

EVALUATION OF INSULIN PUMP THERAPY FOR TYPE 1 DIABETES IN ALBERTA AN ACCESS WITH EVIDENCE DEVELOPMENT (AED) PILOT

FINAL REPORT

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EXECUTIVE SUMMARY

This report summarizes the findings of the Access with Evidence Development (AED) evaluation of insulin pump therapy (IPT) for adults and children with Type 1 Diabetes in Alberta. The evaluation had two objectives: 1) To collect information needed to address existing evidence gaps around 'real world' safety, clinical effectiveness, and system/resource requirements and 2) To assess the feasibility of AED as a policy option for providing access to new technologies for which there appears to be promising but limited evidence.

Methods for the evaluation, developed by an interdisciplinary, multi-stakeholder working group, were based on a registry design. Over a two year period, adults and children with an interest in accessing publicly funded IPT were recruited through insulin pump clinics in the province. Those agreeing to participate were interviewed upon enrollment in the registry and asked to complete surveys every 3 months up to a maximum of 18 months of follow-up. Questions related to diabetes management and its effect on daily life, hypo- and hyper-glycemic events, and pump supply use (once they started IPT). Surveys also included a series of validated generic and diabetes treatment specific health-related quality of life (HRQoL) questionnaires. For each participant, laboratory test results (HbA1c) and inpatient, outpatient and ER visits over the evaluation period were obtained from Alberta Health Services (AHS) and Alberta Health (AH). Quantitative and qualitative data collected were analysed according to participants' 'pump status' at the end of the evaluation in order to assess differences in glycemic control, quality of life, and healthcare use between those on a pump and those not on a pump. The results were then used to calculate the incremental budget impact and cost-effectiveness ratio of IPT compared to standard care (multiple daily injections). To examine implications of the IPT program on pump clinics, in-depth interviews were conducted with staff from clinics across the province.

A total of 340 individuals (242 adults and 98 children) participated in the registry. Across both adults and children, the most commonly reported reason for interest in IPT was better glycemic control. However, there were no statistically significant differences in HbA1c levels or the frequencies of diabetes-related ER visits and non-severe hypo- and hyperglycemic events between adults and children on a pump and those not on a pump. The results suggest that IPT is comparable to standard care in terms of safety and clinical effectiveness. This may be attributable to the eligibility criteria for the provincial IPT program, which include demonstration of acceptable control of blood sugars. Regarding quality of life among adults, based on HRQoL scores, there was a statistically significant gain in HRQoL within the first three months of starting IPT. Diabetes Treatment Satisfaction Questionnaire (DTSQ) scores were also higher among those on a pump. These findings were consistent with qualitative analyses, through which dominant themes around greater freedom and flexibility and improved health with IPT were identified. Although no differences in HRQoL scores for children on a pump and those not on a pump were found, caregiver burden inventory scores for physical health and time dependency were statistically significantly lower (better) for parents of children on a pump. Results of qualitative analyses indicated that IPT

enhanced the quality of life of both parents and children. For children, the pump was primarily associated with more flexibility and freedom and improved health. For parents, the most commonly identified theme related to the positive impact they felt IPT has had on the entire family.

The average cost per patient (including inpatient, outpatient, and ER visits and pump supplies (where applicable)) over the 21 month evaluation period was \$3,152 for adults not on the pump and \$27,973 for those on a pump. For children, it was \$1,545 and \$29,811 for those not on and on a pump, respectively. The average cost per patient to deliver the IPT program (including insulin pump clinic visits, pump information and education sessions, the pump, itself, and pump supplies) from referral to the annual reassessment was \$22,255 for adults and \$25,149 for children who began pump therapy through the program.

For adults, the 15 month and 5 year incremental cost utility ratios for IPT compared to standard care ranged were \$319,889/QALY and \$225,739/QALY, respectively (based on the EQ-5D-5L utility scores). For children, they were \$2,152,399 and \$189,371/QALY (respectively, based on the Child Health Utilities 9D scores). These results suggest that IPT is not cost-effective according to generally accepted cost-effectiveness standards for most interventions.

Feedback on the IPT program from staff was consistent across clinics, and included the lack of resources required to manage the increased patient load as a result of the program, the significant amount of paperwork required by the program, and the need for more insulin pump education and training for staff.

Through the AED pilot, key evidence gaps related to the 'real world' safety, clinical and cost effectiveness and resource implications of IPT were addressed. Based on lessons learned throughout the planning and implementation of the IPT registry, AED appears to be a feasible policy option for providing access to promising technologies in order to generate the evidence needed to support a definitive funding decision.

PREAMBLE

In September 2013, the Access with Evidence Development (AED) evaluation of insulin pump therapy (IPT) for pediatric and adult patients with Type 1 Diabetes began recruiting patients. Funded by Alberta Health, the evaluation had two purposes: 1) To collect information needed to address existing evidence gaps around 'real world' safety, clinical effectiveness, and system/resource requirements and 2) To assess the feasibility of AED as a policy option for providing access to new technologies for which there appears to be promising but limited evidence.

The protocol for the evaluation was developed by a working group, which comprised representatives from Alberta Health (AH), Alberta Health Services (AHS) and the Nutrition, Diabetes and Obesity Strategic Clinical Network (SCN), and the Health Technology and Policy Unit (HTPU) at the University of Alberta. Between January 2013 and June 2013, this group, supported by additional individuals from the three organizations, drafted and agreed upon data collection tools, standard operating procedures for patient recruitment, and information flow processes. Meetings were then held with the 11 insulin pump clinics, ethics approvals from the University of Alberta Health Research Ethics Board, AHS and Covenant Health were received, and additional agreements between AHS and the University regarding access to data were finalized.

OBJECTIVE OF THIS REPORT

This report presents the results of analyses of data collected through the evaluation.

METHODS

Over two years, patients (adult and pediatric) with an interest in receiving pump therapy through the provincial IPT program were recruited to participate in the IPT AED evaluation. To minimize the impact of the evaluation on clinics, separate recruitment processes for each clinic were developed with input from clinic staff. A registry was established to collect information on consenting patients (or parents/guardians) throughout the evaluation. Patients completed in-person baseline interviews on enrollment and follow-up surveys (by mail, web, or in person, depending on their preference) every 3 months for 18 months or until the end of August 2016, when data collection for the evaluation ended. Baseline interviews and follow-up surveys included questions about diabetes and its effects on daily life, frequency of non-severe hypo- and hyperglycemic events in a week,

reasons for patients' current interest in IPT, expectations of IPT, and, where applicable, experiences with IPT. They also included a series of validated health related quality of life (HRQoL) instruments/questionnaires, which were administered at each follow-up point. Adult patients completed the EQ-5D-5L, Health Utilities Index, and the Diabetes Treatment Satisfaction Questionnaire. For pediatric patients, the EQ-5D-Y, Child Health Utility 9D, and Caregiver Burden Inventory were used. Information on relevant laboratory results and diabetes related ER, in-patient and outpatient visits were provided quarterly by AHS. Costing data associated with these visits (including physician claims) were obtained from AH. Qualitative and quantitative analyses involved three groups of patients: 1) 'New pump' patients – those who started IPT following the launch of the provincial program; 2) 'Existing pump' patients – those already on the pump but transitioning from private or out-of-pocket coverage to the provincial program; and 3) 'No pump patients' – those who continue to manage their diabetes with multiple daily injections (MDI). Separate sets of analyses were performed for adult and pediatric patients. To assess any changes in haemoglobin A1c (HbA1c) (a measure of average blood sugar levels over weeks/months), rates of ER, in-patient and outpatient visits, and QoL scores over time within each patient group, repeated measures analyses were performed. For patients in the 'new pump' group, HbA1c values and healthcare resource utilization in the three months prior to the start of IPT were compared with those corresponding to each three month follow-up period after the start of IPT (i.e., pre-post IPT comparison). Responses to open-ended survey questions were analyzed qualitatively using an inductive approach, in which data are analysed without the use of a pre-determined theory or structure. Specifically, thematic content analysis was used. For each group of patients, two researchers independently identified themes and categories that emerged from the data (i.e., chunks of text from individual survey and interview responses to the baseline and follow-up questionnaires) through an iterative process. These themes and categories were then compared across patient groups to assess similarities and differences that may be related to pump status.

To assess the economic implications of the program, cost-effectiveness (i.e., cost-utility) and budget impact analyses were conducted from a healthcare system perspective following published methodological guidelines. For the cost-effectiveness analysis (CEA), quality adjusted life-years (QALYs) gained/lost by the 'new pump' group were compared to those gained/lost by the 'no pump' group over two time periods: 15 months (baseline plus five 3-month follow-up points) and 5 years, a

time horizon commonly used in CEAs. Also, the 5 year time horizon takes into account replacement pump coverage. Through the pump program, patients are eligible for a new pump every 5 years. Where possible, utility values (QALYs) were derived from responses to the EQ-5D-5L questionnaire, the QoL instrument selected for use within AHS. For the 15 month CEA, actual costs and utility scores were used. For the 5 year CEA, such values were not available, since the maximum length of follow-up for any participant was 18 months. Therefore, it was assumed that costs and utilities corresponding to each 3 month follow-up beyond the period of the evaluation were the same as those 12-15 months after pump start for the 'new pump group' or after the baseline interview for the 'no pump' group. It was also assumed that any transitional or 'learning curve' issues associated with the pump and their effect on costs and quality of life would have been resolved by then. Budget impact analyses were based on only those patients enrolled in the AED. However, per patient cost estimates were calculated to facilitate analyses of the financial implications of the program for all patients, should those numbers become available at a later date. To capture information on the impact of the introduction of the IPT program on pump clinics, in-person interviews were conducted with staff in pump clinics across the province. Questions related to resources used in preparation for the launch of the program; changes in the number of patients seen at the clinic since the program was implemented; and time spent reviewing referrals, discussing IPT with the family, preparing and conducting pre-pump information sessions, assessing patients for IPT eligibility, preparing and conducting pump start classes, following up with new pump patients and conducting annual reassessments. Responses were analyzed qualitatively using the inductive approach described above.

RESULTS

A total of 340 patients (242 adult and 98 pediatric (via parents)) consented to participate in the evaluation and were included in the registry. A breakdown of the number of adult and pediatric patients within each pump group is presented in Figure 1. Figure 1 also shows the proportion of patients within each group who completed 3, 6, 9, 12, 15, and 18 month follow-ups from the time of enrollment in the evaluation or, in the case of the 'new pump' patients, from the time they received their pumps and started IPT through the program. The longest follow-up time period for which data were available on at least 50% of patients in all pump groups was 12 months among adults and 6 months among pediatric patients. At each of the follow-up points, the average actual time from

baseline to completion of follow-up questionnaires by patients was similar across pump groups (Table 1). This suggests that any potential differences in outcomes by pump status at a specific follow-up point are not a result of varying follow-up time periods across groups.

Demographic characteristics

Demographic characteristics of patients by pump status are presented in Tables 2 and 3. For both pediatric and adult patients, groups (no pump, new pump and existing pump) were comparable in age, gender, and age at diagnosis of type 1 diabetes (i.e., no statistically significant differences were found). However, for adult patients, their geographical distribution based on location of residence in the AHS zones varied across pump status groups. Among patients who had started on a pump through the provincial program (new pump group), the largest proportion (42%) was from Calgary. Among those who had yet to begin IPT, almost half (44%) resided in Edmonton. For pediatric patients, pump status did not statistically significantly vary with location of residence.

FACTORS RELATED TO ROLL-OUT OF THE IPT PROGRAM

Reasons for interest in the IPT program

Adults

Reasons for interest in the IPT program were obtained from two sources: 1) The AHS pump determination form and 2) The U of A baseline interviews. Reasons recorded for adult patients in the AHS determination forms were similar across pump status groups (Table 4). The majority sought to 'improve glycemic control' (79% of the 'no pump' group and 73% of the 'new pump' group). The second most common reason was to 'improve flexibility with lifestyle factors' (35% of 'no pump' patients and 40% of 'new pump' patients). These findings were consistent with those from the baseline interviews (Tables 5 and 6). The top two themes emerging from analyses of both the 'no pump' and 'new pump' patients were: 1) Better glycemic control and 2) Freedom and flexibility. Patients viewed the pump as offering "*more control of blood sugars*" and a way to "*smooth out highs and lows*" or "*prevent highs and lows that make you feel really crappy.*" In addition, the pump would enable "*greater freedom of choice in terms of schedule*" and "*provide flexibility in life.*" They described specific challenges related to the "*strict regimen*" required with multiple daily injections (MDI) and its impact on diet, exercise/physical activity, career choice and

travel. “[I] must consider food, which is time consuming”; “[I] eat in a large group setting where how the food is prepared and what is served cannot be easily modified”; and “I would like to be able to eat what I want when I want.” Regarding exercise, “I am afraid of exercise and this makes [me] feel unhealthy and unwell.” The pump “would allow me to exercise and get in better shape” or “improve [my] ability to exercise.” In terms of career opportunities, patients stated that “the cost of diabetes is affecting type of career” and it “limits career choices – no shift work.” “I cannot hold down an 8 hour job because of low blood sugar.” They indicated that the pump “would allow more flexibility at work”. Also, they “could do shift work.” Lastly, patients felt that with the pump, they would “be able to travel more easily”, experiencing “less hassle while going through airport security.”

Other, less frequently appearing themes included difficulties with long acting insulin and a preference for smaller, more precise doses. “[I] always feel sickish and believe the pump will change this because [I] will be using short acting insulin.” The “current dosage pen system isn’t flexible enough” and “I am unable to give small doses with pens.” The pump offers “more precise measurements.” The need for fewer injections with the pump was also identified. Some patients had developed “scar tissue due to MDIs” and reported having a “hard time finding areas in the abdomen to absorb insulin.” On the pump, they would “not have to rotate sites as often.” Others disliked needles and expressed frustrations with having to “shoot myself up 10 times a day.”

Themes related to improvement in health (mental, physical and general) were also identified. Some patients felt that the pump would “improve mood,” “improve energy levels,” “reduce chances of complications as a result of diabetes,” and “prolong life.” In general, they would “feel better.” Further, IPT would lead to a greater sense of normalcy (“feel like a regular person” and “want to live a more normal life”) and a higher overall quality of life (“I believe it will improve my quality of life”).

Themes unrelated to the potential impact of IPT therapy centered around ‘access to supplies’. Approximately 10% of patients reported that the main reason for their interest in the IPT program was access to testing supplies, not IPT therapy. “The cost of glucose testing supplies is the main reason.” “I would continue giving injections if testing supplies were covered.” Some have “limited supply coverage even with private insurance” and “don’t test as often to make supplies last longer”

or “reuse lancets to save money.” Almost 25% of patients had considered IPT in the past, but it was unaffordable. “[I] looked at getting a pump 5 years ago and despite having 2 really good insurance plans, I could not get a pump.” “10 years ago my doctor encouraged me to try pump therapy but didn’t because of the costs.” “Supplies are expensive and I am self-employed.”

For patients who had started IPT prior to the public funding announcement (‘existing pump’ group), the provincial program was viewed as a means of lessening the financial burden of IPT (Table 7). Approximately 25% reported the need for a new pump and little or no private coverage to help pay for it. “Private insurance is refusing to pay for a new pump”; “realized a few months ago that my pump would probably crap out soon and insurance will only pay \$1500”; “asked for a new pump through my employer’s plan and was told they would not cover it”; and “I can’t afford to pay out of pocket again.” For some patients, the provincial program was seen as facilitating access to continuous glucose monitoring (CGM). “I have been unable to start CGM because of the costs but may be able to now that I don’t need to pay for my pump supplies.”

Almost all patients in the ‘existing pump’ group mentioned insurance (Table 8), approximately 10% of whom indicated that they were “covered 100%” and “we don’t pay a thing.” A change in their insurance following the introduction of the provincial program was reported by four patients. “My insurance company did send a notice that [I] must go through the Alberta Blue Cross IPT Program for pump supplies and then go through the employer health benefits program for any additional costs that are not covered.” Roughly 25% of patients stated that they had “no coverage at all” for the pump or pump supplies. While fewer patients in the ‘new pump’ and ‘no pump’ groups mentioned insurance, those that did mainly described partial or no coverage for the pump and pump supplies.

Children

Based on data collected through the AHS determination form, the three most common reasons for interest in IPT among pediatric patients in both the ‘no pump’ and ‘new pump’ groups (ranked from highest to lowest) were to: 1) ‘Improve glycemic control’, 2) ‘Improve flexibility with lifestyle factors’ and 3) ‘Reduce number of injections’ (Table 9). Findings from qualitative analyses of baseline interviews with parents and children (where possible) suggested that the top reason comprised

greater freedom and flexibility, in general, or in terms of diet and physical activity (Tables 10 and 11). *“It seems that the pump will give us more freedom and flexibility”* and allow us *“to have a more spontaneous life.”* IPT was perceived as offering *“greater independence”* for their children. *“We hope it will encourage her to become more independent.”* Further, *“The pump will decrease the need for one parent to be available during school hours to deal with her diabetes.”* Parents also felt that with the pump, their child would be able to *“participate in sports and other activities,” “sleep in,”* and *“go to friend’s houses and eat what he wants to eat.”* *“The schedule won’t have to be so rigid so sleepovers would be possible.”* Also, *“I won’t have to force feed my daughter when she isn’t hungry.”*

The second most common theme in both the ‘no pump’ and ‘new pump’ groups was better glycemic control. *“We wanted more stability for her because she was having extreme highs and lows.”* Several parents reported that IPT has been recommended to them by their child’s doctor or one of the clinic’s nurses. *“His doctor suggested that the pump would help him manage his blood sugars even better.”* *“The endocrine nurse told us it is easier to prevent these lows with a pump.”*

The third most frequently appearing theme related to the need for *“less pokes”* or *“fewer needles”* with IPT. Other themes included greater privacy and normalcy. *“He will be able to blend in at school as the pump won’t be as noticeable as pulling up his shirt to give insulin injections.”*

Regarding normalcy, one child reported that she wanted a pump *“so I can do other things that kids can do.”*

One theme unique to the pediatric pump groups was the potential for the pump to have a direct, positive effect on parents. Almost 10% of parents indicated that managing their child’s diabetes with MDIs had negatively impacted their careers. *“Only one of us is able to work because I need to go to school at noon to give him insulin”* and *“he often has low or high blood sugars that need to be dealt with at night, so I am chronically sleep deprived, which makes it impossible to hold down a full time job.”* With IPT, they anticipated being able to return to work. Several parents also mentioned that management of their child’s diabetes had led to a strained relationship with their spouses. *“We have two different approaches, so I hope the pump will help alleviate the inconsistent manner in which we control her sugars- has caused lots of tension.”*

As in the adult pump groups, ‘access to supplies’ was identified as a reason for interest in the provincial program. Approximately one third of parents raised issues around access to testing supplies, pump supplies, or the pump, itself. *“Without the program, we could not afford to have him on the pump.” “Insurance does not cover the cost of pump supplies.”* It was the only reason reported by parents whose children were already on the pump but transitioning from private or out-of-pocket coverage to the publicly funded program (Table 12).

In terms of insurance, across all three pediatric pump groups, combined, approximately 20% of parents stated that they had no access to private coverage for the pump and pump supplies (Table 13). *“Currently, [our] private insurance does not cover the pump or pump supplies”.* Among parents with partial coverage for pump supplies but none for the pump, IPT was considered unaffordable without the provincial program. *“Private insurance does not cover the pump and without public funding, [we] would not be able to afford the insulin pump.” “Because the family’s current private insurance does not cover the cost of the pump and covers only a portion of the supplies, we would have to wait to get the pump.”* Of the 98 parents interviewed, four reported full coverage of the pump and pump supplies. However, three mentioned that the *“manufacturer had encouraged us to seek coverage through the Alberta government program rather than the insurance company.”*

Referral source

Adults

There were no statistically significant differences in referral patterns across the three pump status groups (Table 4). The majority of patients within each group had been referred to the program by their family physician or a specialist.

Children

Among pediatric patients, pump status did not vary by referral source (i.e., referral patterns were similar across groups) (Table 9).

Wait times

Adults

For adult patients not on pump therapy as of the end of the evaluation (August 31, 2016), the average time from referral to completion of the education session had been 3.8 months (Table 4). The average time since referral had been 28.5 months. In contrast, among adults who had started pump therapy, the average wait time from referral had only been 8.8 months. This suggests that the difference in wait times between the two groups is unrelated to clinic resources.

Children

For pediatric patients waiting to begin pump therapy, the average time from referral to completion of the education session was 3 months, but the average time since referral was 23.3 months (Table 9). Patients who had started pump therapy waited an average of 10.1 months (from time of referral).

Type of pump

Adults

Statistically significant differences in pump type selected between 'new pump' and 'existing pump' groups were found (Table 4). The majority (66%) of adult patients who had started pump therapy prior to the launch of the provincial program were on Medtronic's Paradigm® pump. However, the most frequently selected pump among 'new pump' patients was the Animas OneTouch®.

Children

Among pediatric patients, the majority of both 'new pump' and 'existing pump' patients were on the Animas OneTouch® pump (Table 9).

CLINICAL OUTCOMES

Safety

Device malfunctions

Adults

Six patients in the ‘new pump’ group reported device malfunctions (Table 14). *“The pump was neither correctly calculating any corrections nor delivering the amount entered.”* One patient indicated that *“the device malfunctioned numerous times and [I] ended up in Emergency.”* As a result, she decided to discontinue pump therapy. Four patients in the ‘existing pump’ group mentioned experiencing device malfunctions, two of whom specified the problem (Table 15). *“I had a bunch of infusion sets that were a problem”* and *“[manufacturer] has sent out 4 pumps because of software and hardware malfunctions.”* However, in none of the cases did the malfunction result in an ER visit.

Children

Two device issues were raised by parents of children in the ‘new pump’ group (Table 16). The first was a *“test strip recall.”* The second related to the presence of air bubbles in the pump. *“We were having lots of issues with air bubbles in the pump. Now that we are drawing up from a vial instead of a cartridge it has stopped being an issue.”* Neither issue led to adverse events. Only one parent with a child in the ‘existing pump’ group reported a device malfunction (Table 17). *“The pump malfunctioned and the company sent a new pump within 3 hours.”*

Clinical effectiveness

Glycemic control

Adults

Within the ‘no pump’ group, HbA1c levels did not statistically significantly vary over time. For ‘new pump’ patients, HbA1c levels prior to and after starting pump therapy were also similar (Table 18). When changes in HbA1c levels from baseline to each of the follow-up points were compared between the ‘no pump’ and ‘new pump’ groups, no statistically significant differences were found.

Diabetes-related ER visits were also examined as possible indicators of severe hypo- or hyperglycemic events and, in turn, insufficient glycemic control (Table 18). Within pump status groups, no statistically significant differences in the number of diabetes-related ER visits over time were found. Further, none of the changes in the number of ER visits from baseline to each of the follow-up points between pump status groups were statistically significantly different. Thus, glycemic control, assessed using HbA1c levels and ER visits, does not appear to improve with IPT.

There were also no differences in participants' responses to the following survey questions between or within pump status groups: "In the past week, how many times has your blood sugar been low enough that you had to eat something but did not need to go to a doctor?" and "In the past week, how many times has your blood sugar been high enough that you had to take extra insulin but did not need to go to Emergency?".

In contrast to findings from the quantitative analyses, 'better glycemic control' was the most common theme emerging from responses to the follow-up survey question, "Has anything changed regarding how diabetes affects your daily life or how you manage your diabetes?" among 'new pump' patients (Table 14). Half indicated that they had achieved tighter control since starting IPT. "[I] have better blood sugar control", "fewer lows", and "blood sugars are more consistent." However, four patients reported no difference in their ability to control their blood sugars between the pump and MDIs. "I think I expected miracles from the pump, but my current control is no better or worse than it was on MDIs."

Children

Among pediatric patients who had not started IPT ('no pump' group), there were no statistically significant differences in HbA1c levels over the evaluation period (Table 19). Among 'new pump' patients, HbA1c levels before and after starting IPT were comparable. Also, there was no statistically significant difference in the number of diabetes-related ER visits and non-severe hypo- and hyperglycemic events.

However, the most prevalent theme identified through qualitative analyses of follow-up surveys completed by parents whose children had begun IPT was 'better glycemic control'. Almost half provided comments related to improvements in his/her child's sugars. For example, "*his A1Cs have improved dramatically,*" "*fewer highs and lows,*" "*the pump has helped her control her sugars,*" and "*[the pump] has been a critical tool in keeping the A1C within acceptable ranges during puberty.*"

Utilization of other healthcare services

Adults

In the 'new pump' group, on average, there were more ambulatory/outpatient visits during the first 3 months on the pump compared to the 'no pump' group (Table 18). However, at 6, 9, 12, and 15 months, numbers no longer varied with pump status. This can be explained by the fact that patients new to pump therapy are followed up frequently by clinic staff for the first few weeks. Regarding average rates of hospital admissions/in-patient stays over time, no statistically significant differences within or between pump status groups were found.

Children

Within the 'new pump' group, the average number of outpatient visits was higher during the first three months of IPT compared to that during subsequent months (Table 19). In contrast, the average number of outpatient visits within the 'no pump' group did not statistically significantly vary over time. In terms of in-patient stays, rates prior to and following the start of pump therapy were similar among patients in the 'new pump' group, and no differences between pump status groups were found.

Insulin pump supplies

Adults

Results of analyses of weekly pump supply use based on information collected through patient diaries are presented in Table 20. In the 'new pump' group, the average numbers of glucose test strips, blood ketone test strips, pen tip needles, infusion sets, and pod supplies (for patients on the OmniPod®) were highest during the first three months on IPT. After 3 months, they decreased and

remained similar across follow-up points. In the 'existing pump' group, supply use did not significantly vary over time.

Concerns around supplies provided through the program were raised by several patients in both the 'new pump' (N = 13) and 'existing pump' groups (N=9) (Tables 21 and 22). They primarily related to glucose testing strips and the pump warranty. It was felt that the number of strips covered through the program is too low - *"the allotment of strips is not adequate especially for someone who is a beginner with the pump"* and *"the number of test strips allowed is not enough."* Regarding the warranty, patients noted that the provincial program provides a new pump every five years, but the length of the pump warranty is four years - *"I do find it stressful that the pump program will only pay for the pump every 5 years when the warranty on the pump is only 4 years."*

Children

For pediatric patients, supply utilization patterns similar to those in adults were found (Table 23). Over the first three months of IPT, 'new pump' patients used more blood glucose test strips, lancets, syringes, and blood ketone test strips than in subsequent months. Among 'existing pump' patients, there were no clear fluctuations in supply use over time.

The lack of an adequate number of testing supplies covered through the program was mentioned by 27% of parents of pediatric patients in the 'new pump' and 'existing pump' groups, combined (Tables 24 and 25). It was stated that *"I go over the limit for test strips every month"* and *"the pump requires the use of extra test strips."* Several parents recommended that the program *"consider funding more glucose strips."* Two parents felt that the number should be tailored to an individual patient's needs: *"I feel that more test strips should be covered for growing children as their bodies are changing which impacts BG"* and *"the allotted supplies should be based on a patient's needs."*

Comparison between diary and Alberta Blue Cross claims statements

Information from patient diaries (adult and pediatric) was compared to that in monthly aggregate claims statements from Alberta Blue Cross (ABC) for the same time period. Claims data were first converted to average monthly amounts per patient for each type of supply (the number of units

was divided by the number of claimants) since diary data were collected at the patient level. Seven day diary data were extrapolated to monthly estimates assuming 31 days in a month. The results are presented in Table 26. Across all supply categories, the average amounts used by each 'new pump' or 'existing pump' patient based on diary data were lower than those in the claims statements.

Quality of life

Adults

Results of analyses of the impact of IPT on health-related quality of life (HRQoL), assessed using the validated HRQoL instruments referred to above, are presented in Table 27. Based on responses to both the HUI2 and EQ-5D-5L, 'new pump' patients experienced a statistically significant gain in HRQoL during the first three months on IPT, compared to patients who were not on the pump (their HRQoL decreased over that time period). However, beyond those three months, there were no statistically significant differences in changes in HRQoL within or between groups. In contrast, DTSQ scores were statistically significantly higher in the 'new pump' group compared to the 'no pump' group at all follow-up points, suggesting that IPT improves treatment satisfaction.

The impact of IPT on quality of life was also assessed qualitatively through follow-up surveys. As mentioned previously, patients were asked: "Over the last 3 months, has anything changed regarding how diabetes affects your daily life or how you manage your diabetes? If 'yes', please describe." For 'new pump' patients, apart from 'glycemic control', the most prevalent themes identified included 'freedom and flexibility' (67%) and 'health' (55%) (Table 14). 'Freedom and flexibility' related to diet, exercise, career, travel and daily schedule. Regarding diet, "*[I] no longer need to have a regimented schedule where I have to eat at specific times and specific amounts of food*" (11%). Patients also reported feeling "*less worried about meal times*" and "*less anxious about food.*" Approximately 12% mentioned that their "*activity levels had increased*" and they "*exercise more.*" A similar proportion of patients reported a positive impact of the pump on their careers. "*[The pump] has improved my sugars while away at work*" and "*I have started working more.*" Two patients indicated that they have experienced "*less hassle through airport security,*" making travel easier, and 31% of patients reported "*greater freedom in schedule*" and indicated that the "*more*

flexible schedule makes life easier.” With respect to ‘health’, ‘improved mental health’ emerged as a theme in the follow-up surveys of 20% of patients. *“I believe my mood has improved”; “[I] am less depressed”; “I feel less anxious about managing my diabetes” and “I am a happier person.”* Approximately 15% of patients reported that their energy levels had improved and they were *“less tired.”* A general theme associated with better overall health was identified in 20% of patients. Some stated that: *“I feel better,” “I am a much healthier person,” and “I am living a healthier, more positive lifestyle because of the pump.”*

Although not specifically asked during follow-up surveys, the learning curve associated with the pump was mentioned in responses from 20% of patients. *“Finding those insulin amounts takes testing, time, and patience. At times, I am a little frustrated.”* However, most of them also reported they had developed the level of proficiency required with time. *“I have become more comfortable and proficient with the pump.”*

Consistent with findings from the quantitative analysis of HRQoL scores, no additional themes related to impact of the pump on quality of life were identified in the qualitative analysis of 6, 9, 12, 15, or 18 month follow-up surveys, suggesting that with IPT, the gains in quality of life are realized within the first three months.

Patients who chose to discontinue IPT

Six of the 84 patients in the ‘new pump’ group chose to return to MDIs (Table 14). Three of them had experienced consistently high blood sugars while on the pump. *“Due to high blood sugar readings in the past several months my doctors and I have decided to switch back to MDI”.* One patient had experienced *“extreme lows [that] scared my loved ones and me. That is why I chose to quit using the pump.”* A fifth patient stated that *“I really do not like being attached to it. Having a device attached to my body with tubes was bad for my self-esteem.”* The sixth patient indicated that *“there were issues occurring that I found to be a greater inconvenience versus the benefit added (pump could not operate at lower temperatures).”*

The demographic characteristics of these patients were compared with those who remained on the pump. No obvious differences in age, gender, age at diagnosis, or location of residence were noted.

Almost all patients who had yet to start pump therapy not only responded “no” to the follow-up question around changes over the last 3 months, but also provided reasons for not yet being on the pump (Table 28). Approximately 30% reported that they had failed to meet criteria for starting IPT because of poor glycemic control. *“I am unable to keep blood sugar levels at a normal rate.” “I am trying very, very hard to get my A1C level down to be accepted into the pump program.”*

Approximately 22% were waiting for a pump start date. However, approximately 28% (18 patients) had either decided they did not want a pump or were not ready. Of those patients, ten stated that either a pump was too much work or their schedules were too busy to dedicate the time required to start IPT. *“Too much work for me. It is just another insulin delivery system.. “Currently, I am dealing with aging parents and some marital issues plus I have 3 younger kids, so I will wait until life settles down and I can focus more on this process.”* For one patient, the IPT start date was inconvenient. *“I reported to spring training camp in the US one week after I would have started so I did not want to play around with it down south.”* Four patients reported that they were content with MDIs. *“My current treatment plan has good results so I’ve decided not to be on the pump.”* One patient felt that IPT was too complicated. *“...my complicated health problems would likely mean that my family would have to help me deal with my diabetes, but with the pump it seems it would be harder for them to deal with... would be much harder than a needle.”*

Children

Within the ‘new pump’ group, there were no statistically significant differences in utility values before and after starting IPT, based on any of the validated HRQoL questionnaires used (Table 29). Further, the utility gains among ‘new pump’ patients during the first three months on IPT were similar to those among patients without a pump for the same time period.

With respect to the impact of the pump on parents, Caregiver Burden Inventory (CBI) Time Dependency Scores and Physical Health Scores statistically significantly improved among parents

whose children had started IPT ('new pump' group). In contrast, there were no statistically significant differences in scores over time among parents within the 'no pump' group.

Findings from qualitative analyses suggested that IPT was associated with improvements in the quality of life of both children and parents. Regarding children, the most frequently identified themes were 'better health', 'more flexibility and freedom', a 'greater sense of normalcy', and 'fewer injections' (Table 16). 'Better health' included 'mental', 'physical', and 'general'. Almost 25% of parents noted improvements in their child mentally or psychologically. *"She is happier and more relaxed," "she is less self-conscious", and "[he] has fewer bad moods and is less irritable."* *"I knew that we would have better control but I never expected that my son would come out of his shell and start living his life again."* Approximately 15% reported physical improvements, including *"less headaches and belly aches,"* and *"more energy - he can sleep more and better so he has more energy."* An equal proportion mentioned general improvements in health, such as *"he is healthier overall"* or *"she feels better."* 'More flexibility and freedom' spanned diet, physical activity, and daily schedule. One quarter of parents felt that the ability to *"be more spontaneous with food"* had positively impacted their child's quality of life. *"He can eat like a normal person what other kids are eating"*. Approximately 10% of parents reported that their child had become more active. *"He has started taking part in intramural programs at school"* and *"she is more active because she doesn't have to miss recess to give herself injections in the washroom."* However, the most frequently identified sub-theme within 'more freedom and flexibility' related to daily schedule. Almost 75% of parents mentioned that the *"pump has allowed for a more flexible schedule."* In addition, one child reported that with the pump *"I have control over my diabetes and it isn't running my life."* Approximately 40% of parents indicated that the pump had given their child a sense of normalcy. *"It has become easier to do normal things like sleepovers"* and *"It is easier for him to be out and about with his friends."* The need for 'fewer injections' was identified as positively impacting quality of life by 20% of parents. *"We used to have to inject 8 times a day, which was difficult on her and us"* and *"we no longer have temper tantrums and meltdowns with meals/injections."*

In terms of improvements in quality of life among parents and families, six parents stated that they were able to return to work because they *"no longer needed to go to school to give the noon dose of*

insulin.” Ten parents reported less stress and anxiety with the pump. *“The pump has decreased the worry and anxiety about managing diabetes.”* It has *“decreased my stress because I no longer have to withhold food from her or force her to eat when she doesn’t want to”*. Three parents mentioned improvements in their relationship with their spouse. *“There is less conflict with my husband.”* Last, twelve parents felt that *“the pump has had a positive impact on the entire family.”* *“The whole family doesn’t have to have as rigorous a schedule,”* *“life is less centered around diabetes now,”* and *“the pump has been life changing for the family.”*

In addition to those describing the benefits experienced through IPT, themes related to ‘challenges’ and the ‘learning curve’ were identified. Challenges, reported by 13% of parents, included *“difficulty with the insertion sets and she is very thin”*, the *“need to continuously monitor and adjust settings”*, *“difficulty finding a place to connect the meter to a convenient spot on clothing”*, and the development of *“lumps of tissue associated with the injection site.”* Despite these challenges, none of the parents had decided to discontinue pump therapy. Almost one third of the parents mentioned the learning curve. Among them, almost half indicated that *“the pump is a lot of work so I wouldn’t suggest going on it unless you are ready to put in the time”*. *“It took 3 months to solve the issues with air bubbles. I was beginning to think I wanted to go back to pens.”* However, most reported that *“with time, it has become quicker and easier.”* *“She has adjusted and is much more comfortable with site insertions.”*

Parents of pediatric patients who were not on the pump reported no change in how diabetes affected daily life at any of the follow-up points. Half explained why their child had yet to start IPT (Table 30). The most common reason was ‘waiting for a start date’. Only one parent mentioned ‘poor glycemic control’. Two parents were not ready to commit to IPT, either because their child was still uncertain about the pump or their schedules were too busy and they were *“looking for a calm time to make the transition from what we know will be a new system.”*

ECONOMIC OUTCOMES

Cost per patient

Per patient costs over each 3-month period, starting 3 months prior to and ending 18 months after the baseline interview, were calculated (Tables 31 through 36). For patients in the 'no pump' group, the costs of HbA1c tests and diabetes-related ER, outpatient and in-patient visits were included. For patients in the 'new pump' and 'existing pump' groups, these costs, as well as those of the pump and both testing and pump supplies were included. For the 'existing pump' group, it was assumed that the average costs of diabetes-related ER, outpatient visits and in-patient stays were the same as those in the 'new pump' group.

Adults

The average cost/patient over the 21-month period was \$3,152.78 for those without a pump ('no pump'), \$27,973.11 for those who started IPT through the public program ('new pump') and \$21,830.70 for patients already on a pump but transitioning to the public program ('existing pump') (Tables 31 and 32). The main reason for the higher values in the latter 2 groups was the cost of the pump and supplies. The major difference between 'existing pump' and 'new pump' groups was the cost of insertion devices, which was approximately twice as much in 'new pump' patients as in 'existing pump' patients.

Children

The average cost/patient over the 21-month period was \$1,545.09 for patients not on a pump ('no pump' group), \$29,811.26 for those new to pump therapy ('new pump' group) and \$21,969.31 for those on a pump prior to launch of the public program ('existing pump' group) (Tables 33, 34, and 36). As with the adult patients, the higher costs associated with the 'new pump' and 'existing pump' patients groups were attributable to the pump and testing and pump supplies. Once again, the major cost difference between 'existing pump' and 'new pump' appear to be related to insertion devices, which cost twice as much in 'new pump' patients as in the 'existing pump' patients.

Budget impact

The cost per patient of delivering the IPT program was calculated from referral to an insulin pump clinic to the time of the annual reassessment based on the patient flow diagrams provided by AHS. Costs included clinic visits, pump education sessions, the pump, and testing and pump supplies. Results are presented in Tables 37 and 38 for adults and Tables 39 and 40 for children. In addition, the budget impact of the IPT program was calculated (Table 41).

Adults

The average actual and estimated overall costs of the IPT program per patient over this period were \$22,254.94/\$22,657.15 (actual/estimated) for 'new pump' patients and \$14,805.21/\$14,817.58 (actual/estimated) for 'existing pump' patients. Differences between the two groups were related to the costs of assessment and clinic visits for new pump users (which are approximately \$2,800 more than for 'existing pump' users) and the higher cost of insertion devices among 'new pump' users (approximately \$4,500). The incremental budget impact of adult IPT patients enrolled in the AED was estimated to be \$3,840,632.20 (\$2,084,907.72 for the 84 'new pump' patients and \$1,755,724.48 for the 94 'existing pump' patients).

Children

The average actual and estimated overall costs of the IPT program per pediatric patient over the study period were \$25,148.53/\$25,973.41 (actual/estimated) for 'new pump' patients and \$15,853.40/\$15,895.99 (actual/estimated) for 'existing pump' patients. As with adult patients, differences were attributable to the costs of assessment and clinic visits for 'new pump' users (\$5,000 to \$6,000) and the higher cost of insertion devices among 'new pump' users (approximately \$4,500). The incremental budget impact of the 83 pediatric IPT patients enrolled in the AED was estimated to be \$2,314,724.30 (\$2,233,027.42 for the 79 'new pump' patients and \$81,696.88 for the 4 'existing pump' patients).

