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Evaluation of a Family Nurse practitioner–led Individualized Diabetes Care Model in a Primary Care

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ABSTRACT

Type 2 diabetes mellitus (T2DM) is increasing at an alarming rate, as are its complications. "Usual care" is not adequate. This study evaluates the effectiveness of the Individualized Diabetes Care Model (IDCM). One family nurse practitioner, practicing in primary care, managed patients with T2DM over a 3-month period. This is a retrospective chart review of 123 patients attending 2 of 3 visits developed to teach the knowledge and skills required for self-management of T2DM. Over the span of 1 year, there was a sustained improvement of 1.5% in control of hemoglobin A_{1c} ($P = .000$).

Keywords: diabetes complications, individualized self-management vs. usual care in glycemic control, nurse practitioner in primary care, type 2 diabetes

Type 2 diabetes mellitus (T2DM) has become one of the leading chronic diseases in the United States. Its complications include heart disease, renal failure, blindness, neuropathy, and limb amputation. According to the 2014 National Diabetes Statistics Report, 29.1 million people (9.3% of the US population) have been diagnosed with diabetes.[1] Diabetes can lead to premature death if not managed effectively.[2] Because diabetes is predicted to affect 1 in 3 American adults by 2050, the prevalence of diabetes complications is anticipated to rise.[3] In 2012, the total estimated cost of diabetes in the US exceeded $245 billion.[1] Diabetes complications have driven up the economic burden despite current usual practice.[4]

The purpose of this study is to evaluate 5 years (2009 to 2014) of individualized care to persons with T2DM by a family nurse practitioner (FNP) in an internal medicine primary care setting. The FNP-designed Individualized Diabetes Care Model (IDCM; see Table 1) is partly based on an existing American Diabetes Association (ADA) recommendation, and is implemented over 3 monthly office visits. The project aims to determine whether individualized diabetes care by an FNP was more effective than "usual care" in achieving and maintaining glycemic control. Glycemic control of hemoglobin A_{1c} (A_{1c}) was the primary outcome, and high- and low-density cholesterol (HDL and LDL, respectively), blood pressure (BP), and weight were secondary outcomes. "Usual care" describes the customary care provided by clinicians (see Table 1).

LITERATURE REVIEW

The literature is replete with information identifying the causes of diabetes, its effects on the population, and approaches to self-management. Sperl-Hillen et al. conducted a randomized, controlled trial of 623 adults with T2DM divided into 3 groups; 1 group received individual education; another group received group education; and the control group received "usual care."[5] The individual education intervention group demonstrated significant and sustained improvements in self-management and reduced diabetes-related problems relative to the usual care group. However, the self-management and short-term gains (at 7 months) were not sustained over 13 months, suggesting that ongoing reinforcement may achieve lasting behavioral changes and glycemic control.

An interdisciplinary expert panel gathered at the 2011 American Association of Diabetes Educators Conference and suggested that empowering patients in self-management with ongoing support is effective

Table 1. "Usual Care" vs. IDCM

Usual Care	IDCM
• Regular office visits • Monitoring A_{1c}, BP, cholesterol, and weight • Medications adjustment as needed	• Regular extended office visits promoting patient active involvement in treatment decisions • Monitoring A_{1c}, BP, cholesterol, and weight • Medications management • Three extended office visits to provide individualized T2DM management to include pathophysiology, risks, and risk reduction of long-term complications • Teaming up with patient to promote self-care • Focus on prevention, including monitoring labs, self- monitoring blood glucose (SMBG), preventing hypo/hyperglycemia, and coordinating referral

A_{1c} = hemoglobin A_{1c}; BP = blood pressure; IDCM = Individualized Diabetes Care Model; SMBG = self monitoring of blood glucose; T2DM = type 2 diabetes mellitus.

for overall diabetes management.[6] Ideal diabetes management includes an organized, systematic approach, and an adequate commitment to patient-focused care.

A chart audit by Conlon of 42 patients with T2DM, found diabetes interventions by a nurse practitioner (NP) lowered A_{1c} to a greater degree (2.5% vs. 0.2%) than the interventions of 2 physician colleagues.[7] A 1-point reduction in A_{1c} lowers the risk of diabetic complications by 40%.[2] The NP followed the ADA standards of care for diabetes patients, whereas the physicians conducted care as usual. This suggests that the established ADA recommendations positively impact T2DM health outcomes.

Tight A_{1c} control $< 6.5\%$ is associated with severe hypoglycemia; this increases risk of cardiovascular events.[8] There was a 30% increase in the relative risk of severe hypoglycemia with intensive glycemic control ($A_{1c} < 6\%$ or 6.5%), using insulin and sulfonylurea. Nonpharmacologic self-management interventions produce desirable health outcomes without the risk of hypoglycemia. Patient education is supported as the key to better self-management of diabetes.[1]

METHODS

Study Design and Participants

A retrospective chart review and within-subjects design was used to determine the effectiveness of individualized diabetes care by an FNP for achieving glycemic control in patients with T2DM. Inclusion criteria consisted of individuals diagnosed with T2DM over the age of 18 who participated in 2 of 3 monthly encounters, with at least 2 measurements of A_{1c}, BP, HDL, LDL, and weight documented over a 1-year time-frame.

Individuals were excluded from the study if they had been diagnosed with gestational diabetes. The results of this study are not affected by any influx of blood glucose-lowering agents, as individuals with this need required more visits than allowed in the model visitation criteria. Data extraction from electronic medical records were conducted in an internal medicine primary care office in eastern Washington state. Existing charts were reviewed for adult T2DM individuals who saw the FNP for the 3 visits between 2009 and 2014.

The FNP provided medication adjustments and ordered labs, depending on the individual case. The FNP took a thorough history to assess and prioritize a treatment plan. Individuals reported their nutrition and exercise habits and intention to do things differently rather than simply stepping up pharmacotherapy. During visits with the FNP, individuals gained skills to effectively modify lifestyle, treat hyperglycemia and hypoglycemia, and to set achievable goals. Individuals received 3 packets of information based on selected lifestyle changes over the course of the 3 visits (see Table 2).

Data Collection, Ethical Considerations, and Analysis

Institutional review board approval was obtained before initiating the scholarly project. For individuals meeting the inclusion criteria, the values of A_{1c}, BP, HDL, LDL, and weight, along with demographic data (age and gender), were collected. A within-subjects *t* test was used to determine the differences between pre- and postclinical outcomes. To protect individual identities, the data was de-identified and