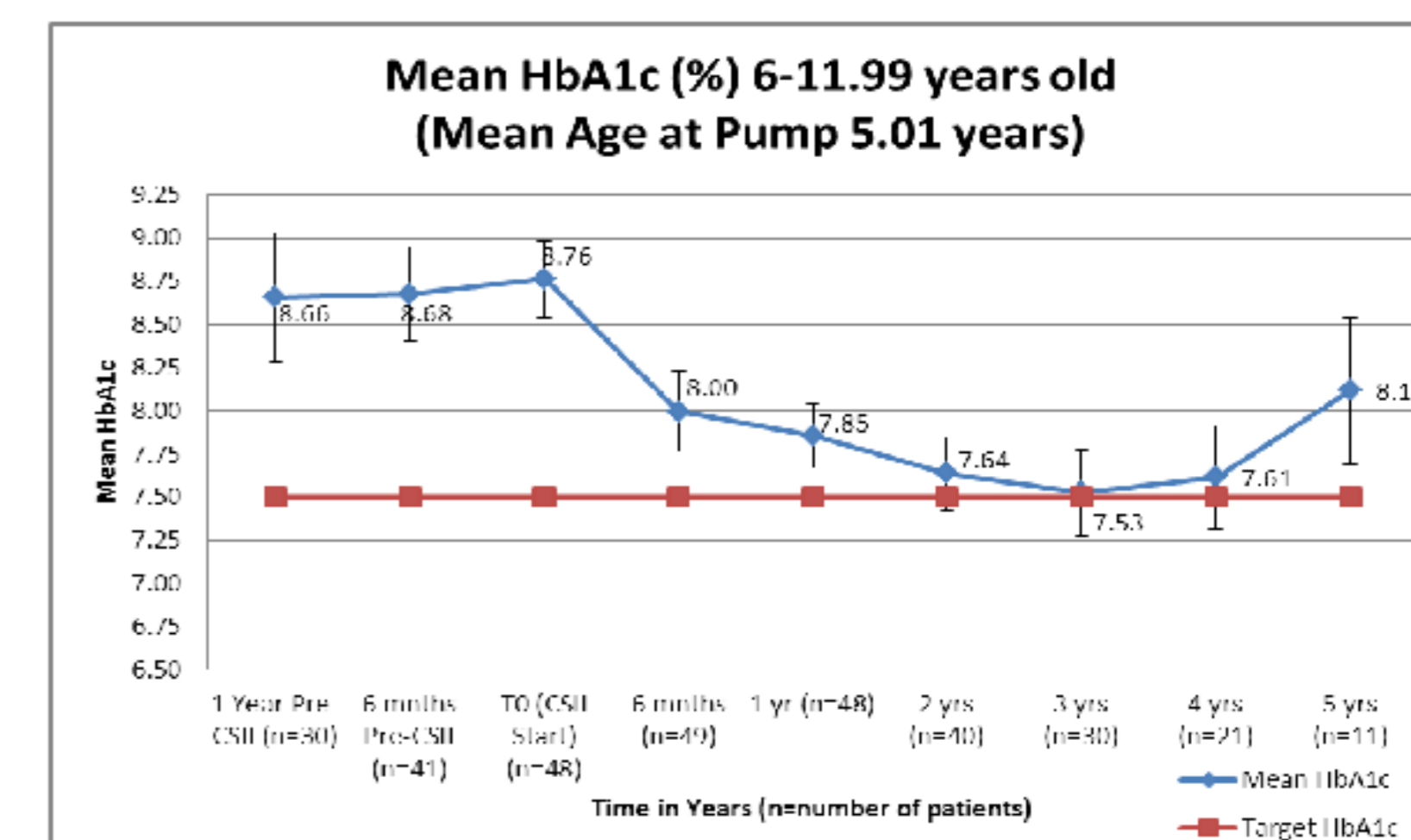
- Mean (SD) HbA1c decreased from 8.75 (1.1) % pre-CSII, to 8.11(0.84) % at year 1, 8.08 (0.88)% at year 2, 8.12 (0.92) % at year 3, and 8.12(0.93) % at year 4 post-CSII.
- Pre-schoolers had the greatest benefit in terms of HbA1c reduction



