Blood, sweat, and stress: Does continuous glucose monitoring ease diabetes distress?

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Introduction

- The ability to self-monitor blood glucose (SMBG) has been an essential method for patients with Type II diabetes mellitus to achieve safe and effective adjustments of their medication regimen.
- However, SMBG requires repeated daily use which can lead to painfully inconvenient situations and decrease adherence.
- Alternatively, continuous glucose monitoring (CGM) has emerged as a potentially efficient monitoring option for serum glucose. We aim to analyze the efficacy of CGM on diabetic patients' distress using results from The Diabetes Distress Scale (DDS) and The Diabetes Quality of Life scale (DQoL).
- The DDS is a 17-item instrument that assesses worries and concerns specifically related to diabetes and its management.
- The DQoL provides an overall scale score, as well as four subscale scores for 1) satisfaction with treatment, 2) impact of treatment, 3) worry about the future effects of diabetes, and 4) worry about social/vocational issues.

Research Objective

- Our objective was to assess if CGM use resulted in a reduction of disease-related psychosocial distress in patients with insulin treated Type II diabetes mellitus compared to SMBG, using results from reliable and valid DDS and DQoL results.

Design

- Evidence based review. PubMed search keywords: "continuous glucose monitoring", "Type 2 Diabetes Mellitus", and "Diabetes Distress Scale".
- Four Randomized control trials were reviewed initially, but these were narrowed down to three studies that were more focused on the outcomes of our question.

Patient Population & Methods

- A total of 474 insulin using Adults (>18 years) with Type II diabetes mellitus
- Trials occurred in outpatient and diabetic centers in Denmark, United States, and Europe.
- Exclusion criteria included pregnancy or lactation, use of CGM in the last 3 months, participation in another clinical trial in the last 30 days, severe hypoglycemia or diabetic ketoacidosis in the last 6 months and known allergy to adhesive material.
- Steno2tech: Participants were randomized at a 2:1 ratio into CGM or SMBG groups, after 2 weeks of 2 weeks of blinded sensor wear, then followed for a total of 6 months of open label trial.
- COACH: Participants completed 6 months of wearing CGM and surveys were used to access diabetic distress.
- Haak: Participants were randomized 1:1 into 12 months of CGM or SMBG from a single-center and open label trial.

Results

Trial	DDS score after 6 months with CGM	DDS score after 6 months with SMBG	Difference	P-value
Steno2tech	1.9	2.3	-0.4	0.011
COACH	1.647	1.904	-0.257	<0.001
Trial	**DDS score after 12 months with CGM**	**DDS score after 12 months with SMBG**	**Difference**	**P-value**
Steno2tech	1.8	2.2	-0.4	0.064
Trial	**DQoL score after 12 months with CGM**	**DQoL score after 12 months with SMBG**	**Difference**	**P-value**
Haak	2.2	2.3	-0.1	0.3863

- DDS scoring: Each item is assessed on a six-point Likert scale, from 1(Not a Problem) to 6 (A Very Serious Problem). An overall mean score <2.0 indicates little or no distress, 2.0-2.9 indicates moderate distress, and ≥3.0 indicates high distress. Any mean score ≥2.0 is considered clinically significant.
- DQoL scores range from 1-5; high scores indicate dissatisfaction, frequent impact, or frequent worry.

Validity of Studies

	Steno2tech	COACH	Haak
Randomized control trial	Yes	No	Yes
Concealed allocation	Yes	Yes	Yes
Baseline demographics	Yes	Yes	Yes
Blinding	No	No	No
Equal treatment of groups	Yes	Yes	Yes
Percentage of follow up	93%	100%	90%

Discussion

- In adults with insulin treated Type II diabetes mellitus, there is inconclusive evidence of consistent statistically and clinically significant reductions of the DDS when using CGM compared to SMBG over 6 - 12 months.
- Diabetes distress levels could be affected by subjective perception of glucose control and could have increased with CGM in patients with highly uncontrolled blood glucose levels.
- Other interventions that may reduce diabetes distress include diabetes self-management education regarding variability, post prandial rises, and realistic goals; diabetes self-management education regarding variability, post prandial rises, and realistic goals; and routine monitoring for distress to address/refer as needed.
- Future direction should include comparative studies between CGM and existing methods for glucose monitoring for both insulin and non-insulin treated adults, in combination with cognitive behavioral therapies, as well as investigations into the long-term effects.
- CGM could potentially be utilized as it reduces finger-pricking frequency, alert patients of severe glucose levels, monitor trends, improve glycemic control, and potentially improve morbidity and mortality.

- Practicality
  - **Safety:** Established as a safe alternative for blood glucose monitoring
  - **Tolerability:** Well tolerated, preferred especially by those with fear of hypoglycemia or distress.
  - **Effectiveness:** Unclear effectiveness due to limited sample size
  - **Price:** CGM is costlier than BGM in the short term. Long-term cost-effectiveness depends on potential reduction in complications and hospitalizations. Affordability varies by healthcare system and insurance
  - **Simplicity:** Simple for ongoing management, particularly for insulin adjustment. It removes the burden of frequent fingerstick and enables better trend analysis.

Conclusion

Clinical Recommendation	SOR
Adults with uncontrolled insulin treated Type 2 DM show reductions of diabetes distress when using CGM compared to SMBG over 6 - 12 months. [1-3]	C (inconclusive evidence)

References

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