Cost-effectiveness

Incremental cost-utility ratios (the cost to produce one additional quality-adjusted life year) for 15 months and 5 years are presented in Tables 42 and 43 for adult and pediatric patients, respectively.

Adults

The additional cost of the average 'new pump' patient versus a 'no pump' patient over 15 months was \$19,193.34 and the incremental gain in utility was 0.06, resulting in an incremental cost-utility ratio for IPT compared to standard care of \$319,888.98/QALY. In contrast, the five year incremental cost-utility ratio was lower (\$225,738.78/QALY (using the EQ-5D-5L)) due to the longer time period over which the cost of the pump is being spread.

Children

The additional cost of the average 'new pump' pediatric patient versus a 'no pump' patient over 16 months was \$21,523.99 and the gain in utility was 0.01, resulting in an incremental cost-utility ratio of \$2,152,398.52/QALY. The estimated 5 year incremental cost-utility ratio was considerably lower - \$189,371.39/QALY. As mentioned above, the cost of the pump is being spread over a longer time period. Also, utility values decreased in the 'no pump' group over time, and were lowest after 15 months, which represented the values used to estimate utilities for the remainder of the 5 year time horizon. In the 'new pump' group, utility gains remained stable. Last, utility values were based on a very small sample size. Therefore, the extent to which they may be generalizable to the broader pediatric population is uncertain.

Impact on diabetes/insulin pump clinic resources

Nine of the eleven adult and pediatric pump clinics participated in the interviews. For most clinics, the majority of patients who had expressed interest in the provincial IPT program were already clinic patients. The estimated amount of time spent preparing for the roll-out of the program varied across clinics (10 hours to 602 hours). Those with the highest numbers reported meetings to develop clinic procedures, documents, education materials, forms and competencies. Across all clinics, preparations had required at least a registered nurse (RN) and registered dietitian (RD). The largest clinic had involved a multidisciplinary team consisting of an educator, RNs, RDs, endocrinologists, administrative staff, a pharmacist, a psychologist, a social worker, and representatives from three pump companies.

While the basic elements of the pump start process were found to be similar across clinics, the way in which they had been implemented differed. For example, the frequency of pre-pump information sessions ranges from *“as demanded (people sign up) and based on the availability of staff”* to once every three to four months, and at one clinic, the sessions are offered online only. Although the length of in-person pump sessions is comparable among clinics, the time required preparing for each one varies (30 minutes to 3 hours). In addition, the average number of appointments per patient (telephone and in-person) during the ‘assessment of IPT eligibility’ phase ranges from 1 to 12 across clinics and takes place over a period of 3 months to 12 months. The availability of pump start classes also differs. Some hold 2 to 3 per month, while others offer 6 per year. In one case, *“all pump starts are one-on-one with the patient.”*

Given the significant variation in IPT-related clinic operations, it was not possible to formulate a single estimate of resource requirements for all clinics.

During the interviews, clinics provided feedback on additional resources for the IPT program. Broadly, comments related to increased staff and education. Half of the clinics mentioned the need for an additional RN and/or RD. *“If I had extra resources I would add a 0.5 FTE RD and a full time RN”; “...requesting an additional on call after hours”; and “I would ask for an additional 1.0 FTE RN to deal with pump starts and to increase the number of follow-up sessions and increase the number of pump starts.”* Two of the clinics mentioned social workers - *“more FTEs for social workers especially for client support for children transitioning into teens.”* One third indicated that more administrative support is required to *“deal with all the paperwork for the program”* and *“because there are more appointments to be booked and more follow-ups to book.”* Regarding education, one third of the clinics indicated that *“more education of staff is needed”* on the IPT program’s process or the insulin pump, itself. *“RN and RD need to be pump knowledgeable”* and *“There is no AHS-sponsored insulin pump education for staff. There is no standard for education.”*

Clinics also provided feedback on elements of the process they would change. The most common theme was ‘reduce the amount of paperwork’. *“Less paperwork. Some questions on the form are tedious especially in [Determination] Form B.”*

IPT AED FEASIBILITY

Several challenges related to the implementation of the AED were identified. Such an evaluation required numerous resources, as well as the establishment of linkages and agreements with a variety of individuals and organizations. Ethics approvals from 3 institutional ethics boards were needed. Compliance with those approvals meant that patients had to be approached first by staff of individual IPT clinics, and the willingness of staff to assist with recruitment varied considerably across clinics. In order to obtain data from both AH and AHS databases, separate arrangements were necessary, and there was limited awareness of the AED as a government-mandated project within both organizations. The question of whether the evaluation constituted “research” or “quality improvement” was the focus of several discussions and meetings, which led to delays in reaching a data sharing agreement. The lack of knowledge regarding the potential number of patients who would participate in the IPT program when it was launched created uncertainties in the projected time frame for the evaluation.

Despite these issues, collaboration among the various groups was achieved. From the outset, the decision problem and uncertainties in existing evidence were clearly specified. This enabled the development of an appropriate methodological framework for the evaluation. Also, with continued engagement of the Steering Committee throughout the AED, it was possible to effectively and efficiently modify processes when necessary.

Reasonable numbers of patients agreed to participate in the evaluation, and the data needed to address the evidence gaps specified in the Project Charter were generated. Thus, the main objective of the AED evaluation was met. However, whether or not AED is a feasible policy option for promising technologies cannot be established until the results of this pilot are considered by decision-makers. Notably, this evaluation has received significant interest from other jurisdictions across Canada, including the Nova Scotia Health Authority and the ministries of health in Ontario and British Columbia.

For this type of policy option to be fully implemented in Alberta, a number of steps would need to be taken. Awareness of AED needs to be broadened within AH and AHS, and an organizational culture that values the generation and use of evidence for decision-making needs to be developed. More effective means of engaging front-line staff at the planning stages of an AED and standard operating procedures for managing AEDs are required.

CONCLUSIONS

Based on 'real world' evidence from the AED evaluation, IPT offers comparable safety and effectiveness in terms of glycemic control to MDIs, while improving HRQoL and overall quality of life. However, it does not meet generally accepted standards (i.e., cost-effectiveness thresholds) for determining that an intervention is cost-effective.

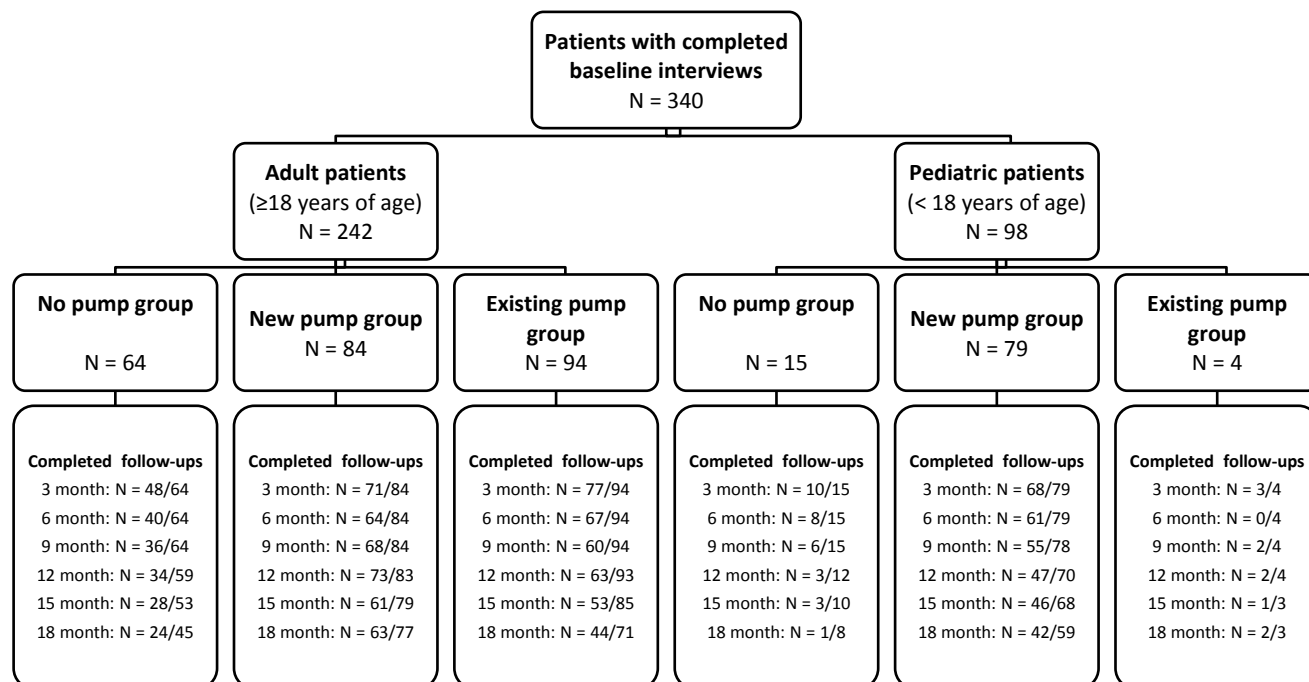


Figure 1. Breakdown of participants recruited to participate in the IPT evaluation according to pump status

Table 1. Number of patients with completed follow-ups and time from follow-up to baseline interview (mean \pm standard deviation (range) in months)

Follow-up period	Adult patients (≥ 18 years of age) (N = 242)			Pediatric patients (< 18 years of age) (N = 98)		
	No pump (N = 64)	New pump (N = 84)	Existing pump (N = 94)	No pump (N = 15)	New pump (N = 79)	Existing pump (N = 4)
3 month	N = 48 3.3 \pm 0.7 (2.4-4.7)	N = 71 3.5 \pm 0.7 (2.3-5.0)	N = 77 3.1 \pm 0.5 (2.2-4.9)	N = 10 3.5 \pm 0.6 (2.9-4.7)	N = 68 3.3 \pm 0.6 (2.3-4.8)	N = 3 3.7 \pm 0.6 (3.1-4.2)
6 month	N = 40 6.2 \pm 0.7 (5.4-7.7)	N = 64 6.3 \pm 0.8 (5.1-7.9)	N = 67 6.1 \pm 0.6 (4.6-7.9)	N = 8 6.7 \pm 0.7 (5.9-7.8)	N = 61 6.4 \pm 0.9 (4.5-8.7)	N = 0
9 month	N = 36 9.1 \pm 0.9 (7.9-11.5)	N = 68 9.2 \pm 0.8 (8.0-10.8)	N = 60 9.3 \pm 0.8 (7.6-11.4)	N = 6 9.5 \pm 0.5 (9.0-10.1)	N = 55 9.2 \pm 0.8 (7.8-11.3)	N = 2 9.3 \pm 0.1 (9.2-9.4)
12 month	N = 34 12.2 \pm 1.1 (10.5-15.0)	N = 73 12.3 \pm 0.9 (10.7-14.2)	N = 63 12.5 \pm 1.2 (10.5-15.2)	N = 3 12.7 \pm 0.8 (11.9-13.4)	N = 47 12.4 \pm 1.0 (10.6-14.8)	N = 2 12.0 \pm 0.16 (11.9-12.2)
15 month	N = 28 15.7 \pm 1.5 (13.3-19.6)	N = 61 15.6 \pm 1.2 (13.6-19.8)	N = 53 15.7 \pm 1.1 (13.6-18.0)	N = 3 16.0 \pm 1.3 (14.6-17.2)	N = 46 15.6 \pm 1.3 (13.3-19.3)	N = 1 15.6
18 month	N = 24 18.9 \pm 1.7 (16.4-23.3)	N = 63 19.5 \pm 2.1 (16.7-30.2)	N = 44 19.3 \pm 1.9 (16.6-23.8)	N = 1 23.3	N = 42 19.6 \pm 2.3 (16.1-28.6)	N = 2 19.1 \pm 1.5 (18.0-20.1)

Table 2. Baseline demographic characteristics for adult patients (≥18 years of age at baseline)

	No pump	New pump	Existing pump	P-value for difference between groups*
Number of patients	64	84	94	
Gender (male / female)	34 (53%) / 30 (47%)	27 (32%) / 57 (68%)	35 (37%) / 59 (63%)	0.029
Age at baseline interview (years)	44.1 ± 13.6 (18.3, 72.0) 45.7 [23.8]	43.0 ± 15.7 (19.1, 73.7) 42.6 [27.8]	43.0 ± 15.8 (18.0, 75.8) 42.5 [25.1]	0.879
Age at diagnosis of type 1 diabetes	21.5 ± 15.0 (0.4, 61.5) 17.7 [18.0]	22.1 ± 14.3 (1.8, 59.5) 20.3 [18.1]	19.5 ± 11.8 (1.7, 54.0) 17.0 [16.3]	0.414
Number of years since diagnosis of type 1 diabetes	22.6 ± 14.4 (0.2-56.8) 21.4 [21.8]	20.9 ± 16.2 (0.3, 60.2) 18.2 [23.6]	23.8 ± 14.1 (3.6, 66.6) 20.7 [17.1]	0.443
Clinic:				0.006
Calgary Diabetes Centre	21 (33%)	36 (43%)	37 (39%)	
Edmonton Clinic	24 (38%)	16 (19%)	22 (23%)	
Edmonton Grey Nuns	13 (20%)	6 (7%)	14 (15%)	
Grande Prairie Diabetes Clinic	2 (3%)	8 (10%)	1 (1%)	
Lethbridge Diabetes Program	0 (0%)	3 (4%)	0 (0%)	
Medicine Hat Diabetes Program	0 (0%)	1 (1%)	1 (1%)	
Red Deer Diabetes Specialty Care Program	4 (6%)	14 (17%)	18 (19%)	
Fort McMurray Diabetes Clinic	0 (0%)	0 (0%)	0 (0%)	
Wetaskiwin Diabetes Specialty Care Program	0 (0%)	0 (0%)	1 (1%)	
Location of residence (AHS Zone):				0.008
North	7 (11%)	11 (13%)	6 (6%)	
Edmonton	28 (44%)	13 (15%)	30 (32%)	
Central	8 (13%)	19 (23%)	19 (20%)	
Calgary	21 (33%)	35 (42%)	38 (40%)	
South	0 (0%)	4 (5%)	1 (1%)	
Out-of-province	0 (0%)	2 (2%)	0 (0%)	

Notes:

- values are in mean ± standard deviation (range) and *median [interquartile range]* or number of patients (percent of patients)
- data source: University of Alberta baseline interview/questionnaire data
- *overall difference between groups assessed by Chi-squared test for categorical variables and one-way ANOVA test for continuous variables

Table 3. Baseline demographic characteristics for pediatric patients (<18 years of age at baseline)

	No pump	New pump	Existing pump	P-value for difference between groups*
Number of patients	15	79	4	
Gender (male / female)	8 (53%) / 7 (47%)	37 (47%) / 42 (53%)	1 (25%) / 3 (75%)	0.709
Age at baseline interview (years)	11.6 ± 3.4 (6.8, 17.9) 10.3 [6.2]	10.7 ± 4.0 (2.9, 17.8) 11.2 [5.6]	13.0 ± 2.8 (9.9, 16.3) 12.3 [4.4]	0.463
Age at diagnosis of type 1 diabetes	8.3 ± 4.0 (1.3, 14.9) 8.4 [5.9]	7.4 ± 3.8 (0.0, 14.3) 7.4 [6.7]	6.0 ± 2.8 (3.3, 9.4) 5.7 [4.6]	0.586
Number of years since diagnosis of type 1 diabetes	3.4 ± 3.0 (0.8, 11.0) 1.6 [4.1]	3.3 ± 3.1 (0.3, 14.5) 2.1 [3.5]	6.9 ± 2.1 (4.7, 9.0) 7.0 [3.5]	0.057
Clinic:				0.408
Calgary - Alberta Children's Hospital	9 (60%)	38 (48%)	2 (50%)	
Edmonton - Stollery Children's Hospital	4 (27%)	27 (34%)	0 (0%)	
Lethbridge Diabetes Program	1 (7%)	2 (3%)	0 (0%)	
Medicine Hat Diabetes Program	0 (0%)	1 (1%)	0 (0%)	
Red Deer Diabetes Specialty Care Program	1 (7%)	11 (14%)	2 (50%)	
Location of residence (AHS Zone):				0.335
North	3 (20%)	7 (9%)	0 (0%)	
Edmonton	1 (7%)	16 (20%)	0 (0%)	
Central	2 (13%)	16 (20%)	3 (75%)	
Calgary	8 (53%)	32 (41%)	1 (25%)	
South	1 (7%)	8 (10%)	0 (0%)	
Out-of-province	0 (0%)	0 (0%)	0 (0%)	

Notes:

- values are in mean ± standard deviation (range) and *median [interquartile range]* or number of patients (percent of patients)
- data source: University of Alberta baseline interview/questionnaire data
- *overall difference between groups assessed by Fisher's exact test for categorical variables and Kruskal-Wallis test for continuous variables

Table 4. Factors related to IPT program processes for adult patients (≥18 years of age at baseline)

	Patients not currently on a pump (N = 64)	Patients who received a pump through program (N = 84)	Patients transitioning from private to public program (N = 94)	P-value for difference between groups*
Main reasons for interest in IPT program†:	N=48	N=77	N/A	
- improve glycemic control	38 (79%)	56 (73%)		0.417
- improve flexibility with lifestyle factors	17 (35%)	31 (40%)		0.588
- reduce number of injections	7 (15%)	12 (16%)		0.879
- improve accuracy/precision of insulin delivery	1 (2%)	7 (9%)		0.120
- obtain coverage of glucose testing supplies	4 (8%)	4 (5%)		0.486
- prevent long-term complications/improve long-term health	2 (4%)	4 (5%)		0.794
- other	3 (6%)	5 (6%)		0.957
Referral source‡:	(N=64)	(N=82)	(N=94)	0.808
- general practitioner	18 (28%)	15 (18%)	19 (20%)	
- specialist physician	22 (34%)	26 (32%)	30 (32%)	
- nurse practitioner	3 (5%)	5 (6%)	5 (5%)	
- self	14 (22%)	29 (35%)	30 (32%)	
- other	7 (11%)	7 (9%)	10 (11%)	
Number of months from referral to completion of education session‡	(N=43) 3.8 ± 4.8 (-1, 27) 3 [4]	(N=47) 3.1 ± 3.8 (0, 14) 2 [5]	(N=55) 7.7 ± 8.1 (-1, 33) 5 [11]	0.000
Number of patients who have not yet completed pump education session	10 (16%)	4 (5%)	33 (36%)	0.000
Number of months from referral to start of IPT – overall	N/A	(N=52) 8.8 ± 5.7 (2, 30) 8 [7.5]	N/A	N/A
Number of months from referral to start of IPT – by clinic	N/A		N/A	0.000**
Calgary Diabetes Centre		6.5±4.1 (2, 14) (N=23) 6 [8]		
Edmonton Clinic		10.6±4.2 (6, 19) (N=8) 9.5 [4.5]		
Edmonton Grey Nuns		17.8±7.1 (12, 30) (N=5) 16 [3]		
Grande Prairie Diabetes Clinic		7.3±5.7 (2, 18) (N=6) 5 [4]		
Lethbridge Diabetes Program		3.5±2.1 (2, 5) (N=2) 3.5 [3]		
Medicine Hat Diabetes Program		3.0 (N=1)		
Red Deer Diabetes Specialty Care Program		11.3±3.7 (8, 18) (N=7) 23 [8]		
Fort McMurray Diabetes Clinic		- (N=0)		
Wetaskiwin Diabetes Specialty Care Program		- (N=0)		
Number of months from referral to current date (31/Aug/2016) – overall	(N=50) 28.5 ± 7.1 (14, 38) 31 [12]	N/A	N/A	N/A
Number of months from referral to current date (31/Aug/2016) – by clinic		N/A	N/A	0.002**
Calgary Diabetes Centre	34.4±2.2 (31, 38) (N=14) 34.5 [2]			
Edmonton Clinic	27.3±7.3 (15, 37) (N=19) 30 [13]			
Edmonton Grey Nuns	25.4±7.5 (14, 36) (N=12) 25 [13.5]			
Grande Prairie Diabetes Clinic	23.0±1.4 (22, 24) (N=2) 23 [2]			

Lethbridge Diabetes Program	- (N=0)			
Medicine Hat Diabetes Program	- (N=0)			
Red Deer Diabetes Specialty Care Program	23.7±4.0 (20, 28) (N=3)			
Fort McMurray Diabetes Clinic	- (N=0)			
Wetaskiwin Diabetes Specialty Care Program	- (N=0)			
Type of pump received‡:	N/A	(N=83)	(N=94)	0.000
- Accu-Check® (Roche)		1 (1%)	3 (3%)	
- OmniPod® (OmniPod)		20 (24%)	6 (6%)	
- OneTouch® (Animas)		37 (45%)	23 (24%)	
- Paradigm® (Medtronic)		25 (30%)	62 (66%)	
Number of patients who have gone off the pump	N/A	6 (7%)	2 (2%)	0.175

Notes:

- values are in mean ± standard deviation (range) and *median [interquartile range]* or number of patients (percent of patients)
- data sources: †AHS determination form A data and ‡University of Alberta baseline interview/questionnaire data
- *overall difference between groups assessed by Chi-squared test for categorical variables and one-way ANOVA test for continuous variables
- **overall difference in months from referral to IPT start and referral to current date assessed by one-way ANOVA test

Table 5. Reasons for interest in IPT program among patients who have not yet started pump therapy ('no pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
Glycemic control	Better control	"not getting good blood sugar control" "will keep sugars in check" "better sugar control" "Am a brittle diabetic" "not have to worry about recovery from lows when I am unable to continue with activities" "family doctor has been encouraging me to go on a pump for some time"	53
	Hypoglycemia at night	"prevent seizures due to night time lows" "lots of erratic highs and lows and overnight low blood sugars that would result in seizures"	2
Insulin	Difficulties with long acting insulin	"always feel sickish and believe pump will change this because [I] will be using short acting insulin" "reduce insulin reactions" "issues with long acting insulin"	3
	Delivery of more precise, smaller doses of insulin	"I am unable to give small doses with pens" "have flexibility with short acting insulin" "current dosage pen system isn't flexible enough" "more precise measurements"	9
Freedom and flexibility	Diet	"eat in a large group setting where how the food is prepared and what is served cannot be easily modified" "must consider food, which is time consuming"	7
	Exercise /physical activity	"can do long distance running" "would allow me to exercise and get in better shape" "afraid of exercise and this makes [me] feel unhealthy and unwell" "unable to exercise" "would like to have an active lifestyle" "to feel better especially when I am exercising or competing in dirt bike races"	8
	Career	"cost of diabetes is affecting type of career" "limits career choices – no shift work" "unable to continue to pursue a career as a pilot without the pump" "cannot hold down 8 hour job because of low blood sugar" "could do shift work" "would allow more flexibility at work" "have physically active job"	12
	Travel	"to travel abroad"	2

Table 5. Reasons for interest in IPT program among patients who have not yet started pump therapy ('no pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
		"less hassle while going through airport security"	
	Schedule	"can have a flexible schedule"	5
	General	"provide flexibility in life" "seems to be more versatile for my active life"	2
Fewer injections	Less scarring and better absorption of insulin	"hard time finding areas in abdomen to absorb insulin" "scar tissue due to MDIs"	3
	General	"exhausted with managing MDIs" "don't like giving myself needles"	6
Health	Mental/psychological	"improve my mood" "no longer have to worry about forgetting to take insulin" "always worry about having enough supplies" "to reduce stress and anxiety over managing my diabetes"	4
	Physical - energy and weight loss	"am hoping to have more energy" "for weight loss"	2
	Physical - diabetes-related complications	"to lower risk of long term complications of diabetes" "to preserve kidney function" "to help stop neuropathy in my feet"	9
Privacy	Manage blood sugars discreetly	"deal with blood sugars privately"	1
Quality of life	General	"I believe it will improve my quality of life"	3
Access to testing supplies, pump and pump supplies	Testing supplies	"limited supply coverage even with private insurance" "don't test as often to make supplies last longer" "conserve testing supplies because they are expensive"	7
	Pump	"I was on a pump but had to leave it when I could no longer be on [my] parents' insurance plan" "interested in getting a pump years ago but could not afford it" "looked at getting a pump 5 years ago and despite having 2 really good insurance plans, I could not get a pump" "had considered pump before but couldn't afford it" "10 years ago doctor encouraged me to try pump therapy but didn't because of the costs of the pump" "AISH does not cover cost of the pump"	16
	Pump supplies	"could not pay for pump supplies without the provincial program"	7

Table 6. Reasons for interest in IPT program among patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing themes	Basic themes	Examples	Frequency of theme
Glycemic control	Better control	"to smooth out highs and lows" "would help with unexplained high blood sugars" "more control of blood sugars" "to deal with significant low blood sugars that are unexplained" "to prevent highs and lows that make you feel really crappy" "brittle diabetic" "could have a high blood sugar of 15 and in an hour it lowers to under 5 – hope that the pump will prevent this issue" "problems with hypoglycemia" "to level out highs and lows"	47
	Hypoglycemia at night	"alleviate fears about going low at night leading to seizures" "history of nighttime hypoglycemia"	3
Insulin	Difficulties with long acting insulin	"struggled with long acting insulin" "would not have to use long acting insulin"	5
	Delivery of more precise, smaller doses of insulin	"able to give smaller incremental units of insulin" "can make more rapid adjustments" "more precise doses"	9
Freedom and flexibility	Diet	"so I can eat what I want when I want" "I am sensitive to insulin and food"	6
	Exercise /physical activity	"improve ability to exercise"	2
	Career	"I'm a farmer who keeps long hours" "to be able to do shift work" "for convenience because of work schedule"	5
	Travel	"to be able to travel more easily"	2
	Schedule	"not having to know your schedule ahead of time" "greater freedom of choice in terms of schedule" "I am going to school and I am hoping the pump will allow me not to have such a strict schedule"	14
	General	"to have a freer life" "pump would be more convenient"	2
Fewer injections	Less scarring and better absorption of insulin	"do not need to rotate sites as often" "Not having to rotate sites every day"	6
	General	"don't have to shoot myself up 10 times a day" "MDI drives me nuts" "only one needle every three days is heaven"	13

Table 6. Reasons for interest in IPT program among patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing themes	Basic themes	Examples	Frequency of theme
Health	Mental/psychological	"improve mood"	1
	Physical -energy	"improve energy level"	3
	Physical - diabetes-related complications	"reduce chances of complications as a result of diabetes" "preserve kidney function"	2
	General	"to feel better" "to prolong life"	2
Normalcy	General	"feel like a regular person" "more normal life" "want to live a normal life"	4
Privacy	Manage blood sugars discreetly	"won't have to be embarrassed" "able to deal with blood sugars privately" "I had someone call the police on me when I was giving myself insulin because they thought I was a drug addict"	3
Access to supplies	Testing supplies	"the cost of glucose testing supplies is the main reason" "would continue giving injections if testing supplies were covered" "test less frequently because test strips are expensive" "reuse lancets to save money"	8
	Pump	"been looking at the pump for 10 years but cost was the barrier" "looked at pump 4 years ago but did not get it because of cost and no private insurance" "stopped using a pump 5 years ago because of costs" "insurance company would not cover pump" "doctors recommended pump years ago but couldn't because of the cost" "without provincial coverage I would be unable to go on the pump"	19
	Pump supplies	"Supplies are expensive and I am self-employed" "Did not get pump earlier because of supplies"	11

Table 7. Reasons for interest in IPT program among patients on pump therapy prior to the launch of the provincial program ('existing pump' patients)

Organizing themes	Basic themes	Examples	Frequency of theme
Access to supplies	Testing supplies	<p>"would conserve testing supplies"</p> <p>"I do think every time I test there go another 89 cents"</p> <p>"Can no longer afford to pay \$6,000 per year for pump and testing supplies"</p> <p>"I have saved supplies to decrease costs"</p> <p>"test less frequently to save supplies"</p>	13
	Need a new pump	<p>"pump broke down and I am on a loaner pump"</p> <p>"I can't afford to pay out of pocket again"</p> <p>"Insurance won't pay for replacement pump"</p> <p>"Private insurance is refusing to pay for a new pump"</p> <p>"unable to afford to replace old pump without public assistance"</p> <p>"realized a few months ago that my pump would probably crap out soon and insurance will only pay \$1500"</p> <p>"asked for a new pump through my employer's plan and was told they would not cover it"</p>	25
	Pump supplies	<p>"I used to stretch out pump supplies to save money"</p> <p>"Insurance company has changed coverage for supplies"</p> <p>"Private insurer is delisting coverage for pump supplies"</p> <p>"I no longer have private insurance"</p> <p>"Can no longer afford to pay \$6,000 per year for pump and testing supplies"</p> <p>"I changed jobs so my insurance changed"</p> <p>"has reused reservoirs and delayed replacing pump"</p> <p>"Has prolonged/saved infusion sets"</p> <p>"found it hard to deal with the costs so have saved/prolonged infusion sets"</p> <p>"employee health benefits insurance company sent me a notice that I must go through the Alberta Blue Cross IPT program first and then go through the employer health benefits program for anything that isn't covered"</p> <p>"Unable to keep pump without the program because husband was recently laid off and I have no benefits because I have a casual nursing position"</p> <p>"insurance does not cover pump supplies"</p> <p>"Am retiring and need the provincial program in order to stay on the pump"</p>	34
Afford CGM	Start CGM(will be able to pay out of pocket because pump and pump supplies are covered)	<p>"to be able to afford CGM"</p> <p>"unable to start CGM because of the costs but may be able to now that I don't need to pay for my pump supplies"</p>	6
	Continue on CGM(will	"free up funds to be able to continue on CGM"	5

Table 7. Reasons for interest in IPT program among patients on pump therapy prior to the launch of the provincial program ('existing pump' patients)

Organizing themes	Basic themes	Examples	Frequency of theme
	be able to pay out of pocket because pump and pump supplies are covered)	"liked CGM but could not afford to continue because of the costs of the sensor" "have saved sensors because of the costs"	

Table 8. Summary of private insurance among adult patients by pump status group

Organizing themes	Coverage details	Examples	Frequency
<i>'Existing pump' group</i>			
Pump and supplies	Full coverage of pump and supplies	<p>"no limitations to my current plan through work"</p> <p>"100% of coverage through work"</p> <p>"covered 100%"</p> <p>"...covers the entire cost of the pump, all pump supplies..."</p> <p>"we don't pay a thing"</p> <p>"insurance paid for first pump entirely and [I] paid for [my] second pump...insurance pays for all pump supplies"</p>	9
	Partial coverage of pump and supplies	<p>"very lucky that family and insurance covers the cost of the pump and the supplies"</p> <p>"current plan covers 80% of testing and pump supplies...pump was 60% covered"</p> <p>"has 85% coverage through work so is out of pocket for 15% of the cost of testing and pump supplies...paid for 15% of the pump..."</p> <p>"only covers a portion of the pump"</p> <p>"pump and testing supplies and insulin are covered up to a maximum of \$4000 a year"</p> <p>"transitioning into the public system for additional coverage and in case [I] need a replacement for her pump"</p> <p>"already on the pump with private insurance"</p> <p>"got the pump earlier for benefits"</p>	8
	Full coverage of supplies, partial coverage of pump	<p>"current insurance covers 100% of pump supplies and CGM supplies but only 90% of pump"</p> <p>"...\$3,500 towards the purchase of an insulin pump every 6 years"</p> <p>"insurance pays for everything...[but] will only pay about \$1500 for the pump"</p> <p>"retired federal employee, which pays for 80% of pump and all supplies"</p> <p>employer's plan paid for part of the pump"</p>	5
Pump only	Full coverage of pump	"original pump was paid for by private insurance...they did not cover any of the supplies cost"	1
	Partial coverage of pump	"covered a portion of the pump and testing but no coverage for supplies"	1
Supplies only	Full coverage of supplies	<p>"wouldn't pay for the replacement pump [I] needed"</p> <p>"paid for all pump supplies but not the pump"</p> <p>"insurance company does not reimburse the cost of the pump but covers all pump supplies"</p> <p>"plan covers supplies and insulin"</p> <p>"supplies are covered"</p> <p>"..boyfriend's insurance plan pays for majority of testing, pump supplies, and insulin"</p> <p>"cost of supplies is covered"</p>	8
	Partial coverage of supplies	<p>"limited insulin supplies coverage"</p> <p>"private insurance only covers 80% of the costs of the pump"</p> <p>"enrolled in the program to get additional pump supplies coverage"</p>	11

Table 8. Summary of private insurance among adult patients by pump status group

Organizing themes	Coverage details	Examples	Frequency
		<p>“covers about 90% of all the costs of the pump supplies”</p> <p>“had to pay for the pump outright and limited coverage for supplies”</p> <p>“paid for the supplies but did not cover any portion of the pump costs”</p> <p>“partially covered by my parents’ plan”</p> <p>“transitioning into the public system for supplies coverage”</p> <p>“benefits plan through work covered insulin and test strips but didn’t cover pump supplies”</p> <p>“private insurance is not covering the cost of a new pump”</p> <p>“new pump not covered...supplies, a percentage is covered by parents’ plan”</p>	
Neither	Pump and supplies not covered	<p>“private insurance does not pay for pump, it pays for the pen supplies”</p> <p>“purchased 2 pumps on my own”</p> <p>“insurance only covered insulin and test strips”</p>	4
Change in private insurance	Pumps and supplies no longer covered	“will no longer cover my pump and supplies”	1
	Pumps no longer covered	“[pump] no longer covered”	1
	Supplies no longer covered	“the insurance company has changed coverage for pump supplies”	1
	Must go through IPT program first	“insurance company did send a notice that [I] must go through the Alberta Blue Cross IPT program for pump supplies and then go through the employer health benefits program for any additional costs that are not covered”	1
Details of insurance not described	N/A	<p>“comprehensive private insurance”</p> <p>“excellent private coverage”</p> <p>“no limitations under current plan”</p> <p>“current health care coverage is very limited”</p>	16
No private insurance	N/A	<p>“after retiring - no coverage”</p> <p>“no private coverage”</p> <p>“currently no private insurance, but in the US parents’ insurance plan was comprehensive”</p> <p>“no coverage at all”</p> <p>“was covered under parents’ benefit plan until I turned 25”</p>	13
	Enrolled in a social program that does not cover pump	<p>“looking at discontinuing using the insulin pump due to the limited private insurance coverage for seniors”</p> <p>“Alberta Seniors Blue Cross”</p> <p>“AISH does not cover pump or supplies”</p> <p>“coverage from Alberta Monitoring for Health”</p>	6
<i>‘New pump’ group</i>			
Pump and supplies	Partial coverage of pump and supplies	<p>“looked at getting pump before 2013 but very expensive even with coverage and supplies”</p> <p>“insurance company would pay for the pump and a percentage of the costs of supplies”</p>	6

Table 8. Summary of private insurance among adult patients by pump status group

Organizing themes	Coverage details	Examples	Frequency
		“private insurance does not pay for any of the pump or pump supplies” “new private plan and it will cover a portion of the pump and a portion of the supplies and all of the test strips”	
Pump only	N/A	N/A	0
Supplies only	Partial coverage of supplies	“it only covers partially for pump supplies and nothing for the pump” “insurance did not cover the costs for the pump and had limited supplies coverage”	2
Neither	Pump and supplies not covered	“no funding from insurance company” “parents’ insurance covers pen supplies but not the pump or the pump supplies” “parents’ health benefits [do] not cover the insulin pump supplies or the pump” “I paid out of pocket for my old pump” “his plan wouldn’t pay for [my] pump”	6
Details of insurance not described	N/A	“private plan” “AB Blue Cross Coverage” “parents’ insurance plan” “coverage through work”	24
	But could not afford pump before public program	“did not get a pump sooner” “did not get a pump earlier because of costs of pump and supplies” “without public funding for the pump, [I] would not be able to start or continue with pump therapy” “could not afford to buy one”	6
No private insurance	N/A	“not working...no private insurance” “forced to leave parent’s insurance plan”	7
	Enrolled in a social program that does not cover pump	“part of seniors Blue Cross Plan” “AISH”	3
<i>‘No pump’ group</i>			
Pump and supplies	Full coverage of pump and supplies	“private insurance was willing to pay for the pump and the supplies” “private insurance did cover pump and supplies and still continues to cover it”	2
	Partial coverage of pump and supplies	“private insurance would cover part of it” “even though our private insurance, covers, I think \$4000 in total for the pump and supplies, the total cost of the pump and monthly costs for supplies would be a stretch for us”	2
Neither	Pump and supplies not covered	“did not get a pump before the province began funding it because of the costs” “I am trying a pump now because it is covered but I couldn’t pay for one before the program” “very limited private insurance” “insurance doesn’t cover the pump or supplies for the pump” “no funding from insurance company”	4
Details of insurance	N/A	“limited private insurance”	29

Table 8. Summary of private insurance among adult patients by pump status group

Organizing themes	Coverage details	Examples	Frequency
not described		“coverage is terrible” “Blue Cross coverage is not great”	
	But could not afford pump before public program	“would be unable to get the pump without public assistance” “a doctor encouraged [me] to try pump therapy to help with management of diabetes but [I] did not because of the high costs of the pump and supplies and [I do] not think insurance covered it”	2
No private insurance	N/A	“no private insurance” “looking for work”	7
	Enrolled in a social program that does not cover pump	“low income funding from province” “currently on AISH” “currently retired and covered under the Alberta Seniors Blue Cross Plan”	4

Table 9. Factors related to IPT program processes for pediatric patients (<18 years of age at baseline)

	No pump (N = 15)	New pump (N = 79)	Existing pump (N = 4)	P-value for difference between groups*
Main reasons for interest in IPT program†:	N=8	N=64	N/A	
- improve glycemic control	5 (63%)	37 (56%)		1.000
- improve flexibility with lifestyle factors	4 (50%)	36 (56%)		1.000
- reduce number of injections	3 (38%)	29 (45%)		0.725
- improve accuracy/precision of insulin delivery	0 (0%)	6 (9%)		1.000
- obtain coverage of glucose testing supplies	0 (0%)	3 (5%)		1.000
- prevent long-term complications/improve long-term health	1 (13%)	7 (11%)		1.000
- other	2 (25%)	3 (5%)		0.092
Referral source‡:	(N=15)	(N=78)	(N=4)	0.076
- general practitioner	2 (13%)	3 (4%)	0 (0%)	
- specialist physician	5 (33%)	29 (37%)	0 (0%)	
- nurse practitioner	0 (0%)	8 (10%)	0 (0%)	
- self	5 (33%)	29 (37%)	0 (0%)	
- other	3 (20%)	16 (21%)	4 (100%)	
Number of months from referral to completion of education session	(N=9) 3.0 ± 3.3 (0, 9) 2 [2]	(N=42) 4.2 ± 5.6 (0, 21) 2 [5]	(N=0)	0.882
Number of patients who have not yet completed pump education session	3 (20%)	17 (22%)	3 (75%)	0.079
Number of months from referral to start of IPT – overall	N/A	(N=51) 10.1 ± 4.9 (2, 21) 10 [7]	N/A	N/A
Number of months from referral to start of IPT – by clinic	N/A		N/A	0.055**
Calgary - Alberta Children's Hospital		8.7±4.3 (2, 16) (N=26) 8 [5]		
Edmonton - Stollery Children's Hospital		12.7±5.7 (6, 14) (N=15) 14 [6]		
Lethbridge Diabetes Program		10.0±5.7 (6, 14) (N=2) 10 [8]		
Medicine Hat Diabetes Program		17.0 (N=1)		
Red Deer Diabetes Specialty Care Program		8.6±3.1 (3, 12) (N=7) 8 [4]		
Number of months from referral to current date (31/Aug/2016) – overall	(N=12) 23.3 ± 7.4 (14, 36) 23 [14]	N/A	N/A	N/A
Number of months from referral to current date (31/Aug/2016) – by clinic		N/A	N/A	0.281**
Calgary - Alberta Children's Hospital	25.6±7.5 (14, 36) (N=7) 23 [10]			
Edmonton - Stollery Children's Hospital	21.8±6.7 (15, 30) (N=4) 21 [10.5]			
Lethbridge Diabetes Program	14.0 (N=1)			
Medicine Hat Diabetes Program	- (N=0)			
Red Deer Diabetes Specialty Care Program	- (N=0)			
Type of pump received:	N/A	(N=77)	(N=4)	0.809
- OmniPod® (OmniPod)		16 (21%)	0 (0%)	
- OneTouch® (Animas)		41 (53%)	3 (75%)	
- Paradigm® (Medtronic)		20 (26%)	1 (25%)	
Number of patients who have gone off the pump	N/A	0 (0%)	0 (0%)	-

