1. Purpose: The purpose of this study is to determine if patients with type 2 diabetes who were affected by the GLP-1 and GIP/GLP-1 agonist shortage experienced a change in hemoglobin A1c.

2. Methods: This study was performed through utilization of retrospective chart review of patients seen by clinical pharmacists within four designated family medicine clinics in Illinois. Data of patients was obtained from electronic health records (EHR) after receiving an exemption through an Institutional Review Board (IRB) approval process. Inclusion criteria are as follows: ≥ 18 to ≤ 89 years of age, diagnosis of type 2 diabetes mellitus, on GLP-1 or GIP/GLP-1 therapy between 4/1/22 to 8/31/23 with documentation in their chart of shortage/supply issues, and two hemoglobin A1c (HbA1c) levels including one at time of documentation and a follow-up level within 3-6 months. Patients were excluded if they were diagnosed with type 1 diabetes mellitus (T1DM), pregnant, or not prescribed a GIP/GLP-1 or GLP-1. Patients included were then classified by the pharmacological intervention, given numerically, made by the clinical pharmacist after shortage or supply issue. Nine total interventions were determined and are as follows: switching to a different once weekly GLP-1 or GIP/GLP-1, switching to a different once daily GLP-1 or GIP/GLP-1, switching to an oral GLP-1, dose increase of current GLP-1 or GIP/GLP-1, dose decrease of current GLP-1 or GIP/GLP-1, current GLP-1 or GIP/GLP-1 held with other medications including insulin titrated, current GLP-1 or GIP/GLP-1 held with other medications excluding insulin titrated, current GLP-1 or GIP/GLP-1 held with addition of non-insulin, and current GLP-1 or GIP/GLP-1 held with addition of insulin. The primary endpoint was designated as the change in HbA1c when considering the shortage of GIP/GLP-1 agonists.

3. Results: A total of 218 patients seen by clinical pharmacists were analyzed in this study; 24 patients were included and 194 patients were excluded. The mean (SD) age was 68 (13). The majority of those included were initially on dulaglutide (58.3%) followed by semaglutide injection

(33.3%) with both tirzepatide and liraglutide with a singular patient (4.2%). A total of 17 received their medications from a community or retail pharmacy setting (70.8%), 4 from a mail order pharmacy (16.7%), and 3 from a patient assistance program (12.5%). Within the interventions, patients were predominantly given a reduced dose of their initial GLP-1 or GIP/GLP-1 (37.5%), followed by either switching from an initial GLP-1 or GIP/GLP-1 to a different, once-weekly injection (29.2%) or to a once-daily injection (12.5%) with all remaining interventions, excluding a current GLP-1 or GIP/GLP-1 held with addition of non-insulin, having one patient (4.2%). Upwards of 6 out of 9 (66.7%) patients who had a dose decrease of current GLP-1 or GIP/GLP-1 were on dulaglutide. Comparatively, semaglutide injection patients were most prominent when switching to a different once weekly GLP-1 or GIP/GLP-1 (42.9%). Following implementation of interventions, 13 patients had a lower secondary HbA1c (54.2%), and 11 patients had a higher secondary HbA1c (45.8%). Patients who underwent the switching to a different once weekly injectable experienced a statistically significant increase in HbA1c ($p = 0.012$).

4. Conclusions: Although no statistical difference was found between initial HbA1c and secondary HbA1c, around half of the patients who were affected by the shortage/supply issue did see a worsening in their HbA1c. However, those who were switched from their initial treatment to a different weekly GLP-1 or GIP/GLP-1 were significantly more likely to experience worsening of their HbA1c.