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Self-monitoring of Blood Glucose in a Multiethnic Population of Rural Older Adults With Diabetes

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Abstract

Purpose—The purpose of the study was to describe self-monitoring of blood glucose (SMBG) practices of 698 older adults with type 2 diabetes in the rural Southeast, to identify characteristics differentiating testers from nontesters, and to identify personal and support-related predictors of monitoring frequency.

Methods—The ELDER (Evaluating Long-term Diabetes Self-management Among Elderly Rural Adults) study was a population-based, cross-sectional survey of African American, Native American, and white Medicare recipients ≥65 years with diagnosed diabetes. Data were obtained through in-home interviews. Multiple logistic regression models were used to identify factors associated with SMBG and frequency of monitoring.

Results—Seventy-seven percent of respondents practiced SMBG in the previous week; 40% tested every day in that week. No ethnic differences were seen. Significant independent predictors of any SMBG were medication regimen (taking oral agents or insulin with or without oral agents) and health care provider (HCP) recommendation to test. Among those monitoring, significant independent predictors of SMBG frequency were medication regimen, HCP recommendation to test, duration of diabetes, and receiving help with testing, which was negatively associated with monitoring frequency.

Conclusions—Among rural older persons with diabetes, HCP recommendation significantly affected practicing SMBG and SMBG frequency. These findings suggest points of intervention by diabetes educators with this vulnerable population. Further research is needed to determine how older adults use SMBG data in their self-care regimen.

Self-monitoring of blood glucose (SMBG) has become an important component of the diabetes self-care regimen. SMBG provides the individual with immediate information on blood glucose status that can be used to adjust the self-care regimen and achieve the glycemic control necessary to prevent or delay the complications of diabetes. SMBG allows patients to be less dependent on health care professionals and provides direct feedback on the effects of other self-care practices such as medication adherence, physical activity, and dietary changes.[1-4]

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However, SMBG also places an additional burden on patients, including time, expense, and discomfort.

SMBG requires a combination of both technical and cognitive skills including the ability to interpret patterns of results and make appropriate inferences. This may prove a challenge to older adults, who often have functional limitations such as diminished vision, slower reaction times, decreased manual dexterity, and the challenges of competing comorbidities.

Personal and support factors have been shown to be associated with SMBG and frequency of testing. The personal variables identified include white ethnicity and education beyond high school diploma,[5,6] understanding of diabetes and its treatment, coping style, family interactions, and stress level.[7-11] Support variables include more frequent physician visits, attending a diabetes education class, and the quality of the patient's relationship with the health care provider.[8,10] Barriers to SMBG identified in previous research include the cost of testing, inadequate understanding by patients of the health benefits and proper use of SMBG results, inadequate understanding by health care providers of the proper application of SMBG results, patient psychological and physical discomfort, and inconvenience of testing, including the time involved and complexity of the technique.[12-16]

Little is known about the extent to which SMBG is used by older adults, ethnic and gender differences in SMBG in older adults, and factors influencing its use. Drawing on the data on SMBG practices among a sample of rural older adults from 3 ethnic groups, the purposes of this study were to (1) describe home glucose-testing practices among rural older adults, (2) identify characteristics that differentiate testers from non-testers, and (3) identify personal and support variables predicting the frequency of SMBG among testers.

Research Design and Methods

These data come from the Evaluating Long-term Diabetes Self-management Among Elderly Rural Adults (ELDER) study, a population-based cross-sectional survey designed to comprehensively assess the self-care strategies of rural, older adults (≥65 years) with diagnosed diabetes and the impact of these practices on diabetes control. Participants in the study were selected from 2 largely rural counties in central North Carolina that have a high proportion of ethnic minorities and persons living below the poverty level. The study began in 2001, with recruitment of participants from May through October 2002. The protocol was approved by the Institutional Review Board of Wake Forest University School of Medicine.

The study recruited a random sample of community-dwelling older adults with diabetes, including African American, Native American, and white men and women. A sampling frame was selected using claims records from the Centers for Medicare and Medicaid Services (CMS). Persons were included in the sampling frame if they were ≥65 years of age, a resident of one of the study counties, and had at least 2 outpatient claims for diabetes (coded 250 [diabetes] in the International Classification of Diseases, ninth revision) in 1998-2000. Random samples of men and women were selected. Letters were sent from CMS and from the study team requesting participation in the study. The letters were followed with a phone call or a personal home visit from an interviewer on the study team to further assess eligibility (confirm diabetes status, resident of study counties, physically and mentally able to participate in the survey) and willingness to participate in the study. The final sample consisted of 701 individuals. Of the 1222 persons contacted, 313 were disqualified because they reported that they did not have diabetes (n = 118), lived out of study counties (n = 51), lived in a nursing home (n = 84), age not ≥65 years (n = 2), did not speak English (n = 1), failed Mini-Mental State Exam (n = 5), or were deceased (n = 52). The eligibility of an additional 122 persons was unable to be assessed because a surrogate refused participation in study (n = 48), they were physically (n = 8) or mentally (n = 14) unable to respond to eligibility questions, or they could not be located (n = 52). For those who met the eligibility criteria after the contact, 86 were not interviewed because they refused participation (n = 74) or study staff determined that the participant was physically (n = 6) or mentally (n = 6) unable to participate. The overall response rate for eligible participants was 89% (701/787). A total of 698 participants were used for this analysis; 3 participants who did not fit the ethnic categories were excluded. Due to missing data on specific interview items, the sample size for some analyses is reduced.