Notes:

- values are in mean ± standard deviation (range) and median [interquartile range] or number of patients (percent of patients)

- data sources: †AHS determination form A data and ‡University of Alberta baseline interview/questionnaire data
- *overall difference between groups assessed by Fisher's exact test for categorical variables and Kruskal-Wallis test for continuous variables
- **overall difference in months from referral to IPT start and referral to current date assessed by Kruskal-Wallis test

Table 10. Reasons for interest in IPT program reported by parents of pediatric patients who have not started pump therapy through the provincial program ('no pump' group)

Organizing themes	Basic themes	Examples	Frequency of theme
Glycemic control	Better control	<p>"insufficient glycemic control"</p> <p>"better control of blood sugars"</p> <p>"less fluctuations"</p> <p>"his doctor suggested that the pump would help him manage his blood sugars even better"</p> <p>"it seems like the pump will help catch high blood sugars and deal with them better"</p>	10
	Hypoglycemia at night	"help with the night time low/high blood sugars"	1
Insulin	Difficulties with intermediate or long acting insulin	"problems with Lantus causing bleeding"	1
	Delivery of more precise, smaller doses of insulin	"greater precision and smaller doses of insulin"	1
Freedom and flexibility	Diet	<p>"greater freedom to eat what I want"</p> <p>"he wants to go to friend's houses and eat what he wants to eat"</p> <p>"will be able to eat what he wants when he wants"</p>	3
	Exercise /physical activity	"being able to participate in sports and other activities"	3
	Schedule	<p>"freedom from having a strict schedule, able to sleep in"</p> <p>"be able to sleep in"</p> <p>"looking forward to greater freedom with her schedule"</p> <p>"will be able to sleep later as she gets older"</p>	4
	General	<p>"it seems like the pump will give us more freedom and flexibility"</p> <p>"more freedom"</p>	3
Record keeping	General	"pump will also help in maintaining precise digital records which is important because the custody arrangements, it is not always possible to know exactly what he ate, how much insulin he took"	1
Independence	Other caregivers	<p>"I think having the pump will make it easier for other people such as my mom to help take care of [her]"</p> <p>"she will probably be able to do it on her own, with supervision of course, but she can help teach her grandma and teachers how to work the pump"</p>	2
	School	<p>"allowing for greater independence for child and caregivers especially at school"</p> <p>"the pump will decrease the need for one parent to be available during school hours to deal with child's diabetes"</p>	2

Table 10. Reasons for interest in IPT program reported by parents of pediatric patients who have not started pump therapy through the provincial program ('no pump' group)

Organizing themes	Basic themes	Examples	Frequency of theme
		"greater independence especially at school"	
	General	"greater independence for child" "encourage child to become more independent and feel like she has more control and can deal with her disease" "more independence"	3
Fewer injections	Less bruising or scarring from injections	"decrease cellulitis from multiple injections"	1
	General	"less pokes" "fewer injections" "I like the idea of few needles"	5
Health	Physical - diabetes-related complications	"having the pump will help decrease the risks of future diabetic related health complications"	1
Normalcy	General	"he will have more freedom and more normalcy"	1
Privacy	Manage blood sugars discreetly	"he will be able to blend in at school as the pump won't be as noticeable as pulling up his shirt to give insulin injections" "not having to do injections in public" "we won't have to worry about finding a sharps bin, finding a place to draw up the insulin and if we need some privacy to give her an injection"	3
Access to supplies	Pump	"if there was not public coverage for the insulin pump, [we] would not be able to get the pump for the child in a timely manner" "the pump is not covered by the private insurance" "looked at pump prior to the IPT program and [we] couldn't afford the cost of the pump" "the cost of the pump and the supplies would probably mean that he wouldn't get it right away, we probably would wait a bit before getting the pump" "Without the government program, it would be really difficult for us to manage the full cost for the pump"	4
	Pump supplies	"pump supplies are not covered by the private insurance" "we would have to save the money to be able to buy the pump and to afford the monthly supplies"	3

Table 11. Reasons for interest in IPT program reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' group)

Organizing themes	Basic themes	Examples	Frequency of themes
Glycemic control	Better control	"insufficient glycemic control" "better control of blood sugars" "reduce the number of highs and lows" "we wanted more stability for her because she was having extreme highs and lows"	27
	Hypoglycemia at night	"to deal with severe night time lows" "She had a severe low overnight that required a 911 call. The endocrine nurse told us it is easier to prevent these lows with a pump"	7
Insulin	Difficulties with intermediate or long acting insulin	"won't need NPH insulin – it is causing bruising now" "she is a competitive swimmer and it is hard to gauge the effects of the long acting insulin"	3
	Delivery of more precise, smaller doses of insulin	"pens do not allow her to deal with blood sugars quick enough" "to give smaller amounts of insulin" "to be able to make corrections when necessary"	7
Freedom and flexibility	Diet	"greater flexibility in terms of eating" "could eat what he wants when he wants" "won't have to force feed my daughter when she isn't hungry"	13
	Exercise /physical activity	"easier in gym class" "to participate in sports more easily" "she is often dancing when she should be eating"	5
	Schedule	"schedule won't have to be so rigid so sleepovers would be possible" "not stuck to a strict schedule" "could sleep in"	13
	General	"for more flexibility" "greater independence" "to have a more spontaneous life" "we hope it will encourage her to become more independent"	13
Fewer injections	Less bruising or scarring from injections	"bruising caused by injections" "pen program is invasive" "is very lean and hard to find injection sites"	4
	General	"less needles" "interested in the pump because will have fewer needles" "not have to poke himself so often"	25

Table 11. Reasons for interest in IPT program reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' group)

Organizing themes	Basic themes	Examples	Frequency of themes
Health	Physical	<p>"less weight gain"</p> <p>"help with growth spurts"</p> <p>"very active with sports and it is difficult to manage with the needles"</p> <p>"chronic tiredness due to a lack of sleep (currently waking every 2 hours to test"</p> <p>"help deal with hormonal changes during puberty"</p>	8
	Physical - diabetes-related complications	<p>"to decrease infections"</p> <p>"to help decrease the long term side effects of diabetes"</p>	9
	General	<p>"to be a more active participant in the management of his diabetes because he can make changes or help us or his babysitter with changes"</p>	2
Normalcy	General	<p>"no school nurse and was made to feel isolated and different"</p> <p>"to make life more normal"</p> <p>"we hope that she will be able to go to her friend's house and play"</p> <p>"so I can do other things that kids can do" (reported by child)</p>	12
Privacy	Manage blood sugars discreetly	<p>"pens are isolating for a child and cause unwanted attention"</p> <p>"easier at school and when hanging out with friends"</p> <p>"the pump is small and not noticeable" (reported by child)</p>	6
Access to supplies	Testing supplies	<p>"have conserved testing supplies in the past"</p>	5
	Pump	<p>"did not get the pump earlier due to finances"</p>	13
	Pump supplies	<p>"insurance does not cover the cost of pump supplies"</p> <p>"would have to seriously reconsider the pump if supplies weren't covered by the program"</p> <p>"unable to afford supplies"</p>	6
Potential impact on parents	Career	<p>"only one of us is able to work because I need to go to the school at noon to give him insulin"</p> <p>"often has low or high blood sugars that need to be dealt with at night, so I am chronically sleep deprived, which makes it impossible to hold down a full time job"</p> <p>"has really hurt my ability to maintain a full time job. Can you imagine dealing with an employee who would have to leave on a moment's notice on a regular basis to deal with her child's blood sugars?"</p>	8
	Relationship with spouse	<p>"we [husband and wife] have two different approaches, so I hope the pump will help alleviate the inconsistent manner in which we control her sugars – has caused lots of tension"</p> <p>"we argue over how to manage his diabetes a lot. Hopefully with the pump there will be less stress"</p>	4

Table 12. Reasons for interest in IPT program among parents of pediatric patients on pump therapy prior to the launch of the provincial program (existing pump patients)

Organizing themes	Basic themes	Examples	Frequency of themes
Access to supplies	Testing supplies	"have 80% coverage of test strips but the costs really add up"	
	Need a new pump	"To get a new pump" "Insurance didn't cover the cost of the pump. She was able to get her first pump because of a fund raiser" "We put money towards the new pump rather than other things, such as new vehicles, vacations."	3
	Pump supplies	"To get supplies coverage. I used to have 100% coverage of all supplies but left that job and in my current job, the health benefits only apply to me and there is no family coverage" "our insurance doesn't cover pump supplies"	2

Table 13. Availability of private insurance – pediatric patients

Insurance	Coverage details	Examples	Frequency
<i>'New pump' patients</i>			
Private insurance	Full coverage of pump and supplies	<p>"Yes, but [manufacturer] encouraged us to seek coverage through the Alberta government program rather than Manulife."</p> <p>"...private insurance covers the cost of the pump and the supplies."</p> <p>"...have 2 private insurance plans that will cover all of the costs of the pump and the supplies."</p>	3
	Partial coverage of pump and supplies	<p>"We have good insurance that will help cover the costs of supplies and probably a portion of the pump itself..."</p> <p>"[I do] not think private insurance pays for entire cost of pump or supplies."</p> <p>"...private insurance would only cover a portion of the pump and only up to \$1500 is allowed for pump supplies..."</p> <p>"Private insurance covers a portion of the costs for the pump, unsure of the pump supplies coverage."</p> <p>"...has private insurance that covers a portion of the cost of the pump, but it will only fund the pump 'once in a lifetime'."</p> <p>"Private insurance covers a portion of the costs for the pump, unsure of the pump supplies coverage."</p>	7
	Change in coverage	<p>"In Dec 2013 employer switched benefits plan company from Manulife to Great West Life, who does not cover the pump. So now they are waiting for pump through public program."</p> <p>"...insurance plan wouldn't cover the pump now that the government plan is in place even though [my] plan is through Alberta Blue Cross."</p>	2
	Pump and supplies are not covered	<p>"...insurance does not cover the pump or the supplies."</p> <p>"Currently, [our] private insurance does not cover the pump or the supplies."</p>	6
	Pump not covered	<p>"single parent with limited coverage" who "would be unable to afford the pump"</p> <p>"If the pump was covered we would have gotten it 5 years ago."</p> <p>"...if the pump was not publically funded, [we] would have to wait a few years to save up to purchase the pump."</p> <p>"Private insurance does not cover the pump and without public funding, [we] would not be able to afford the insulin pump."</p> <p>"Private insurance doesn't cover the cost of the pump."</p>	5
	Unsure if pump and supplies are covered	<p>"Unsure if private insurance covers the costs of pump or supplies."</p> <p>"Unsure if [our] employee benefits cover the pump or the supplies."</p>	2

Table 13. Availability of private insurance – pediatric patients

Insurance	Coverage details	Examples	Frequency
	Details of insurance not described, but family could not afford pump before public program	<p>“This is something that we just could not afford on our own.”</p> <p>“We are very grateful for the program as it makes it affordable to have a pump.”</p> <p>“[We] would not have been able to afford the insulin pump without public funding.”</p> <p>“Without public funding, [our] child would have waited longer to get the insulin pump.”</p> <p>“Without public funding of the insulin pump, [we] wouldn’t be able to afford the pump.”</p> <p>“If there was no public coverage for the insulin pump, [we] would be unable to get the pump.”</p> <p>“...if [we] did not have insurance coverage for extra test strips and the IPT program, [we] would not be able to continue pump therapy.”</p> <p>“There is no way [we] could afford a pump for [our] son on [our] own.”</p>	8
No private insurance	N/A	<p>“No private insurance at this time.”</p> <p>“...pay for all expenses out-of-pocket and claim the expenses as an income tax deduction.”</p> <p>“...pay for all diabetic supplies and glucose testing. [We do] not have private insurance.”</p>	9
	Enrolled in a social program	“Alberta Works covers 100% of glucose testing supplies and insulin.”	2
<i>Existing pump patients</i>			
Private insurance	Full coverage of pump, supplies not mentioned	“Private health care covered the pump.”	1
	Partial coverage of pump and supplies	“Currently, insurance pays for \$6000 for the pump and 100% of the supplies once the patient is out-of-pocket of more than \$600.”	1
	Partial coverage of supplies, pump not mentioned	“For two kids on pump therapy and limited coverage for supplies [has] spent \$10,000 a year on medical supplies.”	1
	Pump not covered	“Our insurance didn’t cover the cost of the pump.”	1
<i>No pump patients</i>			
Private insurance	Full coverage of pump and supplies	“No financial considerations for pump/supplies, good coverage under [employer] through work plan.”	1
	Partial coverage of pump and supplies	“My insurance covers a maximum of \$6,500/5 year period for pump and supplies and my husband’s insurance covers \$1500 for medical devices and equipment.”	1
	Partial coverage of supplies, pump not covered	“...because the family’s current private insurance does not cover the cost of the pump and covers only a portion of the supplies, [we] would have to	1

Table 13. Availability of private insurance – pediatric patients

Insurance	Coverage details	Examples	Frequency
		wait to get the pump.”	
	Pump and supplies are not covered	“However, the pump and pump supplies [are] not covered by the private insurance.” “Private insurance does not cover the pump or the supplies.” “No funding through private insurance”	3
	Unaware if pump or supplies are covered	“...unaware if private insurance covers the pump or the supplies.” “...unsure if pump would be covered by the insurance but does cover all strips and insulin.”	2

Table 14. Impact of the pump reported by patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
Overall experience	Positive	<p>"love, love, love the pump and don't want it to be taken away"</p> <p>"pump is a god send"</p> <p>"life is so much better"</p> <p>"the pump has been life changing"</p>	10
	Negative – no longer on the pump	<p>"Due to high blood sugar readings in the past several months my doctors and I have decided to switch back to MDI"</p> <p>"The extreme lows scared my loved ones and me. That is why I chose to quit using the pump."</p> <p>"I really do not like being attached to it. Having a device attached to my body with tubes was bad for my self-esteem."</p> <p>"the trip to the emergency room when the pump malfunctioned was scary"</p> <p>"there were issues occurring that I found to be a greater inconvenience versus the benefit added (pump could not operate at lower temperatures)"</p> <p>"I stopped using my pump because I was constantly having issues with infusions and high blood sugars"</p>	6
Glycemic control	Better control	<p>"maintained overall stability"</p> <p>"have better blood sugar control"</p> <p>"fewer lows"</p> <p>"blood sugars are more consistent"</p>	43
	No difference in control compared to MDI	<p>"I think I expected miracles from the pump, but my current control is no better or worse than it was on MDIs"</p>	4
	Ability to download data from pump	<p>"benefit from reviewing the results downloaded from my pump and using that data to make changes"</p> <p>"allows me to keep closer track of my sugars"</p>	7
Insulin	Delivery of more precise, smaller doses	<p>"simply push a button for insulin and it is a measured amount and seems to be more precise"</p> <p>"small amounts of insulin a great benefit"</p> <p>"can fine tune insulin"</p> <p>"able to change basal rates quickly"</p> <p>"Don't have to worry about giving the incorrect amount or type of insulin"</p>	12
	No longer need to use long acting insulin	<p>"I like not having to use two different types of insulin"</p>	2
Freedom and flexibility	Diet	<p>"no longer need to have a regimented schedule where I have to eat at specific times and specific amounts of food"</p> <p>"less anxious about food"</p>	9

Table 14. Impact of the pump reported by patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
		"less worried about meal times"	
	Exercise/physical activity	"my activity levels have increased" "I exercise more" "I'm no longer afraid to ski a whole day"	10
	Career	"Pump has freed me up, especially because I work in construction and never know what I will be doing" "have been able to do farm work" "improved my sugars while away at work" "I have started working more" "have begun day and evening shift work"	10
	Travel	"less hassle through airport security"	2
	Daily schedule	"Freedom of not being tied down to a schedule, able to sleep in and manage busy schedule with 3 babies" "more flexible schedule makes life easier" "greater freedom in schedule" "being home and taking care of a baby, I can quickly inject without needing to take out a needle" "has been liberating"	26
Fewer injections	General	"I enjoy not having to poke myself all of the time"	7
Health	Mental/psychological	"I believe my mood has improved" "feel sharper and more alert" "I am less depressed" "has decreased stress on my family because now they don't have to worry about me being alone" "my family worries less" "I feel less anxious about managing my diabetes" "I am a much happier person" "I no longer worry about forgetting to take my insulin" "I have peace of mind now"	17
	Physical	"improved energy levels" "I feel less tired"	12
	General	"feel better" "I am a much healthier person" "I am living a healthier, more positive lifestyle because of the pump" "given me greater control of my health" "very motivating to have instant information on blood sugars"	18
Normalcy	More normal	"the pump has made me able to function like a normal person"	9

Table 14. Impact of the pump reported by patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
		"helped me control my diabetes and fell confident in my daily life to live normally"	
	Less normal	"hard to get used to being attached to something" "hard to get used to being tethered to a machine"	2
Privacy	Manage blood sugars discreetly	"less embarrassed" "can be discreet about my diabetes" "no need for needles in public" "can be discreet and private when dealing with my diabetes"	6
Quality of life	Improved quality of life	"more convenient method of dealing with diabetes" "made life easier" "pump has improved my standard of life" "my life has greatly improved"	9
	Carries more supplies	"I carry significantly more equipment in case of pump failure"	3
Need for supplies	Carries fewer supplies	"need to carry fewer supplies with me"	6
	Time required to figure out the right settings	"I'm still struggling with setting basal rates correctly" "I'm still trying to figure it out" "Learning how difficult it is to calculate insulin needs as the job requirements change" "I have had a few months of experience to work out all of the kinks a get my setting correct" "finding those insulin amounts takes testing, time, and patience. At times, I am a little frustrated" "having trouble changing pods and getting them to work properly" – I am spending a lot of additional time due to problem with pods and setting up/adjusting" "still working with clinic to adjust basal amounts"	9
	Proficiency with time	"I have become more comfortable and proficient with using the pump"	7
	More work than expected	"It is not as hands free as I believe people think it is"	3
	Met expectations	"Overall I have been extremely satisfied" "I had pretty high expectations and so far that pump is doing a pretty good job of meeting them" "it is just what I thought"	12
Expectations of the pump	Exceeded expectations	"Far exceeded my expectations" "See and realize more benefits than I anticipated"	6
	Did not meet	"not yet – takes testing, time and patience"	8

Table 14. Impact of the pump reported by patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
	expectations	"I was not prepared for the time I would need to commit once I started the pump" "Pump is very annoying to deal with" "I expected the pump to regulate my sugars better"	
Device	Malfunction	"Device malfunctioned numerous times and ended up in Emergency" "pump malfunction problems" "pump was neither correctly calculating any corrections nor delivering the amount entered." "the device malfunctioned"	6
	Manufacturer support	"I changed pumps. This was done after sales support for my previous pump was very poor"	2
	Other issues	"They changed the syringes and I find it impossible to get all the air bubbles out"	2

Table 15. Continued Impact of the pump reported by patients on pump therapy prior to the launch of the provincial program ('existing pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
Overall experience	General	"Pump has been a life changing addition"	4
Glycemic control	Better control	"Can catch highs faster and deal with them quicker" "found I have much better sugar control when compared to the MDI system" "Ability to alter or stop basal rates on the pump is a huge benefit " "Used to always be sick and unable to manage blood sugars" "Used to feel terrible all the time" "I could not imagine going back to the pen system, my AICs are much better – they have been under 7 ever since I have been on the pump" "pump made it so much easier to be pregnant" "less stress and anxiety over low blood sugars"	21
	Delivery of more precise, smaller doses	"Ability to change the bolus and basal rates hourly is very helpful" "Make quick adjustments to basal rates and not forced to eat extra food" "pump gives me peace of mind because I can give myself much smaller doses that I couldn't with needles" "Able to give smaller doses of insulin" "I can change my bolus/basal rates easily to suit my day" "has been a major asset with my pregnancies" "Exact doses of insulin has helped me feel great"	9
Insulin	No longer need to use long acting insulin	"used to struggle with long acting insulin"	2
	Diet	"easier to vary schedule for eating"	4
Freedom and flexibility	Exercise/physical activity	"easier to exercise" "more active" "I exercise more regularly"	8
	Career	"less worried when schedule changes and things at work pops up" "can do shift work" "like the pump because of flexibility" "It would be much more difficult to do shift work without the pump"	5
	Travel	"easier to travel with through security" "way easier to go through security" "I carry less supplies and now I have no problems with going through airport security"	6
	Schedule	"easier to have a varied schedule and lifestyle" "I need to spend less time dealing with my diabetes" "On MDI had to live with a rigorous schedule"	42

Table 15. Continued Impact of the pump reported by patients on pump therapy prior to the launch of the provincial program ('existing pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
		"Can program the pump to the rhythm of my life and have the flexibility to just live my life" "greater flexibility, less strict schedule and more freedom" "can sleep in" "with needles I was a prisoner to a schedule" "greater independence" "Can't imagine going back to needles. The pump has allowed me to be free." "the pump allows me to be more free to have a better life" "much more stressed on the pens and felt less in control" "greater feeling of control"	
Fewer injections	General	"not having to inject myself 8 times a day is nice" "I would never go back to the pens and the many daily injections"	13
Health	Mental/psychological	"family says [I] am less moody and easier to be around" "Happier person who is no longer sleep deprived" "pump has decreased stress and anxiety of dealing with diabetes. I never have to worry about supplies." "less worry and anxiety being home alone and caring for children" "positive impact on self- esteem" "I am more mentally alert" "I never forget to deal with blood sugars" "prevents accidental needle injury – don't have to worry about a bunch of needles being around my children"	16
	Physical	"fewer incidents of cellulitis and significant improvement in skin breakdown" "have more energy" "When I started on the pump, I felt better, I had more energy" "I tried returning to the pens when I was 19 and I felt like crap. My vision was terrible and I was nauseous all the time." "pump has decreased complications from being sick"	10
	General	"feel better on the pump" "no longer have the feeling of impending doom, physically feel better and able to sleep better"	4
Normalcy	More normal	"can do everything that other people can do" "afforded me the opportunity to be like everyone else" "feels more normal" "can live more normally" "feeling more close to normal"	20

Table 15. Continued Impact of the pump reported by patients on pump therapy prior to the launch of the provincial program ('existing pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
Privacy	Manage blood sugars discreetly	"I can discreetly deal with blood sugars without people knowing" "more comfortable dealing with high blood sugars in public" "I can deal with my blood sugars in a public environment and not be embarrassed" "I felt so self-conscious in public, people would stare and ask questions or thought I was a drug addict" "I don't have to go to the bathroom or find a private place"	14
Quality of life	Improved quality of life	"my quality of life has significantly improved with the pump" "I am able to enjoy life" "huge change in quality of life" "pump opened up a whole new world"	9
Need for supplies	Carries fewer supplies	"less stress worrying about things like if I brought enough supplies"	7
Device	Malfunction	"device malfunctioned" "pump failed" "had a bunch of infusion sets that were a problem but [manufacturer] replaced them" "[manufacturer] has sent out 4 pumps because of software and hardware malfunctions"	4
	Other issues	"can be painful to put in and difficult to find a place to secure the pump" "almost all infusion sets are uncomfortable" "can't always tell if there is an air bubble in the tubing" "tubing sometimes gets caught" "tubing detached in the middle of the night"	5

Table 16. Impact of the pump reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
Overall Experience	Positive	<p>"the pump has been life changing for the family"</p> <p>"has made it easier to manage diabetes"</p> <p>"pump is always attached so you never forget it"</p> <p>"none of us can imagine going back to the old way of dealing with diabetes"</p> <p>"easier to use pump versus the pen"</p> <p>"I really like the pump" (reported by child)</p> <p>"the pump is really cool" (reported by child)</p>	31
	Challenges	<p>"difficult sometimes to connect meter to convenient spot on clothing"</p> <p>"difficulty with the insertion sets and she is very thin so it is difficult. It is painful."</p> <p>"Still reluctant to give control to a machine"</p> <p>"we do need to continuously monitor and adjust settings in order for her to get benefit from the pump"</p> <p>"he is beginning to get lumps of tissue associated with injection site"</p> <p>"With the pump we are back to the beginning again – around the clock testing, no sleep, new worries, etc."</p>	10
Glycemic control	Better control	<p>"pump has helped her control blood sugars"</p> <p>"fewer highs and lows"</p> <p>"he keeps on top of his blood sugars"</p> <p>"his A1Cs have improved dramatically"</p> <p>"has been a critical tool in keeping the A1C within acceptable ranges during puberty"</p> <p>"when she was sick it was easier to manage her blood sugars"</p>	39
	No difference in control compared to MDI	<p>"A1Cs have not improved as of yet"</p>	1
	Ability to download data from pump	<p>"allows him to keep better records and to chart his progress"</p> <p>"I have been having issues uploading the pump"</p> <p>"records that the pump and monitor can keep track of and print out make keeping track of insulin changes easier"</p>	5
Insulin	Delivery of more precise, smaller doses	<p>"more predictable blood sugars because more exact measures of insulin"</p> <p>"can change insulin dose more quickly"</p> <p>"very, very small doses compared to MDI"</p>	16
	No longer need to use long acting insulin	<p>"happy not to have to deal with long acting insulin"</p> <p>"can manage and make changes without the complication of long acting insulin"</p>	6

Table 16. Impact of the pump reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
		"fast acting insulin enables us to fix high BGs quickly"	
Freedom and flexibility	Diet	"great flexibility with eating" "can have spontaneous events like snacks with friends" "can eat like a normal person what other kids are eating" "easier and flexible when eating out, e.g., at a recent birthday party he enjoyed it more" "can be more spontaneous with food" "the freedom to eat whenever he is hungry is priceless"	20
	Exercise/physical activity	"greater flexibility with exercising" "he has started taking part in intramural programs at school" "more active because she doesn't have to miss recess to give herself injections in the washroom" "he could go swimming"	8
	Travel	"it has been much easier to travel"	4
	Daily schedule	"pump has allowed for a more flexible schedule" "have control over diabetes and it isn't running my life" (reported by child) "can go out with friends and be more spontaneous" "we have activated the patterns feature on the pump and have created a lazy day sleep in pattern when she has no activities scheduled" "He can sleep in"	25
Fewer injections	General	"less injections and less painful" "less pokes" "we used to have to inject 8 times a day, which was difficult on her and us" "we no longer have temper tantrums and meltdowns with meals/injections"	17
Health	Mental/psychological	"can do more things with friends" "never forgets about dealing with diabetes" "has given him greater independence and confidence" "gives her more control and she can complete the last click and feel like she has control" "has improved her mood, reduced anxiety and is more willing to share" "she is less self-conscious" "has fewer bad moods and is less irritable" "she is often asked about her pump and she is happy to show it off" "we are also very happy with how much responsibility she is taking for her diabetes care using the pump"	19

Table 16. Impact of the pump reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
		"it is easier for him to concentrate on schooling" "she is happier and more relaxed"	
	Physical	"he can sleep more and better so he has more energy" "reduced the number of lows, especially with vigorous activity like when playing squash" "he is more energetic" "less headaches and belly aches"	12
	General	"has made it easier to deal with the dawn phenomenon" "can deal with her blood sugars without waking her up because we can give the correct dose without physically injecting her" "she has gained weight and is growing faster since she started on the pump" "he is much more involved in his diabetes care and interested in controlling the pump" "he is healthier overall" "she feels better"	12
Normalcy	More normal	"has become easier to do normal things like sleepovers" "feels more normal" "I can go more places on my own" (reported by child) "the pump continues to allow her to have more freedom as the summer is in full swing and she is able to go out with her friends" "now her friends just can't run off – she can go with them" "It is easier for him to be out and about with his friends"	27
	Less normal	"sometimes feel pump gets in the way because it is always attached" "initially did not like the idea of being attached to something all the time and thought it would be intrusive" "tubing is inconvenient" "it is always sticking out and her friends ask about it"	5
Privacy/stigma/embarrassment	Manage blood sugars discreetly	"allows for more privacy to deal with blood sugars in public" "she no longer takes food in secret"	4
Quality of life	Improved quality of life	"it has improved his quality of life" "we love, love, love how her quality of life has improved since starting with the pump" "she regularly tells people it's changed her life for the better"	9
Need for supplies	Carries fewer supplies	"no need to bring as many supplies"	2
Learning curve	Time required to	"not enough sleep but this is due to having to wake her up at 3 am to do a	5

Table 16. Impact of the pump reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
	figure out the right settings	sugar because she still has lows at night , but this will improve soon" "there is a lot of work done to reach proper dosage" "still learning"	
	Proficiency with time	"when she started with the pump her blood sugars were still high and low until we could get accurate insulin levels" "know we need continued modification for exercise, sickness and monthly periods" "She has adjusted and is much more comfortable with site insertions" "with time now it has become easier and quicker" "I am very excited to continue modifying settings where they need to be"	8
	More work than expected	"The insulin pump is a lot of work so I wouldn't suggest going on it unless you are ready to put in the time" "it took us 3 months to solve the issues of air bubbles in the pump. I was beginning to think I wanted to go back to pens"	12
Expectations of the pump	Met expectations	"the pump has done pretty much what we had thought. We had done a lot of research already." "We are still experiencing the benefits we had expected" "I still think it is the best way to manage her diabetes" "we are still seeing positive effects we anticipated"	8
	Exceeded expectations	"the pump met and exceeded our expectations" "we now see the benefits as opposed to anticipated them" "I am now aware of the calculation of IOB feature the pump offers. Because of this, I feel more confident using the pump" "was great and helped control her highs when she was sick better than expected" "we are totally impressed with the pump. It is better than we had imagined." "we realize more and more each day how much a pump makes our lives easier" "I think that the pump has exceeded our expectations" "I have found the pump easier than I thought it would be" "using the insulin on board feature is great –we didn't know about this before" "I knew that we would have better control but I never expected that my son would come out of his shell and start living his life again"	13
	Did not meet expectations	"The pump is more intensive for me to manage than I had expected" "I was hoping we would have an easier time but the infusion sets pull out easily"	4

Table 16. Impact of the pump reported by parents of pediatric patients who have started pump therapy through the provincial program ('new pump' patients)

Organizing theme	Basic theme	Examples	Frequency of theme
		"I had no idea there was more work rather than less" "I was expecting her blood sugars to be more constant by now"	
Impact on parents	Career	"I can now work part time whereas before I had to go to the school to give noon dose of insulin" "I've gone back to work because I no longer have to go to her school every day at lunch"	6
	Stress and anxiety	"the pump has decreased the worry and anxiety about managing diabetes" "we are more comfortable with him going away overnight." "don't have to worry about how to dress her (huge relief)" "less stressful with meal planning" "also causes more worry when away from us but it is easier when he is with us to deal with" "has decreased stress, worry and anxiety because have more control" "we've become more relaxed" "has decreased my stress because I no longer have to withhold food from her or force her to eat more when she doesn't want to"	10
	Inter-personal relationships	"has made things easier and there is less conflict with my husband" "My husband and I share midnight checks but we are both tired. I'm resentful of those who could help but don't" "My husband and I fight less"	3
Impact on entire family	General	"life is less centered around diabetes now" "the whole family doesn't have to have as rigorous a schedule" "the pump has had a positive impact on our entire family" "The pump program has helped me be able to manage my 4 diabetic children a lot more accurately"	12
Device	Issues	"Test strips were recalled. I have documented proof that the official news about the recall did not make it to Alberta until almost a month later" "We were having lots of issues with air bubbles in the pump. Now that we are drawing up from a vial instead of a cartridge it has stopped being an issue"	2

Table 17. Continued Impact of the pump reported by parents of pediatric patients on pump therapy prior to the launch of the provincial program ('existing pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
Overall experience	General	"the pump is just a way of life for her, we can't imagine going back"	2
Glycemic control	Better control	"fewer high blood sugars and fewer low blood sugars"	2
Freedom and flexibility	Diet	"allows her to eat like a normal person, what other kids are eating" "easier to eat without having a strict regimen"	2
	Exercise/physical activity	"can play sports better because can decrease basal and bolus rates"	1
	Schedule	"she can sleep in" "she has control over her diabetes and it isn't running her life" "can sleep in"	4
Fewer injections	General	"fewer needles"	1
Health	Mental/psychological	"fewer ups and downs, it has improved his mood, concentration..."	1
	Physical	"can deal with dawn phenomenon more easily"	1
Privacy	Manage blood sugars discreetly	"It has allowed her to have greater privacy... she was embarrassed to deal with her diabetes in public" "facilitates more privacy to deal with diabetes"	2
Need for supplies	Carries fewer supplies	"do not need to carry as much supplies"	1
Device	Malfunction	"pump malfunctioned and the company sent a new pump within 3 hours"	1
	Other issues	"still difficult sometimes to connect it to a convenient spot of clothing such as dresses"	1
Impact on parents	Career	"prior to the pump we would have to go to school regularly at lunch or during special events to give her a bolus of insulin" "I have returned to working full time." "gave me the freedom to leave my job because I don't need to rely on benefits"	3
	Less stress and anxiety	"less stressful – I hated force feeding carbs to him for his lows" "I can sleep better"	1
Impact on family	General	"Pump has given the entire family greater freedom"	1

Table 18. Clinical outcomes in adult patients (≥18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
Mean and Median HbA1c (%)								
No pump group†	8.2 ± 1.3 (6.1, 11.2) 8 [1.8] (N=36)	8.2 ± 1.4 (5.4, 11.1) 8.0 [1.5] (N=32)	8.1 ± 1.4 (5.9, 11.9) 8.0 [1.8] (N=28)	8.1 ± 1.1 (6.6, 10.8) 7.8 [1.4] (N=21)	8.0 ± 8.0 (6.3, 10.1) 7.9 [1.3] (N=19)	8.0 ± 1.0 (6.0, 9.8) 7.9 [0.7] (N=11)	7.3 ± 0.7 (6.2, 8.1) 7.6 [1.0] (N=8)	0.3298
New pump group‡	7.5 ± 0.8 (5.9, 10.1) 7.5 [1.1] (N=57)	7.5 ± 1.0 (5.8, 12.2) 7.5 [1.1] (N=72)	7.3 ± 0.9 (5.7, 9.5) 7.3 [1.3] (N=46)	7.4 ± 0.9 (6.1, 10.0) 7.4 [1.0] (N=46)	7.4 ± 0.8 (6.1, 9.5) 7.4 [1.0] (N=38)	7.4 ± 0.9 (5.9, 10.4) 7.4 [1.1] (N=26)	7.5 ± 0.9 (6.3, 8.8) 7.6 [1.3] (N=12)	0.7995
Existing pump group†	8.0 ± 1.1 (5.7, 10.5) 7.7 [1.5] (N=71)	7.8 ± 0.8 (6.2, 10.4) 7.9 [1.2] (N=68)	7.8 ± 1.0 (5.8, 10.9) 7.6 [1.5] (N=59)	7.6 ± 0.7 (6.3, 9.6) 7.6 [1.2] (N=55)	7.7 ± 0.8 (6.4, 9.2) 7.6 [1.2] (N=41)	7.4 ± 0.8 (6.0, 9.2) 7.4 [1.2] (N=38)	7.7 ± 0.8 (6.6, 9.2) 7.5 [1.5] (N=22)	0.0015
P-value for difference between no pump and new pump group**	0.0078	0.0048	0.0144	0.0123	0.0242	0.0232	0.5612	
Change in Mean and Median HbA1c (%) From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.0 ± 0.5 (-1.0, 1.3) 0.1 [0.6] (N=21)	-0.0 ± 0.6 (-1.3, 0.8) 0.1 [1.0] (N=19)	-0.2 ± 0.7 (-1.3, 1.0) -0.4 [1.1] (N=14)	-0.2 ± 0.6 (-1.3, 0.6) -0.1 [1.0] (N=14)	-0.2 ± 0.5 (-1.1, 0.4) -0.2 [1.0] (N=10)	-0.1 ± 0.3 (-0.4, 0.2) -0.1 [0.5] (N=6)	
New pump group‡		-0.1 ± 0.6 (-1.4, 2.0) -0.2 [0.7] (N=49)	-0.1 ± 0.6 (-1.4, 1.0) -0.1 [0.8] (N=34)	-0.2 ± 0.6 (-1.1, 1.0) -0.3 [1.0] (N=31)	0.0 ± 0.5 (-0.9, 1.3) 0.0 [0.5] (N=26)	-0.2 ± 0.5 (-1.6, 0.7) -0.1 [0.4] (N=17)	0.0 ± 0.3 (-0.5, 0.3) 0.0 [0.5] (N=8)	
Existing pump group†		-0.2 ± 0.6 (-1.7, 1.2) -0.1 [0.7] (N=49)	0.0 ± 0.8 (-2.0, 2.0) -0.1 [0.9] (N=49)	-0.2 ± 0.7 (-2.0, 1.6) -0.1 [0.8] (N=42)	-0.3 ± 0.6 (-2.2, 1.2) -0.3 [0.5] (N=34)	-0.3 ± 1.0 (-2.4, 1.5) -0.3 [0.6] (N=30)	-0.3 ± 1.0 (-2.8, 1.4) -0.2 [0.9] (N=18)	
P-value for difference between no pump and new pump group**		0.6125	0.5340	0.7125	0.5140	0.7823	0.3012	
Mean and Median Number of Type 1 Diabetes-Related ER Visits Per Patient								
No pump group†	0.02 ± 0.14 (0, 1) 0 [0] (N=48)	0.19 ± 0.47 (0, 2) 0 [0] (N=32)	0.08 ± 0.27 (0, 1) 0 [0] (N=26)	0.15 ± 0.37 (0, 1) 0 [0] (N=20)	0.38 ± 0.65 (0, 2) 0 [1] (N=13)	0.00 ± 0.00 (0, 0) 0 [0] (N=4)	- (N=0)	0.0717
New pump group‡	0.11 ± 0.36 (0, 2) 0 [0] (N=72)	0.13 ± 0.45 (0, 3) 0 [0] (N=64)	0.06 ± 0.32 (0, 2) 0 [0] (N=48)	0.12 ± 0.32 (0, 1) 0 [0] (N=43)	0.06 ± 0.35 (0, 2) 0 [0] (N=33)	0.00 ± 0.00 (0, 0) 0 [0] (N=20)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.5672
Existing pump group†	0.04 ± 0.19 (0, 1) 0 [0] (N=79)	0.04 ± 0.19 (0, 1) 0 [0] (N=52)	0.05 ± 0.21 (0, 1) 0 [0] (N=43)	0.04 ± 0.20 (0, 1) 0 [0] (N=26)	0.07 ± 0.26 (0, 1) 0 [0] (N=15)	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	0.00 (N=1)	0.9948
P-value for difference between no pump and new pump group**	0.1005	0.3678	0.5439	0.7105	0.0088	-	-	
Change in Mean and Median Number of Type 1 Diabetes-Related ER Visits Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.16 ± 0.45 (0, 2) 0 [0] (N=32)	0.04 ± 0.34 (-1, 1) 0 [0] (N=26)	0.10 ± 0.45 (-1, 1) 0 [0] (N=20)	0.31 ± 0.75 (-1, 2) 0 [1] (N=13)	-0.25 ± 0.50 (-1, 0) 0 [0.5] (N=4)	- (N=0)	
New pump group‡		0.02 ± 0.58 (-2, 3) 0 [0] (N=64)	-0.06 ± 0.52 (-2, 2) 0 [0] (N=48)	0.02 ± 0.41 (-1, 1) 0 [0] (N=43)	-0.03 ± 0.53 (-2, 2) 0 [0] (N=33)	-0.15 ± 0.49 (-2, 0) 0 [0] (N=20)	-0.11 ± 0.33 (-1, 0) 0 [0] (N=9)	
Existing pump group†		0.00 ± 0.28 (-1, 1) 0 [0] (N=52)	0.00 ± 0.22 (-1, 1) 0 [0] (N=43)	-0.04 ± 0.34 (-1, 1) 0 [0] (N=26)	0.00 ± 0.38 (-1, 1) 0 [0] (N=15)	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	0.00 (N=1)	

