Evaluation Of Glycaemic Control Using Insulin Pump Therapy In “Poor” Candidates And Non-Insured Children In A Rural Diabetic Youth Clinic

Peter W Goss MB BS FRACP
Gippsland Paediatrics Diabetes Unit, Victoria, Australia
ISPAD Istanbul 2012

Background
Australian children with Type 1 Diabetes Mellitus (T1DM) are currently denied access to Insulin Pump Therapy (IPT) for three main reasons:
1. Lack of funds - most Australian children gain access to an insulin pump through private health insurance. Those without insurance cannot usually afford to purchase an insulin pump.
2. Not considered a “good” candidate for IPT - they fail to fulfill a number of traditional prerequisites and are therefore neither offered nor encouraged to trial IPT.
3. Lack of local resources - patients have difficulty accessing an experienced insulin pump program, particularly in rural Australia.

Our rural based multidisciplinary team has demonstrated that successful insulin pump therapy can be initiated and maintained in rural Australia using local resources. (1) Our rural diabetic youth have experienced significant improvement in glycaemic control, quality of life and very high levels of patient satisfaction. There is scant data to determine whether children and adolescents who are usually denied access to IPT for the reasons other than lack of local resources would benefit from IPT. One study of adult uninsured T1DM patients demonstrated no improvement in glycaemic control. (2)

Some studies have demonstrated that the greatest improvement in HbA1c using IPT is in those with poor glycaemic control. (3) The DCCT demonstrated that the greatest risk of long term complications from T1DM occurs with poor glycaemic control. (4) Yet there is little support of considered selective management of children with very poor glycaemic control with IPT.

Aim
To evaluate the effect of Insulin Pump Therapy (IPT) on glycaemic control in children traditionally considered as “poor” candidates or without health insurance.

Methods
Gippsland Paediatrics services a regional South Eastern Australia population of 95,000 people. The population is representative of a typical rural Australian population. Our diabetes team manages over 90% of children and adolescents (up to 25 years of age) with T1DM in the region.

An observational study of 70 T1DM patients was performed to analyze the glycaemic outcome the first 2 years of IPT in “good” vs. “poor” candidates and insured vs. uninsured patients.

An eligible patient was any patient managed by Gippsland Paediatrics with insulin pump therapy between 2007 and 2011 inclusive.

1. “Poor” candidates
There are many varying guidelines as to who is an appropriate candidate for IPT. (5,6) Some centers demand adherence prior to IPT commencement. (6) Most guidelines state the following as being required to be a suitable candidate for IPT:
1. Good adherence to recommended T1DM therapy and formulate an individualized treatment plan.
2. At least 4 tests of blood glucose levels per day.
3. Competent at carbohydrate counting.
4. Willing to communicate with diabetes team.
5. Principal caregiver is mature and responsible.

A “good” candidate was defined as a patient who in the consensus view of the IPT team satisfied at least 5 of the 6 most common criteria for IPT.

A “poor” candidate was defined as satisfying 4 or less criteria.

Once our team had gained experience with IPT we specifically targeted and initiated IPT in many “poor” candidates. Once our team had gained experience with IPT we specifically targeted and initiated IPT in many “poor” candidates. (5,6) Some candidates were considered “good” candidates but still at comparable rates to “poor” candidates.

Results
By the end of 2007, 66.7% (127) current T1DM patients were managed with IPT and the remaining 33.3% (67) had tried but ceased IPT.

Since 2007 we have initiated IPT in 67 patients and another 3 of our patients had IPT commenced elsewhere. Hence, we have managed 70 patients with IPT, representing 131 patient years for the time period of this study.

Only 12 patients have not been offered IPT over the past 4 years. The reasons for not commencing IPT were unacceptable risk with extreme family chaos (4), low IQ (2), left the practice (3) and patient unwilling to trial IPT (3).

Six patients have ceased IPT - 4 voluntarily and 2 by our request because of unacceptable risk.

“Good” vs. “Poor” candidates
34/70 (51%) IPT were classified as “good” candidates.
“Good” candidates (average age 12.6 ± 5.9 years) improved HbA1c from 8.2% ± 0.71 to 7.1% ± 0.52 (p=0.001) at 3 months, 7.1% ± 0.74 (p=0.001) over one year and 7.52 ± 0.97 (p=0.016) over the second year.

36/70 children (49%) were classified as “poor” candidates (average age 14.7 ± 4.7 years). Pre IPT HbA1c was 9.8% ± 1.51 improving to 8.5% ± 1.30 (p=0.001) at 3 months, 8.2% ± 0.71 (p=0.001) over one year and 8.56 ± 0.98 (p=0.001) over the second year.

“Good” candidates have significantly better HbA1c compared to “poor” candidates (p=0.001). Only 1/34 “good” candidates has been admitted to hospital with DKA over their first 2 years of IPT and no “good” candidate was admitted with DKA over these first 2 years.

6/36 “poor” candidates experienced severe hypoglycaemia (p=0.001) - a rate of 9.3 per 100 patient years. 6/36 “poor” candidates have been admitted to hospital with DKA in the first 2 years after commencement of IPT (p=0.001) though none more than once also representing a rate of 9.3 per 100 patient years. Those rates in “poor” candidates still compare favourably with other published series.

Conclusion
Insulin Pump Therapy, managed by a skilled rural multidisciplinary team using emotional and peer support, significantly improves glycaemic control in T1DM paediatric patients traditionally considered “poor” candidates that are at most risk of long term complications.

The risk of DKA and severe hypoglycaemia is significantly more in poor candidates than “good” candidates but still at comparable rates to other tertiary centres.

Selection criteria for IPT should not preclude patients who are denied access to IPT for the reasons other than lack of local resources. That is, health insurance, in 2007 we commenced a subsidy for uninsured patients to purchase an insulin pump. In 2008 the Australian Government introduced the “Type 1 Diabetes Insulin Pump Program” providing a subsidy for uninsured patients to purchase an insulin pump.

The uninsured patients were defined as those whose insulin pump was funded by means other than private health insurance.

Conclusion
Insulin Pump Therapy, managed by a skilled rural multidisciplinary team using emotional and peer support, significantly improves glycaemic control in T1DM paediatric patients traditionally considered “poor” candidates that are at most risk of long term complications.

The risk of DKA and severe hypoglycaemia is significantly more in poor candidates than “good” candidates but still at comparable rates to other tertiary centres.

Selection criteria for IPT should not preclude traditionally “poor” candidates, provided the diabetes team provides extra support.

IPT equally benefits the glycaemic control of both insured and uninsured patients given equal quality of diabetes team support.