# Achieving fundamental renal testing, foot care inspections and ophthalmology examinations through DSMT

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**SUMMARY**

**Background:** There are cost benefits to maintaining acceptable blood glucose levels. Due to the rise in documented cases of type 2 diabetes, education for managing the disease is imperative. Diabetes self-management refers to the ongoing process of coaching individuals towards the necessary knowledge, skill, and ability to independently manage diabetes. The process of Diabetes Self-Management Training (DSMT) incorporates the needs, goals, and life experiences of the person with diabetes and is guided by evidence-based standards. The overall objective of DSMT is to support informed decision-making, self-care behaviors, problem-solving and active collaboration with the health care team and to improve clinical outcomes, health status, and quality of life. The objective of the study was to evaluate the influence of DSMT on achieving renal testing, foot care inspections and ophthalmology examinations among diabetic Veterans in an outpatient care clinic.

**Material/Methods:** A cross sectional analysis of a representative sample of 550 adult Veterans with type 1 and type 2 diabetes was completed to assess the effect of receiving diabetes education via DSMT in a primary care setting on hemoglobin A1C (HgA1C), documentation of renal testing, documentation of an annual foot examination and documentation of an annual ophthalmology examination.

**Results:** The percentage lowering of HgA1C at the end of three months lowered to 7.5% compared to 9.2%. The number documented renal testing at the end of three months was 433, 78% compared to 244, 44%. The number of documented ophthalmologic examinations at the end of three months was 416, 76% compared to 231, 42%. The number reported foot examination at the end of three months performed at home by self or a family member was 442, 80%. The number of documented foot examination at the end of three months was 268, 49% compared 199, 36%.

**Conclusions:** Conclusions are DSMT in a primary care setting improves Veterans diabetes care as indicated by a decrease mean HgA1C, increase in the number of renal testing, increase in the number of ophthalmologic examinations, increase in reported and documented foot examinations.

 

## 1. BACKGROUND

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels [5,8,11,13,15,18]. Blood glucose control is pivotal in the management of diabetes, preventing and delaying its complications [8,11,13,15]. DSMT programs provide comprehensive diabetes care helping healthcare facilities prevent long term complications, leading to cost savings that outweigh cost of the intervention [8,10,11,13]. Meta-studies document the effectiveness of DSMT in improving the knowledge and skills of individuals with diabetes [6,7,8,10,11,13,15]. The Centers for Medicare and Medicaid allow ten hours of diabetes education each calendar year for DSMT for improving knowledge, psychosocial, and health outcomes [1,2,3,4]. Patients' success at controlling their diabetes is in-consistent; hence individualized care is required to achieve glucose goals. Providing individualized diabetes care and goal setting is fundamental to effective diabetes self management [8,10,16,17]. Multidisciplinary diabetes education programs offer structured diabetes education allowing for individualized goals and willingness to participate, and is not gender specific [6,7,11,12]. DSMT coaching and support tools help with sustained behavioral change. Diabetes can damage the eyes and is the leading cause of blindness among Americans [17]. Diabetes damages the nerves and causes neuropathy leading to foot amputations [9,11,15]. Twenty-eight percent of Americans in 2008 had diabetic retinopathy leading to loss of vision [15,18]. Diabetes and hypertension, left untreated is the primary cause of kidney disease [11]. Approximately 20 million Americans have kidney disease; of these, 11 million have protein in their urine, a sign of early kidney disease [18]. In 2011,

 

a total of 228,924 people of all ages with kidney failure due to diabetes were living on chronic dialysis or with a kidney transplant [15,18]. The American Diabetes Association recommends a dilated and comprehensive eye exam at the time of diagnosis for individuals with type 2 diabetes and within five years of diabetes onset for individuals with type 1 diabetes [8,17,18]. Screening for diabetic peripheral neuropathy is recommended at the time of diagnosis for individuals with type 2 diabetes and within five years of diabetes onset for individuals with type 1 diabetes [8,17]. The aim of treating diabetic feet is proper footwear, diabetic foot care education, aggressive follow-up and surveillance [8,9,14,15,17].

## 2. MATERIALS/METHODS

Five hundred and fifty medical records of Veterans with type 1 and type 2 diabetes were viewed on VA's Computerized Patient Record System (CPRS). They were seen in an accredited DSMT Clinic between July 2015 and August 2016 at our medical center. Criteria used for diagnosing type 2 diabetes: A1C ≥6.5%, or FPG ≥126 mg/dL (7.0 mmol/L), or 2-h PG ≥200 mg/dL (11.1 mmol/L) during an OGTT, or a random plasma glucose ≥200 mg/dL (11.1 mmol/L). The age, ethnicity, sex, education, diabetes type, date of renal examinations, date of ophthalmologic examinations, and date of foot examinations was based upon medical histories and confirmed by the medical record documentation including fasting and post-prandial glucose values. Approved consults to the DSMT program was the tool used to enroll Veterans into the study. Veterans with a diagnosis of cancer with a prognosis of <12 months were excluded. Parameters assessed were: A1C, fasting glucose, date of renal examination, date of retinal examination and the date of foot examination upon entry and again approximately three months later. Upon entry, Veterans received DSMT in that instructions were given for individualized goal-setting, group and one-on-one coaching were made available and they

 

were asked to complete a participant's self assessments. Veterans were asked to provide an honest self assessment rating their ability to achieve their goal at a follow-up visit, approximately eight weeks later using a 25 point scale. Those requiring extra help received telephone communication towards achieving their goal. All Veterans were issued a 5.07 monofilament used for performing sensory self foot examinations.