Table 18. Clinical outcomes in adult patients (≥18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
P-value for difference between no pump and new pump group**		0.1349	0.2648	0.4953	0.0571	0.4583	-	
Mean and Median Number of Type 1 Diabetes-Related Outpatient Visits Per Patient (excluding ER visits)								
No pump group†	3.63 ± 2.37 (0, 11) 4 [3] (N=48)	2.50 ± 2.29 (0, 9) 2 [2] (N=32)	1.81 ± 1.79 (0, 6) 1 [1] (N=26)	2.80 ± 2.35 (0, 10) 2 [2.5] (N=20)	2.46 ± 2.79 (0, 9) 1 [3] (N=13)	1.50 ± 0.58 (1, 2) 1.5 [1] (N=4)	- (N=0)	0.0000
New pump group‡	4.47 ± 2.64 (0, 16) 4.5 [3] (N=72)	6.11 ± 4.22 (0, 18) 6 [6] (N=64)	2.27 ± 2.69 (0, 15) 1 [4] (N=48)	2.23 ± 2.78 (0, 14) 1 [1] (N=43)	2.18 ± 1.98 (0, 7) 1 [2] (N=33)	2.75 ± 2.53 (0, 8) 2 [3] (N=20)	1.78 ± 1.79 (0, 6) 1 [1] (N=9)	0.0000
Existing pump group†	3.06 ± 2.20 (0, 9) 3 [3] (N=79)	2.19 ± 1.87 (0, 7) 2 [2.5] (N=52)	2.02 ± 1.86 (0, 8) 2 [2] (N=43)	3.19 ± 3.06 (0, 14) 2.5 [3] (N=26)	2.87 ± 2.26 (0, 8) 2 [4] (N=15)	2.67 ± 1.15 (2, 4) 2 [2] (N=3)	1.00 (N=1)	0.0005
P-value for difference between no pump and new pump group**	0.0534	0.0000	0.7807	0.0952	0.9599	0.4741	-	
Change in Mean and Median Number of Type 1 Diabetes-Related Outpatient Visits Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-1.50 ± 2.24 (-5, 3) -2 [3.5] (N=32)	-2.12 ± 2.10 (-6, 2) -2 [3] (N=26)	-0.95 ± 2.63 (-8, 3) 0 [2.5] (N=20)	-1.85 ± 2.03 (-5, 2) -2 [3] (N=13)	-3.5 ± 3.11 (-6, 1) -4.5 [4] (N=4)	- (N=0)	
New pump group‡		1.78 ± 4.45 (-9, 12) 1.5 [6] (N=64)	-2.19 ± 3.23 (-15, 6) -2 [3] (N=48)	-2.28 ± 2.92 (-13, 6) -3 [4] (N=43)	-2.79 ± 2.81 (-14, 4) -2 [2] (N=33)	-2.25 ± 2.75 (-6, 4) -3 [4.5] (N=20)	-2.33 ± 2.78 (-5, 4) -3 [2] (N=9)	
Existing pump group†		-1.19 ± 2.03 (-7, 2) -1 [2] (N=52)	-1.65 ± 2.35 (-8, 3) -1 [3] (N=43)	-0.88 ± 3.68 (-7, 7) -1 [4] (N=26)	-1.53 ± 3.72 (-8, 7) -2 [5] (N=15)	-1.00 ± 2.00 (-3, 1) -1 [4] (N=3)	0.00 (N=1)	
P-value for difference between no pump and new pump group**		0.0001	0.8859	0.0376	0.2964	0.3678	-	
Mean and Median Number of Type 1 Diabetes-Related Inpatient Stays Per Patient								
No pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=48)	0.03 ± 0.18 (0, 1) 0 [0] (N=32)	0.00 ± 0.00 (0, 0) 0 [0] (N=26)	0.00 ± 0.00 (0, 0) 0 [0] (N=20)	0.00 ± 0.00 (0, 0) 0 [0] (N=13)	0.00 ± 0.00 (0, 0) 0 [0] (N=4)	- (N=0)	0.6884
New pump group‡	0.00 ± 0.00 (0, 0) 0 [0] (N=72)	0.05 ± 0.28 (0, 2) 0 [0] (N=64)	0.02 ± 0.14 (0, 1) 0 [0] (N=48)	0.00 ± 0.00 (0, 0) 0 [0] (N=43)	0.00 ± 0.00 (0, 0) 0 [0] (N=33)	0.00 ± 0.00 (0, 0) 0 [0] (N=20)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.5429
Existing pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=79)	0.02 ± 0.14 (0, 1) 0 [0] (N=52)	0.02 ± 0.15 (0, 1) 0 [0] (N=43)	0.00 ± 0.00 (0, 0) 0 [0] (N=26)	0.00 ± 0.00 (0, 0) 0 [0] (N=15)	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	0.00 (N=1)	0.9669
P-value for difference between no pump and new pump group**	-	0.9897	0.4617	-	-	-	-	
Change in Mean and Median Number of Type 1 Diabetes-Related Inpatient Stays Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.03 ± 0.18 (0, 1) 0 [0] (N=32)	0.00 ± 0.00 (0, 0) 0 [0] (N=26)	0.00 ± 0.00 (0, 0) 0 [0] (N=20)	0.00 ± 0.00 (0, 0) 0 [0] (N=13)	0.00 ± 0.00 (0, 0) 0 [0] (N=4)	- (N=0)	

Table 18. Clinical outcomes in adult patients (≥18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
New pump group‡	0.05 ± 0.28 (0, 2) 0 [0] (N=64)	0.02 ± 0.14 (0, 1) 0 [0] (N=48)	0.00 ± 0.00 (0, 0) 0 [0] (N=43)	0.00 ± 0.00 (0, 0) 0 [0] (N=33)	0.00 ± 0.00 (0, 0) 0 [0] (N=20)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)		
Existing pump group†	0.02 ± 0.14 (0, 1) 0 [0] (N=52)	0.02 ± 0.15 (0, 1) 0 [0] (N=43)	0.00 ± 0.00 (0, 0) 0 [0] (N=26)	0.00 ± 0.00 (0, 0) 0 [0] (N=15)	0.00 ± 0.00 (0, 0) 0 [0] (N=3)			
P-value for difference between no pump and new pump group**	0.9897	0.4617	-	-	-	-		

Notes:

- values are in mean ± standard deviation (range) and median [interquartile range]
- data sources: Alberta Health and Alberta Health Services administrative databases, including data from practitioner claims, outpatient (ACCS), inpatient (DAD), and laboratory databases from January 1, 2012 to March 31, 2015 (for claims, in-patient and outpatient data) and January 1, 2012 to March 31, 2016 (for laboratory data)
- type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718)
- *overall changes in outcomes over time were assessed using repeated measures ANOVA tests
- **differences in outcomes between no pump group and new pump group assessed using two sample Wilcoxon rank-sum (Mann-Whitney) test
- † for patients not currently on a pump and patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline values correspond to average values over the 3 months preceding the baseline interview, 3 month values correspond to averages between the baseline interview and 3 months after the baseline interview, 6 month values correspond to averages between 3 and 6 months after the baseline interview, 9 month values correspond to averages between 6 and 9 months after the baseline interview, etc.
- ‡ for patients who received a pump through the public program, baseline values correspond to average values over the 3 months preceding the insulin pump start date, 3 month values correspond to averages between the pump start date and 3 months after the pump start date, 6 month values correspond to averages between 3 and 6 months after the pump start date, 9 month values correspond to averages between 6 and 9 months after the pump start date, etc.

Table 19. Clinical outcomes in pediatric patients (<18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
Mean and Median HbA1c (%)								
No pump group†	7.8 ± 1.1 (5.9, 9.0) 8.1 [1.8] (N=8)	9.0 ± 1.4 (7.7, 11.7) 8.7 [1.0] (N=6)	8.2 ± 0.1 (8.1, 8.3) 8.2 [0.2] (N=2)	8.8 ± 0.1 (8.7, 8.8) 8.8 [0.1] (N=2)	9.3 ± 0.6 (8.8, 9.7) 9.3 [0.9] (N=2)	7.2 (N=1)	- (N=0)	0.7347
New pump group‡	7.9 ± 0.7 (6.1, 9.6) 7.8 [1.0] (N=54)	7.7 ± 0.7 (5.8, 9.2) 7.7 [0.9] (N=43)	7.8 ± 0.7 (6.1, 9.0) 7.8 [0.8] (N=40)	7.8 ± 0.9 (6.1, 11.0) 7.8 [0.6] (N=24)	8.1 ± 0.9 (6.6, 10.1) 8.1 [1.4] (N=29)	7.9 ± 0.7 (7.0, 9.2) 7.6 [1.0] (N=20)	7.9 ± 1.1 (6.1, 9.2) 8.1 [1.2] (N=9)	0.5071
Existing pump group†	9.2 (N=1)	7.9 ± 0.7 (7.1, 8.4) 8.3 [1.3] (N=3)	7.7 ± 0.5 (7.3, 8.0) 7.7 [0.7] (N=2)	8.0 (N=1)	- (N=0)	7.4 (N=1)	7.8 (N=1)	0.9834
P-value for difference between no pump and new pump group**	0.8996	0.0118	0.2366	0.0538	0.0835	-	-	
Change in Mean and Median HbA1c (%) From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.4 ± 0.9 (-0.6, 1.2) 0.6 [1.8] (N=3)	-0.5 (N=1)	- (N=0)	- (N=0)	0.1 (N=1)	- (N=0)	
New pump group‡		-0.1 ± 0.6 (-2.1, 1.5) -0.1 [0.5] (N=41)	0.1 ± 0.6 (-1.0, 1.8) 0.0 [0.6] (N=35)	0.1 ± 0.8 (-1.3, 2.1) 0.0 [0.8] (N=21)	0.3 ± 0.8 (-1.3, 2.2) 0.1 [0.8] (N=25)	0.0 ± 0.5 (-0.9, 1.2) -0.1 [0.4] (N=17)	0.0 ± 0.8 (-1.0, 1.3) -0.1 [1.0] (N=6)	
Existing pump group†		- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
P-value for difference between no pump and new pump group**		0.3514	-	-	-	-	-	
Mean and Median Number of Type 1 Diabetes-Related ER Visits Per Patient								
No pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.00 ± 0.00 (0, 0) 0 [0] (N=4)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	- (N=0)	-
New pump group‡	0.10 ± 0.36 (0, 2) 0 [0] (N=52)	0.09 ± 0.29 (0, 1) 0 [0] (N=44)	0.02 ± 0.16 (0, 1) 0 [0] (N=41)	0.03 ± 0.17 (0, 1) 0 [0] (N=34)	0.00 ± 0.00 (0, 0) 0 [0] (N=24)	0.00 ± 0.00 (0, 0) 0 [0] (N=17)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.4995
Existing pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
P-value for difference between no pump and new pump group**	0.0252	0.0415	0.6957	-	-	-	-	
Change in Mean and Median Number of Type 1 Diabetes-Related ER Visits Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.00 ± 0.00 (0, 0) 0 [0] (N=4)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	- (N=0)	
New pump group‡		0.00 ± 0.37 (-1, 1) 0 [0] (N=44)	-0.07 ± 0.35 (-2, 0) 0 [0] (N=41)	-0.09 ± 0.45 (-2, 1) 0 [0] (N=34)	-0.08 ± 0.28 (-1, 0) 0 [0] (N=24)	0.00 ± 0.00 (0, 0) 0 [0] (N=17)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	
Existing pump group†		0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	

Table 19. Clinical outcomes in pediatric patients (<18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
P-value for difference between no pump and new pump group**		0.5128	0.3239	-	-	-	-	
Mean and Median Number of Type 1 Diabetes-Related Outpatient Visits Per Patient (excluding ER visits)								
No pump group†	2.33 ± 1.32 (0, 4) 2 [1] (N=9)	2.00 ± 0.82 (1, 3) 2 [1] (N=4)	1.00 ± 1.41 (0, 2) 1 [2] (N=2)	0.00 (N=1)	0.00 (N=1)	1.00 (N=1)	- (N=0)	0.4138
New pump group‡	6.37 ± 5.54 (0, 24) 6 [6.5] (N=52)	7.20 ± 5.17 (0, 20) 7.5 [7.5] (N=44)	1.73 ± 2.10 (0, 9) 1 [1] (N=41)	1.47 ± 1.42 (0, 5) 1 [2] (N=34)	1.58 ± 1.35 (0, 5) 1 [1] (N=24)	1.65 ± 1.58 (0, 6) 1 [1] (N=17)	1.78 ± 1.30 (0, 4) 2 [1] (N=9)	0.0000
Existing pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	1.50 ± 0.71 (1, 2) 1.5 [1] (N=2)	1.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	0.3062
P-value for difference between no pump and new pump group**	0.0252	0.0415	0.6957	-	-	-	-	
Change in Mean and Median Number of Type 1 Diabetes-Related Outpatient Visits Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.25 ± 2.06 (-2, 2) -0.5 [3.5] (N=4)	-1.00 ± 1.41 (-2, 0) -1 [2] (N=2)	-4.00 (N=1)	-4.00 (N=1)	-3.00 (N=1)	- (N=0)	
New pump group‡		0.95 ± 5.81 (-16, 14) 1 [5.5] (N=44)	-4.73 ± 5.39 (-19, 3) -4 [7] (N=41)	-5.41 ± 4.78 (-20, 1) -5.5 [5] (N=34)	-5.88 ± 5.94 (-22, 2) -5.5 [6.5] (N=24)	-5.71 ± 5.08 (-20, 0) -5 [5] (N=17)	-5.89 ± 7.11 (-22, 2) -6 [5] (N=9)	
Existing pump group†		1.5 ± 0.71 (1, 2) 1.5 [1] (N=2)	1.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
P-value for difference between no pump and new pump group**		0.5128	0.3239	-	-	-	-	
Mean and Median Number of Type 1 Diabetes-Related Inpatient Stays Per Patient								
No pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.00 ± 0.00 (0, 0) 0 [0] (N=4)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	- (N=0)	-
New pump group‡	0.04 ± 0.19 (0, 1) 0 [0] (N=52)	0.00 ± 0.00 (0, 0) 0 [0] (N=44)	0.02 ± 0.16 (0, 1) 0 [0] (N=41)	0.00 ± 0.00 (0, 0) 0 [0] (N=34)	0.00 ± 0.00 (0, 0) 0 [0] (N=24)	0.06 ± 0.24 (0, 1) 0 [0] (N=17)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)	0.4431
Existing pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=3)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
P-value for difference between no pump and new pump group**	0.5530	-	0.8252	-	-	-	-	
Change in Mean and Median Number of Type 1 Diabetes-Related Inpatient Stays Per Patient From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.00 ± 0.00 (0, 0) 0 [0] (N=4)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	- (N=0)	

Table 19. Clinical outcomes in pediatric patients (<18 years of age at baseline)

	-3 to 0 months	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	P-value for differences over time*
New pump group‡	-0.02 ± 0.15 (-1, 0) 0 [0] (N=44)	0.00 ± 0.22 (-1, 1) 0 [0] (N=41)	-0.03 ± 0.17 (-1, 0) 0 [0] (N=34)	-0.04 ± 0.2 (-1, 0) 0 [0] (N=24)	0.06 ± 0.24 (0, 1) 0 [0] (N=17)	0.00 ± 0.00 (0, 0) 0 [0] (N=9)		
Existing pump group†	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)		
P-value for difference between no pump and new pump group**	0.7630	1.0000	-	-	-	-		

- Notes:
- values are in mean ± standard deviation (range) and median [interquartile range]
 - data sources: Alberta Health and Alberta Health Services administrative databases, including data from practitioner claims, outpatient (ACCS), inpatient (DAD), and laboratory databases from January 1, 2012 to March 31, 2015 (for claims, in-patient and outpatient data) and January 1, 2012 to March 31, 2016 (for laboratory data)
 - type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718)
 - *overall changes in outcomes over time were assessed using repeated measures ANOVA tests
 - **differences in outcomes between no pump group and new pump group assessed using two sample Wilcoxon rank-sum (Mann-Whitney) test
 - † for patients not currently on a pump and patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline values correspond to average values over the 3 months preceding the baseline interview, 3 month values correspond to averages between the baseline interview and 3 months after the baseline interview, 6 month values correspond to averages between 3 and 6 months after the baseline interview, 9 month values correspond to averages between 6 and 9 months after the baseline interview, etc.
 - ‡ for patients who received a pump through the public program, baseline values correspond to average values over the 3 months preceding the insulin pump start date, 3 month values correspond to averages between the pump start date and 3 months after the pump start date, 6 month values correspond to averages between 3 and 6 months after the pump start date, 9 month values correspond to averages between 6 and 9 months after the pump start date, etc.

Table 20. Mean and median amounts of Insulin pump supplies used by adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
Patients who started IPT through the public program ('new pump' group) (N = 84)†							
Average dose of insulin (pump): total (units/day)	37.7 ± 18.3 (11.7, 83.1) 31.5 [24.0] (N=27)	42.6 ± 27.9 (7.6, 157.9) 33.3 [25.7] (N=60)	38.5 ± 20.9 (9.1, 127.5) 36.6 [23.1] (N=62)	37.8 ± 19.4 (8.5, 107) 32.2 [27.4] (N=58)	37.7 ± 16.2 (13.7, 88) 35.5 [19.7] (N=44)	37.7 ± 18.3 (10.3, 107.4) 35.2 [19.3] (N=40)	40.6 ± 25.2 (15.0, 118.6) 32.9 [21.5] (N=39)
Insulin pump supplies: (number/week)							
- blood glucose test strips	54.9 ± 15 (33, 106) 55 [18] (N=27)	46.1 ± 13.1 (21, 75) 47 [21] (N=60)	45.0 ± 12.3 (27, 76) 44 [18] (N=62)	44.6 ± 12.9 (14, 75) 44 [16] (N=58)	45.4 ± 16.6 (23, 126) 42.5 [19] (N=44)	45.7 ± 18.5 (25, 126) 41 [20.5] (N=40)	44.6 ± 15.5 (20, 105) 41 [20] (N=39)
- lancets	25.5 ± 21.8 (1, 67) 16 [37] (N=27)	18.8 ± 18.1 (0, 61) 10.5 [18.5] (N=60)	18.1 ± 17.5 (0, 68) 8.5 [21] (N=62)	19.1 ± 19.1 (0, 72) 7 [22] (N=58)	18.3 ± 18.0 (0, 65) 7.5 [21.5] (N=44)	18.4 ± 19.1 (0, 76) 7 [20.5] (N=40)	14.7 ± 16.6 (0, 62) 7 [21] (N=39)
- glucagon	0.0 ± 0.0 (0, 0) 0 [0] (N=27)	0.1 ± 0.5 (0, 4) 0 [0] (N=60)	0.0 ± 0.0 (0, 0) 0 [0] (N=62)	0.0 ± 0.0 (0, 0) 0 [0] (N=58)	0.1 ± 0.3 (0, 2) 0 [0] (N=44)	0.1 ± 0.5 (0, 3) 0 [0] (N=40)	0.0 ± 0.0 (0, 0) 0 [0] (N=39)
- syringes	0.4 ± 0.9 (0, 4) 0 [0] (N=27)	0.2 ± 0.7 (0, 3) 0 [0] (N=60)	0.6 ± 1.5 (0, 7) 0 [0] (N=62)	0.3 ± 0.8 (0, 4) 0 [0] (N=58)	0.1 ± 0.5 (0, 3) 0 [0] (N=44)	0.4 ± 1.3 (0, 7) 0 [0] (N=40)	0.2 ± 0.9 (0, 5) 0 [0] (N=39)
- alcohol wipes	6.9 ± 13.6 (0, 55) 3 [6] (N=27)	6.2 ± 11.8 (0, 57) 3 [4] (N=60)	4.6 ± 9.9 (0, 57) 3 [4] (N=62)	6.7 ± 12.8 (0, 56) 2 [6] (N=58)	5.0 ± 9.9 (0, 54) 2.5 [4.5] (N=44)	6.2 ± 14.1 (0, 63) 2 [4] (N=40)	5.4 ± 10.3 (0, 41) 2 [4] (N=39)
- blood ketone test strips	1.6 ± 3.4 (0, 16) 0 [2] (N=27)	0.5 ± 1.4 (0, 8) 0 [0] (N=60)	0.2 ± 0.7 (0, 4) 0 [0] (N=62)	0.3 ± 1.2 (0, 8) 0 [0] (N=58)	0.2 ± 0.5 (0, 3) 0 [0] (N=44)	0.1 ± 0.3 (0, 2) 0 [0] (N=40)	0.1 ± 0.4 (0, 2) 0 [0] (N=39)
- urine ketone test strips	0.5 ± 1.5 (0, 6) 0 [0] (N=27)	0.3 ± 1.3 (0, 9) 0 [0] (N=60)	0.3 ± 1.4 (0, 8) 0 [0] (N=62)	0.7 ± 2.6 (0, 17) 0 [0] (N=58)	0.5 ± 1.4 (0, 5) 0 [0] (N=44)	0.6 ± 2.0 (0, 10) 0 [0] (N=40)	0.6 ± 2.5 (0, 14) 0 [0] (N=39)
- pen tip needle	0.4 ± 1.1 (0, 4) 0 [0] (N=27)	0.2 ± 0.6 (0, 3) 0 [0] (N=60)	0.1 ± 0.4 (0, 3) 0 [0] (N=62)	0.2 ± 0.6 (0, 3) 0 [0] (N=58)	0.1 ± 0.3 (0, 2) 0 [0] (N=44)	0.2 ± 1.1 (0, 7) 0 [0] (N=40)	0.5 ± 1.7 (0, 8) 0 [0] (N=39)
- infusion set: tubing	3.5 ± 0.7 (2, 5) 3.5 [1] (N=22)	2.8 ± 1.3 (0, 7) 3 [1] (N=45)	2.7 ± 0.9 (1, 5) 2 [1] (N=47)	2.5 ± 1.4 (0, 7) 3 [1] (N=44)	2.9 ± 1.4 (0, 8) 3 [2] (N=34)	2.4 ± 1.1 (0, 4) 2 [1] (N=28)	2.4 ± 1.0 (0, 5) 2 [1] (N=29)
insertion device	3.1 ± 1.2 (0, 5) 3 [1] (N=22)	3.0 ± 1.4 (0, 7) 3 [2] (N=45)	2.7 ± 1.0 (0, 5) 3 [1] (N=47)	3.0 ± 1.2 (2, 7) 3 [1] (N=44)	2.9 ± 0.9 (2, 5) 3 [1] (N=34)	2.5 ± 1.0 (0, 4) 2 [1] (N=28)	2.6 ± 0.9 (0, 5) 2 [1] (N=29)
needle/cannula	3.5 ± 0.7 (2, 5) 3.5 [1] (N=22)	3.1 ± 1.3 (1, 7) 3 [2] (N=45)	2.8 ± 0.9 (1, 5) 3 [1] (N=47)	3.0 ± 1.2 (2, 7) 3 [1] (N=44)	2.9 ± 0.9 (2, 5) 3 [1] (N=34)	2.5 ± 1.0 (0, 4) 2 [1] (N=28)	2.6 ± 0.9 (0, 5) 2 [1] (N=29)
adhesive	1.3 ± 1.7 (0, 4) 0 [3] (N=22)	1.3 ± 1.5 (0, 5) 0 [3] (N=45)	1.2 ± 1.4 (0, 4) 0 [2] (N=47)	1.1 ± 1.7 (0, 8) 0 [2] (N=44)	1.3 ± 2 (0, 8) 0 [3] (N=34)	0.9 ± 1.4 (0, 5) 0 [2] (N=28)	1.1 ± 1.6 (0, 5) 0 [3] (N=29)
syringe	0.6 ± 1.2 (0, 4) 0 [0] (N=22)	0.7 ± 1.3 (0, 4) 0 [0] (N=45)	0.8 ± 1.2 (0, 4) 0 [2] (N=47)	0.5 ± 1.1 (0, 4) 0 [0] (N=44)	1.0 ± 1.5 (0, 4) 0 [2] (N=34)	0.3 ± 0.7 (0, 2) 0 [0] (N=28)	0.9 ± 1.4 (0, 5) 0 [2] (N=29)
reservoir cartridge	3.2 ± 0.9 (1, 5) 3 [1] (N=22)	2.8 ± 1.2 (0, 7) 3 [1] (N=45)	2.5 ± 0.9 (1, 4) 2 [1] (N=47)	2.7 ± 1.0 (1, 7) 3 [1] (N=44)	2.4 ± 1.0 (0, 4) 2 [1] (N=34)	2.3 ± 1.0 (0, 4) 2 [1] (N=28)	2.1 ± 0.9 (0, 3) 2 [1] (N=29)
- pod: insertion device	0.0 ± 0.0 (0, 0) 0 [0] (N=5)	0.4 ± 0.8 (0, 2) 0 [0] (N=15)	0.2 ± 0.8 (0, 3) 0 [0] (N=15)	0.0 ± 0.0 (0, 0) 0 [0] (N=14)	0.0 ± 0.0 (0, 0) 0 [0] (N=10)	0.0 ± 0.0 (0, 0) 0 [0] (N=12)	0.0 ± 0.0 (0, 0) 0 [0] (N=10)
needle/cannula	5.0 ± 3.4 (3, 11) 4 [1] (N=5)	3.1 ± 1.1 (2, 6) 3 [2] (N=15)	2.7 ± 0.9 (2, 5) 3 [1] (N=15)	2.7 ± 0.7 (2, 4) 3 [1] (N=14)	2.8 ± 0.8 (2, 4) 3 [1] (N=10)	2.9 ± 1.0 (2, 5) 3 [1.5] (N=12)	2.5 ± 0.8 (2, 4) 2 [1] (N=10)
adhesive	2.0 ± 1.9 (0, 4) 3 [3] (N=5)	2.6 ± 1.5 (0, 6) 3 [1] (N=15)	1.5 ± 1.3 (0, 3) 2 [3] (N=15)	1.4 ± 1.3 (0, 3) 2 [3] (N=14)	2.0 ± 1.5 (0, 4) 2.5 [3] (N=10)	1.9 ± 1.3 (0, 4) 2 [2] (N=12)	1.3 ± 1.2 (0, 3) 2 [2] (N=10)
syringe	4.4 ± 4.0 (0, 11)	2.7 ± 1.4 (0, 6)	1.6 ± 1.2 (0, 3)	2.4 ± 1.2 (0, 4)	2.0 ± 1.5 (0, 4)	2.1 ± 1.6 (0, 5)	1.9 ± 1.2 (0, 4)

Table 20. Mean and median amounts of Insulin pump supplies used by adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
- CGM: insertion device	4 [1] (N=5) 1.2 ± 0.4 (1, 2) 1 [0] (N=5)	3 [2] (N=15) 1.0 ± 0.0 (1, 1) 1 [0] (N=5)	2 [3] (N=15) 1.1 ± 0.6 (0, 2) 1 [0.5] (N=8)	2.5 [1] (N=14) 0.9 ± 0.4 (0, 1) 1 [0] (N=8)	2.5 [3] (N=10) 0.5 ± 0.7 (0, 1) 0.5 [1] (N=2)	2 [2] (N=12) 0.7 ± 0.6 (0, 1) 1 [1] (N=3)	2 [0] (N=10) 0.8 ± 1.0 (0, 2) 0.5 [1.5] (N=4)
sensor	1.4 ± 0.9 (1, 3) 1 [0] (N=5)	1.2 ± 0.4 (1, 2) 1 [0] (N=6)	1.0 ± 0.8 (0, 2) 1 [1] (N=8)	0.9 ± 0.4 (0, 1) 1 [0] (N=8)	1.5 ± 0.7 (1, 2) 1.5 [1] (N=2)	1.3 ± 0.6 (1, 2) 1 [1] (N=3)	1.2 ± 0.4 (1, 2) 1 [0] (N=5)
Insulin pump batteries (no. of times changed per 3 months):	N/A	3.6 ± 2.7 (1, 18) 3 [2] (N=58)	3.2 ± 2.3 (0, 12) 3 [2] (N=61)	3.0 ± 2.1 (1, 12) 3 [2] (N=56)	3.1 ± 2.1 (0, 12) 3 [2] (N=43)	3.8 ± 5.5 (0, 36) 3 [2] (N=40)	3.3 ± 2.2 (0, 12) 3 [2] (N=38)
Patients transitioning from private to public program ('existing pump' group) (N = 94)*							
Average dose of insulin (pump): total (units/day)	45.8 ± 25.4 (13.2, 144.9) 42 [21.1] (N=59)	45 ± 21.5 (16.8, 133.1) 39.7 [19.8] (N=73)	44.9 ± 21.2 (18.9, 126.8) 39 [15.7] (N=67)	47.7 ± 26.4 (16.7, 152) 41.1 [18.1] (N=58)	45.1 ± 20.3 (16.2, 140.1) 39.9 [21.6] (N=58)	45.5 ± 20.8 (18, 134.3) 41.3 [20] (N=48)	46.7 ± 25.2 (17.6, 136.7) 38 [31.5] (N=41)
Insulin pump supplies: (number/week)							
- blood glucose test strips	42.8 ± 16.1 (3, 97) 41.5 [17] (N=60)	45.4 ± 19.4 (12, 115) 43 [22] (N=73)	44.0 ± 18.6 (14, 144) 42 [20] (N=67)	43.6 ± 16.0 (0, 91) 41.5 [21] (N=58)	45.7 ± 16.6 (16, 107) 42.5 [20] (N=58)	46.8 ± 14.7 (17, 90) 45.5 [19] (N=48)	48.7 ± 12.5 (24, 75) 49 [18] (N=41)
- lancets	14.3 ± 18.9 (0, 94) 7 [16.5] (N=60)	15.2 ± 22.1 (0, 114) 7 [11] (N=73)	14.0 ± 22.1 (0, 144) 7 [7] (N=67)	13.6 ± 20.0 (0, 91) 7 [7] (N=58)	12.7 ± 19.8 (0, 107) 7 [8] (N=58)	14.4 ± 20.7 (0, 90) 7 [9] (N=48)	15.5 ± 21.4 (0, 75) 7 [10] (N=41)
- glucagon	0.0 ± 0.1 (0, 1) 0 [0] (N=60)	0.1 ± 0.6 (0, 4) 0 [0] (N=73)	0.0 ± 0.0 (0, 0) 0 [0] (N=67)	0.1 ± 0.5 (0, 4) 0 [0] (N=58)	0.1 ± 0.4 (0, 3) 0 [0] (N=58)	0.0 ± 0.2 (0, 1) 0 [0] (N=48)	0.1 ± 0.8 (0, 5) 0 [0] (N=41)
- syringes	0.1 ± 0.5 (0, 3) 0 [0] (N=60)	0.2 ± 0.6 (0, 4) 0 [0] (N=73)	0.3 ± 1.4 (0, 10) 0 [0] (N=67)	0.2 ± 0.9 (0, 6) 0 [0] (N=58)	0.2 ± 0.8 (0, 6) 0 [0] (N=58)	0.2 ± 0.8 (0, 5) 0 [0] (N=48)	0.1 ± 0.3 (0, 2) 0 [0] (N=41)
- alcohol wipes	4.4 ± 9.7 (0, 58) 2 [4] (N=60)	3.4 ± 6.8 (0, 47) 2 [4] (N=73)	4.1 ± 8.2 (0, 54) 2 [4] (N=67)	4.7 ± 9.7 (0, 50) 2 [4] (N=58)	2.7 ± 5.4 (0, 26) 0 [3] (N=58)	3.1 ± 8.5 (0, 51) 0 [3] (N=48)	3.1 ± 7 (0, 44) 1 [3] (N=41)
- blood ketone test strips	0.2 ± 0.7 (0, 5) 0 [0] (N=60)	0.3 ± 1.2 (0, 7) 0 [0] (N=73)	0.2 ± 1.1 (0, 7) 0 [0] (N=67)	0.1 ± 0.4 (0, 2) 0 [0] (N=58)	0.2 ± 0.5 (0, 2) 0 [0] (N=58)	0.2 ± 0.6 (0, 3) 0 [0] (N=48)	0.3 ± 0.8 (0, 4) 0 [0] (N=41)
- urine ketone test strips	0.2 ± 1.0 (0, 6) 0 [0] (N=60)	0.2 ± 0.7 (0, 4) 0 [0] (N=73)	0.2 ± 1.0 (0, 7) 0 [0] (N=66)	0.2 ± 0.9 (0, 6) 0 [0] (N=58)	0.2 ± 0.8 (0, 6) 0 [0] (N=58)	0.1 ± 0.3 (0, 2) 0 [0] (N=48)	0.1 ± 0.7 (0, 4) 0 [0] (N=41)
- pen tip needle	0.9 ± 2.8 (0, 18) 0 [0] (N=60)	0.5 ± 1.3 (0, 7) 0 [0] (N=73)	0.1 ± 0.6 (0, 3) 0 [0] (N=67)	0.5 ± 1.6 (0, 8) 0 [0] (N=58)	0.1 ± 0.6 (0, 4) 0 [0] (N=58)	0.9 ± 6.1 (0, 42) 0 [0] (N=48)	0.1 ± 0.3 (0, 2) 0 [0] (N=40)
- infusion set: tubing	2.3 ± 0.9 (0, 4) 2 [1] (N=59)	2.3 ± 0.8 (1, 4) 2 [1] (N=69)	2.6 ± 1.0 (0, 5) 3 [1] (N=63)	2.7 ± 0.9 (1, 5) 3 [1] (N=54)	2.5 ± 0.9 (1, 5) 2.5 [1] (N=54)	2.6 ± 1.0 (0, 4) 3 [1] (N=44)	2.8 ± 1.2 (1, 7) 3 [1] (N=35)
insertion device	2.4 ± 1.0 (0, 4) 2 [1] (N=59)	2.4 ± 1.0 (0, 5) 2 [1] (N=69)	2.8 ± 0.9 (1, 6) 3 [1] (N=63)	2.8 ± 0.8 (1, 5) 3 [1] (N=54)	2.7 ± 1.1 (0, 6) 3 [1] (N=54)	2.9 ± 1.2 (0, 8) 3 [1] (N=44)	3.1 ± 1.2 (1, 7) 3 [2] (N=35)
needle/cannula	2.5 ± 0.9 (0, 4) 2 [1] (N=59)	2.4 ± 0.9 (0, 5) 2 [1] (N=69)	2.8 ± 0.9 (1, 6) 3 [1] (N=63)	2.8 ± 0.8 (1, 5) 3 [1] (N=54)	2.7 ± 1.1 (0, 6) 3 [1] (N=54)	2.9 ± 1.2 (0, 8) 3 [1] (N=44)	3.1 ± 1.2 (1, 7) 3 [2] (N=35)
adhesive	1.3 ± 1.5 (0, 5) 0 [3] (N=59)	1.0 ± 1.3 (0, 4) 0 [2] (N=69)	1.1 ± 1.4 (0, 4) 0 [2] (N=63)	1.3 ± 1.8 (0, 7) 0 [3] (N=54)	1.1 ± 1.4 (0, 4) 0 [2] (N=54)	1.0 ± 1.7 (0, 8) 0 [2] (N=44)	0.8 ± 1.6 (0, 6) 0 [0] (N=35)
syringe	0.3 ± 0.8 (0, 4) 0 [0] (N=59)	0.3 ± 0.8 (0, 4) 0 [0] (N=68)	0.3 ± 0.9 (0, 4) 0 [0] (N=63)	0.3 ± 0.8 (0, 4) 0 [0] (N=54)	0.2 ± 0.7 (0, 3) 0 [0] (N=53)	0.3 ± 0.8 (0, 3) 0 [0] (N=44)	0.1 ± 0.6 (0, 3) 0 [0] (N=35)
reservoir cartridge	2.1 ± 1.0 (0, 4) 2 [1] (N=59)	2.2 ± 0.7 (1, 4) 2 [1] (N=69)	2.4 ± 1.0 (0, 5) 2 [1] (N=63)	2.5 ± 1.0 (0, 4) 3 [1] (N=53)	2.4 ± 1.0 (0, 5) 2 [1] (N=54)	2.5 ± 1.0 (0, 4) 2.5 [1] (N=44)	2.7 ± 1.2 (1, 7) 2 [1] (N=35)

Table 20. Mean and median amounts of Insulin pump supplies used by adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
- pod: insertion device	0.0 (N=1)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=6)
needle/cannula	5.0 (N=1)	4.3 ± 0.5 (4, 5) 4 [0.5] (N=4)	4.3 ± 0.5 (4, 5) 4 [0.5] (N=4)	4.3 ± 1.3 (3, 6) 4 [1.5] (N=4)	4.3 ± 1.3 (3, 6) 4 [1.5] (N=4)	4.3 ± 0.5 (4, 5) 4 [0.5] (N=4)	2.8 ± 1.0 (2, 4) 2.5 [2] (N=6)
adhesive	5.0 (N=1)	3.3 ± 2.2 (0, 5) 4 [2.5] (N=4)	3.3 ± 2.2 (0, 5) 4 [2.5] (N=4)	2.5 ± 3 (0, 6) 2 [5] (N=4)	2.8 ± 3.4 (0, 7) 2 [5.5] (N=4)	2.3 ± 2.6 (0, 5) 2 [4.5] (N=4)	1.7 ± 2.0 (0, 4) 1 [4] (N=6)
syringe	5.0 (N=1)	3.3 ± 2.2 (0, 5) 4 [2.5] (N=4)	4.3 ± 0.5 (4, 5) 4 [0.5] (N=4)	3.5 ± 2.5 (0, 6) 4 [3] (N=4)	4.3 ± 1.3 (3, 6) 4 [1.5] (N=4)	3.3 ± 2.2 (0, 5) 4 [2.5] (N=4)	1.7 ± 2.0 (0, 4) 1 [4] (N=6)
- CGM: insertion device	0.9 ± 0.7 (0, 2) 1 [1] (N=11)	0.8 ± 0.8 (0, 2) 1 [1] (N=11)	0.7 ± 0.5 (0, 1) 1 [1] (N=7)	0.8 ± 0.8 (0, 2) 1 [1] (N=5)	1.0 ± 0.5 (0, 2) 1 [0] (N=9)	1.0 ± 0.0 (1, 1) 1 [0] (N=2)	1.3 ± 0.5 (1, 2) 1 [0.5] (N=4)
sensor	1.3 ± 0.8 (0, 3) 1 [1] (N=11)	1.0 ± 0.6 (0, 2) 1 [0] (N=12)	0.9 ± 0.4 (0, 1) 1 [0] (N=7)	1.2 ± 0.4 (1, 2) 1 [0] (N=5)	1.1 ± 0.3 (1, 2) 1 [0] (N=9)	1.0 ± 0.0 (1, 1) 1 [0] (N=2)	1.3 ± 0.5 (1, 2) 1 [0.5] (N=4)
Insulin pump batteries (no. of times changed per 3 months):	N/A	3.5 ± 1.9 (1, 12) 3 [1] (N=71)	3.8 ± 3.1 (0, 24) 3 [1] (N=64)	3.2 ± 1.4 (1, 7) 3 [1] (N=57)	3.6 ± 1.7 (1, 12) 3 [1] (N=58)	3.7 ± 1.7 (1, 12) 3 [1] (N=48)	3.3 ± 1.3 (1, 6) 3 [1] (N=40)

Notes:

- values are in mean ± standard deviation (range)
- data source: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
- † for patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline data is from the baseline diary, 3-month data is from the 3-month follow-up diary, 6-month data is from the 6-month follow-up diary, etc.
- * for patients who received a pump through the public program, baseline data is from the diary completed in 1.5 months after the insulin pump start date, 3-month data is from the diary completed between 1.5 and 4.5 months after the pump start date, 6-month data is from the diary completed between 4.5 and 7.5 months after the pump start date, 9-month data is from the diary completed between 7.5 and 10.5 months after the pump start date, etc.

