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Diabetes Management in Adolescents: Insulin Pump Therapy versus Insulin Injection Therapy

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Type 1 Diabetes Management in Adolescents: Insulin Pump Therapy versus Insulin Injection Therapy

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Introduction

Type 1 Diabetes Mellitus (T1DM) is a chronic condition affecting almost 9% of the United States population. In T1DM, the pancreas fails to produce insulin, resulting in an increased blood glucose. T1DM requires blood glucose monitoring to maintain normal levels, and determine how much exogenous insulin is needed to decrease blood glucose. The insulin can then be administered in two ways:

- Insulin pump: a semi-permanent attachment that automatically administers insulin as needed
- Insulin injections: manually injected into the subcutaneous tissue with the required dose of insulin throughout the day

Maintaining normal blood glucose levels is essential to prevent further complications of T1DM. As posed in the PICO question, the authors question which method of insulin administration results in more stable glycemic control in the adolescent population.

PICO

In adolescents, aged 13-18 years with type 1 diabetes mellitus (T1DM), does the use of an insulin pump therapy compared to insulin injection therapy lead to better long-term glycemic control?

Figure 1

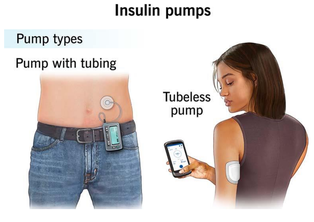

Figure 1: illustration of insulin pump (Cleveland Clinic, 2023)

Figure 2

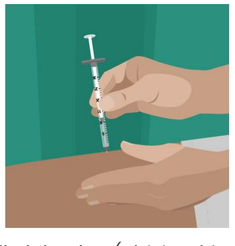

Figure 2: insulin injection (Kidshealth.org, 2022)

Methods

Databases used: OneSearch, Nursing Reference Center, PubMed, Google Scholar, and National Library of Medicine.
Search terms: type 1 diabetes, adolescent adherence, T1DM treatment, and compliance.
Inclusion criteria: type 1 diabetes treatment, long term glycemic control, adherence in the adolescent population, and articles published since 2019.
Exclusion criteria: did not pertain to type 1 diabetes, introduced other forms of treatment other than insulin pumps and insulin injections, did not include compliance, and represented another population besides adolescence.
Total Number of Articles: 11 met this criteria

Results

Insulin Pump Therapy versus Insulin Injection Therapy pertaining to Glycemic Control

Insulin Pump Therapy:

- Deliver more accurate injections automatically
- Adherence to insulin regimen is enforced due to the attachment
- Lowered A1C (average blood glucose over three months)

Insulin Injection Therapy:

- Flexibility to skip a dose if necessary from reduced intake

Figure 3

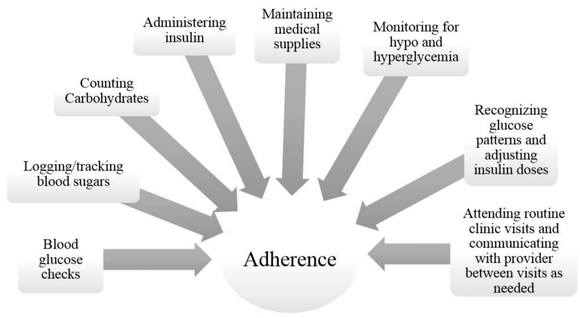

Figure 3: graphic demonstrating factors contributing to adolescent adherence (Dabas et al., 2023)

Conclusion

Evidence shows that insulin pumps are preferred over traditional insulin injections. As shown in Figure 3, there are multiple factors that affect T1DM treatment adherence; many of which are diminished by insulin pump use. Removing treatment barriers results in increased treatment compliance, which is seen in insulin pump therapy. These results conclude that in adolescents, aged 13-18 years with T1DM, the use of insulin pump therapy leads to better glycemic control due to increased adherence to treatment. Suggestions for future research include the need for further studies and development of treatment options to further compliance

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