Impact of Professional Continuous Glucose Monitoring Use for Diabetes Management in Uninsured and Underinsured Patients: A Retrospective Study

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Background

- Many uninsured or underinsured patients face a multitude of adversity resulting in delayed glycemic control.
- A major contributor to delayed control = cost
- Patients with diabetes experience:
  - Average medical expenditures of ~$16,750 per year with ~$9,600 attributed to diabetes[1]
  - Medical expenditures ~2.3x higher than expenditures would be in the absence of diabetes[1]
- Current best practice requires testing up to four times daily to measure and track blood glucose levels.[2]
- Test strips can be expensive and limit the provider's understanding of a patient's overall glycemic pattern.
- Only measuring Hemoglobin A1c (HbA1c) limits the understanding of acute glycemic patterns, acute complications of hypo- and hyperglycemia, and the magnitude and frequency of glucose variations.
- Use of continuous glucose monitors (CGMs) allows for real-time feedback to both the patient and the provider.

Purpose

The purpose of this retrospective analysis was to assess pharmacist-led patient-specific interventions made for patients with diabetes based on data obtained from November 2020 to December 31st, 2022 through the use of Freestyle Libre Professional Continuous Glucose Monitor (CGM) devices.

Primary Outcomes

- Time spent in target range (70-180 mg/dL)
- Decrease in average blood glucose (BG) from pre-intervention to post-intervention
- Decrease of Glucose Management Indicator (GMI) from pre-intervention to post-intervention

Secondary Outcome

- Improvement in overall diabetes management after interpretation of a single 14-day wear, patient-specific interventions and therapy modifications

Methods

- A Drake University IRB approved, retrospective chart review from a federally qualified health center studied patients with a diabetes diagnosis (Type I and Type II patients eligible).
- Interested patients identified as having poorly managed diabetes (HbA1c >9%), 18 years and older, and classified as uninsured or underinsured were included.
  - Uninsured or underinsured is defined as utilizing government funded programs, sliding scale fee (charity application), commercial insurance from the insurance marketplace, or self pay.
  - Interested patients were not excluded based on current combination of diabetes drug therapy or therapy history.

Figure 1: Data collection process

- Success of pharmacist-led interventions after professional CGM wear was determined by:
  - Percent of time in range changed by 30% OR decreased time out of range by 30% both from baseline
  - Overall progress towards their GMI goal of < 7%
- The goal sample size was 50 unique individual professional CGM wears.
- Descriptive statistics were used and data is presented in a de-identified aggregate form. An alpha value of 0.05 was used to run t-tests to generate a p-value to assess the clinical significance of the interventions made.

Results

Figure 2: Average blood glucose

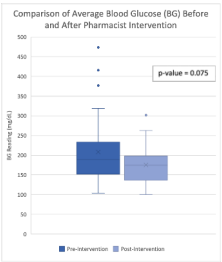


Figure 3: Average glucose management indicator

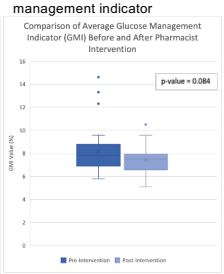
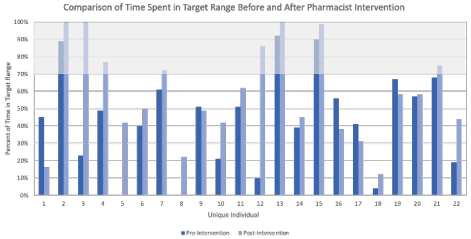
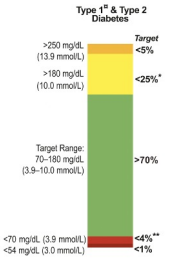


Figure 4: Percent of time spent in target range (70-180 mg/dL)



Discussion

Figure 5: Time in range "stoplight"[3]



Individualized goals should be set for each patient but aimed at reducing time spent in the low range (<70 mg/dL) to less than 1 hour/day and time spent in the very low range (<54 mg/dL) to less than 15 minutes/day.

- Evidenced by p-values generated, aggregate data was not clinically significant, but there were improvements in individual average BG readings and GMI values following pharmacist intervention.
- Data collected demonstrates clinical value in utilizing CGM devices to address blood glucose variability, especially for patients with highly unmanaged diabetes.
- CGM devices have the potential to greatly improve patient quality of life and reduce "disease burnout" by offering an alternative to traditional blood glucose monitoring methods such as fingerstick blood glucose monitoring.
- Limitations to this study included participants not returning for a second 14-day professional CGM wear and lost or unretrievable sensors.
- An additional limitation included not achieving 50 unique individual wears, as some patients wore more than two professional CGM's.

Conclusion

The use of CGM devices did not result in significant statistical improvement in patients' blood glucose during the study but did provide clinical value in lowering and stabilizing blood glucose variability. Additionally, clinical implications included decreased financial burden for patients related to diabetes testing supplies as well as the opportunity to address appropriate medication prescribing based on CGM personalized data reports. Pharmacists may be involved in appropriate therapy management and glycemic control, which will lead to decreased healthcare resource strain as patients are maintaining appropriate diabetes management and avoiding acute care settings for diabetes related complications. Future studies may consider the cost evaluation for third party payers to exhibit the value of CGM and the minimal difference in price compared to the value of data obtained.

Acknowledgements

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References

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