Table 21. Feedback on IPT program from patients who have started pump therapy through the provincial program

Organizing theme	Basic theme	Examples	Frequency of theme
Response to announcement of program	Appreciation	<p>“appreciative the province is funding insulin pumps”</p> <p>“very happy when province announced funding”</p> <p>“very surprised and happy with the amount of coverage”</p> <p>“very appreciative that the government is funding the program”</p> <p>“I’m very grateful to be on the pump program because without it I wouldn’t be able to afford one”</p> <p>“Because of the pump program, I am now able to be on one – thank you”</p>	16
	Concerns over differences in access to testing supplies between patients on and not on IPT	<p>“Other diabetics should also be funded for supplies”</p> <p>“glucose test strips should be funded for everyone”</p> <p>“significant disparity on how non pump and pump users are treated</p>	5
Support from pump clinic	Positive	<p>“staff very helpful”</p> <p>“they have been so awesome and supportive”</p> <p>“receptive to questions”</p> <p>“happy with the support”</p>	10
	Negative	<p>“trainer initially gave me wrong info for loading infusion sets”</p> <p>“not enough time to answer all my questions”</p> <p>“should be support after hours and on the weekend”</p>	3
Process for accessing pump therapy	Clear/smooth	<p>“really great process and fast”</p> <p>“program has been easy to navigate”</p> <p>“process was smooth and quick”</p> <p>“the process was really fast and only had to wait a year”</p> <p>“seemed reasonable and fair”</p> <p>“very impressed with the entire process”</p>	5
	Unclear	<p>“process was unclear and not well advertised”</p> <p>“not easy to navigate the pump program”</p> <p>“need more public visibility of the program”</p> <p>“there is no set process”</p> <p>“program is confusing”</p>	7
	Tailoring program/criteria to individual patient needs	<p>“process should have greater flexibility in regards to patients who are stable and have a good track record”</p> <p>“nurses were not responsive to [my] needs”</p> <p>“should have more than one clinic with the program because patients may have a rapport at a different clinic”</p> <p>“do not understand why I wasn’t able to start the program through my endocrinologist’s office. It would have been easier since they know me”</p>	7

Table 21. Feedback on IPT program from patients who have started pump therapy through the provincial program

Organizing theme	Basic theme	Examples	Frequency of theme
		"after managing my insulin for 20 plus years, I'm treated as if I don't know anything"	
	Complicated	"arduous process and unduly complicated and filled with delays" "process doesn't need to be so complicated" "needs to be simple flowchart for someone looking at getting a pump"	4
Wait times	Specialist	"have waited a year" "long wait for endocrinologist" "waited 5 months to get an appointment with an endocrinologist"	4
	Appointment at clinic for assessment	"I found that there was a significant delay in getting in to meet with a diabetes nurse" "there seemed to be a bottleneck in the processing of the initial application" "I applied over a year ago to the clinic and just got an appointment"	3
	Pump education session	"not enough pump education sessions" "need additional pump information sessions" "time for pump sessions are inconvenient for someone who is working"	2
Education	Pump education session	"pump start class was fantastic" "pre-pump class was amazing and there was lots of information" "forces people to count carbs" "liked the online class" "Pump class was about carb counting and not the pump"	6
	Additional education	"more education is needed for the pumps and carb counting" "more one on one instruction" "should offer an additional but optional carb counting course"	4
	Differences between pumps	"would have appreciated more advice about the different pumps" "not enough information about each pump" "local educators were not familiar or trained on this [pump]"	5
	Primary care physicians	"Should be more education for GPs" "Family doctor had never heard of pump program"	2
	Pharmacists	"pharmacists don't understand the technology" "pharmacists need to be more aware of procedures" "pharmacists generally uninformed"	5
	Peer support	"Appreciated advice from other pump users" "Should have a patient support group to get advice from other pumpers"	3
CGM	Education	"Offer session on CGM"	2
	Training of clinic staff	"staff isn't up to date on CGM technology"	2
	Fund CGM	"should fund CGM" "I do wish CGM were funded"	18

Table 21. Feedback on IPT program from patients who have started pump therapy through the provincial program

Organizing theme	Basic theme	Examples	Frequency of theme
		"please, please consider funding sensors"	
	Experience	"Sensor has woken me up at night for true lows. It gives me security that I won't die at night because I don't sense hypos" "CGM changed my life, made me more aware of changes to my blood sugars, made me more aware of my reaction to exercise, stress and other things that affected my blood sugars" "It has been a god send" "life saving addition to the pump – helped to identify lows and highs quickly and deal with them" "has forced me to be more aware"	6
	Expectations	"allow more freedom in activities" "peace of mind living alone" "would like it because I cannot feel when I am going high"	4
Coverage of supplies	Testing supplies	"allotment of strips is not adequate especially for someone who is a beginner with the pump" "Have pretty much stopped driving because there are not enough strips to check through lows and highs" "I can only get 1 box of lancets and 1 box of test strips at a time – that means I have to go to the pharmacy every 2 weeks"	5
	Pump	"pump warranty is only 4 years and the program only provides a new pump every 5 years"	3
	Pump supplies	"pump program does not cover necessary battery and adapter caps" "the hundred day cycle is very confusing"	5

Table 22. Feedback on IPT program from patients transitioning from private to public coverage of IPT

Organizing theme	Basic theme	Examples	Frequency of theme
Response to announcement of program	Appreciation	“very happy province is covering so much of the supplies” “very grateful to the government”	11
	Relief	“taken a huge financial burden off our family” “I was so relieved. I wasn’t sure I would be able to stay on the pump much longer” “I recently lost my job so now I will be able to stay on the pump”	5
Support from pump clinic	Positive	“Clinic staff are very helpful” “everyone has been awesome and very supportive”	8
	Suggestions for improvement	“I don’t feel supported. I feel I need to ask everything and I don’t always know what to ask” “Every time I go to the clinic I see a different person and each nurse and dietitian have slightly different ways of carb counting”	3
Process for accessing pump therapy	Clear/smooth	“Satisfied with the program and have found it easy to navigate” “feel program is well organized” “had a smooth transition to the pump supplies coverage part of the program” “process was easy and straightforward” “process was quick”	9
	Unclear	“Unclear of protocols to get a pump” “lack of direction of how to transition and been waiting several months for a new pump”	6
	Tailoring program/criteria to individual patient needs	“2 A1C measurements is a built in delay” “frustrated with wait to get into the system and requirement for A1Cs to be less than or equal to 9, which hers never are” “program needs to be tailored more to the individual”	4
	Complicated	“extremely unhappy with the process – the endocrinologist is happy but the nurse is holding up the process” “I don’t believe that someone who has been on the pump for years should have to go through all of the hoops to qualify for a pump” “expected the process to be faster and easier for old pumpers” “qualifying for a new pump has been a long drawn out process” “frustrated with the amount of documentation required”	17
Wait times	Specialist	“Waiting period is too long” “had to physically wait at clinic to get answers” “could not get a quick appointment to see endocrinologist”	7
	Appointment at clinic for assessment	“seemed like a waste of my time to attend all of the appointments”	2

Table 22. Feedback on IPT program from patients transitioning from private to public coverage of IPT

Organizing theme	Basic theme	Examples	Frequency of theme
Education	Pump education session	“there should be an abbreviated education class for existing users” “pre-pump class pointless for someone who has been on the pump for a number of years” “Class was exhausting and unnecessary”	8
	Differences between pumps	“missing advice on which pump to get”	2
	Primary care physicians	“my own family physician was unaware of the program so it took a while to get referred to an endocrinologist”	3
	Other medical professionals	“There needs to be greater awareness amongst medical professionals of the IPT program” “greater awareness and education needs to be done for pharmacies and pharmacists” “Knowledge among health care professionals is low especially in the ER”	13
	Peer support	“Should have a pumper in the class”	2
CGM	Fund CGM	“the province should consider funding CGM”	16
	Experience	“I find CGM helpful with monitoring blood sugars at night” “Saved CGM sensors” “Helps decrease the number of low blood sugars through the night.” “MedTronic CGM is more hassle and not worth the investment”	4
Coverage of supplies	Testing supplies	“number of test strips allowed is not enough”	3
	Pump warranty	“I do find it stressful that the pump program will only pay for the pump every 5 years when the warranty on the pump is only 4 years” “Why is the province only paying for the pump every 5 years when the warranty coverage is for 4 years?”	6

Table 23. Mean and median amounts of Insulin pump supplies used by pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
Patients who started on IPT through the public program ('new pump' group) (N = 84)†							

Table 23. Mean and median amounts of Insulin pump supplies used by pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
Average dose of insulin (pump): total (units/day)	38.8 ± 22.8 (6.8, 115.7) 35.5 [25] (N=28)	37.6 ± 23.0 (5.0, 100.0) 35.5 [30.1] (N=45)	34.9 ± 21.4 (5.5, 92) 32.6 [24.8] (N=48)	35.1 ± 20.5 (7.1, 109.1) 31.8 [21] (N=45)	36.7 ± 21.4 (10.7, 120.7) 34.4 [20.1] (N=33)	39.6 ± 20.4 (7.5, 87.8) 32.7 [31.5] (N=30)	41.1 ± 19.1 (8.6, 82.9) 41.6 [26.3] (N=34)
Insulin pump supplies: (number/week)							
- blood glucose test strips	59.6 ± 16.7 (29, 94) 61 [27] (N=28)	50.7 ± 17.6 (14, 96) 49 [15] (N=45)	52.4 ± 16.5 (22, 129) 51 [18] (N=48)	50.1 ± 12.6 (28, 79) 46 [17] (N=45)	50.2 ± 18.7 (20, 109) 47.5 [26] (N=34)	49.7 ± 13.6 (27, 76) 48 [22] (N=30)	47.7 ± 14.6 (20, 82) 46 [21] (N=35)
- lancets	35.6 ± 30.9 (0, 94) 22 [57.5] (N=28)	26 ± 23.5 (0, 82) 15 [36] (N=45)	25 ± 22.3 (0, 74) 14 [43] (N=48)	24.2 ± 20.7 (2, 71) 14 [35] (N=45)	20.7 ± 19.5 (1, 72) 10 [26] (N=34)	22.4 ± 19.2 (0, 65) 13.5 [35] (N=30)	20.9 ± 20.8 (0, 81) 9 [37] (N=35)
- glucagon	0.0 ± 0.0 (0, 0) 0 [0] (N=28)	0.0 ± 0.0 (0, 0) 0 [0] (N=45)	0.0 ± 0.0 (0, 0) 0 [0] (N=48)	0.0 ± 0.0 (0, 0) 0 [0] (N=45)	0.0 ± 0.0 (0, 0) 0 [0] (N=34)	0.0 ± 0.0 (0, 0) 0 [0] (N=30)	0.0 ± 0.0 (0, 0) 0 [0] (N=35)
- syringes	0.6 ± 1.6 (0, 7) 0 [0] (N=28)	0.1 ± 0.6 (0, 3) 0 [0] (N=45)	0.2 ± 0.5 (0, 2) 0 [0] (N=48)	0.3 ± 0.8 (0, 4) 0 [0] (N=45)	0.1 ± 0.6 (0, 3) 0 [0] (N=34)	0.1 ± 0.4 (0, 2) 0 [0] (N=30)	0.1 ± 0.5 (0, 3) 0 [0] (N=35)
- alcohol wipes	5.4 ± 5.5 (0, 22) 4 [3] (N=28)	5.6 ± 8.3 (0, 40) 4 [4] (N=45)	6.3 ± 11.6 (0, 59) 3 [5] (N=48)	7.1 ± 12.6 (0, 56) 3 [6] (N=45)	9.4 ± 15.8 (0, 61) 3.5 [8] (N=34)	5.4 ± 10.1 (0, 46) 3.5 [5] (N=30)	6.9 ± 13.6 (0, 57) 3 [7] (N=35)
- blood ketone test strips	3.9 ± 6.8 (0, 27) 1.5 [4] (N=28)	2.2 ± 3.3 (0, 13) 1 [3] (N=45)	2.9 ± 4.4 (0, 18) 1 [4.5] (N=48)	2.2 ± 3.6 (0, 19) 0 [3] (N=45)	2.6 ± 5.6 (0, 30) 0.5 [3] (N=34)	1.4 ± 3.3 (0, 17) 0 [2] (N=30)	2.4 ± 3.8 (0, 16) 0 [4] (N=35)
- urine ketone test strips	1.1 ± 2.2 (0, 8) 0 [1] (N=28)	0.8 ± 2.1 (0, 12) 0 [0] (N=45)	0.7 ± 1.5 (0, 7) 0 [0.5] (N=48)	0.8 ± 2.0 (0, 10) 0 [0] (N=45)	0.1 ± 0.4 (0, 2) 0 [0] (N=34)	0.3 ± 1.1 (0, 6) 0 [0] (N=30)	0.1 ± 0.4 (0, 2) 0 [0] (N=35)
- pen tip needle	0.3 ± 0.8 (0, 4) 0 [0] (N=28)	0.3 ± 1.1 (0, 6) 0 [0] (N=45)	0.0 ± 0.3 (0, 2) 0 [0] (N=48)	0.3 ± 0.9 (0, 4) 0 [0] (N=45)	0.1 ± 0.4 (0, 2) 0 [0] (N=34)	0.3 ± 0.7 (0, 3) 0 [0] (N=30)	0.4 ± 1.1 (0, 4) 0 [0] (N=35)
- infusion set: tubing	2.9 ± 0.7 (2, 4) 3 [1] (N=19)	2.8 ± 1.0 (0, 5) 3 [1] (N=34)	2.6 ± 0.9 (0, 4) 3 [1] (N=39)	2.7 ± 1.1 (0, 5) 3 [1] (N=35)	2.6 ± 1.2 (0, 5) 3 [1] (N=26)	3.0 ± 1.0 (0, 5) 3 [1] (N=26)	2.8 ± 0.8 (1, 4) 3 [1] (N=29)
insertion device	3.2 ± 1.4 (2, 8) 3 [1] (N=19)	2.9 ± 1.0 (0, 5) 3 [2] (N=34)	2.9 ± 0.8 (2, 5) 3 [1] (N=39)	3.2 ± 1.1 (0, 5) 3 [1] (N=35)	3.1 ± 0.9 (2, 6) 3 [2] (N=26)	3.0 ± 1.0 (0, 5) 3 [1] (N=26)	3.0 ± 0.9 (1, 5) 3 [2] (N=29)
needle/cannula	3.2 ± 1.4 (2, 8) 3 [1] (N=19)	2.9 ± 1.0 (0, 5) 3 [2] (N=34)	2.9 ± 0.8 (2, 5) 3 [1] (N=39)	3.2 ± 1.1 (0, 5) 3 [1] (N=35)	3.0 ± 1.1 (0, 6) 3 [2] (N=26)	3.0 ± 1.0 (0, 5) 3 [1] (N=26)	3.0 ± 0.9 (1, 5) 3 [2] (N=29)
adhesive	0.6 ± 1.1 (0, 3) 0 [1] (N=19)	0.9 ± 1.3 (0, 4) 0 [2] (N=34)	0.9 ± 1.5 (0, 5) 0 [2] (N=39)	1.2 ± 1.5 (0, 4) 0 [3] (N=35)	0.8 ± 1.4 (0, 4) 0 [2] (N=26)	1.0 ± 1.5 (0, 5) 0 [2] (N=26)	1.2 ± 1.6 (0, 4) 0 [3] (N=29)
syringe	0.6 ± 1.3 (0, 3) 0 [0] (N=19)	0.7 ± 1.2 (0, 4) 0 [2] (N=34)	0.7 ± 1.2 (0, 4) 0 [1] (N=39)	0.5 ± 1.0 (0, 3) 0 [0] (N=35)	0.3 ± 0.7 (0, 3) 0 [0] (N=25)	0.3 ± 0.8 (0, 3) 0 [0] (N=25)	0.7 ± 1.4 (0, 4) 0 [0] (N=29)
reservoir cartridge	2.8 ± 0.7 (2, 4) 3 [1] (N=19)	2.8 ± 0.9 (1, 5) 3 [1] (N=34)	2.3 ± 0.8 (0, 4) 2 [1] (N=39)	2.7 ± 0.9 (0, 4) 3 [1] (N=35)	2.5 ± 0.9 (1, 4) 2.5 [1] (N=26)	2.8 ± 1.0 (1, 5) 3 [1] (N=26)	2.6 ± 1.0 (1, 4) 3 [1] (N=29)
- pod: insertion device	0.0 ± 0.0 (0, 0) 0 [0] (N=9)	0.5 ± 1.2 (0, 3) 0 [0] (N=11)	0.3 ± 1.0 (0, 3) 0 [0] (N=9)	0.0 ± 0.0 (0, 0) 0 [0] (N=10)	0.0 ± 0.0 (0, 0) 0 [0] (N=8)	0.0 ± 0.0 (0, 0) 0 [0] (N=4)	0.0 ± 0.0 (0, 0) 0 [0] (N=6)
needle/cannula	3 ± 0.7 (2, 4) 3 [0] (N=9)	2.7 ± 0.5 (2, 3) 3 [1] (N=11)	3.0 ± 0.7 (2, 4) 3 [0] (N=9)	2.7 ± 0.7 (2, 4) 3 [1] (N=10)	2.9 ± 0.4 (2, 3) 3 [0] (N=8)	2.5 ± 0.6 (2, 3) 2.5 [1] (N=4)	3.0 ± 0.6 (2, 4) 3 [0] (N=6)
adhesive	3.1 ± 0.9 (2, 5) 3 [0] (N=9)	2.5 ± 0.9 (0, 3) 3 [1] (N=11)	2.7 ± 1.2 (0, 4) 3 [1] (N=9)	2.0 ± 1.2 (0, 3) 2 [1] (N=10)	2.1 ± 1.4 (0, 3) 3 [2] (N=8)	2.0 ± 1.4 (0, 3) 2.5 [2] (N=4)	2.5 ± 1.4 (0, 4) 3 [1] (N=6)
syringe	2.8 ± 1.2 (0, 4) 3 [0] (N=9)	2.5 ± 0.9 (0, 3) 3 [1] (N=11)	1.7 ± 1.7 (0, 4) 2 [3] (N=9)	2.4 ± 1.1 (0, 4) 2.5 [1] (N=10)	1.9 ± 1.6 (0, 3) 3 [3] (N=8)	2.0 ± 1.4 (0, 3) 2.5 [2] (N=4)	2.5 ± 1.4 (0, 4) 3 [1] (N=6)
- CGM: insertion device	1.0 ± 0.0 (1, 1)	0.8 ± 0.5 (0, 1)	0.3 ± 0.6 (0, 1)	0.7 ± 0.6 (0, 1)	0.7 ± 0.6 (0, 1)	0.7 ± 0.6 (0, 1)	1.3 ± 0.5 (1, 2)

Table 23. Mean and median amounts of Insulin pump supplies used by pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
	1 [0] (N=2)	1 [0.5] (N=4)	0 [1] (N=3)	1 [1] (N=3)	1 [1] (N=3)	1 [1] (N=3)	1 [0.5] (N=4)
sensor	1.0 ± 0.0 (1, 1)	1.0 ± 0.0 (1, 1)	0.7 ± 0.6 (0, 1)	1.0 ± 0.0 (1, 1)	1.0 ± 0.0 (1, 1)	1.0 ± 0.0 (1, 1)	1.3 ± 0.5 (1, 2)
	1 [0] (N=2)	1 [0] (N=4)	1 [1] (N=3)	1 [0] (N=3)	1 [0] (N=3)	1 [0] (N=3)	1 [0.5] (N=4)
Insulin pump batteries (no. of times changed per 3 months):	3.8 ± 2.8 (0, 13)	3.2 ± 1.4 (1, 6)	3.7 ± 2.3 (1, 12)	3.9 ± 2.2 (1, 12)	3.6 ± 2.1 (1, 12)	3.4 ± 2.6 (1, 12)	3.7 ± 2.5 (1, 12)
	3 [1] (N=21)	3 [1.5] (N=44)	3 [2] (N=47)	3 [2] (N=45)	3 [1] (N=34)	3 [2] (N=30)	3 [2] (N=35)
Patients transitioning from private to public program ('existing pump' group) (N = 94)*							
Average dose of insulin (pump): total (units/day)	57 ± 5.7 (53, 63.6)	51.7 ± 6.6 (44.3, 57.1)	- (N=0)	60.4 ± 7.3 (55.3-65.6)	61.0 ± 1.2 (60.1-61.9)	75.5	62.4
	54.5 [10.6] (N=3)	53.6 [12.9] (N=3)		(N=2)	(N=2)	(N=1)	(N=1)
Insulin pump supplies: (number/week)							
- blood glucose test strips	51.0 ± 16.1 (33, 64)	44.3 ± 12.3 (34, 58)	- (N=0)	60.4 ± 7.3 (55.3, 65.6)	61 ± 1.2 (60.1, 61.9)	44.0	39.0
	56 [31] (N=3)	41 [24] (N=3)		60.4 [10.3] (N=2)	61 [1.7] (N=2)	(N=1)	(N=1)
- lancets	33.7 ± 30 (4, 64)	26.3 ± 19.7 (4, 41)	- (N=0)			3.0	7.0
	33 [60] (N=3)	34 [37] (N=3)				(N=1)	(N=1)
- glucagon	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	- (N=0)	61.5 ± 19.1 (48, 75)	51.5 ± 0.7 (51, 52)	0.0 (N=1)	0.0 (N=1)
	0 [0] (N=3)	0 [0] (N=3)		61.5 [27] (N=2)	51.5 [1] (N=2)		
- syringes	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	- (N=0)	41 ± 48.1 (7, 75)	27 ± 35.4 (2, 52)	0.0 (N=1)	3.0 (N=1)
	0 [0] (N=3)	0 [0] (N=3)		41 [68] (N=2)	27 [50] (N=2)		
- alcohol wipes	4.0 ± 0.0 (4, 4)	3.3 ± 3.1 (0, 6)	- (N=0)	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	3.0 (N=1)	3.0 (N=1)
	4 [0] (N=3)	4 [6] (N=3)		0 [0] (N=2)	0 [0] (N=2)		
- blood ketone test strips	1.3 ± 2.3 (0, 4)	0.0 ± 0.0 (0, 0)	- (N=0)	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	0.0 (N=1)	0.0 (N=1)
	0 [4] (N=3)	0 [0] (N=3)		0 [0] (N=2)	0 [0] (N=2)		
- urine ketone test strips	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	- (N=0)	10.5 ± 7.8 (5, 16)	1.5 ± 2.1 (0, 3)	0.0 (N=1)	0.0 (N=1)
	0 [0] (N=3)	0 [0] (N=3)		10.5 [11] (N=2)	1.5 [3] (N=2)		
- pen tip needle	2.3 ± 4 (0, 7)	0.0 ± 0.0 (0, 0)	- (N=0)	0.5 ± 0.7 (0, 1)	0.0 ± 0.0 (0, 0)	0.0 (N=1)	0.0 (N=1)
	0 [7] (N=3)	0 [0] (N=3)		0.5 [1] (N=2)	0 [0] (N=2)		
- infusion set: tubing	3.3 ± 0.6 (3, 4)	3.3 ± 0.6 (3, 4)	- (N=0)	0.0 ± 0.0 (0, 0)	0.0 ± 0.0 (0, 0)	3.0 (N=1)	3.0 (N=1)
	3 [1] (N=3)	3 [1] (N=3)		0 [0] (N=2)	0 [0] (N=2)		
insertion device	3.3 ± 0.6 (3, 4)	1.0 ± 1.7 (0, 3)	- (N=0)	4.0 ± 5.7 (0, 8)	0.0 ± 0.0 (0, 0)	0.0 (N=1)	3.0 (N=1)
	3 [1] (N=3)	0 [3] (N=3)		4 [8] (N=2)	0 [0] (N=2)		
needle/cannula	3.3 ± 0.6 (3, 4)	1.0 ± 1.7 (0, 3)	- (N=0)	4.0 ± 0.0 (4, 4)	3.5 ± 0.7 (3, 4)	0.0 (N=1)	3.0 (N=1)
	3 [1] (N=3)	0 [3] (N=3)		4 [0] (N=2)	3.5 [1] (N=2)		
adhesive	1.3 ± 2.3 (0, 4)	0.0 ± 0.0 (0, 0)	- (N=0)	4.0 ± 0.0 (4, 4)	2.0 ± 2.8 (0, 4)	0.0 (N=1)	0.0 (N=1)
	0 [4] (N=3)	0 [0] (N=3)		4 [0] (N=2)	2 [4] (N=2)		
syringe	0.0 ± 0.0 (0, 0)	0.3 ± 0.6 (0, 1)	- (N=0)	4.0 ± 0.0 (4, 4)	2.0 ± 2.8 (0, 4)	0.0 (N=1)	0.0 (N=1)
	0 [0] (N=3)	0 [1] (N=3)		4 [0] (N=2)	2 [4] (N=2)		
reservoir cartridge	3.3 ± 0.6 (3, 4)	3.3 ± 0.6 (3, 4)	- (N=0)	2.0 ± 2.8 (0, 4)	2.0 ± 2.8 (0, 4)	3.0 (N=1)	3.0 (N=1)
	3 [1] (N=3)	3 [1] (N=3)		2 [4] (N=2)	2 [4] (N=2)		
- pod: insertion device	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)
needle/cannula	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)
adhesive	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)

Table 23. Mean and median amounts of Insulin pump supplies used by pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months
Syringe	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)
- CGM: insertion device	1.5±0.7 (1-2) 1.5 [1] (N=2)	1.0±1.4 (0-2) 1 [2] (N=2)	- (N=0)	1.5±0.7 (1-2) 1.5 [1] (N=2)	0.5±0.7 (0-1) 0.5 [1] (N=2)	0.0 (N=1)	0.0 (N=1)
sensor	1.5±0.7 (1-2) 1.5 [1] (N=2)	1.5±0.7 (1-2) 1.5 [1] (N=2)	- (N=0)	1.5±0.7 (1-2) 1.5 [1] (N=2)	1.5±0.7 (1-2) 1.5 [1] (N=2)	1.0 (N=1)	1.0 (N=1)
Insulin pump batteries (no. of times changed per 3 months):	2.7±1.5 (1-4) 3 [3] (N=3)	2.7±1.5 (1-4) 3 [3] (N=3)	- (N=0)	3.5±0.7 (3-4) 3.5 [1] (N=2)	3.5±0.7 (3-4) 3.5 [1] (N=2)	4.0 (N=1)	4.0 (N=1)

Notes:

- values are in mean ± standard deviation (range)
- data source: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
- * for patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline data is from the baseline diary, 3-month data is from the 3-month follow-up diary, 6-month data is from the 6-month follow-up diary, etc.
- † for patients who received a pump through the public program, baseline data is from the diary completed in ≤3 months before the insulin pump start date, 3-month data is from the diary completed between the pump start date and 4.5 months after the pump start date, 6-month data is from the diary completed between 4.5 and 7.5 months after the pump start date, 9-month data is from the diary completed between 7.5 and 10.5 months after the pump start date, etc.

Table 24. Feedback on IPT program from parents of pediatric patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
Response to announcement of program	Appreciation	"grateful for the public funding" "grateful for program and government support" "very happy and grateful for public funding of the pump" "grateful for program – it has made a huge impact financially" "we are grateful to the province for allowing us the chance to try the pump"	26
	Concerns over differences in access to testing supplies between patients on and not on IPT	"testing should be covered for all diabetics" "it is unfair that non pump users do not have funding for test strips"	6
Support from pump clinic	Positive	"good follow-up support" "very supportive and helpful" "it seems to be a well-run program with lots of follow up"	26
	Suggestions for improvement	"would have been more helpful if the follow-up was one-on-one. There were issues with privacy." "not enough time with the nurse" "need greater support for families who may need additional help with the pump" "wished we were able to contact the nurse in the evening instead of paging the endocrinologist" "wish there were more nurses at the clinic so when I need advice someone would return my call right away"	5
Process for accessing pump therapy	Clear/smooth	"process went smoothly"	2
	Unclear	"feel like we are left in the dark not knowing where we are in the process" "it is very confusing all of the stuff you have to do to get started"	4
	Tailoring program/criteria to individual patient needs	"needed more individualized training" "too rigid and regimented" "we believe the cut off for getting a pump is too strict. Other provinces have an A1C of 10. Alberta is 9.0. We believe there must be other indicators."	6
	Complicated	"it has been frustrating with the waiting period and not knowing where we are in the system and if all the paperwork is in place" "it is a very complicated process"	3
Wait times	Appointment at clinic for assessment	"the only comment we would like to make is about the long wait to get in" "it would be nice if the wait period could be cut down"	4
	Pump education session	"more pump classes and additional classroom space" "suggest that there are more educational classes and general information sessions available in the evening"	13

Table 24. Feedback on IPT program from parents of pediatric patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
		<p>"Our only issue is the extreme wait time for training. Our wait is 1 year and we must spend 4 to 5 days in Edmonton for training which means hotels, meals and gas and missed work for me and my husband. We have a clinic here but training cannot be done here"</p> <p>"I wish we didn't have to wait over a year to get pump training"</p> <p>"provide training through telehealth for out of town families"</p>	
Education	Pump education session – positive feedback	<p>"education session was really good"</p> <p>"well laid out and easy to follow"</p>	7
	Pump education session – areas of improvement	<p>"classes are large"</p> <p>"information night was too rushed. Lots of information in a very short amount of time."</p> <p>"I felt the second session talked too much about the future with pumping. I would have liked to been taught about what was going to happen in the next few weeks"</p> <p>"too much information in a very short amount of time"</p>	5
	Additional education	<p>"more comprehensive education is needed with more hands on training with the pump"</p> <p>"should have more closely monitored follow-up"</p> <p>"would suggest additional (but optional) information session"</p> <p>"should spend more time on instructing how to insert a site"</p>	6
	Differences between pumps	<p>"would have liked more time with vendors to ask questions and look at the pump"</p>	2
	Pharmacists	<p>"it was difficult to get pharmacy to understand the program"</p>	1
	Peer support	<p>"would have been helpful to hear about other families' experiences"</p> <p>"peer support group for patients"</p>	6
CGM	Fund CGM	<p>"CGM should be funded"</p> <p>"consider covering CGM"</p> <p>"consider funding CGM to help fine tune basal rates"</p> <p>"we would love some coverage of CGM but we are happy that government is funding pump supplies so that we can spend money on glucose sensor refills"</p>	14
	Experience	<p>"we have found it very useful"</p> <p>"a huge help to know what amount of insulin to give and a huge relief to know what his blood sugars were doing"</p> <p>"the lack of calculating and recording due to the CGM has been nice"</p> <p>"CGM has proved to be a life-saver. It provides peace of mind, more sleep for us and easier management at school"</p>	7

Table 24. Feedback on IPT program from parents of pediatric patients who have started pump therapy through the provincial program ('new pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
		"site is itchy especially after showering but less blood testing"	
Coverage of supplies	Testing supplies	"pump requires the use of extra strips but we are able to deal with the cost" "consider funding more glucose strips" "increase the number of test strips" "The allotted supplies should be based on a patient's needs. He doesn't use all the allotted infusion sets, but often needs more strips for testing." "it is inconvenient to be only able to pick up one box of testing strips at a time" "I feel that more strips should be covered for growing children as their bodies are changing which impacts BG." "I go over the limit for test strips every month"	20
	Pump	"would not be able to get the pump without public funding"	7
	Pump supplies	"consider funding alcohol prep pads" "adhesive tape is not covered"	4
Insurance	Coverage has changed since the launch of the public program	"Employer switched benefits plan company from Manulife to Great West Life, who does not cover the pump"	2
	Last payer coverage	"[manufacturer] encouraged us to seek coverage through the government program rather than their own employer insurance"	3

Table 25. Feedback on IPT program from parents of pediatric patients on pump therapy prior to the launch of the provincial program ('existing pump' group)

Organizing theme	Basic theme	Examples	Frequency of theme
Response to announcement of program	Appreciation	"very grateful with the announcement of the program because it decreased our worry about how to pay for a new pump" "grateful for the IPT program. It has made a huge impact financially"	3
Coverage of supplies	Testing supplies	"the number of testing strips is not enough"	1
	Pump choice	"Consider more choice than the four current pumps"	1

Table 26. Comparison of patient-reported supply use with ABC claims statements

	Average number of supplies used per patient													
	April 2014		May 2014		June 2014		July 2014		September 2014		October 2014		November 2014	
	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims
New Insulin Pump Users														
Infusion Sets*	10 (N=9)	27 (N=162)	12 (N=20)	28 (N=191)	14 (N=12)	28 (N=212)	13 (N=18)	31 (N=247)	12 (N=20)	28 (N=281)	10 (N=16)	27 (N=245)	13 (N=16)	26 (N=224)
Insulin Cartridges*	11 (N=9)	29 (N=190)	11 (N=20)	29 (N=201)	14 (N=12)	30 (N=215)	12 (N=18)	29 (N=293)	12 (N=20)	29 (N=301)	11 (N=16)	29 (N=287)	11 (N=16)	28 (N=254)
Blood Ketone Test Strips	2 (N=12)	22 (N=20)	11 (N=26)	16 (N=35)	5 (N=15)	17 (N=31)	6 (N=24)	15 (N=31)	4 (N=24)	14 (N=40)	3 (N=22)	15 (N=39)	3 (N=21)	18 (N=31)
Alcohol Wipes	13 (N=12)	78 (N=26)	22 (N=26)	80 (N=31)	22 (N=15)	68 (N=44)	23 (N=24)	64 (N=35)	22 (N=24)	83 (N=44)	21 (N=22)	76 (N=37)	41 (N=21)	76 (N=33)
Insertion Devices*	12 (N=9)	1 (N=1)	13 (N=20)	0 (N=0)	17 (N=12)	0 (N=1)	13 (N=18)	0 (N=0)	13 (N=20)	0 (N=0)	12 (N=16)	0 (N=0)	13 (N=16)	0 (N=0)
Lancets	84 (N=12)	240 (N=41)	111 (N=26)	268 (N=48)	70 (N=15)	243 (N=48)	97 (N=24)	276 (N=52)	107 (N=24)	246 (N=76)	57 (N=22)	268 (N=63)	110 (N=21)	238 (N=55)
Syringes	3 (N=12)	91 (N=10)	1 (N=26)	37 (N=3)	1 (N=15)	63 (N=7)	1 (N=24)	50 (N=2)	1 (N=24)	60 (N=6)	1 (N=22)	43 (N=3)	0 (N=21)	10 (N=2)
Blood Glucose Test Strips	240 (N=12)	254 (N=158)	221 (N=26)	280 (N=197)	213 (N=15)	272 (N=231)	216 (N=24)	270 (N=235)	224 (N=24)	301 (N=312)	193 (N=22)	275 (N=285)	215 (N=21)	261 (N=285)
Pen Tip Needles	2 (N=12)	100 (N=4)	0 (N=26)	117 (N=6)	1 (N=15)	43 (N=7)	1 (N=24)	100 (N=6)	1 (N=24)	150 (N=6)	0 (N=22)	120 (N=5)	1 (N=21)	100 (N=4)
Existing Insulin Pump Users														
Infusion Sets*	10 (N=10)	20 (N=254)	12 (N=6)	23 (N=312)	11 (N=9)	22 (N=288)	12 (N=12)	24 (N=281)	11 (N=18)	22 (N=341)	11 (N=15)	22 (N=285)	12 (N=6)	24 (N=275)
Insulin Cartridges*	9 (N=10)	21 (N=247)	12 (N=6)	23 (N=288)	10 (N=9)	22 (N=286)	12 (N=12)	24 (N=273)	10 (N=18)	22 (N=334)	8 (N=15)	21 (N=268)	12 (N=6)	23 (N=275)
Blood Ketone Test Strips	3 (N=11)	14 (N=18)	0 (N=6)	13 (N=10)	0 (N=9)	19 (N=16)	1 (N=14)	17 (N=11)	0 (N=18)	24 (N=18)	0 (N=16)	18 (N=14)	3 (N=6)	20 (N=11)
Alcohol Wipes	28 (N=11)	69 (N=21)	16 (N=6)	56 (N=29)	10 (N=9)	51 (N=22)	11 (N=14)	74 (N=19)	21 (N=18)	71 (N=22)	25 (N=16)	68 (N=26)	7 (N=6)	62 (N=21)
Insertion Devices*	10 (N=10)	1 (N=1)	13 (N=6)	0 (N=1)	11 (N=9)	0 (N=0)	11 (N=12)	1 (N=3)	11 (N=18)	0 (N=0)	11 (N=15)	0 (N=0)	12 (N=6)	0 (N=0)
Lancets	102 (N=11)	214 (N=42)	78 (N=6)	324 (N=36)	135 (N=9)	221 (N=46)	88 (N=14)	291 (N=30)	75 (N=18)	209 (N=54)	87 (N=16)	214 (N=35)	29 (N=6)	285 (N=29)
Syringes	0 (N=11)	27 (N=3)	0 (N=6)	58 (N=6)	0 (N=9)	62 (N=5)	2 (N=14)	100 (N=1)	0 (N=18)	64 (N=7)	2 (N=16)	58 (N=4)	0 (N=6)	43 (N=3)
Blood Glucose Test Strips	207 (N=11)	242 (N=229)	189 (N=6)	273 (N=231)	214 (N=9)	242 (N=236)	203 (N=14)	269 (N=227)	207 (N=18)	262 (N=294)	214 (N=16)	252 (N=233)	178 (N=6)	228 (N=234)
Pen Tip Needles	3 (N=11)	100 (N=3)	0 (N=6)	100 (N=2)	1 (N=9)	100 (N=1)	0 (N=14)	100 (N=4)	0 (N=18)	100 (N=6)	2 (N=16)	0 (N=1)	0 (N=6)	80 (N=5)
Total														
Infusion Sets*	10 (N=19)	23 (N=415)	12 (N=26)	25 (N=503)	13 (N=21)	25 (N=500)	13 (N=30)	27 (N=528)	11 (N=38)	25 (N=621)	11 (N=31)	25 (N=530)	13 (N=22)	25 (N=499)
Insulin Cartridges*	10 (N=19)	24 (N=437)	11 (N=26)	26 (N=488)	12 (N=21)	26 (N=501)	12 (N=30)	26 (N=566)	11 (N=38)	26 (N=634)	9 (N=31)	25 (N=555)	11 (N=22)	25 (N=528)
Blood Ketone Test Strips	2 (N=23)	18 (N=38)	9 (N=32)	16 (N=45)	3 (N=24)	18 (N=47)	4 (N=38)	16 (N=42)	3 (N=42)	17 (N=58)	2 (N=38)	15 (N=53)	3 (N=27)	19 (N=42)
Alcohol Wipes	20 (N=23)	73 (N=47)	21 (N=32)	69 (N=59)	18 (N=24)	62 (N=66)	19 (N=38)	68 (N=54)	22 (N=42)	79 (N=66)	23 (N=38)	73 (N=63)	33 (N=27)	71 (N=54)
Insertion Devices*	11 (N=19)	1 (N=2)	13 (N=26)	0 (N=1)	14 (N=21)	0 (N=1)	12 (N=30)	1 (N=3)	12 (N=38)	0 (N=0)	12 (N=31)	0 (N=0)	13 (N=22)	0 (N=0)
Lancets	93 (N=23)	227 (N=83)	105 (N=32)	292 (N=84)	94 (N=24)	232 (N=94)	93 (N=38)	282 (N=82)	93 (N=42)	231 (N=130)	70 (N=38)	248 (N=98)	92 (N=27)	254 (N=84)
Syringes	2 (N=23)	76 (N=13)	1 (N=32)	51 (N=9)	1 (N=24)	63 (N=12)	1 (N=38)	67 (N=3)	0 (N=42)	62 (N=13)	2 (N=38)	51 (N=7)	0 (N=27)	30 (N=5)
Blood Glucose Test Strips	224 (N=23)	247 (N=386)	215 (N=32)	277 (N=427)	213 (N=24)	257 (N=467)	211 (N=38)	270 (N=462)	217 (N=42)	283 (N=604)	202 (N=38)	265 (N=518)	207 (N=27)	246 (N=519)
Pen Tip Needles	2 (N=23)	100 (N=7)	0 (N=32)	113 (N=8)	1 (N=24)	50 (N=8)	1 (N=38)	100 (N=10)	1 (N=42)	125 (N=12)	1 (N=38)	100 (N=6)	0 (N=27)	89 (N=9)

