Conversion from a basal-bolus insulin regimen to a glucagon-like peptide-1 receptor agonist and basal insulin regimen in type 2 diabetes

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BACKGROUND

Diabetes Mellitus is a metabolic disease in which the body’s production and response to insulin is altered. Type 2 diabetes mellitus (T2DM) is a subset of the disease in which the pancreas continues to produce insulin; however, the level of endogenous Insulin production decreases over time. Many patients with T2DM eventually require basal-bolus insulin as part of their medication regimen; however, this regimen is complex and increases the risk of hypoglycemia and weight gain.

A newer regimen for T2DM includes the combination of a glucagon-like peptide-1 receptor agonist (GLP-1RA) plus basal insulin. This regimen is less complex, safer, promotes weight loss, and has the potential to reduce cardiovascular risk. This regimen is incorporated in the American Diabetes Association (ADA) guidelines as part of the step therapy of diabetes. What is less well known is which patients, if any, may be successfully de-escalated from basal-bolus insulin to this regimen.

OBJECTIVES

- Analyze a retrospective case series of patients who were converted from a basal-bolus insulin regimen to a basal insulin and GLP-1RA regimen at the Advocate Aurora Family Medicine clinic.

- Identify patient characteristics that predict a successful conversion from a basal-bolus insulin regimen to a basal insulin and GLP-1RA regimen and create a clinical pathway for providers.

METHODS

- 32 patients converted from a basal-bolus insulin regimen to a GLP-1RA + basal insulin regimen
- 24 patients were successful
  - 8 patients were unsuccessful (defined as discontinuation of the GLP-1RA due to intolerance, expense, or clinical decline seen in lab values)
- Assess patient characteristics (hemoglobin A1c, blood glucose average and range, C-peptide level, years since diagnosis, and insulin requirements).
- Compare weights of patients who converted from basal-bolus insulin to a GLP-1RA/basal insulin regimen to patients who were on an initial regimen that did not include short-acting insulin.
- Complete a statistical analysis of categorical variables by Pearson’s Chi-squared test or Fisher’s exact test and continuous variables by the two-sample t-test or the Mann-Whitney U test. P-value of ≤ 0.05 was considered to be statistically significant.
- Complete a cost comparison between basal insulin and GLP-1RA.
- Create a clinical pathway and continue education modules for providers.

RESULTS

- There was no statistical difference in age, incidence of CKD, T2D of insulin, or years of T2DM between successful and unsuccessful conversions.
- Patients that successfully converted had significantly higher C-peptide values, significantly fewer side effects, and nearly significantly fewer diagnoses of gastroparesis.
- Patients that successfully converted had an average reduction in A1c of 0.74% +/- 1.63% compared to an average increase in A1c of 0.86% +/- 1.16% in unsuccessful patients. (P = 0.035)
- While not statistically significant, there was a trend towards a higher glucose pattern with fewer high and low blood glucose values, as well as a lower overall average in patients who successfully converted.
- Successful patients had an average reduction in the total daily dose of insulin of 76 +/- 61 units.
- Patients who had their bolus insulin replaced with GLP-1RA therapy lost more weight at one month (3.6 +/- 2.3 kg) than those who had a GLP-1RA added to a regimen that did not contain basal insulin (0.9 +/- 3.1 kg) (P = 0.014) and also had a non-statistically significant trend toward more overall weight loss.

CONCLUSIONS

Patients with T2DM presently managed on basal-bolus insulin can be successfully converted to a GLP-1RA plus basal insulin if appropriately screened and selected.

Successful patients on average had higher C-peptide levels and fewer side effects driven by fewer diagnoses of gastroparesis.

Based on the average insulin utilization in this cohort of patients, the cost of short acting insulin and GLP-1RA therapy was roughly equivalent.

Limitations

- C-peptide levels were random; fasting status was not documented and patients did not follow a specific test meal.
- Patients were pre-screened based on C-peptide level. Patients with a C-peptide of 0.8 or less were generally not converted, leading to a higher success rate.

REFERENCES