Predictors of Hemoglobin A1c Goal Attainment in Patients Treated With Insulin at a VA Pharmacist-Managed Insulin Clinic

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Showing up to appointments and adherence to treatment recommendations correlated with glycemic goal attainment for patients.

A bout 30.3 million Americans (9.4%) have diabetes mellitus (DM).1 Veterans are disproportionally affected—about 1 in 4 of those who receive US Department of Veterans Affairs (VA) care have DM.2 The consequences of uncontrolled DM include microvascular complications (eg, retinopathy, neuropathy, and nephropathy) and macrovascular complications (eg, cardiovascular disease).3

The American Diabetes Association (ADA) recommends achieving a goal hemoglobin A1c (HbA1c) level of < 7% to prevent these complications. However, a goal of < 8% HbA1c may be more appropriate for certain patients when a more strict goal may be impractical or have the potential to cause harm.4 Furthermore, guidelines developed by the VA and the US Department of Defense suggest a target HbA1c range of 7.0% to 8.5% for patients with established microvascular or macrovascular disease, comorbid conditions, or a life expectancy of 3 to 10 years.5 Despite the existence of evidence showing the importance of glycemic control in preventing morbidity and mortality associated with DM, many patients have inadequate glycemic control. Diabetes mellitus is the seventh leading cause of death in the US. Moreover, DM is a known risk factor for heart disease, stroke, and kidney disease, which are the first, fifth, and ninth leading causes of death in the US, respectively.1

Because DM management requires ongoing and comprehensive monitoring and monitoring, the ADA supports a collaborative, multidisciplinary, and patient-centered approach to delivery of care.2 Collaborative teams involving pharmacists have been shown to improve outcomes and cost savings for chronic diseases, including DM.6-12 In 1995, the VA launched a national policy providing clinical pharmacists with prescribing privileges that would aid in the provision of coordinated medication management for patients with chronic illnesses.10 The policy created a framework for collaborative drug therapy management (CDTM) models, which grants pharmacists the ability to perform patient assessments, order laboratory tests, and modify medications within a scope of practice.

Since the initiation of these services, several examples of successful DM management services using clinical pharmacists within the VA exist in the literature.13,14 However, even with intensive chronic disease and drug therapy management, not all patients who enroll in these services successfully reach clinical goals. Although these pharmacist-driven services seem to demonstrate overall benefit and cost savings to veteran patients and the VA system, little published data exist to help determine patient behaviors that are associated with glycemic goal attainment when using these services.

At the Corporal Michael J. Crescenz VA Medical Center in (CMCVMC) Philadelphia, Pennsylvania, this study was performed, primary care providers may refer patients with uncontrolled DM to the pharmacist disease state management (DSM) clinic. The clinic is a form of a CDTM and receives numerous referrals per year, with many patients discharged for successfully meeting glycemic targets.

However, a percentage of patients fail to attain glycemic goals despite involvement in this clinic. We observed specific patient behaviors that delayed glycemic goal attainment. This study examined whether these behaviors correlated with prolonged glycemic goal attainment. The purpose of this study was to identify patient behaviors that led to a glycemic goal attainment in insulin-treated patients referred to this pharmacist DSM clinic.

METHODS

This study was performed as a single-center retrospective chart review. The protocol and data collection documents were approved by the CMCVMC Institutional Review Board. It included patients referred to a pharmacist-led DSM clinic for insulin titration/optimization from January 1, 2011 through December 31, 2012. Data were collected through June 30, 2013, to allow for 6 months after the last referral date of December 31, 2012.

This study included patients who were on insulin therapy at the time of pharmacy consult, who attended at least 3 consecutive pharmacy DSM clinic visits, and had an HbA1c > 8% at the time of initial clinic consult. Patients who failed to have 3 consecutive pharmacy DSM clinic visits, were insulin-naïve at the time of referral, aged ≥ 90, lacked at least 1 follow-up HbA1c result while enrolled in the clinic, or had HbA1c < 8% were excluded.

Among the patients who met eligibility criteria, charts within the Computerized Patient Record System (CPRS) were reviewed in a chronological order within the respective study time frame. A total sample of 100 patients were enrolled in each treatment arm: the goal-attained arm or the goal-not-attained arm. The primary study variable was HbA1c goal attainment, which was defined in this investigation as at least 1 HbA1c reading of < 8% while enrolled in the DSM clinic during the review period. Secondary variables included specific patient factors such as optimal frequency of self-monitoring of blood glucose (SMBG) testing, adherence to pharmacist instructions for changes to glucose-lowering medications, adherence to bringing glucose meter/glucose log book to clinic appointments, and percentage of visits attended. Definitions for each variable are provided in Table 1. Data were collected for the 4 months prior to the date of goal HbA1c. For patients in the goal-not-attained group, the secondary variables were collected for the 4-month period prior to the end of...
A fixed-mixed includes prepared mixed combination of intermediate-acting insulin regimens to correlate with glycemic goal attainment. The development and constant modification of clinical practice guidelines has made DM treatment a focus and priority. Additionally, the collaborative approach to health care and creation of VA pharmacist-driven services have demonstrated successful patient outcomes. Despite these efforts, further insight is needed to improve the management of DM. Our study identified specific behavioral factors that correlated to veteran patients to attain their HbA1c goal of < 8% within a VA pharmacist DSM clinic. Additionally, it highlighted factors that contributed to patients not achieving their glycemic goal. The patients in this study had type 2 diabetes for about 11 years, were overwhelmingly male (99%), were aged about 61 years, and were taking on average 13 medications at the time of referral to the pharmacist DSM clinic. Mean HbA1c at time of enrollment was slightly higher in the goal-not-attained arm vs goal-attained arm (10.7 vs 10.2%, respectively), but the difference was not statistically significant (P = .066). A little more than half the patients in both study arms were on basal + prandial insulin regimens.

Patients who attained their goal HbA1c were more likely to bring their glucose meter/glucose log book to at least 80% of their appointments (P < .001). Additionally, this same cohort followed insulin dosing instructions of at least 80% of the time (P < .001). Frequency of glucose testing was not significantly different between goal-attained and goal-not-attained groups (P = .373). Moreover, our analysis showed that, on average, patients who met goal did so within 6 months of referral to the pharmacist-managed clinic (P < .001) (Table 3). Five variables were included in the multivariate analysis because they had a P value ≤ 2 in univariate analyses: (1) patient adherence to instructions (P < .001); (2) duration in clinic (P < .001); (3) patient bringing glucose meter or glucose log to appointments (P < .001); (4) percentage of scheduled appointments at least 80% of the time, increased the likelihood of glycemic goal achievement (OR 17.3; 95% CI: 8.0-37.4).

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investigation was not designed to characterize the specific pharmacist’s interventions that improved glycemic control. Future studies would benefit from the inclusion of specific interventions and their effect on glycemic goal attainment.

CONCLUSION

This retrospective study offers insight to specific patient behavioral factors that correlate with glycemic goal attainment in a VA pharmacist DSM clinic. Behavioral factors linked to HbA1c goal attainment of < 8% included appointment keeping, bringing glucose meter/glucose log book at least 80% of the time to these appointments, and following clinic instructions. This investigation also found that patients who attain glycemic goals generally do so within 6 months of enrollment. Furthermore, this study provided insight that following the clinic instructions a majority of the time strongly contributes to glycemic goal attainment. We believe that an assessment of patients’ behaviors prior to referrals to diabetes management programs will yield useful information about possible barriers to glycemic goal attainment.

Author disclosures

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REFERENCES