Table 26. Comparison of patient-reported supply use with ABC claims statements

	Average number of supplies used per patient													
	January 2015		February 2015		April 2015		May 2015		July 2015		October 2015		November 2015	
	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims	Diaries	ABC Claims
New Insulin Pump Users														
Infusion Sets*	12 (N=23)	27 (N=303)	11 (N=13)	29 (N=239)	13 (N=18)	31 (N=404)	13 (N=23)	29 (N=297)	10 (N=18)	22 (N=246)	12 (N=14)	30 (N=378)	12 (N=17)	29 (N=409)
Insulin Cartridges*	11 (N=23)	29 (N=344)	11 (N=13)	30 (N=261)	12 (N=18)	30 (N=495)	11 (N=23)	30 (N=345)	9 (N=18)	23 (N=230)	12 (N=14)	29 (N=460)	12 (N=17)	28 (N=490)
Blood Ketone Test Strips	7 (N=28)	16 (N=52)	2 (N=24)	15 (N=46)	7 (N=22)	14 (N=36)	4 (N=33)	32 (N=40)	6 (N=22)	20 (N=13)	3 (N=18)	24 (N=52)	8 (N=21)	13 (N=55)
Alcohol Wipes	36 (N=28)	88 (N=48)	34 (N=24)	64 (N=40)	16 (N=22)	42 (N=65)	31 (N=33)	54 (N=51)	28 (N=22)	76 (N=18)	26 (N=18)	54 (N=53)	29 (N=21)	54 (N=69)
Insertion Devices*	15 (N=23)	0 (N=0)	11 (N=13)	1 (N=2)	13 (N=18)	0 (N=1)	13 (N=23)	1 (N=1)	11 (N=18)	1 (N=1)	14 (N=14)	1 (N=2)	14 (N=17)	1 (N=2)
Lancets	98 (N=28)	266 (N=82)	86 (N=24)	272 (N=78)	93 (N=22)	297 (N=77)	94 (N=33)	267 (N=80)	92 (N=22)	204 (N=34)	62 (N=18)	243 (N=90)	107 (N=21)	239 (N=92)
Syringes	2 (N=28)	73 (N=4)	2 (N=24)	80 (N=8)	1 (N=22)	82 (N=5)	1 (N=33)	69 (N=7)	1 (N=22)	77 (N=3)	2 (N=18)	72 (N=6)	2 (N=21)	91 (N=10)
Blood Glucose Test Strips	225 (N=28)	279 (N=361)	182 (N=24)	261 (N=352)	213 (N=22)	293 (N=407)	205 (N=33)	273 (N=435)	210 (N=22)	248 (N=239)	207 (N=18)	260 (N=459)	216 (N=21)	282 (N=497)
Pen Tip Needles	1 (N=28)	92 (N=12)	1 (N=24)	100 (N=9)	0 (N=22)	100 (N=5)	1 (N=33)	70 (N=10)	1 (N=22)	120 (N=5)	0 (N=18)	136 (N=8)	1 (N=21)	90 (N=10)
Existing Insulin Pump Users														
Infusion Sets*	10 (N=19)	21 (N=287)	9 (N=9)	23 (N=262)	10 (N=24)	24 (N=309)	10 (N=15)	23 (N=277)	12 (N=22)	26 (N=590)	12 (N=19)	22 (N=253)	11 (N=17)	23 (N=232)
Insulin Cartridges*	10 (N=19)	23 (N=281)	9 (N=9)	22 (N=249)	10 (N=24)	24 (N=303)	9 (N=15)	23 (N=287)	11 (N=21)	27 (N=630)	12 (N=19)	24 (N=279)	10 (N=17)	24 (N=215)
Blood Ketone Test Strips	3 (N=21)	18 (N=20)	0 (N=10)	14 (N=9)	2 (N=25)	15 (N=21)	0 (N=17)	23 (N=11)	2 (N=22)	18 (N=56)	1 (N=19)	15 (N=14)	1 (N=19)	21 (N=11)
Alcohol Wipes	8 (N=21)	53 (N=19)	13 (N=10)	66 (N=13)	11 (N=25)	47 (N=33)	17 (N=17)	51 (N=16)	23 (N=22)	57 (N=70)	14 (N=19)	73 (N=20)	14 (N=19)	57 (N=22)
Insertion Devices*	11 (N=19)	1 (N=1)	10 (N=9)	1 (N=1)	12 (N=24)	1 (N=3)	11 (N=15)	1 (N=1)	12 (N=22)	1 (N=1)	12 (N=19)	1 (N=2)	12 (N=17)	1 (N=1)
Lancets	71 (N=21)	249 (N=34)	54 (N=10)	273 (N=32)	71 (N=25)	261 (N=39)	48 (N=17)	248 (N=37)	55 (N=22)	248 (N=115)	80 (N=19)	155 (N=37)	41 (N=19)	212 (N=27)
Syringes	2 (N=21)	87 (N=3)	0 (N=10)	100 (N=1)	2 (N=25)	70 (N=3)	1 (N=17)	38 (N=5)	0 (N=22)	64 (N=12)	0 (N=19)	35 (N=4)	1 (N=19)	100 (N=4)
Blood Glucose Test Strips	228 (N=21)	250 (N=252)	179 (N=10)	226 (N=240)	192 (N=25)	247 (N=237)	189 (N=17)	234 (N=235)	219 (N=22)	260 (N=650)	191 (N=19)	244 (N=222)	197 (N=19)	235 (N=203)
Pen Tip Needles	5 (N=21)	150 (N=4)	0 (N=10)	120 (N=5)	1 (N=25)	100 (N=3)	1 (N=17)	100 (N=5)	2 (N=22)	117 (N=11)	2 (N=19)	100 (N=5)	0 (N=19)	100 (N=5)
Total														
Infusion Sets*	11 (N=42)	24 (N=590)	10 (N=22)	26 (N=501)	11 (N=42)	28 (N=713)	12 (N=38)	26 (N=573)	11 (N=40)	29 (N=344)	12 (N=33)	27 (N=631)	12 (N=34)	27 (N=641)
Insulin Cartridges*	10 (N=42)	26 (N=625)	10 (N=22)	26 (N=510)	11 (N=42)	28 (N=798)	10 (N=38)	27 (N=631)	10 (N=39)	30 (N=400)	12 (N=33)	27 (N=739)	11 (N=34)	27 (N=705)
Blood Ketone Test Strips	5 (N=49)	17 (N=72)	1 (N=34)	15 (N=55)	4 (N=47)	14 (N=57)	3 (N=50)	30 (N=51)	4 (N=44)	18 (N=43)	2 (N=37)	22 (N=66)	5 (N=40)	15 (N=66)
Alcohol Wipes	24 (N=49)	78 (N=67)	28 (N=34)	64 (N=53)	14 (N=47)	44 (N=98)	27 (N=50)	53 (N=67)	26 (N=44)	50 (N=52)	20 (N=37)	59 (N=73)	22 (N=40)	55 (N=91)
Insertion Devices*	13 (N=42)	1 (N=1)	11 (N=22)	1 (N=3)	12 (N=42)	1 (N=4)	12 (N=38)	1 (N=2)	12 (N=40)	0 (N=0)	13 (N=33)	1 (N=4)	13 (N=34)	1 (N=3)
Lancets	86 (N=49)	261 (N=116)	76 (N=34)	272 (N=110)	82 (N=47)	285 (N=116)	79 (N=50)	261 (N=117)	73 (N=44)	266 (N=81)	71 (N=37)	218 (N=127)	75 (N=40)	233 (N=119)
Syringes	2 (N=49)	79 (N=7)	1 (N=34)	82 (N=9)	1 (N=47)	78 (N=8)	1 (N=50)	56 (N=12)	0 (N=44)	60 (N=9)	1 (N=37)	57 (N=10)	1 (N=40)	94 (N=14)
Blood Glucose Test Strips	226 (N=49)	267 (N=613)	181 (N=34)	247 (N=591)	202 (N=47)	276 (N=644)	199 (N=50)	259 (N=670)	214 (N=44)	267 (N=411)	199 (N=37)	255 (N=679)	207 (N=40)	268 (N=699)
Pen Tip Needles	3 (N=49)	106 (N=16)	1 (N=34)	107 (N=14)	1 (N=47)	100 (N=8)	1 (N=50)	80 (N=15)	2 (N=44)	115 (N=6)	1 (N=37)	122 (N=13)	1 (N=40)	93 (N=15)

Notes:
- All values are reported as means
* for all pumps except OmniPod

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Health Utilities Index® Mark 2 (HUI2) and Mark 3 (HUI3)								
HUI2 Utility Value								
No pump group†	0.82 ± 0.15 (0.33, 1.00) <i>0.86 [0.14]</i> (N=64)	0.79 ± 0.19 (0.28, 1.00) <i>0.85 [0.2]</i> (N=47)	0.81 ± 0.19 (0.22, 1.00) <i>0.88 [0.21]</i> (N=40)	0.79 ± 0.18 (0.32, 1.00) <i>0.87 [0.21]</i> (N=35)	0.83 ± 0.16 (0.39, 1.00) <i>0.88 [0.19]</i> (N=33)	0.80 ± 0.19 (0.36, 1.00) <i>0.89 [0.26]</i> (N=27)	0.81 ± 0.18 (0.37, 1.00) <i>0.87 [0.19]</i> (N=24)	0.6265
New pump group‡	0.81 ± 0.16 (0.07, 1.00) <i>0.85 [0.16]</i> (N=54)	0.86 ± 0.13 (0.27, 1.00) <i>0.88 [0.14]</i> (N=74)	0.87 ± 0.13 (0.23, 1.00) <i>0.92 [0.11]</i> (N=68)	0.87 ± 0.11 (0.52, 1.00) <i>0.90 [0.14]</i> (N=58)	0.85 ± 0.15 (0.23, 1.00) <i>0.90 [0.2]</i> (N=53)	0.86 ± 0.12 (0.55, 1.00) <i>0.90 [0.11]</i> (N=47)	0.88 ± 0.11 (0.52, 1.00) <i>0.92 [0.1]</i> (N=42)	0.0632
Existing pump group†	0.83 ± 0.16 (0.08, 1.00) <i>0.87 [0.15]</i> (N=94)	0.85 ± 0.14 (0.26, 1.00) <i>0.88 [0.12]</i> (N=76)	0.85 ± 0.15 (0.11, 1.00) <i>0.90 [0.14]</i> (N=67)	0.87 ± 0.13 (0.31, 1.00) <i>0.91 [0.12]</i> (N=60)	0.86 ± 0.13 (0.32, 1.00) <i>0.92 [0.10]</i> (N=63)	0.84 ± 0.16 (0.23, 1.00) <i>0.87 [0.15]</i> (N=51)	0.85 ± 0.11 (0.6, 1.00) <i>0.85 [0.14]</i> (N=44)	0.2234
P-value for difference between no pump and new pump group**	0.7171	0.0215	0.0499	0.0144	0.6648	0.1213	0.0541	
Change in HUI2 Utility Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.02 ± 0.13 (-0.48, 0.33) <i>0.00 [0.12]</i> (N=47)	0.01 ± 0.08 (-0.26, 0.15) <i>0.00 [0.10]</i> (N=40)	-0.02 ± 0.12 (-0.42, 0.23) <i>0.00 [0.13]</i> (N=35)	0.02 ± 0.11 (-0.2, 0.28) <i>0.00 [0.14]</i> (N=33)	0.00 ± 0.14 (-0.29, 0.28) <i>0.00 [0.14]</i> (N=27)	0.00 ± 0.10 (-0.2, 0.21) <i>0.00 [0.11]</i> (N=24)	
New pump group‡		0.05 ± 0.14 (-0.26, 0.70) <i>0.03 [0.11]</i> (N=50)	0.05 ± 0.12 (-0.21, 0.34) <i>0.03 [0.14]</i> (N=44)	0.01 ± 0.12 (-0.36, 0.26) <i>0.00 [0.12]</i> (N=39)	0.02 ± 0.10 (-0.2, 0.26) <i>0.00 [0.05]</i> (N=33)	0.01 ± 0.09 (-0.16, 0.16) <i>0.00 [0.05]</i> (N=22)	0.03 ± 0.12 (-0.22, 0.37) <i>0 [0.07]</i> (N=23)	
Existing pump group†		0.00 ± 0.09 (-0.27, 0.26) <i>0.00 [0.11]</i> (N=76)	0.00 ± 0.11 (-0.31, 0.31) <i>0.00 [0.07]</i> (N=67)	0.03 ± 0.11 (-0.33, 0.32) <i>0.00 [0.05]</i> (N=60)	0.01 ± 0.10 (-0.26, 0.35) <i>0.00 [0.07]</i> (N=63)	-0.01 ± 0.10 (-0.36, 0.22) <i>0.00 [0.11]</i> (N=51)	0.01 ± 0.01 (-0.23, 0.22) <i>0.02 [0.11]</i> (N=44)	
P-value for difference between no pump and new pump group**		0.0107	0.0983	0.2676	0.8657	0.6484	0.2937	
HUI3 Utility Value								
No pump group†	0.70 ± 0.27 (-0.13, 1.00) <i>0.79 [0.37]</i> (N=64)	0.69 ± 0.29 (-0.15, 1.00) <i>0.79 [0.41]</i> (N=47)	0.73 ± 0.29 (-0.07, 1.00) <i>0.85 [0.33]</i> (N=40)	0.69 ± 0.27 (0.03, 1.00) <i>0.79 [0.4]</i> (N=35)	0.68 ± 0.31 (0.01, 1.00) <i>0.78 [0.48]</i> (N=33)	0.7 ± 0.30 (0.02, 1.00) <i>0.79 [0.53]</i> (N=27)	0.71 ± 0.30 (0.08, 1.00) <i>0.83 [0.36]</i> (N=24)	0.3404
New pump group‡	0.75 ± 0.25	0.83 ± 0.19	0.85 ± 0.17	0.84 ± 0.16	0.80 ± 0.23	0.82 ± 0.17	0.87 ± 0.14	0.0167

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Existing pump group†	(-0.05, 1.00)	(0.16, 1.00)	(0.24, 1.00)	(0.33, 1.00)	(-0.05, 1.00)	(0.4, 1.00)	(0.43, 1.00)	0.4796
	0.85 [0.27]	0.87 [0.22]	0.92 [0.19]	0.90 [0.20]	0.87 [0.27]	0.88 [0.25]	0.92 [0.18]	
	(N=54)	(N=74)	(N=68)	(N=58)	(N=53)	(N=47)	(N=42)	
	0.77 ± 0.23	0.81 ± 0.20	0.82 ± 0.21	0.82 ± 0.21	0.84 ± 0.17	0.80 ± 0.19	0.81 ± 0.18	
	(-0.26, 1.00)	(0.08, 1.00)	(0.16, 1.00)	(0.1, 1.00)	(0.36, 1.00)	(0.09, 1.00)	(0.32, 1.00)	
	0.84 [0.21]	0.86 [0.21]	0.91 [0.25]	0.92 [0.19]	0.92 [0.17]	0.85 [0.22]	0.86 [0.22]	
	(N=94)	(N=76)	(N=67)	(N=60)	(N=63)	(N=51)	(N=44)	
P-value for difference between no pump and new pump group**	0.3041	0.0025	0.0099	0.0012	0.0590	0.0324	0.0055	
Change in HUI3 Utility Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.01 ± 0.21	0.07 ± 0.17	0.01 ± 0.23	0.01 ± 0.23	0.01 ± 0.30	0.01 ± 0.26	
		(-0.73, 0.49)	(-0.38, 0.57)	(-0.43, 0.66)	(-0.58, 0.55)	(-0.65, 0.8)	(-0.53, 0.68)	
		0.00 [0.22]	0.06 [0.19]	0.0 [0.25]	0.04 [0.24]	0.02 [0.21]	0.00 [0.33]	
		(N=47)	(N=40)	(N=35)	(N=33)	(N=27)	(N=24)	
New pump group‡		0.08 ± 0.21	0.08 ± 0.21	0.03 ± 0.19	0.02 ± 0.22	0.03 ± 0.14	0.06 ± 0.16	
		(-0.7, 0.63)	(-0.44, 0.63)	(-0.43, 0.55)	(-0.67, 0.61)	(-0.19, 0.42)	(-0.2, 0.69)	
		0.03 [0.15]	0.03 [0.16]	0.00 [0.22]	0.00 [0.14]	0.00 [0.19]	0.00 [0.11]	
		(N=50)	(N=44)	(N=39)	(N=33)	(N=22)	(N=23)	
Existing pump group†		0.01 ± 0.15	0.01 ± 0.15	0.04 ± 0.18	0.03 ± 0.15	0.02 ± 0.16	0.01 ± 0.17	
		(-0.39, 0.53)	(-0.39, 0.61)	(-0.54, 0.61)	(-0.4, 0.57)	(-0.41, 0.46)	(-0.38, 0.44)	
		0.00 [0.11]	0.00 [0.13]	0.00 [0.11]	0.00 [0.11]	0.00 [0.15]	0.00 [0.14]	
		(N=76)	(N=67)	(N=60)	(N=63)	(N=51)	(N=44)	
P-value for difference between no pump and new pump group**		0.0930	0.9263	0.5670	0.8520	0.8154	0.4992	
EQ-5D								
EQ-5D-5L VAS Score								
No pump group†	75.03 ± 15.29	76.06 ± 12.68	73.00 ± 17.27	75.14 ± 12.22	74.47 ± 16.14	75.37 ± 15.63	77.92 ± 13.81	0.9138
	(10, 100)	(40, 100)	(30, 98)	(40, 95)	(20, 95)	(43, 97)	(45, 99)	
	76.5 [15]	80 [15]	77.5 [22.5]	75 [15]	80 [20]	80 [20]	80 [18.5]	
	(N=64)	(N=47)	(N=40)	(N=36)	(N=34)	(N=27)	(N=24)	
New pump group‡	78.17 ± 15.70	83.45 ± 9.41	82.56 ± 10.29	79.72 ± 14.18	79.55 ± 17.82	81.13 ± 12.81	82.93 ± 12.88	0.2162
	(10, 100)	(55, 100)	(49, 100)	(30, 100)	(0, 99)	(35, 98)	(40, 99)	
	80 [15]	85 [12]	85 [10]	85 [15]	85 [15]	85 [15]	85 [15]	
	(N=54)	(N=74)	(N=68)	(N=58)	(N=53)	(N=47)	(N=42)	
Existing pump group†	80.79 ± 12.53	80.39 ± 10.59	80.75 ± 10.32	81.77 ± 10.32	83.54 ± 9.17	82.88 ± 8.77	80.86 ± 10.25	0.1447
	(20, 100)	(40, 95)	(50, 100)	(50, 98)	(60, 100)	(60, 100)	(60, 100)	
	80 [15]	80 [12]	82 [10]	85 [15]	85 [10]	80 [13]	82 [16.5]	

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
	(N=94)	(N=77)	(N=67)	(N=60)	(N=63)	(N=51)	(N=44)	
P-value for difference between no pump and new pump group**	0.2753	0.0004	0.0005	0.1120	0.1825	0.0905	0.1435	
Change in EQ-5D-5L VAS Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.94 ± 18.08 (-55, 85) 0 [15] (N=47)	-3.13 ± 16.36 (-60, 20) 0 [12.5] (N=40)	-0.94 ± 20.13 (-55, 65) 0 [17.5] (N=36)	-1.94 ± 15.62 (-60, 40) 0 [10] (N=34)	0.00 ± 19.08 (-35, 70) 0 [23] (N=27)	1.88 ± 12.33 (-23, 35) 1 [14.5] (N=24)	
New pump group‡		5.16 ± 14.83 (-21, 75) 4 [17] (N=50)	4.30 ± 16.28 (-21, 80) 0 [16] (N=44)	0.21 ± 13.64 (-45, 30) 0 [17] (N=39)	0.79 ± 12.08 (-35, 35) 0 [14] (N=33)	0.14 ± 9.14 (-15, 17) -0.5 [10] (N=22)	-1.87 ± 16.3 (-60, 21) 0 [16] (N=23)	
Existing pump group†		-1.90 ± 8.50 (-20, 20) 0 [12] (N=77)	-1.63 ± 10.13 (-40, 30) 0 [10] (N=67)	0.42 ± 11.73 (-40, 25) 0 [12.5] (N=60)	-0.10 ± 7.56 (-28, 16) 0 [10] (N=63)	0.25 ± 9.11 (-30, 20) 0 [10] (N=51)	-0.09 ± 10.81 (-35, 20) 0 [10] (N=44)	
P-value for difference between no pump and new pump group**		0.0719	0.0405	0.7715	0.4276	0.9756	0.3778	
EQ-5D-5L Index (Utility) Value								
No pump group†	0.85 ± 0.11 (0.55, 1.00) 0.83 [0.20] (N=64)	0.84 ± 0.12 (0.52, 1.00) 0.86 [0.09] (N=47)	0.84 ± 0.13 (0.47, 1.00) 0.84 [0.07] (N=40)	0.84 ± 0.11 (0.52, 1.00) 0.85 [0.08] (N=36)	0.82 ± 0.17 (0.37, 1.00) 0.86 [0.21] (N=34)	0.85 ± 0.13 (0.55, 1.00) 0.84 [0.25] (N=27)	0.83 ± 0.14 (0.49, 1.00) 0.87 [0.06] (N=24)	0.6473
New pump group‡	0.85 ± 0.13 (0.23, 1.00) 0.86 [0.19] (N=54)	0.89 ± 0.11 (0.6, 1.00) 0.87 [0.18] (N=74)	0.89 ± 0.10 (0.68, 1.00) 0.86 [0.18] (N=68)	0.91 ± 0.09 (0.63, 1.00) 0.88 [0.17] (N=58)	0.88 ± 0.14 (0.39, 1.00) 0.88 [0.18] (N=53)	0.89 ± 0.09 (0.68, 1.00) 0.86 [0.18] (N=47)	0.91 ± 0.12 (0.58, 1.00) 1.00 [0.18] (N=42)	0.1023
Existing pump group†	0.86 ± 0.15 (0.32, 1.00) 0.86 [0.18] (N=94)	0.87 ± 0.11 (0.48, 1.00) 0.86 [0.18] (N=77)	0.86 ± 0.12 (0.39, 1.00) 0.86 [0.19] (N=67)	0.87 ± 0.13 (0.39, 1.00) 0.88 [0.18] (N=60)	0.87 ± 0.12 (0.55, 1.00) 0.86 [0.18] (N=63)	0.85 ± 0.11 (0.41, 1.00) 0.83 [0.08] (N=51)	0.86 ± 0.10 (0.65, 1.00) 0.84 [0.06] (N=44)	0.8942
P-value for difference between no pump and new pump group**	0.9747	0.0124	0.0355	0.0016	0.0995	0.0750	0.0235	
Change in EQ-5D-5L Index (Utility) Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.02 ± 0.11 (-0.4, 0.33)	-0.01 ± 0.12 (-0.31, 0.17)	0.00 ± 0.12 (-0.25, 0.21)	-0.03 ± 0.17 (-0.63, 0.35)	-0.01 ± 0.14 (-0.25, 0.35)	-0.01 ± 0.13 (-0.31, 0.19)	

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
New pump group[†]		0.00 [0.14] (N=47)	0.00 [0.11] (N=40)	0.00 [0.12] (N=36)	0.00 [0.14] (N=34)	0.00 [0.17] (N=27)	0.00 [0.2] (N=24)	
		0.04 ± 0.12 (-0.18, 0.55)	0.03 ± 0.12 (-0.18, 0.51)	0.04 ± 0.09 (-0.12, 0.39)	0.03 ± 0.09 (-0.17, 0.18)	0.03 ± 0.1 (-0.18, 0.23)	0.01 ± 0.11 (-0.18, 0.18)	
Existing pump group[†]		0.00 [0.12] (N=50)	0.00 [0.06] (N=44)	0.01 [0.08] (N=39)	0.00 [0.09] (N=33)	0.00 [0.14] (N=22)	0.00 [0.16] (N=23)	
		-0.01 ± 0.11 (-0.33, 0.45)	-0.01 ± 0.12 (-0.37, 0.41)	0.00 ± 0.12 (-0.37, 0.45)	0.00 ± 0.13 (-0.33, 0.45)	-0.02 ± 0.11 (-0.35, 0.23)	-0.01 ± 0.09 (-0.19, 0.23)	
P-value for difference between no pump and new pump group**		0.0239	0.0892	0.1247	0.0764	0.3331	0.5289	
Diabetes Treatment Satisfaction Questionnaire (DTSQ)								
DTSQ Perceived Hyperglycemia Index								
No pump group[†]	3.34 ± 1.49 (0, 6) 4 [2] (N=64)	3.63 ± 1.33 (1, 6) 4 [1] (N=43)	2.8 ± 1.56 (0, 6) 3 [2.5] (N=40)	3.5 ± 1.54 (1, 6) 4 [3] (N=36)	3.35 ± 1.61 (0, 6) 4 [2] (N=34)	3.22 ± 1.58 (1, 6) 3 [2] (N=27)	3.17 ± 1.55 (0, 5) 3.5 [2] (N=24)	0.1670
New pump group[†]	2.92 ± 1.65 (0, 6) 3 [2] (N=51)	2.89 ± 1.58 (0, 6) 3 [2] (N=62)	2.52 ± 1.44 (0, 6) 2 [1] (N=61)	2.64 ± 1.19 (1, 5) 2.5 [2] (N=58)	2.40 ± 1.31 (0, 6) 2 [1] (N=53)	2.49 ± 1.37 (0, 6) 2 [2] (N=47)	2.55 ± 1.64 (0, 6) 2 [2] (N=42)	0.1292
Existing pump group[†]	2.46 ± 1.39 (0, 6) 2 [2] (N=91)	2.71 ± 1.48 (0, 6) 2.5 [2.5] (N=76)	2.32 ± 1.32 (0, 6) 2 [3] (N=65)	2.34 ± 1.38 (1, 6) 2 [3] (N=59)	2.35 ± 1.28 (1, 6) 2 [2] (N=63)	2.22 ± 1.24 (0, 5) 2 [2] (N=51)	2.59 ± 1.28 (1, 5) 2.5 [2] (N=44)	0.2573
P-value for difference between no pump and new pump group**	0.1530	0.0133	0.3656	0.0031	0.0032	0.0393	0.1377	
Change in DTSQ Perceived Hyperglycemia Index From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group[†]		0.19 ± 1.56 (-3, 4) 0 [2] (N=43)	-0.48 ± 1.93 (-5, 5) 0 [2.5] (N=40)	0.11 ± 2.08 (-4, 5) 0 [2.5] (N=36)	0.00 ± 1.72 (-4, 4) 0 [2] (N=34)	-0.15 ± 2.21 (-4, 4) 1 [4] (N=27)	-0.17 ± 1.97 (-3, 4) 0 [2.5] (N=24)	
New pump group[†]		-0.08 ± 1.59 (-3, 3) 0 [2] (N=36)	-0.44 ± 1.67 (-4, 3) 0 [3] (N=41)	-0.64 ± 1.82 (-5, 4) -0.5 [2] (N=36)	-0.47 ± 1.85 (-3, 3) 0 [3] (N=30)	-0.48 ± 2.02 (-3, 4) -1 [3] (N=21)	0.19 ± 1.94 (-3, 4) 0 [2] (N=21)	

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Existing pump group†		0.29 ± 1.62 (-5, 3) 0 [2] (N=73)	-0.13 ± 1.55 (-5, 3) 0 [2] (N=64)	0.00 ± 1.93 (-5, 5) 0 [2] (N=58)	-0.03 ± 1.67 (-5, 5) 0 [2] (N=62)	-0.18 ± 1.68 (-5, 3) 0 [2] (N=49)	0.14 ± 1.54 (-4, 4) 0 [1] (N=42)	
P-value for difference between no pump and new pump group**		0.4516	0.9289	0.1083	0.3006	0.5991	0.5444	
DTSQ Perceived Hypoglycemia Index								
No pump group†	2.08 ± 1.44 (0, 6) 2 [2] (N=64)	2.3 ± 1.64 (0, 6) 2 [2] (N=43)	2.48 ± 1.52 (0, 6) 2 [2.5] (N=40)	1.69 ± 1.31 (0, 6) 1 [1] (N=36)	2.12 ± 1.74 (0, 6) 2 [3] (N=34)	2.26 ± 1.35 (0, 5) 2 [2] (N=27)	2.38 ± 1.50 (0, 5) 2 [3] (N=24)	0.3323
New pump group‡	2.10 ± 1.42 (0, 6) 2 [2] (N=51)	2.05 ± 1.45 (0, 6) 2 [2] (N=62)	1.92 ± 1.36 (0, 6) 2 [2] (N=61)	1.64 ± 1.27 (0, 6) 1 [1] (N=58)	1.83 ± 1.33 (0, 5) 1 [2] (N=53)	1.94 ± 1.48 (0, 5) 1 [2] (N=47)	1.64 ± 1.16 (0, 4) 1 [1] (N=42)	0.5822
Existing pump group†	1.49 ± 1.08 (0, 5) 1 [1] (N=91)	1.39 ± 0.92 (0, 4) 1 [1] (N=76)	1.58 ± 1.13 (0, 5) 1 [1] (N=65)	1.73 ± 0.96 (0, 4) 1 [1] (N=59)	1.94 ± 1.19 (0, 5) 2 [1] (N=63)	1.73 ± 1.06 (0, 5) 1 [1] (N=51)	2.02 ± 1.27 (0, 5) 2 [2] (N=44)	0.1540
P-value for difference between no pump and new pump group**	0.9410	0.4057	0.0573	0.8358	0.3853	0.3538	0.0307	
Change in DTSQ Perceived Hypoglycemia Index From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.14 ± 1.75 (-3, 6) 0 [2] (N=43)	0.38 ± 1.41 (-3, 3) 0 [2] (N=40)	-0.25 ± 1.16 (-3, 2) 0 [2] (N=36)	0.09 ± 1.86 (-3, 5) 0 [2] (N=34)	0.19 ± 1.92 (-3, 5) 0 [2] (N=27)	0.21 ± 1.53 (-3, 3) 0 [2.5] (N=24)	
New pump group‡		-0.11 ± 1.49 (-4, 4) 0 [2] (N=36)	-0.27 ± 2.00 (-6, 5) 0 [2] (N=41)	-0.53 ± 1.68 (-4, 4) -0.5 [1] (N=36)	-0.17 ± 1.62 (-4, 3) 0 [2] (N=30)	0.00 ± 1.22 (-3, 2) 0 [2] (N=21)	-0.29 ± 1.49 (-3, 3) 0 [2] (N=21)	
Existing pump group†		-0.19 ± 1.16 (-4, 3) 0 [2] (N=73)	-0.02 ± 1.11 (-4, 2) 0 [2] (N=64)	0.21 ± 1.33 (-3, 3) 0 [2] (N=58)	0.18 ± 1.40 (-3, 4) 0 [2] (N=62)	-0.04 ± 1.32 (-4, 2) 0 [2] (N=49)	0.31 ± 1.22 (-2, 4) 0 [1] (N=42)	
P-value for difference between no pump and new pump group**		0.5003	0.0989	0.4168	0.5641	0.7024	0.2801	

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
DTSQ Treatment Satisfaction Score (TSS)								
No pump group†	24.73 ± 6.45 (8, 36) 25 [10.5] (N=64)	24.40 ± 6.31 (8, 36) 25 [10] (N=43)	24.03 ± 7.15 (11, 36) 24 [9.5] (N=40)	23.42 ± 7.73 (4, 36) 25 [12] (N=36)	24.76 ± 7.56 (4, 36) 26 [7] (N=34)	24.96 ± 7.86 (3, 36) 27 [9] (N=27)	26.29 ± 6.40 (12, 36) 27 [7.5] (N=24)	0.3552
New pump group‡	24.08 ± 6.46 (9, 36) 24 [8] (N=51)	33.31 ± 2.84 (24, 36) 34 [4] (N=62)	32.51 ± 3.14 (24, 36) 33 [4] (N=61)	31.59 ± 4.23 (15, 36) 32.5 [4] (N=58)	31.92 ± 4.99 (15, 36) 34 [3] (N=53)	33.15 ± 3.55 (18, 36) 34 [4] (N=47)	32.74 ± 3.92 (18, 36) 34 [5] (N=42)	0.0000
Existing pump group†	31.81 ± 4.04 (9, 36) 33 [5] (N=91)	31.57 ± 4.49 (7, 36) 32 [5.5] (N=76)	32.03 ± 3.64 (20, 36) 33 [5] (N=65)	31.56 ± 3.97 (19, 36) 32 [5] (N=59)	32.02 ± 3.65 (16, 36) 33 [5] (N=63)	31.61 ± 3.37 (21, 36) 32 [4] (N=51)	32.32 ± 2.89 (25, 36) 33 [4] (N=44)	0.8478
P-value for difference between no pump and new pump group**	0.5892	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Change in DTSQ TSS From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.09 ± 4.76 (-11, 10) 1 [5] (N=43)	-0.28 ± 4.92 (-11, 10) -0.5 [5] (N=40)	-2.19 ± 4.38 (-10, 6) -1 [7.5] (N=36)	0.09 ± 5.86 (-11, 14) -1 [7] (N=34)	0.26 ± 6.10 (-10, 15) 0 [8] (N=27)	0.46 ± 5.65 (-8, 14) -0.5 [8] (N=24)	
New pump group‡		8.97 ± 7.95 (-8, 27) 7.5 [9.5] (N=36)	8.95 ± 7.37 (-3, 27) 8 [10] (N=41)	7.75 ± 7.38 (-6, 23) 7 [12] (N=36)	7.37 ± 6.78 (-6, 18) 9 [11] (N=30)	8.76 ± 6.11 (-6, 19) 9 [7] (N=21)	7.48 ± 6.05 (-6, 19) 8 [8] (N=21)	
Existing pump group†		-0.21 ± 2.41 (-8, 7) 0 [3] (N=73)	-0.08 ± 3.41 (-10, 12) 0 [3] (N=64)	-0.17 ± 3.87 (-13, 11) -0.5 [4] (N=58)	-0.19 ± 3.47 (-18, 5) 0 [4] (N=62)	-0.69 ± 2.96 (-8, 8) 0 [3] (N=49)	-0.43 ± 2.33 (-7, 4) 0 [3] (N=42)	
P-value for difference between no pump and new pump group**		0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	

Notes:

- values are in mean ± standard deviation (range)
- data sources: HUI2/3, EQ-5D-5L and DTSQ questionnaire data (see Appendix 1 for a description of questionnaires)
- *overall changes in outcomes over time were assessed using repeated measures ANOVA tests
- **differences in outcomes between no pump group and new pump group assessed using two sample t-test
- † for patients not currently on a pump and patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline data are from the baseline interview/questionnaire, 3-month data are from the 3-month follow-up questionnaire, 6-month data are from the 6-month follow-up questionnaire, etc.

Table 27. Quality of life outcomes in adult patients (≥18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
- ‡ for patients who received a pump through the public program, baseline data are from the questionnaire completed in ≤3 months before the insulin pump start date, 3-month data are from the questionnaire completed between the pump start date and 4.5 months after the pump start date, 6-month data are from the questionnaire completed between 4.5 and 7.5 months after the pump start date, 9-month data are from the questionnaire completed between 7.5 and 10.5 months after the pump start date, etc.								