## 3. RESULTS

See Table 1 for the demographics of this group. The results of the review of 550 medical records are shown in Table 2. Participants had a mean age of 68 years and a mean HgA1C of 9.2%. The number of Veterans with documentation of at least one renal test within the preceding 12 months was 244, 44%. The number of Veterans with at least one ophthalmologic exam within the preceding 12 months was 231, 42%. The number of Veterans with documentation of at least one foot examination performed in the primary care setting was 199, 36%. At the end of the second DSMT visit, approximately 3 months later, Veterans' mean HgA1C was 7.5%. The number of Veterans with documentation of at least one retinal testing was 433, 78%. The number of Veterans with documented at least one ophthalmologic exam within the preceding 12 months was 416, 76%. The number of Veterans with a reported foot examination performed at home by self or a family member was 442, 80%. The number of Veterans with documentation of at least one foot examination performed in the primary care setting was 268, 49%.

## 4. DISCUSSION

The objective of the study was to evaluate the influence of DSMT on achieving renal testing, foot care inspections and ophthalmology examinations among diabetic Veterans in an outpatient care clinic. Data suggest that DSMT programs provide comprehensive diabetes care, helping healthcare facilities achieve positive HgA1C outcomes in-

 

addition to helping meet fundamental diabetes preventive measures for renal testing, foot care inspections and ophthalmology examinations. Table 2 compares the percent of Veterans receiving renal testing, foot examinations and ophthalmology examinations initially and again at a follow-up visit, approximately three months later. Veterans with type 1 diabetes received a referral for a comprehensive eye exam within five years of diagnosis. Veterans with type 2 diabetes received a diabetic tele-retinal and comprehensive eye examination annually. Those Veterans with blindness received comprehensive blind rehabilitation services. Annual renal testing was completed for all Veterans. Veterans received orders for urine testing for microalbumin if there were no ACEI or ARB medications shown on their medication profile. All Veterans received diabetic foot care education, instructions for performing sensory foot care inspections, and instructions for identifying and reporting foot problems. All Veterans were issued a 5.07 monofilament used for performing daily sensory self foot examinations. Veterans with symptoms of claudication, decreased or absence of pedal pulse for ankle brachial index, and those requiring further vascular assessment were referred to a podiatrist for specialized treatment.

## 5. CONCLUSIONS

DSMT in a primary care setting improves diabetes care as indicated by a decrease in mean HgA1C, an increase in the number of renal testing, an increase in the number of retinal examinations, an increase in reported and documented foot examinations. These improvements in Veterans diabetic care may decrease the associated costs of diabetic related kidney disease, blindness and foot amputations in this population.

 

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Author's Contribution:

A=Study Design

B=Data Collection

C=Statistical Analysis

D=Data Interpretation

E=Manuscript Preparation

F=Literature Preparation

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## FOOTNOTES

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**Table 1**

| Characteristics | Baseline data (n=550) | | at 3 months (n=538) | |
|---|---|---|---|---|
| Demographic, n (%) | | | | |
| Ethnicity | | | | |
| White | 269 | (49.0) | 262 | (49.0) |
| Black | 258 | (47.0) | 255 | (47.0) |
| Asian | 3 | (0.5) | 2 | (0.4) |
| Native Hawaiian | 4 | (0.7) | 4 | (0.7) |
| Native American | 10 | (2.0) | 10 | (2.0) |
| Declined to state | 6 | (1.0) | 5 | (0.9) |
| | | mean=92 SD=13 | | mean=90 SD=13 |
| Age | | | | |
| 18-29 | 11 | (2.0) | 9 | (2.0) |
| 30-39 | 5 | (0.9) | 3 | (0.5) |
| 40-49 | 112 | (20.4) | 111 | (20.6) |
| 50-59 | 131 | (23.9) | 130 | (24.0) |
| 60-69 | 160 | (29.0) | 158 | (29.0) |
| 70-79 | 73 | (13.3) | 72 | (13.4) |
| 80-89 | 50 | (9.0) | 47 | (9.0) |
| >90 | 8 | (1.5) | 8 | (1.5) |
| Sex | | | | |
| Male | 472 | (86.0) | 462 | (86.0) |
| Female | 78 | (14.0) | 76 | (14.0) |
| Education | | | | |
| Grade 12 or GED | 378 | (69.0) | 375 | (70.0) |
| College, 1-3 years | 128 | (23.0) | 122 | (22.5) |
| College, 4 years or more | 41 | (7.5) | 38 | (7.0) |
| Postgraduate | 3 | (0.5) | 3 | (0.5) |
| Clinical | | | | |
| Diabetes, type 1 | 1 | (1.0) | 1 | (1.0) |
| Diabetes, type 2 | 549 | (99.0) | 537 | (99.0) |
| HgA1C (%) | 9.2 | | 7.2 | |

 

**Table 2**