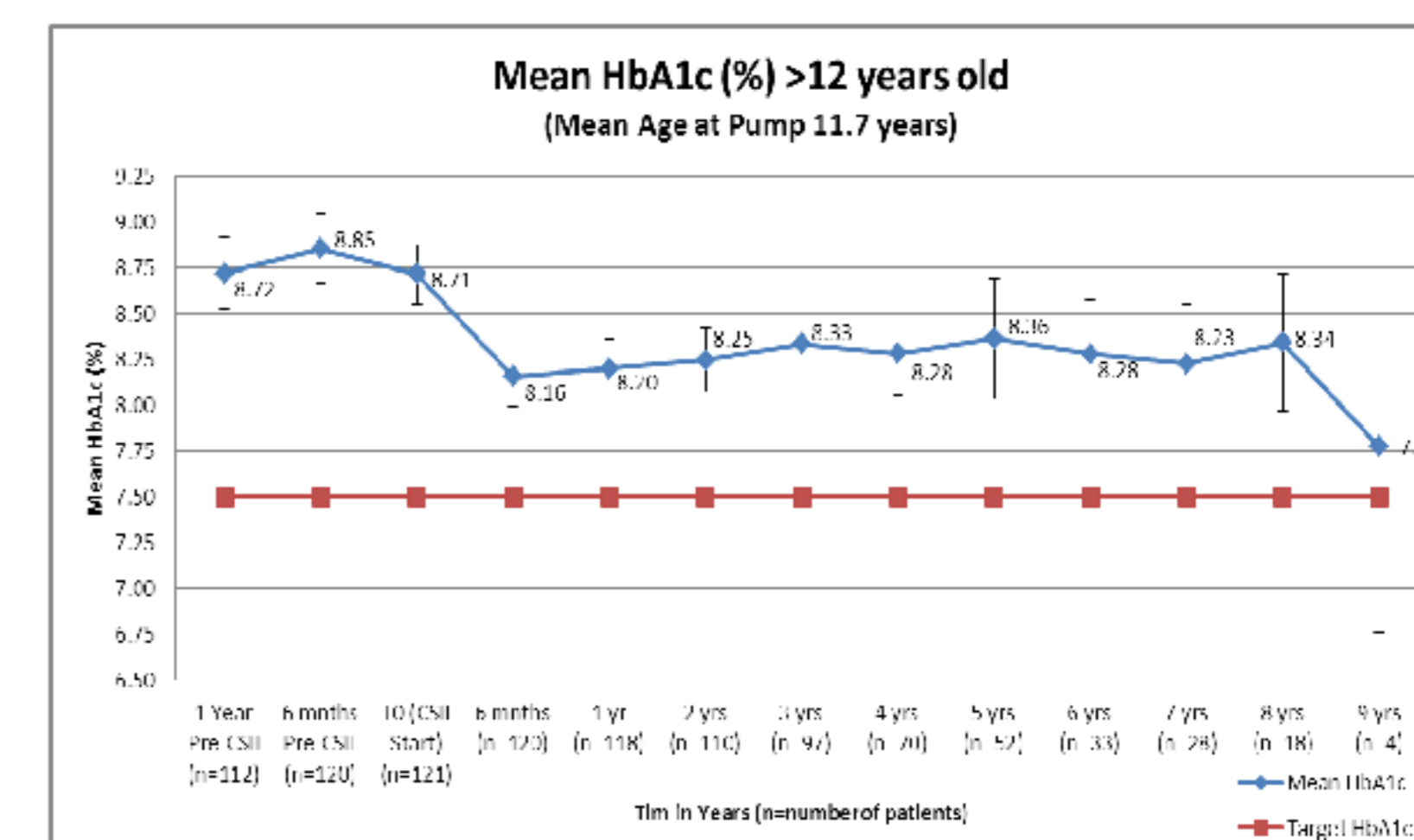
Graph 1. Mean HbA1c (%) for all children on CSII



Graph 2. Mean HbA1c (%) in children 0-5.99 years old



Graph 3. Mean HbA1c (%) in children 6-11.99 years old



Graph 4. Mean HbA1c (%) in children >12 years old

Body Mass Index (BMI) Z Scores and Insulin Requirements:

- No increase in Body Mass Index Z scores was seen during follow up.
- Insulin dose (U/kg/day) did not significantly change over time.

Adverse Events:

- Severe adverse events were decreased on insulin pump therapy.
- Severe hypoglycaemic events (SH) and diabetic ketoacidosis (DKA) episodes reduced from 2.55 to 0.56 and 4.7 to 0.84 per 100 patient-years post-CSII respectively.

	Pre-CSII		Post-CSII										
	Tm12	Tm6	T0	6m	1 yr	2yrs	3yrs	4yrs	5yrs	6yrs	7yrs	8yrs	9yrs
Hypo	3	1	2	0	0	1	1	0	1	0	1	0	0
DKA	5	4	2	2	0	0	3	0	0	0	1	0	0

Conclusions

CSII therapy is a safe and effective long-term treatment for improvement and maintenance of glycaemic control in children and adolescents with T1D. A reduction in severe hypoglycaemic events was seen and an absence of weight gain. Achieving target HbA1c remains very challenging.

Additional benefits may be achieved with:

1. Aggressively aiming to achieve target HbA1c.
2. Use of sensor augmented pump therapy.
3. Use of adolescent directed re-education programmes.

References

1. The Diabetes Control and Complications Trial Research Group (1994) Effect of intensive diabetes treatment on the development and progression of long-term complications in adolescents with insulin-dependent diabetes mellitus: Diabetes Control and Complications Trial. Diabetes Control and Complications Trial Research Group. J Pediatr 125: 177-188