Table 28. Reasons for not being on IPT reported by patients in the ‘no pump’ group

Organizing theme	Basic theme	Examples	Frequency
Does not meet the criteria to start IPT	Poor control of blood sugars	<p>“People with ideal A1C are approved but they are doing well with current treatment methods. People not doing well are not considered for a pump - they should be as they are not doing well.”</p> <p>“unable to keep blood sugar levels at a normal rate.”</p> <p>“More stability needed in highs and lows. More fine tuning to deal with above.”</p> <p>“I talked to the nurses at the Clinic and they are referring me to a diabetic doctor to see if I can get better control of sugar levels first.”</p> <p>“I am unable to go on the pump due to A1C being too high.”</p> <p>“Yes, trying very, very hard to get my A1C level down to be accepted into the pump program.”</p> <p>“I am still striving to have the pump.”</p> <p>“I'm not yet on the pump. I'm having difficulty trying to stay in my average of 9.”</p> <p>“I felt I had good control with MDI but that's not true now. If my BG is not correct I am willing to do the work to try something new and different.”</p> <p>“I have been having a few lows so I am having to adjust my insulin.”</p> <p>“I am stress eating and trying to test more often.”</p> <p>“money for supplies has been tough. Went for a month without insulin and taking sugars. Sugars have been out of control.”</p> <p>“Had open heart surgery so diabetes and insulin levels changed because I have not exercised in 3 or 4 months. I start cardiac rehab on August 11. “</p> <p>“I have had an infection in my foot that has required antibiotics and has led to higher than usual glucose levels.”</p> <p>“Yes - severe pain in left foot has caused blood sugars to be higher and lower. Working hard to eliminate that.”</p>	20
	Misdiagnosis	<p>“I am curious how I was misdiagnosed then seen by several professionals or diabetes specialists, then wait 10 months to go through the program only to be told I am not a type 1 diabetic. Surely these tests should be done prior to making someone wait for so long.”</p> <p>“Because the diabetic doctor I saw in March was convinced that I'm a Type 2 I do not qualify even though a doctor I saw last week for my driver's medical was quite sure I'm a Type 1. It would be good if the insulin pump program would be expanded to include people in limbo like me.”</p>	2
Decided not to start IPT	Eyesight issues	“Yes, because of my eyesight issues I have decided not to get a pump because	1

Table 28. Reasons for not being on IPT reported by patients in the ‘no pump’ group

Organizing theme	Basic theme	Examples	Frequency
		if I go blind again I can't read the info."	
	Pregnancy	"I am pregnant - conceived May 20 making me 10.5 weeks. I don't feel making the switch is safe at this point."	1
	Uncertain about IPT	"I'm not certain if I want the pump."	1
	Too much work	"No, too much work. I think that if I had more discipline in my lifestyle i.e. regimented routine that the pump may be effective in better blood sugar control." "Too much work for me. It is just another insulin delivery system." "Due to amount of self-management on pump (carb counting) at this time I no longer feel I'm a good candidate." "...technology is disappointing and CGM isn't included and the pump is not convenient enough"	4
	24/7 attachment to device	"...and I am not sure that I want something attached to me all the time."	1
Currently on a clinical trial	Currently on a clinical trial	"[I have] put the insulin pump on hold right now because [I am] participating in a drug trial and the research team has asked [me] not to go on the pump until spring."	1
Waiting for pump start date	No start date yet	"No, still looking forward to having the pump." "I did not expect it would take 6 months to get started." "Well, it could be faster about going on the pump." "I would like it to be easier to get a pump." "Hope to do it soon!"	7
	Has a start date	"Scheduled for pump start in August 2016." "Finally got pump approval - only took about 17 appointments despite my A1C being 7.1" "No we start next week. The pump arrived today."	4
	Pushed down on wait-list	"I am extremely frustrated that I keep getting moved down the list to see an endo to get approval. The insulin pump is the only next step for me to manage my sugars better with less injections. I meet all requirements and have really worked hard to control my diabetes. I have been waiting since August for this next step."	1
	Start date delayed	"I received my letter of approval for the pump program on May 15. My pump arrived via courier less than a week later. It is now July 10th and I am still waiting for my pump start which isn't until the 24th. This is too long to wait."	1
	No follow-up from clinic	"I would still like to get back onto pump however never did receive anything from the program after taking online course and my doctor submitted twice."	1
	Limited support for special	"So far there has been no further communication with them for 9 months."	1

Table 28. Reasons for not being on IPT reported by patients in the ‘no pump’ group

Organizing theme	Basic theme	Examples	Frequency
	needs patients	Seems they are unable to help [him] with his limited vision and unpredictable swinging glucose levels. [He’s] not a "normal" diabetic.”	
Content with current therapy	Happy with control on current therapy	“I believe that for myself multiple daily injections is a good treatment plan.” “My current treatment has good results so I've decided not be on a pump.” “[I have] decided not to switch to the pump. [My] doctor doesn't think a pump would be of benefit as [my] current control is so good.”	4
	IPT seems complicated	“I really thought the pump would be beneficial especially since my complicated health problems would likely mean my family would have to help me deal with my diabetes but with the pump it seems it would be harder for them to deal with, pushing buttons and figuring out my basal/bolus rates would be much harder than a needle.”	1
Not ready	Too busy	“Yes. I realized I may not have enough time to pursue this right now, but I will later on.” “[I] wonder given our active travel schedule when we will be home long enough to start pump and then - when travelling -value if I have to carry so much extra backup anyway and availability of supplies internationally...” “Yes, I am finding that I don’t have the time in my life right now to commit to an insulin pump. I cannot make all [of] the trips to Edmonton that are required...” “...it's just a matter of getting in and getting this all done. We have 2 young children and I work every night until 6 PM so it has been a struggle to get a free moment to pursue.” “Currently I am dealing with aging parents and some marital issues plus I have 3 younger kids so I will wait until life "settles" down and I can focus more on this process.”	6
	Inconvenient start date	“Reported to spring training camp in the US one week after I would have started [the pump] so [I] didn't want to play around with it down south.”	1

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Health Utilities Index® Mark 2 (HUI2) and Mark 3 (HUI3)								
HUI2 Utility Value								
No pump group†	0.92 ± 0.04 (0.88, 0.95) 0.93 [0.07] (N=3)	0.96 ± 0.06 (0.92, 1.00) 0.96 [0.08] (N=2)	0.93 (N=1)	0.95 (N=1)	0.88 (N=1)	0.95 (N=1)	- (N=0)	0.8138
New pump group‡	0.89 ± 0.07 (0.80, 1.00) 0.91 [0.12] (N=12)	0.91 ± 0.06 (0.80, 1.00) 0.92 [0.07] (N=24)	0.92 ± 0.06 (0.80, 1.00) 0.95 [0.1] (N=16)	0.91 ± 0.06 (0.80, 1.00) 0.9 [0.07] (N=13)	0.93 ± 0.06 (0.84, 1.00) 0.95 [0.12] (N=11)	0.95 ± 0.07 (0.80, 1.00) 0.96 [0.08] (N=8)	0.91 ± 0.06 (0.80, 1.00) 0.92 [0.07] (N=10)	0.3529
Existing pump group†	0.93 ± 0.02 (0.92, 0.95) 0.93 [0.03] (N=2)	0.90 ± 0.14 (0.80, 1.00) 0.90 [0.20] (N=2)	- (N=0)	0.97 ± 0.04 (0.95, 1.00) 0.97 [0.05] (N=2)	0.97 ± 0.04 (0.95, 1.00) 0.97 [0.05] (N=2)	1.00 (N=1)	1.00 (N=1)	0.8815
P-value for difference between no pump and new pump group**	0.7129	0.3313	-	-	-	-	-	
Change in HUI2 Utility Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.02 ± 0.07 (-0.03, 0.07) 0.02 [0.1] (N=2)	0.00 (N=1)	0.02 (N=1)	-0.05 (N=1)	0.02 (N=1)	- (N=0)	
New pump group‡		0.02 ± 0.04 (-0.05, 0.07) 0 [0.05] (N=12)	0.05 ± 0.07 (-0.05, 0.14) 0.05 [0.14] (N=7)	0.01 ± 0.04 (-0.05, 0.05) 0.01 [0.07] (N=6)	0.01 ± 0.05 (-0.05, 0.05) 0.02 [0.09] (N=4)	0.01 ± 0.08 (-0.1, 0.05) 0.05 [0.08] (N=4)	0.02 ± 0.05 (-0.02, 0.05) 0.02 [0.07] (N=2)	
Existing pump group†		-0.03 ± 0.12 (-0.11, 0.05) -0.03 [0.17] (N=2)	- (N=0)	0.04 ± 0.06 (0, 0.08) 0.04 [0.08] (N=2)	0.04 ± 0.02 (0.03, 0.05) 0.04 [0.02] (N=2)	0.05 (N=1)	0.05 (N=1)	
P-value for difference between no pump and new pump group**		0.8517	-	-	-	-	-	
HUI3 Utility Value								
No pump group†	0.85 ± 0.08 (0.78, 0.93) 0.83 [0.15]	0.92 ± 0.11 (0.84, 1.00) 0.92 [0.16]	1.00 (N=1)	0.97 (N=1)	0.97 (N=1)	0.97 (N=1)	- (N=0)	0.0960

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
New pump group†	(N=3) 0.84 ± 0.11 (0.6, 0.97) 0.88 [0.16]	(N=2) 0.89 ± 0.11 (0.65, 1.00) 0.91 [0.16]	0.89 ± 0.14 (0.49, 1.00) 0.95 [0.18]	0.90 ± 0.07 (0.76, 1.00) 0.89 [0.11]	0.87 ± 0.17 (0.4, 1.00) 0.91 [0.16]	0.93 ± 0.07 (0.82, 1.00) 0.94 [0.1]	0.88 ± 0.19 (0.4, 1.00) 0.95 [0.05]	0.5753
Existing pump group†	(N=12) 0.58 ± 0.37 (0.32, 0.84) 0.58 [0.52]	(N=24) 0.88 ± 0.09 (0.82, 0.95) 0.88 [0.13]	(N=16) - (N=0)	(N=13) 0.95 ± 0.08 (0.89, 1.00) 0.95 [0.11]	(N=11) 0.99 ± 0.02 (0.97, 1.00) 0.99 [0.03]	(N=8) 1.00 (N=1)	(N=10) 0.95 (N=1)	0.4873
P-value for difference between no pump and new pump group**	1.0000	0.6284	-	-	-	-	-	
Change in HUI3 Utility Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.06 ± 0.01 (0.06, 0.07) 0.06 [0.01]	0.07 (N=1)	0.04 (N=1)	0.04 (N=1)	0.04 (N=1)	- (N=0)	
New pump group†		0.04 ± 0.04 (0.00, 0.11) 0.04 [0.08]	0.09 ± 0.16 (-0.11, 0.38) 0.03 [0.22]	0.02 ± 0.03 (0.00, 0.07) 0.03 [0.03]	0.04 ± 0.02 (0.03, 0.07) 0.03 [0.02]	0.01 ± 0.06 (-0.08, 0.07) 0.03 [0.07]	0.08 ± 0.02 (0.07, 0.09) 0.08 [0.02]	
Existing pump group†		0.3 ± 0.27 (0.11, 0.49) 0.30 [0.39]	- (N=0)	0.36 ± 0.44 (0.05, 0.68) 0.36 [0.63]	0.4 ± 0.35 (0.16, 0.65) 0.4 [0.49]	0.16 (N=1)	0.05 (N=1)	
P-value for difference between no pump and new pump group**		0.4087	-	-	-	-	-	
Child Health Utility 9D (CHU9D)								
CHU9D Utility Value								
No pump group†	0.90 ± 0.09 (0.75, 1.00) 0.92 [0.16]	0.89 ± 0.07 (0.81, 1.00) 0.87 [0.11]	0.88 ± 0.11 (0.64, 0.97) 0.92 [0.04]	0.82 ± 0.11 (0.69, 0.92) 0.89 [0.19]	0.81 ± 0.08 (0.76, 0.87) 0.81 [0.11]	0.84 ± 0.09 (0.78, 0.90) 0.84 [0.12]	0.76 (N=1)	0.9990
New pump group†	(N=11) 0.90 ± 0.07 (0.79, 1.00) 0.92 [0.11]	(N=8) 0.90 ± 0.07 (0.73, 1.00) 0.92 [0.09]	(N=7) 0.90 ± 0.07 (0.70, 1.00) 0.91 [0.11]	(N=5) 0.90 ± 0.06 (0.74, 1.00) 0.91 [0.09]	(N=2) 0.90 ± 0.09 (0.66, 1.00) 0.92 [0.09]	(N=2) 0.93 ± 0.08 (0.78, 1.00) 0.95 [0.10]	(N=25) 0.90 ± 0.1 (0.59, 1.00) 0.90 [0.12]	0.5526
Existing pump group†	(N=20) 0.94 ± 0.02	(N=45) 0.91 (N=1)	(N=41) - (N=0)	(N=34) - (N=0)	(N=25) - (N=0)	(N=23) - (N=0)	(N=25) - (N=0)	-

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
	(0.92, 0.95) 0.94 [0.03] (N=2)							
P-value for difference between no pump and new pump group**	0.8358	0.7182	1.0000	0.1102	0.1373	0.0668	-	
Change in CHU9D Utility Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.01 ± 0.05 (-0.05, 0.06) -0.03 [0.09] (N=7)	0.00 ± 0.12 (-0.22, 0.15) 0.02 [0.09] (N=6)	0.00 ± 0.16 (-0.18, 0.16) 0.08 [0.28] (N=5)	-0.04 ± 0.10 (-0.1, 0.03) -0.04 [0.14] (N=2)	-0.01 ± 0.10 (-0.09, 0.06) -0.01 [0.14] (N=2)	-0.10 (N=1)	
New pump group‡		-0.02 ± 0.06 (-0.19, 0.08) -0.02 [0.06] (N=18)	-0.01 ± 0.08 (-0.12, 0.16) 0 [0.12] (N=15)	0.00 ± 0.08 (-0.11, 0.17) -0.03 [0.06] (N=9)	-0.03 ± 0.10 (-0.19, 0.08) -0.01 [0.18] (N=7)	0.01 ± 0.07 (-0.06, 0.08) 0.01 [0.14] (N=3)	-0.01 ± 0.05 (-0.07, 0.04) -0.01 [0.08] (N=4)	
Existing pump group†		-0.04 (N=1)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
P-value for difference between no pump and new pump group**		0.6718	0.6790	0.8415	1.0000	0.1573	-	
EQ-5D								
EQ-5D-5L VAS Score								
No pump group†	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
New pump group‡	89.50 ± 13.44 (80, 99) 89.5 [19] (N=2)	86.33 ± 14.84 (70, 99) 90 [29] (N=3)	92.50 ± 3.54 (90, 95) 92.5 [5] (N=2)	89.33 ± 9.02 (80, 98) 90 [18] (N=3)	86.50 ± 16.26 (75, 98) 86.5 [23] (N=2)	94.00 ± 5.66 (90, 98) 94 [8] (N=2)	85.00 ± 5.00 (80, 90) 85 [10] (N=3)	0.9311
Existing pump group†	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
P-value for difference between no pump and new pump group**	-	-	-	-	-	-	-	
Change in EQ-5D-5L VAS Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
New pump group‡		-5.00 ± 7.07 (-10.00, 0.00) -5 [10] (N=2)	3.00 ± 16.97 (-9.00, 15.00) 3 [24] (N=2)	-0.50 ± 0.71 (-1.00, 0.00) -0.5 [1] (N=2)	-1.00 (N=1)	-1.00 (N=1)	- (N=0)	

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Existing pump group†		- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
P-value for difference between no pump and new pump group**		-	-	-	-	-	-	
EQ-5D-Y VAS Score								
No pump group†	81.60 ± 13.22 (60, 100) 85 [19] (N=15)	85.50 ± 13.63 (50, 100) 90 [5] (N=10)	80.63 ± 14.50 (50, 95) 85 [15] (N=8)	78.00 ± 21.98 (35, 97) 83 [10] (N=6)	72.33 ± 10.79 (60, 80) 77 [20] (N=3)	73.33 ± 16.07 (55, 85) 80 [30] (N=3)	70.00 (N=1)	0.8830
New pump group‡	84.35 ± 14.73 (30, 100) 90 [15] (N=31)	85.15 ± 13.85 (40, 100) 90 [15] (N=66)	86.72 ± 11.1 (50, 100) 90 [15] (N=54)	86.41 ± 13.69 (25, 100) 90 [15] (N=44)	86.66 ± 11.65 (60, 100) 90 [16] (N=35)	87.68 ± 10.99 (57, 100) 90 [10] (N=31)	82.18 ± 15.39 (30, 100) 80 [18] (N=33)	0.3735
Existing pump group†	91.25 ± 11.09 (75, 100) 95 [12.5] (N=4)	82.33 ± 8.74 (75, 92) 80 [17] (N=3)	- (N=0)	90.00 ± 0.00 (90, 90) 90 [0] (N=2)	85.00 ± 14.14 (75, 95) 85 [20] (N=2)	95.00 (N=1)	100.00 (N=1)	0.7306
P-value for difference between no pump and new pump group**	0.3638	0.8833	0.1940	0.3748	0.0474	0.0616	-	
Change in EQ-5D-Y VAS Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		6.50 ± 15.28 (-10, 40) 2.5 [15] (N=10)	2.50 ± 19.82 (-40, 30) 5 [10] (N=8)	-1.50 ± 27.49 (-55, 21) 10 [15] (N=6)	-1.00 ± 3.61 (-5, 2) 0 [7] (N=3)	0.00 ± 5.00 (-5, 5) 0 [10] (N=3)	10.00 (N=1)	
New pump group‡		-2.03 ± 16.25 (-50, 25) 0 [10] (N=29)	3.75 ± 17.38 (-25, 60) 1 [11] (N=20)	7.31 ± 15.50 (-10, 46) 5 [20] (N=13)	5.91 ± 18.00 (-28, 46) 5 [15] (N=11)	2.83 ± 13.48 (-10, 27) 0 [16] (N=6)	2.00 ± 11.82 (-13, 17) 4 [20] (N=6)	
Existing pump group†		-6.00 ± 7.94 (-15, 0) -3 [15] (N=3)	- (N=0)	5.00 ± 14.14 (-5, 15) 5 [20] (N=2)	0.00 ± 0.00 (0, 0) 0 [0] (N=2)	0.00 (N=1)	5.00 (N=1)	
P-value for difference between no pump and new pump group**		0.4364	0.4583	0.9649	0.2414	1.0000	-	
EQ-5D-5L Index (Utility) Value								
No pump group†	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
New pump group‡	1.00 ± 0.00 (1.00, 1.00) 1.00 [0.00] (N=2)	0.91 ± 0.08 (0.86, 1.00) 0.88 [0.14] (N=3)	0.84 ± 0.03 (0.82, 0.86) 0.84 [0.04] (N=2)	0.91 ± 0.08 (0.86, 1.00) (N=3)	0.94 ± 0.09 (0.88, 1.00) 0.86 [0.14] (N=2)	0.94 ± 0.09 (0.88, 1.00) 0.94 [0.12] (N=2)	0.94 ± 0.10 (0.82, 1.00) 1.00 [0.18] (N=3)	0.2098
Existing pump group†	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	-
P-value for difference between no pump and	-	-	-	-	-	-	-	

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
new pump group**								
Change in EQ-5D-5L Index (Utility) Value From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	
New pump group‡		-0.07 ± 0.10 (-0.14, 0.00)	-0.16 ± 0.03 (-0.18, -0.14)	-0.07 ± 0.10 (-0.14, 0.00)	0.00 (N=1)	0.00 (N=1)	- (N=0)	
Existing pump group†		-0.07 [0.14] (N=2)	-0.16 [0.04] (N=2)	-0.07 [0.14] (N=2)				
P-value for difference between no pump and new pump group**		-	-	-	-	-	-	
Caregiver Burden Inventory (CBI)								
CBI Time Dependency Score								
No pump group†	1.52 ± 0.90 (0.0, 3.6) 1.4 [0.6] (N=15)	1.46 ± 0.93 (0.2, 3.4) 1.4 [0.6] (N=10)	1.58 ± 0.97 (0.4, 3.4) 1.5 [1.3] (N=8)	1.37 ± 1.05 (0.2, 3.2) 1.3 [1.0] (N=6)	1.07 ± 0.95 (0.0, 1.8) 1.4 [1.8] (N=3)	1.47 ± 1.40 (0.0, 2.8) 1.6 [2.8] (N=3)	3 (N=1)	0.0459
New pump group‡	1.29 ± 1.04 (0.0, 3.6) 1.0 [1.4] (N=33)	1.29 ± 0.87 (0.0, 3.6) 1.2 [1.4] (N=69)	1.18 ± 0.92 (0.0, 3.8) 1.0 [1.4] (N=57)	1.29 ± 0.83 (0.0, 4.0) 1.0 [1.0] (N=47)	0.97 ± 0.75 (0.0, 2.8) 1.0 [1.0] (N=37)	1.01 ± 0.74 (0.0, 2.8) 0.8 [1.2] (N=33)	0.82 ± 0.62 (0.0, 2.2) 0.8 [1.0] (N=34)	0.0000
Existing pump group†	1.2 ± 0.82 (0.6, 2.4) 0.9 [1.0] (N=4)	1.73 ± 0.61 (1.2, 2.4) 1.6 [1.2] (N=3)	- (N=0)	1.60 ± 0.85 (1.0, 2.2) 1.6 [1.2] (N=2)	1.30 ± 0.99 (0.6, 2.0) 1.3 [1.4] (N=2)	2.0 (N=1)	2.0 (N=1)	0.2237
P-value for difference between no pump and new pump group**	0.2644	0.5691	0.2370	0.9548	0.7964	0.6041	-	
Change in CBI Time Dependency Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.16 ± 0.46 (-1.0, 0.4) -0.1 [0.6] (N=10)	-0.28 ± 0.43 (-0.8, 0.4) -0.3 [0.6] (N=8)	-0.37 ± 0.51 (-1.0, 0.4) -0.4 [0.8] (N=6)	-1.07 ± 0.81 (-1.8, -0.2) -1.2 [1.6] (N=3)	-0.67 ± 0.61 (-1.2, 0.0) -0.8 [1.2] (N=3)	-0.60 (N=1)	
New pump group‡		-0.17 ± 0.68 (-2.2, 1.2) -0.2 [0.8] (N=31)	-0.39 ± 0.55 (-2.4, 0.2) -0.3 [0.4] (N=22)	-0.49 ± 0.64 (-2.4, 0.2) -0.4 [0.8] (N=15)	-0.43 ± 0.45 (-1.4, 0.0) -0.3 [0.8] (N=7)	-0.26 ± 0.55 (-0.8, 0.8) -0.4 [0.8] (N=12)	-0.53 ± 0.43 (-1.2, 0.0) -0.5 [0.6] (N=6)	
Existing pump group†		0.33 ± 0.42 (0.0, 0.8)	- (N=0)	-0.10 ± 0.14 (-0.2, 0.0)	-0.40 ± 0.00 (-0.4, -0.4)	-0.40 (N=1)	-0.40 (N=1)	

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
		0.2 [0.8] (N=3)		-0.1 [0.2] (N=2)	-0.4 [0] (N=2)			
P-value for difference between no pump and new pump group**		0.6813	0.7240	0.8146	0.1091	0.4928	-	
CBI Development Score								
No pump group†	0.93 ± 0.69 (0.0, 1.8) 1.2 [1.6] (N=15)	0.98 ± 0.52 (0.0, 1.8) 1.0 [0.6] (N=10)	1.20 ± 0.83 (0.0, 2.0) 1.4 [1.6] (N=8)	0.83 ± 0.86 (0.0, 2.2) 1.4 [1.2] (N=6)	1.27 ± 0.92 (0.2, 1.8) 1.8 [1.6] (N=3)	1.67 ± 1.30 (0.4, 3.0) 1.6 [2.6] (N=3)	1.4 (N=1)	0.8264
New pump group‡	0.92 ± 0.88 (0.0, 3.2) 0.8 [1.2] (N=33)	0.97 ± 0.85 (0.0, 3) 0.8 [1.6] (N=69)	0.89 ± 0.91 (0.0, 3) 0.6 [1.6] (N=57)	1.02 ± 0.9 (0.0, 3.8) 0.8 [1.4] (N=47)	0.85 ± 0.74 (0.0, 2.2) 0.8 [1.2] (N=37)	0.83 ± 0.77 (0.0, 2.6) 0.6 [1.0] (N=33)	0.8 ± 0.8 (0.0, 2.8) 0.6 [1.4] (N=34)	0.0000
Existing pump group†	0.9 ± 0.82 (0.0, 1.6) 1.0 [1.4] (N=4)	1.87 ± 0.23 (1.6, 2.0) 2 [0.4] (N=3)	- (N=0)	1.20 ± 0.28 (1.0, 1.4) 1.2 [0.4] (N=2)	1.00 ± 0.00 (1.0, 1.0) 1.0 [0.0] (N=2)	0.40 (N=1)	0.60 (N=1)	0.4262
P-value for difference between no pump and new pump group**	0.7788	0.8119	0.3015	0.6310	0.3122	0.1757	-	
Change in CBI Development Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		-0.02 ± 0.48 (-0.8, 0.8) 0.0 [0.8] (N=10)	0.18 ± 0.92 (-1.2, 2.0) 0.0 [0.7] (N=8)	-0.30 ± 0.68 (-1.2, 0.6) -0.3 [1.0] (N=6)	-0.07 ± 0.64 (-0.8, 0.4) 0.2 [1.2] (N=3)	0.33 ± 1.01 (-0.6, 1.4) 0.2 [2] (N=3)	0.00 (N=1)	
New pump group‡		-0.14 ± 0.37 (-1.2, 0.6) 0.0 [0.4] (N=31)	-0.27 ± 0.4 (-1.4, 0.4.0) -0.2 [0.4] (N=22)	-0.48 ± 0.48 (-1.6, 0.0) -0.4 [0.8] (N=15)	-0.25 ± 0.57 (-1.4, 1.0) -0.2 [0.6] (N=12)	-0.49 ± 0.72 (-2.0, 0.0) -0.2 [0.6] (N=7)	-0.23 ± 0.78 (-1.4, 0.8) -0.2 [0.8] (N=6)	
Existing pump group†		0.08 ± 0.69 (0.4, 1.6) 0.4 [1.2] (N=3)	- (N=0)	0.40 ± 0.85 (-0.2, 1.0) 0.4 [1.2] (N=2)	0.20 ± 1.13 (-0.6, 1.0) 0.2 [1.6] (N=2)	0.40 (N=1)	0.60 (N=1)	
P-value for difference between no pump and new pump group**		0.4270	0.0825	0.5563	0.4649	0.2472	-	
CBI Physical Health Score								
No pump group†	0.98 ± 0.86	1.15 ± 0.58	1.38 ± 0.92	1.17 ± 0.94	1.42 ± 1.01	1.58 ± 1.13	2.00 (N=1)	0.8661

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
	(0.0, 2.5)	(0.25, 2.25)	(0.25, 2.5)	(0.0, 2.5)	(0.25, 2.0)	(0.5, 2.75)		
	1.0 [1.5]	1.13 [0.75]	1.13 [1.75]	1.25 [1.5]	2 [1.75]	1.5 [2.25]		
	(N=15)	(N=10)	(N=8)	(N=6)	(N=3)	(N=3)		
New pump group†	1.20 ± 0.94	1.15 ± 0.95	1.13 ± 0.96	1.19 ± 1.04	1.20 ± 1.07	1.01 ± 0.83	0.82 ± 0.83	0.0086
	(0.0, 4)	(0.0, 3.75)	(0.0, 3.25)	(0.0, 4)	(0.0, 3)	(0.0, 2.75)	(0.0, 3)	
	1.0 [1.25]	1.0 [1.25]	1.0 [1.25]	0.75 [1.5]	1.25 [2.25]	1.0 [1.5]	0.75 [1.25]	
	(N=33)	(N=69)	(N=57)	(N=47)	(N=37)	(N=33)	(N=34)	
Existing pump group†	1.19 ± 0.99	2.25 ± 0.87	- (N=0)	2.25 ± 0.35	1.75 ± 1.06	2.00 (N=1)	1.25 (N=1)	0.2031
	(0.0, 2.0)	(1.25, 2.75)		(2.0, 2.5)	(1.0, 2.5)			
	1.38 [1.63]	2.75 [1.5]		2.25 [0.5]	1.75 [1.5]			
	(N=4)	(N=3)		(N=2)	(N=2)			
P-value for difference between no pump and new pump group**	0.4878	0.6193	0.4101	0.8988	0.6584	0.3136	-	
Change in CBI Physical Health Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.13 ± 0.58	0.28 ± 0.45	0.25 ± 0.77	0.33 ± 0.63	0.50 ± 1.25	-0.25 (N=1)	
		(-0.5, 1.25)	(-0.25, 1.25)	(-0.5, 1.5)	(-0.25, 1.0)	(-0.75, 1.75)		
		0.0 [0.75]	0.25 [0.38]	0.13 [1.25]	0.25 [1.25]	0.5 [2.5]		
		(N=10)	(N=8)	(N=6)	(N=3)	(N=3)		
New pump group†		-0.15 ± 0.45	-0.2 ± 0.67	-0.3 ± 0.53	-0.1 ± 0.68	0.07 ± 0.83	-0.21 ± 0.91	
		(-1.25, 0.5)	(-1.75, 1.0)	(-1.25, 0.25)	(-1.25, 1.25)	(-1.0, 1.25)	(-1.25, 1.0)	
		0.0 [0.75]	-0.13 [0.75]	0.0 [1.0]	-0.13 [0.5]	0.0 [1.5]	-0.38 [1.75]	
		(N=31)	(N=22)	(N=15)	(N=12)	(N=7)	(N=6)	
Existing pump group†		0.67 ± 0.14	- (N=0)	0.25 ± 0.35	-0.25 ± 1.06	0.00 (N=1)	-0.75 (N=1)	
		(0.5, 0.75)		(0.0, 0.5)	(-1, 0.5)			
		0.75 [0.25]		0.25 [0.5]	-0.25 [1.5]			
		(N=3)		(N=2)	(N=2)			
P-value for difference between no pump and new pump group**		0.2743	0.0719	0.1548	0.3058	0.5676	-	
CBI Emotional Health Score								
No pump group†	0.21 ± 0.40	0.30 ± 0.58	0.48 ± 0.67	0.50 ± 0.86	0.80 ± 0.92	1.33 ± 1.67	0.60 (N=1)	0.5302
	(0.0, 1.4)	(0.0, 1.8)	(0.0, 1.8)	(0.0, 2.2)	(0.0, 1.8)	(0.0, 3.2)		
	0.0 [0.4]	0.0 [0.2]	0.2 [0.8]	0.1 [0.6]	0.6 [1.8]	0.8 [3.2]		
	(N=15)	(N=10)	(N=8)	(N=6)	(N=3)	(N=3)		
New pump group†	0.14 ± 0.21	0.15 ± 0.32	0.16 ± 0.31	0.15 ± 0.36	0.15 ± 0.31	0.16 ± 0.29	0.16 ± 0.37	0.5833
	(0.0, 0.8)	(0.0, 1.6)	(0.0, 1.2)	(0.0, 2.0)	(0.0, 1.4)	(0.0, 1.0)	(0.0, 1.8)	
	0.0 [0.2]	0.0 [0.2]	0.0 [0.2]	0.0 [0.2]	0.0 [0.2]	0.0 [0.2]	0.0 [0.2]	
	(N=33)	(N=69)	(N=57)	(N=47)	(N=37)	(N=33)	(N=34)	

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Existing pump group†	0.25 ± 0.38 (0.0, 0.8) 0.1 [0.5] (N=4)	0.13 ± 0.12 (0.0, 0.2) 0.2 [0.2] (N=3)	- (N=0)	0.30 ± 0.42 (0.0, 0.6) 0.3 [0.6] (N=2)	0.20 ± 0.28 (0.0, 0.4) 0.2 [0.4] (N=2)	0.40 (N=1)	0.40 (N=1)	0.9516
P-value for difference between no pump and new pump group**	0.9898	0.4297	0.0609	0.2282	0.0708	0.0759	-	
Change in CBI Emotional Health Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†		0.00 ± 0.50 (-0.6, 1.2) 0.0 [0.2] (N=10)	0.18 ± 0.43 (-0.2, 1.2) 0.0 [0.2] (N=8)	0.10 ± 0.80 (-0.8, 1.6) 0.0 [0.2] (N=6)	0.13 ± 1.01 (-0.8, 1.2) 0.0 [2] (N=3)	0.67 ± 1.7 (-0.6, 2.6) 0.0 [3.2] (N=3)	-0.80 (N=1)	
New pump group‡		-0.06 ± 0.17 (-0.6, 0.2) 0.0 [0.2] (N=31)	-0.09 ± 0.25 (-0.8, 0.4) 0.0 [0.2] (N=22)	-0.07 ± 0.28 (-0.4, 0.8) 0.0 [0.2] (N=15)	-0.03 ± 0.34 (-0.2, 1.0) -0.2 [0.2] (N=12)	-0.17 ± 0.21 (-0.6, 0) -0.2 [0.2] (N=7)	0.17 ± 0.61 (-0.2, 1.4) 0.0 [0.2] (N=6)	
Existing pump group†		-0.2 ± 0.53 (-0.8, 0.2) 0.0 [1.0] (N=3)	- (N=0)	-0.1 ± 0.14 (-0.2, 0) -0.1 [0.2] (N=2)	-0.2 ± 0.28 (-0.4, 0) -0.2 [0.4] (N=2)	-0.40 (N=1)	-0.40 (N=1)	
P-value for difference between no pump and new pump group**		0.8185	0.0615	0.6164	0.6484	0.4791	-	
CBI Social Relationships Score								
No pump group†	0.75 ± 0.75 (0.0, 2.4) 0.6 [1.4] (N=15)	0.98 ± 0.76 (0.0, 2.2) 0.8 [1.0] (N=10)	1.20 ± 0.71 (0.0, 2.0) 1.5 [1.1] (N=8)	0.80 ± 0.75 (0.0, 2.0) 0.5 [1.0] (N=6)	1.07 ± 1.17 (0.2, 2.4) 0.6 [2.2] (N=3)	1.33 ± 1.63 (0.2, 3.2) 0.6 [3] (N=3)	0.20 (N=1)	0.5514
New pump group‡	0.68 ± 0.73 (0.0, 2.2) 0.4 [1.2] (N=33)	0.59 ± 0.61 (0.0, 2.0) 0.4 [1.0] (N=69)	0.67 ± 0.77 (0.0, 3.0) 0.4 [1.2] (N=57)	0.59 ± 0.65 (0.0, 2.0) 0.4 [1.2] (N=47)	0.57 ± 0.58 (0.0, 1.8) 0.4 [1.0] (N=37)	0.49 ± 0.54 (0.0, 2.0) 0.2 [0.8] (N=33)	0.50 ± 0.60 (0.0, 1.8) 0.2 [0.8] (N=34)	0.3458
Existing pump group†	0.30 ± 0.35 (0.0, 0.8) 0.2 [0.4] (N=4)	0.47 ± 0.12 (0.4, 0.6) 0.4 [0.2] (N=3)	- (N=0)	0.40 ± 0.57 (0.0, 0.8) 0.4 [0.8] (N=2)	0.40 ± 0.57 (0.0, 0.8) 0.4 [0.8] (N=2)	0.00 (N=1)	0.00 (N=1)	0.9800
P-value for difference between no pump and new pump group**	0.8207	0.0930	0.0415	0.3721	0.3487	0.2804	-	

Table 29. Quality of life outcomes in pediatric patients (<18 years of age at baseline)

	Baseline	3 months	6 months	9 months	12 months	15 months	18 months	P-value for differences over time*
Change in CBI Social Relationships Score From Baseline to 3, 6, 9, 12, 15 and 18 Months								
No pump group†	0.18 ± 0.40 (-0.4, 1.0) 0.1 [0.4] (N=10)	0.35 ± 0.55 (-0.2, 1.4) 0.2 [0.6] (N=8)	0.07 ± 0.74 (-1, 1.2) [0.8] (N=6)	0.33 ± 1.21 (-0.8, 1.6) 0.2 [2.4] (N=3)	0.60 ± 1.80 (-1.2, 2.4) 0.6 [3.6] (N=3)	-1.20 (N=1)		
New pump group‡	-0.06 ± 0.35 (-1, 0.8) 0.0 [0.2] (N=31)	0.14 ± 0.38 (-0.6, 0.8) 0.0 [0.4] (N=22)	-0.11 ± 0.47 (-1.2, 0.6) 0.0 [0.4] (N=15)	-0.12 ± 0.39 (-0.8, 0.6) 0.0 [0.5] (N=12)	-0.26 ± 0.47 (-1.2, 0.2) 0.0 [0.4] (N=7)	0.00 ± 0.72 (-1.4, 0.6) 0.2 [0.4] (N=6)		
Existing pump group†	0.07 ± 0.23 (-0.2, 0.2) 0.2 [0.4] (N=3)	- (N=0)	0.20 ± 0.57 (-0.2, 0.6) 0.2 [0.8] (N=2)	0.20 ± 0.57 (-0.2, 0.6) 0.2 [0.8] (N=2)	-0.20 (N=1)	-0.20 (N=1)		
P-value for difference between no pump and new pump group**	0.0794	0.2612	0.5827	0.4627	0.2976	-		

Notes:

- values are in mean ± standard deviation (range)
- data sources: HUI2/3, CHU9D, EQ-5D-5L, EQ-5D-Y, and CBI questionnaire data (see Table 6 for a description of questionnaires)
- *overall changes in outcomes over time were assessed using repeated measures ANOVA tests
- **differences in outcomes between no pump group and new pump group assessed using two sample Wilcoxon rank-sum (Mann-Whitney) test
- † for patients not currently on a pump and patients on a pump prior to the start of the IPT program (i.e., patients transitioning from private to public program), baseline data are from the baseline interview/questionnaire, 3-month data are from the 3-month follow-up questionnaire, 6-month data are from the 6-month follow-up questionnaire, etc.
- ‡ for patients who received a pump through the public program, baseline data are from the questionnaire completed ≤3 months before the insulin pump start date, 3-month data are from the questionnaire completed between the pump start date and 4.5 months after the pump start date, 6-month data are from the questionnaire completed between 4.5 and 7.5 months after the pump start date, 9-month data are from the questionnaire completed between 7.5 and 10.5 months after the pump start date, etc.

Table 30. Reasons for not being on IPT reported by parents of patients in the ‘no pump’ group

Organizing theme	Basic theme	Examples	Frequency
Does not meet the criteria to start IPT	Poor control of blood sugars	“Special consideration should be given for those kids struggling with non-pump therapy programs. Perhaps a trial period can be done to see if improvement in control occurs for those kids who are having trouble getting into the program due to lack of control.”	1
Waiting for pump start date	No start date yet	“We have been waiting for months and probably won't start the pump until the fall 2015. Right now, ACH doesn't start any pumps over the summer and they only take 6 families in each pump start class.” “The waiting list is way too long. Our nurse said it can take up to 18 months.”	2
	Has a start date	“Scheduled for pump start in August 2016.” “No we start next week. The pump arrived today.” “We received a phone call in June that [she] would get her pump in Sept. 2016. We applied for her pump in Aug. 2015 so we are more than thrilled we have a date and pump coming.”	3
Not ready	Too busy	“We are looking for a calm time in our lives to make the transition from what we know to a new system. As soon as our new caregiver arrives we will make plans to take the pump class and get started.”	1
	Still uncertain	“She has to be comfortable with the process and at present she is not.”	1

Table 31. Overall cost of clinical visits from 3 months before baseline to 18 months after baseline: average cost (\$CAD) per adult 'no pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.14 (N=36)	1.36 (N=25)	1.32 (N=31)	1.27 (N=33)	1.07 (N=15)	1.06 (N=18)	1.38 (N=13)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$109.13
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.02 (N=48)	0.19 (N=32)	0.08 (N=26)	0.15 (N=20)	0.38 (N=13)	0.00 (N=4)	0.00 (N=4)†	
- Average cost per visit	\$621.37 (N=1)	\$392.68 (N=4)	\$392.68 (N=4)†	\$392.68 (N=4)†	\$392.68 (N=4)†	- (N=0)	- (N=0)	\$326.57
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	3.63 (N=48)	2.50 (N=32)	1.81 (N=26)	2.80 (N=20)	2.46 (N=13)	1.50 (N=4)	1.50 (N=4)†	
- Average cost per visit	\$223.72 (N=38)	\$179.89 (N=25)	\$129.63 (N=13)	\$129.63 (N=13)†	\$129.63 (N=13)†	\$129.63 (N=13)†	\$129.63 (N=13)†	\$2,567.20
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.00 (N=48)	0.03 (N=32)	0.00 (N=26)	0.00 (N=20)	0.00 (N=13)	0.00 (N=4)	0.00 (N=4)†	
- in-patient stays	- (N=0)	\$4995.81 (N=1)‡	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$149.87
Total cost per patient:	\$839.00	\$691.47	\$282.80	\$437.98	\$481.69	\$207.90	\$211.96	\$3,152.78

Notes:

- Data sources:

- HbA1c tests: Alberta Health Services administrative database - laboratory database from January 1, 2012 to March 31, 2016
- HbA1c costs: Schedule of Fees for the Laboratory Services Outpatient. Payment Schedule. Fee-For-Service Outpatient Laboratory Services in British Columbia. As of October 1, 2015. http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/laboratory-services/schedule_of_fees_-_laboratory_services_payment_schedule.pdf
- Type 1 Diabetes related emergency, outpatient and in-patient visits and costs: Alberta Health administrative databases - practitioner claims, outpatient (Ambulatory Care Classification System) and in-patient (Discharge Abstract Database) databases from January 1, 2012 to March 31, 2015. Type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E11*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718). Costs for each visit include physician fees and outpatient or inpatient visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were used where available. Where not available, estimated costs were calculated from ambulatory and in-patient resource intensity weights (RIWs) and costs per weighted case (CPWCs).

- * Baseline = date of baseline interview = 0 months.

- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.

- ‡ No cost data on in-patient stays for adult 'no pump' patients was available. Therefore, the average cost per visit for adult 'new pump' patients was used.

Table 32. Overall cost of clinical visits and IPT supplies from 3 months before pump start to 18 months after pump start: average cost (\$CAD) per adult 'new pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.25 (N=55)	1.37 (N=63)	1.35 (N=49)	1.41 (N=44)	1.17 (N=41)	1.30 (N=30)	1.25 (N=28)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$115.48
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.11 (N=72)	0.13 (N=64)	0.06 (N=48)	0.12 (N=43)	0.06 (N=33)	0.00 (N=20)	0.00 (N=9)	
- Average cost per visit	\$467.61 (N=4)	\$413.61 (N=3)	\$413.61 (N=3) [†]	\$413.61 (N=3) [†]	\$413.61 (N=3) [†]	- (N=0)	- (N=0)	\$204.47
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	4.47 (N=72)	6.11 (N=64)	2.27 (N=48)	2.23 (N=43)	2.18 (N=33)	2.75 (N=20)	1.78 (N=9)	
- Average cost per visit	\$153.02 (N=57)	\$141.06 (N=47)	\$132.09 (N=28)	\$126.85 (N=28) [†]	\$126.85 (N=28) [†]	\$126.85 (N=28) [†]	\$126.85 (N=28) [†]	\$2,979.76
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.00 (N=72)	0.05 (N=64)	0.02 (N=48)	0.00 (N=43)	0.00 (N=33)	0.00 (N=20)	0.00 (N=9)	
- in-patient stays	- (N=0)	\$4995.81 (N=1)	\$4995.81 (N=1) [†]	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$349.71
Average cost of pump & supplies:								
- pump	N/A	\$6,577.76	N/A	N/A	N/A	N/A	N/A	\$6,577.76
- infusion sets‡	N/A	\$688.87	\$670.28	\$636.36	\$720.69	\$598.21	\$594.95	\$3,909.37
- insulin cartridges‡	N/A	\$410.83	\$371.37	\$403.34	\$361.05	\$338.03	\$311.15	\$2,195.77
- blood ketone test strips	N/A	\$11.43	\$5.00	\$6.48	\$3.53	\$1.66	\$1.70	\$29.80
- alcohol wipes	N/A	\$34.20	\$25.25	\$36.65	\$27.22	\$33.92	\$29.86	\$187.10
- insertion devices‡	N/A	\$1,608.96	\$1,428.25	\$1,585.46	\$1,538.87	\$1,321.29	\$1,348.43	\$8,831.27
- lancets	N/A	\$22.33	\$21.58	\$22.78	\$21.75	\$21.87	\$17.55	\$127.87
- syringes	N/A	\$0.83	\$3.15	\$1.55	\$0.68	\$1.88	\$1.15	\$9.25
- blood glucose test strips	N/A	\$416.33	\$406.11	\$402.80	\$410.24	\$412.42	\$403.30	\$2,451.20
- pen tip needles	N/A	\$0.68	\$0.36	\$0.57	\$0.25	\$0.74	\$1.70	\$4.30
Total cost per patient:	\$751.30	\$10,955.04	\$3,373.06	\$3,446.39	\$3,400.48	\$3,095.35	\$2,951.45	\$27,973.11

Notes:

- Data sources:
 - HbA1c tests: Alberta Health Services administrative database - laboratory database from January 1, 2012 to March 31, 2016
 - HbA1c costs: Schedule of Fees for the Laboratory Services Outpatient. Payment Schedule. Fee-For-Service Outpatient Laboratory Services in British Columbia. As of October 1, 2015. http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/laboratory-services/schedule_of_fees_-_laboratory_services_payment_schedule.pdf
 - Type 1 Diabetes related emergency, outpatient and in-patient visits and costs: Alberta Health administrative databases - practitioner claims, outpatient (Ambulatory Care Classification System) and in-patient (Discharge Abstract Database) databases from January 1, 2012 to March 31, 2015. Type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E11*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718). Costs for each visit include physician fees and outpatient or in-patient visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were used where available. Where not available, estimated costs were calculated from ambulatory and in-patient resource intensity weights (RIWs) and costs per weighted case (CPWCs).
 - Pump supply utilization: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
 - Pump supply costs: Alberta Blue Cross IPT program data - monthly product utilization reports from 2014 (April, May, June, July, September and October) and 2015 (January, February, April, May, October and November).
- * Baseline = date of pump start = 0 months.
- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.
- ‡ The unit cost of each of these supplies was based on all pumps except OmniPod.

Table 33. Overall cost of clinical visits and IPT supplies from 3 months before baseline to 18 months after baseline: average cost (\$CAD) per adult 'existing pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.25 (N=71)	1.34 (N=59)	1.18 (N=49)	1.32 (N=57)	1.28 (N=46)	1.33 (N=49)	1.15 (N=34)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$112.31
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.04 (N=79)	0.04 (N=52)	0.05 (N=43)	0.04 (N=26)	0.07 (N=15)	0.00 (N=3)	0.00 (N=3) [†]	
- Average cost per visit	\$598.52 (N=2)	\$598.52 (N=2) [†]	\$598.52 (N=2) [†]	\$598.52 (N=2) [†]	\$598.52 (N=2) [†]	- (N=0)	- (N=0)	\$143.64
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	3.06 (N=79)	2.19 (N=52)	2.02 (N=43)	3.19 (N=26)	2.87 (N=15)	2.67 (N=3) [†]	2.67 (N=3) [†]	
- Average cost per visit	\$175.28 (N=54)	\$108.28 (N=29)	\$133.01 (N=24)	\$124.17 (N=16) [†]	\$124.17 (N=16) [†]	\$124.17 (N=16) [†]	\$124.17 (N=16) [†]	\$2,457.71
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.00 (N=79)	0.02 (N=52)	0.02 (N=43)	0.00 (N=26)	0.00 (N=15)	0.00 (N=3)	0.00 (N=3) [†]	
- in-patient stays	- (N=0)	\$4995.81 (N=1) ^{††}	\$4995.81 (N=1) ^{††}	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$199.83
Average cost of pump & supplies:								
- pump	N/A	\$6,577.76	N/A	N/A	N/A	N/A	N/A	\$6,577.76
- infusion sets‡	N/A	\$581.88	\$641.12	\$673.82	\$631.89	\$644.39	\$709.79	\$3,882.90
- insulin cartridges‡	N/A	\$225.84	\$248.93	\$258.72	\$244.31	\$257.29	\$281.98	\$1,517.06
- blood ketone test strips	N/A	\$5.55	\$4.12	\$1.91	\$2.85	\$3.84	\$5.39	\$23.65
- alcohol wipes	N/A	\$17.60	\$21.67	\$24.40	\$14.14	\$16.43	\$16.05	\$110.28
- insertion devices‡	N/A	\$615.55	\$727.73	\$724.16	\$700.33	\$747.59	\$806.56	\$4,321.92
- lancets	N/A	\$17.05	\$15.72	\$15.29	\$14.26	\$16.23	\$17.44	\$95.99
- syringes	N/A	\$1.13	\$1.68	\$1.12	\$1.22	\$0.98	\$0.43	\$6.57
- blood glucose test strips	N/A	\$393.00	\$380.92	\$377.21	\$395.26	\$405.13	\$421.53	\$2,373.06
- pen tip needles	N/A	\$1.66	\$0.49	\$1.96	\$0.51	\$3.21	\$0.18	\$8.02
Total cost per patient:	\$576.16	\$8,815.02	\$2,455.88	\$2,515.38	\$2,419.28	\$2,443.50	\$2,605.48	\$21,830.70

Notes:

- Data sources:

- Education session: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015. Visits were included if they had a date that matched the date of the education session listed in the University of Alberta baseline and follow-up questionnaire data and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- Pump supply utilization: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
- Pump supply costs: Alberta Blue Cross IPT program data - monthly product utilization reports from 2014 (April, May, June, July, September and October) and 2015 (January, February, April, May, October and November).

- * Baseline = date of baseline interview = 0 months.

- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.

- †† Cost data was missing for these visits for existing pump patients. Therefore, costs were assumed to be the same as those for new pump patients.

- ‡ The unit cost of each of these supplies was based on all pumps except OmniPod.

Table 34. Overall cost of clinical visits from 3 months before baseline to 18 months after baseline: average cost (\$CAD) per pediatric 'no pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.00 (N=7)	1.00 (N=6)	1.00 (N=4)	1.00 (N=2)	1.00 (N=2)	1.00 (N=1)	1.00 (N=1)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$88.83
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.00 (N=9)	0.00 (N=4)	0.00 (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)†	
- Average cost per visit	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$0.00
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	2.33 (N=9)	2.00 (N=4)	1.00 (N=2)	1.00 (N=2)†	1.00 (N=2)†	1.00 (N=2)†	1.00 (N=2)†	
- Average cost per visit	\$147.25 (N=6)	\$84.36 (N=3)	\$188.89 (N=1)	\$188.89 (N=1)†	\$188.89 (N=1)†	\$188.89 (N=1)†	\$188.89 (N=1)†	\$1,456.26
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.00 (N=9)	0.00 (N=4)	0.00 (N=2)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)	0.00 (N=1)†	
- in-patient stays	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$0.00
Total cost per patient:	\$355.78	\$181.41	\$201.58	\$201.58	\$201.58	\$201.58	\$201.58	\$1,545.09

Notes:

- Data sources:

- HbA1c tests: Alberta Health Services administrative database - laboratory database from January 1, 2012 to March 31, 2016
- HbA1c costs: Schedule of Fees for the Laboratory Services Outpatient. Payment Schedule. Fee-For-Service Outpatient Laboratory Services in British Columbia. As of October 1, 2015. http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/laboratory-services/schedule_of_fees_-_laboratory_services_payment_schedule.pdf
- Type 1 Diabetes related emergency, outpatient and in-patient visits and costs: Alberta Health administrative databases - practitioner claims, outpatient (Ambulatory Care Classification System) and in-patient (Discharge Abstract Database) databases from January 1, 2012 to March 31, 2015. Type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E11*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718). Costs for each visit include physician fees and outpatient or in-patient visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were used where available. Where not available, estimated costs were calculated from ambulatory and in-patient resource intensity weights (RIWs) and costs per weighted case (CPWCs).

- * Baseline = date of baseline interview = 0 months.

- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.

Table 35. Overall cost of clinical visits and IPT supplies from 3 months before pump start to 18 months after pump start: average cost (\$CAD) per pediatric 'new pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.20 (N=54)	1.18 (N=40)	1.08 (N=26)	1.26 (N=27)	1.00 (N=34)	1.00 (N=23)	1.16 (N=19)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$100.00
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.10 (N=52)	0.09 (N=44)	0.02 (N=41)	0.03 (N=34)	0.00 (N=24)	0.00 (N=17)	0.00 (N=9)	
- Average cost per visit	\$410.00 (N=3)	\$375.54 (N=1)	\$375.54 (N=1)	\$375.54 (N=1) [†]	- (N=0)	- (N=0)	- (N=0)	\$93.58
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	6.37 (N=52)	7.2 (N=44)	1.73 (N=41)	1.47 (N=34)	1.58 (N=24)	1.65 (N=17)	1.78 (N=9)	
- Average cost per visit	\$152.96 (N=33)	\$160.32 (N=34)	\$230.03 (N=19)	\$158.80 (N=9)	\$158.80 (N=9) [†]	\$158.80 (N=9) [†]	\$158.80 (N=9) [†]	\$3,555.64
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.04 (N=52)	0.00 (N=44)	0.02 (N=41)	0.00 (N=34)	0.00 (N=24)	0.06 (N=17)	0.00 (N=9)	
- in-patient stays	\$937.57 (N=1)	- (N=0)	\$937.57 (N=1) [†]	- (N=0)	- (N=0)	\$937.57 (N=1) [†]	- (N=0)	\$112.51
Average cost of pump & supplies:								
- pump	N/A	\$6,577.76	N/A	N/A	N/A	N/A	N/A	\$6,577.76
- infusion sets‡	N/A	\$691.17	\$641.15	\$671.43	\$653.99	\$750.02	\$706.89	\$4,114.66
- insulin cartridges‡	N/A	\$413.32	\$345.17	\$393.03	\$369.78	\$415.25	\$387.58	\$2,324.14
- blood ketone test strips	N/A	\$49.17	\$64.53	\$48.18	\$56.61	\$31.72	\$52.46	\$302.67
- alcohol wipes	N/A	\$30.89	\$34.33	\$39.19	\$51.54	\$29.66	\$37.67	\$223.27
- insertion devices‡	N/A	\$1,507.67	\$1,517.80	\$1,691.22	\$1,626.39	\$1,585.46	\$1,585.46	\$9,514.00
- lancets	N/A	\$30.90	\$29.78	\$28.78	\$24.68	\$26.66	\$24.93	\$165.74
- syringes	N/A	\$0.67	\$0.83	\$1.45	\$0.74	\$0.33	\$0.43	\$4.45
- blood glucose test strips	N/A	\$458.14	\$473.73	\$452.52	\$453.31	\$449.30	\$430.80	\$2,717.80
- pen tip needles	N/A	\$1.15	\$0.15	\$1.07	\$0.33	\$0.98	\$1.37	\$5.05
Total cost per patient:	\$1,068.09	\$10,963.92	\$3,545.39	\$3,587.56	\$3,500.96	\$3,620.34	\$3,524.97	\$29,811.26

Notes:

- Data sources:
 - HbA1c tests: Alberta Health Services administrative database - laboratory database from January 1, 2012 to March 31, 2016
 - HbA1c costs: Schedule of Fees for the Laboratory Services Outpatient. Payment Schedule. Fee-For-Service Outpatient Laboratory Services in British Columbia. As of October 1, 2015. http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/laboratory-services/schedule_of_fees_-_laboratory_services_payment_schedule.pdf
 - Type 1 Diabetes related emergency, outpatient and in-patient visits and costs: Alberta Health administrative databases - practitioner claims, outpatient (Ambulatory Care Classification System) and inpatient (Discharge Abstract Database) databases from January 1, 2012 to March 31, 2015. Type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E11*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718). Costs for each visit include physician fees and outpatient or inpatient visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were used where available. Where not available, estimated costs were calculated from ambulatory and inpatient resource intensity weights (RIWs) and costs per weighted case (CPWCs).
 - Pump supply utilization: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
 - Pump supply costs: Alberta Blue Cross IPT program data - monthly product utilization reports from 2014 (April, May, June, July, September and October) and 2015 (January, February, April, May, October and November).
- * Baseline = date of pump start = 0 months.
- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.
- ‡ The unit cost of each of these supplies was based on all pumps except OmniPod.

Table 36. Overall cost of clinical visits and IPT supplies from 3 months before baseline to 18 months after baseline: average cost (\$CAD) per pediatric 'existing pump' patient

	-3 to 0 months*	0 to 3 months	3 to 6 months	6 to 9 months	9 to 12 months	12 to 15 months	15 to 18 months	Overall Cost Per Patient (from -3 to 18 months)
HbA1c Tests:								
- Average number of tests	1.00 (N=1)	1.00 (N=3)	1.00 (N=2)	1.00 (N=2)	1.00 (N=1)	1.00 (N=2)	1.00 (N=1)	
- Average cost per test	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$12.69	\$88.83
Type 1 Diabetes-Related ER Visits:								
- Average number of visits	0.00 (N=3)	0.00 (N=2)	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	
- Average cost per visit	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$0.00
Type 1 Diabetes-Related Outpatient Visits:								
- Average number of visits	0.00 (N=3)	1.50 (N=2)	1.50 (N=2) [†]	1.50 (N=2) [†]	1.50 (N=2) [†]	1.50 (N=2) [†]	1.50 (N=2) [†]	
- Average cost per visit	- (N=0)	\$142.00 (N=1)	\$142.00 (N=1) [†]	\$142.00 (N=1) [†]	\$142.00 (N=1) [†]	\$142.00 (N=1) [†]	\$142.00 (N=1) [†]	\$1,278.00
Type 1 Diabetes-Related In-patient Stays:								
- in-patient stays	0.00 (N=3)	0.00 (N=2)	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	0.00 (N=2) [†]	
- in-patient stays	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	- (N=0)	\$0.00
Average cost of pump & supplies:								
- pump	N/A	\$6,577.76	N/A	N/A	N/A	N/A	N/A	\$6,577.76
- infusion sets‡	N/A	\$836.36	\$1,003.71	\$1,003.71	\$878.10	\$752.69	\$752.69	\$5,227.27
- insulin cartridges‡	N/A	\$346.24	\$415.52	\$415.52	\$363.52	\$311.60	\$311.60	\$2,163.99
- blood ketone test strips	N/A	\$0.00	\$9.20	\$9.20	\$0.00	\$0.00	\$0.00	\$18.40
- alcohol wipes	N/A	\$17.41	\$54.83	\$54.83	\$7.83	\$15.67	\$15.67	\$166.23
- insertion devices‡	N/A	\$258.93	\$1,036.10	\$1,036.10	\$518.05	\$0.00	\$776.98	\$3,626.16
- lancets	N/A	\$29.60	\$46.09	\$46.09	\$30.35	\$3.37	\$7.87	\$163.37
- syringes	N/A	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$17.74	\$17.74
- blood glucose test strips	N/A	\$383.67	\$532.24	\$532.24	\$445.70	\$380.79	\$337.52	\$2,612.18
- pen tip needles	N/A	\$0.00	\$14.69	\$14.69	\$0.00	\$0.00	\$0.00	\$29.38
Total cost per patient:	\$12.69	\$8,675.66	\$3,338.07	\$3,338.07	\$2,469.24	\$1,689.81	\$2,445.76	\$21,969.31

Notes:

- Data sources:

- Education session: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015. Visits were included if they had a date that matched the date of the education session listed in the University of Alberta baseline and follow-up questionnaire data and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- Pump supply utilization: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
- Pump supply costs: Alberta Blue Cross IPT program data - monthly product utilization reports from 2014 (April, May, June, July, September and October) and 2015 (January, February, April, May, October and November).

- * Baseline = date of baseline interview = 0 months.

- † Data for each time period was not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.

- ‡ The unit cost of each of these supplies was based on all pumps except OmniPod.

Table 37. Cost of the IPT program from referral to annual reassessment: average cost (\$CAD) per adult 'new pump' patient

	Referral	Education Session	Initial Assessment	Post-Initial Assessment to Pump Start	Pump Start to One Month Post-Pump Start	One Month Post-Pump Start to Annual Reassessment	Overall Cost Per Patient (from referral to reassessment)
Average number of visits	1.00 (N=18)	1.00 (N=30)	1.00 (N=17)	6.00 (N=18)	5.49 (N=51)	8.90 (N=10)	
Average cost per visit*:							
- actual	\$127.27 (N=8)	\$228.89 (N=9)	\$457.32 (N=3)	\$126.73 (N=12)	\$99.84 (N=19)	\$91.83 (N=9)	\$2,939.27
- estimated	\$164.22 (N=16)	\$241.26 (N=23)	\$247.1 (N=17)	\$165.09 (N=18)	\$125.94 (N=43)	\$113.14 (N=9)	\$3,341.48
Average cost of pump & supplies:							
- pump	N/A	N/A	N/A	N/A	\$6,577.76	N/A	\$6,577.76
- infusion sets†	N/A	N/A	N/A	N/A	\$301.31	\$2,499.01	\$2,800.32
- insulin cartridges†	N/A	N/A	N/A	N/A	\$166.88	\$1,461.57	\$1,628.45
- blood ketone test strips	N/A	N/A	N/A	N/A	\$16.59	\$27.39	\$43.98
- alcohol wipes	N/A	N/A	N/A	N/A	\$7.55	\$148.67	\$156.23
- insertion devices†	N/A	N/A	N/A	N/A	\$650.48	\$5,649.44	\$6,299.92
- lancets	N/A	N/A	N/A	N/A	\$10.81	\$86.34	\$97.16
- syringes	N/A	N/A	N/A	N/A	\$1.15	\$5.52	\$6.67
- blood glucose test strips	N/A	N/A	N/A	N/A	\$182.19	\$1,519.98	\$1,702.17
- pen tip needles	N/A	N/A	N/A	N/A	\$0.69	\$2.31	\$3.01
Average total cost per patient:							
- actual							\$22,254.94
- estimated							\$22,657.15

Notes:

- data sources: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015
- relevant visits were identified by matching visit dates in practitioner claims and outpatient databases with dates of referral, education session, initial assessment, pump start and annual reassessment listed in either the University of Alberta questionnaire and follow-up data or the Alberta Health Services insulin pump clinic determination form data
- visits were included if they had a matching date and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- *Includes physician fees and ambulatory visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were only available for a subset of patients from one insulin pump clinic.
- †For all pumps except OmniPod

Table 38. Cost of the IPT program from referral to annual reassessment: average cost (\$CAD) per adult 'existing pump' patient

	Referral	Education Session	Initial Assessment	Post-Initial Assessment to Pump Start	Pump Start to One Month Post-Pump Start	One Month Post-Pump Start to Annual Reassessment	Overall Cost Per Patient (from referral to reassessment)
Average number of visits	N/A	1.00 (N=30)	N/A	N/A	N/A	N/A	
Average cost per visit*:	N/A		N/A	N/A	N/A	N/A	
- actual		\$228.89 (N=9)					\$228.89
- estimated		\$241.26 (N=23)					\$241.26
Average cost of pump & supplies:							
- pump	N/A	N/A	N/A	N/A	\$6,577.76	N/A	\$6,577.76
- infusion sets†	N/A	N/A	N/A	N/A	\$192.79	\$2,343.48	\$2,536.27
- insulin cartridges†	N/A	N/A	N/A	N/A	\$71.60	\$912.62	\$984.22
- blood ketone test strips	N/A	N/A	N/A	N/A	\$1.02	\$18.39	\$19.41
- alcohol wipes	N/A	N/A	N/A	N/A	\$7.72	\$68.96	\$76.68
- insertion devices†	N/A	N/A	N/A	N/A	\$209.25	\$2,574.77	\$2,784.03
- lancets	N/A	N/A	N/A	N/A	\$5.36	\$54.43	\$59.79
- syringes	N/A	N/A	N/A	N/A	\$0.26	\$3.78	\$4.04
- blood glucose test strips	N/A	N/A	N/A	N/A	\$123.56	\$1,402.84	\$1,526.41
- pen tip needles	N/A	N/A	N/A	N/A	\$1.10	\$6.61	\$7.71
Average total cost per patient:							
- actual							\$14,805.21
- estimated							\$14,817.58

Notes:

- data sources: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015
- relevant visits were identified by matching visit dates in practitioner claims and outpatient databases with dates of referral, education session, initial assessment, pump start and annual reassessment listed in either the University of Alberta questionnaire and follow-up data or the Alberta Health Services insulin pump clinic determination form data
- visits were included if they had a matching date and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- *Includes physician fees and ambulatory visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were only available for a subset of patients from one insulin pump clinic.
- †For all pumps except the OmniPod.

Table 39. Cost of the IPT program from referral to annual reassessment: average cost (\$CAD) per pediatric 'new pump' patient

	Referral	Education Session	Initial Assessment	Post-Initial Assessment to Pump Start	Pump Start to One Month Post-Pump Start	One Month Post-Pump Start to Annual Reassessment	Overall Cost Per Patient (from referral to reassessment)
Average number of visits	1.00 (N=17)	1.00 (N=5)	1.00 (N=9)	9.33 (N=9)	7.45 (N=31)	10.14 (N=14)	
Average cost per visit*:							
- actual	\$164.63 (N=14)	\$348.64 (N=4)	\$441.63 (N=6)	\$156.64 (N=8)	\$163.84 (N=25)	\$204.7 (N=15)	\$5,712.62
- estimated	\$192.3 (N=16)	\$391.23 (N=4)	\$476.65 (N=8)	\$179.09 (N=8)	\$189.85 (N=25)	\$235.9 (N=15)	\$6,537.50
Average cost of pump & supplies:							
- pump	N/A	N/A	N/A	N/A	\$6,577.76	N/A	\$6,577.76
- infusion sets†	N/A	N/A	N/A	N/A	\$237.20	\$2,483.55	\$2,720.75
- insulin cartridges†	N/A	N/A	N/A	N/A	\$140.33	\$1,407.02	\$1,547.35
- blood ketone test strips	N/A	N/A	N/A	N/A	\$36.09	\$172.37	\$208.47
- alcohol wipes	N/A	N/A	N/A	N/A	\$7.71	\$127.16	\$134.86
- insertion devices†	N/A	N/A	N/A	N/A	\$528.51	\$5,746.63	\$6,275.15
- lancets	N/A	N/A	N/A	N/A	\$11.63	\$105.72	\$117.35
- syringes	N/A	N/A	N/A	N/A	\$0.53	\$3.22	\$3.75
- blood glucose test strips	N/A	N/A	N/A	N/A	\$181.16	\$1,665.95	\$1,847.11
- pen tip needles	N/A	N/A	N/A	N/A	\$0.39	\$2.97	\$3.36
Average total cost per patient:							
- actual							\$25,148.53
- estimated							\$25,973.41

Notes:

- data sources: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015
- relevant visits were identified by matching visit dates in practitioner claims and outpatient databases with dates of referral, education session, initial assessment, pump start and annual reassessment listed in either the University of Alberta questionnaire and follow-up data or the Alberta Health Services insulin pump clinic determination form data
- visits were included if they had a matching date and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- *Includes physician fees and ambulatory visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use).
- †For all pumps except the OmniPod.

Table 40. Cost of the IPT program from referral to annual reassessment: average cost (\$CAD) per pediatric 'existing pump' patient

	Referral	Education Session	Initial Assessment	Post-Initial Assessment to Pump Start	Pump Start to One Month Post-Pump Start	One Month Post-Pump Start to Annual Reassessment	Overall Cost Per Patient (from referral to reassessment)
Average number of visits	N/A	1.00 (N=5)	N/A	N/A	N/A	N/A	
Average cost per visit*:	N/A		N/A	N/A	N/A	N/A	
- actual		\$348.64 (N=4)					\$348.64
- estimated		\$391.23 (N=4)					\$391.23
Average cost of pump & supplies:							
- pump	N/A	N/A	N/A	N/A	\$6,577.76	N/A	\$6,577.76
- infusion sets†	N/A	N/A	N/A	N/A	\$278.79	\$3,332.44	\$3,611.23
- insulin cartridges†	N/A	N/A	N/A	N/A	\$115.41	\$1,379.57	\$1,494.98
- blood ketone test strips	N/A	N/A	N/A	N/A	\$8.18	\$4.50	\$12.68
- alcohol wipes	N/A	N/A	N/A	N/A	\$6.96	\$85.10	\$92.06
- insertion devices†	N/A	N/A	N/A	N/A	\$287.78	\$1,603.92	\$1,891.70
- lancets	N/A	N/A	N/A	N/A	\$12.61	\$136.38	\$148.99
- syringes	N/A	N/A	N/A	N/A	\$0.00	\$4.34	\$4.34
- blood glucose test strips	N/A	N/A	N/A	N/A	\$147.12	\$1,509.06	\$1,656.19
- pen tip needles	N/A	N/A	N/A	N/A	\$2.86	\$11.97	\$14.83
Average total cost per patient:							
- actual							\$15,853.40
- estimated							\$15,895.99

Notes:

- data sources: Alberta Health administrative databases - practitioner claims and outpatient (Ambulatory Care Classification System) databases from January 1, 2012 to March 31, 2015
- relevant visits were identified by matching visit dates in practitioner claims and outpatient databases with dates of referral, education session, initial assessment, pump start and annual reassessment listed in either the University of Alberta questionnaire and follow-up data or the Alberta Health Services insulin pump clinic determination form data
- visits were included if they had a matching date and one of the following icd-9/icd-10 diagnosis codes or Canadian Classification of Health Intervention (CCI) procedure codes present within the first three diagnosis or procedure codes of each visit: diabetes mellitus, hyperinsulinism or hypoglycaemia (icd-9: 250*, 251.0, 251.1, 251.2 / icd-10: E10*, E11*, E13*, E14*), dietary counselling and surveillance (icd-10: Z713), other counselling (icd-10: Z718), instruction, personal care, for medication administration, includes any route: injections, intravenous, infusion pumps (CCI: 7.SC.59.QA), instruction, promotion health and preventing disease, for self monitoring of biochemical levels, e.g., glucose and for self monitoring of diet, nutrition, optimal weight (CCI: 7.SP.59.UA, 7.SP.59.UB), and education, promotion health and preventing disease, for specific disease (CCI: 7.SP.60.XA)
- *Includes physician fees and ambulatory visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were only available for a subset of patients from one insulin pump clinic.
- †For all pumps except the OmniPod.

Table 41. Overall and incremental cost of clinical visits and IPT supplies from 3 months before baseline up to 18 months after baseline for 'no pump', 'new pump' and 'existing pump' patients*

	Average Cost Per Patient (\$CAD)					
	Adults			Children		
	No Pump	New Pump	Existing Pump	No Pump	New Pump	Existing Pump
Type 1 diabetes clinical visits:						
- HbA1c tests	\$109.13	\$115.48	\$112.31	\$88.33	\$100.00	\$88.83
- emergency visits	\$326.57	\$204.47	\$143.64	\$0.00	\$93.58	\$0.00
- outpatient visits	\$2,567.20	\$2,979.76	\$2,457.71	\$1,456.26	\$3,555.64	\$1,278.00
- inpatient stays	\$149.87	\$349.71	\$199.83	\$0.00	\$112.51	\$0.00
Supplies	N/A			N/A		
- pump		\$6,577.76	\$6,577.76		\$6,577.76	\$6,577.76
- infusion sets†		\$3,909.37	\$3,882.90		\$4,114.66	\$5,227.27
- insulin cartridges†		\$2,195.77	\$1,517.06		\$2,324.14	\$2,163.99
- blood ketone test strips		\$29.80	\$23.65		\$302.67	\$18.40
- alcohol wipes		\$187.10	\$110.28		\$223.27	\$166.23
- insertion devices†		\$8,831.27	\$4,321.92		\$9,514.00	\$3,626.16
- lancets		\$127.87	\$95.99		\$165.74	\$163.37
- syringes		\$9.25	\$6.57		\$4.45	\$17.74
- blood glucose test strips		\$2,451.20	\$2,373.06		\$2,717.80	\$2,612.18
- pen tip needles		\$4.30	\$8.02		\$5.05	\$29.38
Total cost per patient	\$3,152.78	\$27,973.11	\$21,830.70	\$1,545.09	\$29,811.26	\$21,969.31
Incremental cost per patient	-	\$24,820.33	\$18,677.92	-	\$28,266.17	\$20,424.22
Total number of patients	-	84	94	-	79	4
Incremental budget impact	-	\$2,084,907.72	\$1,755,724.48	-	\$2,233,027.43	\$81,696.88

Notes:

- Data sources:

- HbA1c tests: Alberta Health Services administrative database - laboratory database from January 1, 2012 to March 31, 2016
 - HbA1c costs: Schedule of Fees for the Laboratory Services Outpatient. Payment Schedule. Fee-For-Service Outpatient Laboratory Services in British Columbia. As of October 1, 2015. http://www2.gov.bc.ca/assets/gov/health/practitioner-pro/laboratory-services/schedule_of_fees_-_laboratory_services_payment_schedule.pdf
 - Type 1 Diabetes related emergency, outpatient and in-patient visits and costs: Alberta Health administrative databases - practitioner claims, outpatient (Ambulatory Care Classification System) and inpatient (Discharge Abstract Database) databases from January 1, 2012 to March 31, 2015. Type 1 diabetes related visits were considered any visit with one of the following icd-9/icd-10 diagnosis codes present within the first three diagnosis codes of each visit: diabetes mellitus, hypoglycaemic coma, hyperinsulinism or hypoglycaemia (250*, 251.0, 251.1, 251.2/E10*, E11*, E13*, E14*), diabetic retinopathy (362.0/H36.0*), diabetic polyneuropathy (357.2/G63.2*), dietary counselling and surveillance (-/Z713) and other counselling (-/Z718). Costs for each visit include physician fees and outpatient or in-patient visit costs (costs associated with: diagnostic tests, procedures, consumables, medications administered in-facility, allied health professionals and facility use). Actual costs were used where available. Where not available, estimated costs were calculated from ambulatory and inpatient resource intensity weights (RIWs) and costs per weighted case (CPWCs).
 - Pump supply utilization: University of Alberta baseline and follow-up interview/questionnaire - insulin pump supply diary data
 - Pump supply costs: Alberta Blue Cross IPT program data - monthly product utilization reports from 2014 (April, May, June, July, September and October) and 2015 (January, February, April, May, October and November).
- * For 'no pump' patients, the date of their first interview was used for their baseline date and for 'new pump' patients, the date of their pump start was used as their baseline date. Data for each time period were not available for some groups. Therefore, the average number of visits and/or the average cost per visit were assumed to be the same as that over the last available time period.
- † The unit cost of each of these supplies was based on all pumps except OmniPod.

Table 42. Cost-utility analysis of ‘new pump’ vs. ‘no pump’ adult patients

	Overall cost per patient (\$CAD)	Incremental cost per 'new pump' patient (\$CAD)	Change in EQ-5D-5L utility value (mean)	Incremental change in EQ-5D-5L utility value (mean)	Incremental Cost Utility Ratio
<i>Over 15 months</i>					
No Pump Patients:	\$2,732.93	-	-0.03	-	-
New Pump Patients:	\$21,926.27	\$19,193.34	0.03	0.06	\$319,888.98
<i>Over 5 years</i>					
No Pump Patients:	\$5,220.34	-	4.11875	-	
New Pump Patients:	\$70,684.57	\$65,464.23	4.40875	0.29	\$225,738.72

Table 43. Cost-utility analysis of ‘new pump’ vs. ‘no pump’ pediatric patients

	Overall cost per patient (\$CAD)	Incremental cost per ‘new pump’ patient (\$CAD)	Change in CHU9D utility value (mean)	Incremental change in CHU9D utility value (mean)	Incremental Cost Utility Ratio
Over 15 months					
No Pump Patients:	\$1,141.93	-	-0.04	-	-
New Pump Patients:	\$22,665.92	\$21,523.99	-0.03	0.01	\$2,152,398.52
Over 5 years					
No Pump Patients:	\$4,011.43	-	4.10125	-	
New Pump Patients:	\$79,523.27	\$75,511.84	4.50000	0.39875	\$189,371.39

Appendix 1. Description of HRQoL questionnaires used

Questionnaire	Summary of Questionnaire	Presentation of Results
<p>EQ-5D-5L¹ - adults and adolescents</p>	<p><i>Dimensions:</i> - 5 questions each representing a health dimension (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) - each dimension has 5 possible responses (no problems, slight problems, moderate problems, severe problems, extreme problems) <i>Self-rated health:</i> - visual analogue scale from 0 ('the worst health you can imagine') to 100 ('the best health you can imagine')</p>	<p>- response from each domain assigned a value from 1 (no problems) to 5 (extreme problems) - value from each domain combined to generate a 5 digit profile for each patient - 5 digit profile converted to a single summary index (utility value) using an existing value set from the general US population² - average utility presented (mean, standard deviation, min, max)</p>
<p>EQ-5D-Y³ - children</p>	<p><i>Dimensions:</i> - 5 questions each representing a health dimension (mobility, self-care, usual activities, pain/discomfort, anxiety/depression) - each dimension has 3 possible responses (no problems, some problems, a lot of problems) <i>Self-rated health:</i> - self-rated health visual analogue scale from 0 ('the worst health you can imagine') to 100 ('the best health you can imagine')</p>	<p>- average rating presented (mean, standard deviation, min, max), where higher ratings indicate better self-rated health - no value sets available for youth version</p>
<p>Health Utilities Index® Mark 2 and Mark 3 (HUI2/3)⁴ - adults and adolescents</p>	<p>- 15 questions representing various health dimensions (HUI2: sensation, mobility, cognition, self-care, emotion, pain; HUI3: vision, hearing, speech, emotion, pain, ambulation, dexterity, and cognition) - each question has 4-6 possible responses</p>	<p>- average rating presented (mean, standard deviation, min, max), where higher ratings indicate better self-rated health - HUI2 and HUI3 variables representing each health dimension created and assigned attribute levels from 1 to 4, 1 to 5, or 1 to 6 using existing attribute level decision tables - HUI2 and HUI3 utilities calculated using utility function - average utility presented (mean, standard deviation, min, max)</p>
<p>Child Health Utilities 9D (CHU9D) - children</p>	<p>- 9 questions each representing a dimension (worried, sad, pain, tired, annoyed, homework, sleep, routine, activities) - each dimension has 5 possible responses (for the first 5 dimensions: don't feel, feel a little bit, feel a bit, feel quite, feel very; for the last 4 dimensions: no problems, few problems, some problems, many problems, unable to do)</p>	<p>- response from each domain assigned a value from 1 (don't feel/no problems) to 5 (feel very/unable to do) - value converted to corresponding code from existing set of codes - utilities calculated using utility function - average utility presented (mean, standard deviation, min, max)</p>
<p>Diabetes Treatment Satisfaction Questionnaire – status version (DTSQs)⁵ - adults</p>	<p>- 8 questions about current diabetes treatment (over the past few weeks) - 6 questions relate to treatment satisfaction and are scored from 0 (very dissatisfied/inconvenient/inflexible/etc.) to 6 (very satisfied/convenient/flexible/etc.)</p>	<p>- scores from 6 treatment satisfaction questions summed, generating overall treatment satisfaction score ranging from 0 to 36; higher scores indicate greater satisfaction with treatment - average treatment satisfaction scores presented (mean, standard deviation, min, max) - scores from the 2 hyperglycemia and hypoglycemia questions presented individually; lower</p>

¹ <http://www.euroqol.org/about-eq-5d/valuation-of-eq-5d.html>

² <http://www.euroqol.org/about-eq-5d/valuation-of-eq-5d/eq-5d-5l-value-sets.html>

³ <http://www.euroqol.org/about-eq-5d/valuation-of-eq-5d.html>

⁴ HUI® Health Utilities Index® Procedures Manual for Self-Administered Questionnaires

⁵ The Diabetes Treatment Satisfaction Questionnaire (DTSQ) Status and Change Versions USER GUIDELINES

Questionnaire	Summary of Questionnaire	Presentation of Results
<p>Diabetes Treatment Satisfaction Questionnaire – change version (DTSQc)⁶ - adults</p> <p>Caregiver Burden Inventory (CBI)⁷ - parents of children/adolescents</p>	<p>- 2 questions relate to perceived frequency of hyperglycemia and hypoglycemia are scored from 0 ('none of the time') to 6 ('most of the time')</p> <p>- 8 questions about changes in current treatment compared to start of study/before study began (over the past few weeks/months)</p> <p>- 6 questions relate to changes in treatment satisfaction and are scored from -3 (much less satisfied/convenient/flexible/etc. now) to +3 (much more satisfied/convenient/flexible/etc. now)</p> <p>- 2 questions relate to perceived changes in frequency of hyperglycemia and hypoglycemia and are scored from -3 ('much less of the time now') to +3 ('much more of the time now')</p> <p>- 24 statements about burden of caregiving across 5 subscales (time-dependence burden, developmental burden, physical burden, social burden, and emotional burden)</p> <p>- each statement scored from 0 ('never') to 4 ('nearly always') on how often the statement describes the caregivers feelings</p>	<p>scores indicate blood glucose levels closer to ideal and higher scores indicate problems</p> <p>- scores from 6 change in treatment satisfaction questions summed, generating overall treatment satisfaction (change) score ranging from -18 to +18; higher scores indicate greater improvement in satisfaction with treatment and lower scores indicate greater deterioration in satisfaction with treatment</p> <p>- average treatment satisfaction (change) scores presented (mean, standard deviation, min, max)</p> <p>- scores from 2 hyperglycemia and hypoglycemia questions presented individually; lower scores indicate fewer problems with blood glucose levels and higher scores indicate more problems than before</p> <p>- average score in each dimension presented (mean, standard deviation, min, max), where higher score indicate greater feelings of burden</p>

⁶ The Diabetes Treatment Satisfaction Questionnaire (DTSQ) Status and Change Versions USER GUIDELINES

⁷ Novak and Guest. (1989). Application of a Multidimensional Caregiver Burden Inventory. The Gerontological Society of America.