Participant in-home interviews were conducted by local, trained interviewers and lasted approximately 1.5 hours. A comprehensive survey was used to elicit information about the diabetes self-care practices of the participants. The survey instruments included standardized items as well as items developed and pilot tested by the investigators. The elements of the survey included demographic background and medical history; self-care resources, diabetes self-care practices,[17] and support; financial resources; and the 12-Item Short Form Health Survey (SF-12) as a measure of general health.[18,19] For quality control, portions of 26% of the interviews were verified by telephone. Survey data were recorded on paper forms and translated into a SAS database using EpiInfo (version 6.0, Centers for Disease Control and Prevention, Atlanta, Ga).

The study was based on a conceptual model developed by the investigators based on a review of the literature.[6-11] The model identified personal variables (gender, ethnicity, medication regimen, duration of diabetes, perceptions of physical and mental health) and support variables (support for SMBG, being advised to test by the health care provider, attending an American Diabetes Association (ADA)–recognized diabetes self-management education program) as potential predictors of testing and frequency of testing. This model was used to frame the analysis.

Measures

Participants were asked, “On how many of the past 7 days did you test your blood sugar?” For the purposes of data analysis, 2 outcome measures were defined from this reported SMBG frequency. The first is a dichotomy: (1) testing at least 1 d/wk versus not testing at all. The second is restricted to only those testing at least 1 d/wk: a categorical measure of testing 1 to 2, 3 to 5, or 6 to 7 days per week.

Gender is a dichotomous variable, and ethnicity is self-reported as African American, Native American, or white. Medication regimen has the values no diabetes medication, oral agents only, and insulin with or without oral agents. For the purposes of regression modeling, the duration of diabetes was natural log-transformed after addition of one-half year to the duration among participants whose duration was zero. Physical health is the score of the physical component score (PCS) subscale of the SF-12; mental health is reported as the score of the mental component score (MCS) subscale of the SF-12.[18,19]

The variable support for SMBG was measured in 3 ways. Participants were asked if they had been shown how to test their blood glucose in the past year, if they were receiving help with testing, and if they had been given information on how to interpret their test results. Health care provider recommendation to test is reported as no recommendation versus 1 to 7 d/wk. ADA class attendance is a dichotomous variable.

For purposes of logistic regression modeling, indicator variables were created for the following characteristics: female, African American, Native American, pills only (diabetes medication regimen), insulin and pills (diabetes medication regimen), shown how to test (support for SMBG), helped test (support for SMBG), understand results (support for SMBG), physician recommended testing (health care provider recommendation for SMBG), and attended a diabetes education class.

Demographic and health characteristics were summarized using counts and percentages or means and standard deviations. Associations between SMBG outcome measures and personal and support variables were evaluated for statistical significance using logistic regression (simple and multiple) and the proportional odds model on all available nonmissing data for each model. The PCS and MCS were divided by 10. No interaction terms were included in the multiple logistic regressions. Statistical significance was defined as $P < .05$. Confidence intervals were calculated at the 95% level of confidence. All analyses were performed using SAS Statistical Software version 8.2 (SAS Institute, Inc, Cary, NC).

Results

The sample included 220 African American (31.5%), 297 white (42.6%), and 181 Native American (25.9%) participants with an average age of 74.1 years (SD = 5.42). Of the sample, 49.1% were female and 50.1% were married. An eighth-grade education or less was reported by 40.8%. A total of 21.9% reported annual household incomes of $25,000 or more, while 35.9% reported annual household incomes of less than $10,000.

The mean duration of diabetes was 12.4 years (SD = 10.97). The most common diabetes medication regimen was oral agents only (60.2%), followed by insulin with or without oral agents (27.5%) and no medication (12.3%). Of the diabetes-related health conditions reported by participants, hypertension was the most common (77.1%), followed by heart disease (45.6%), eye disease (40.4%), stroke (25.4%), neuropathy (22.6%), kidney disease (11.2%), thrombosis or blood clots in the legs (8.3%), and amputation (2.9%).

Of the total sample, 23.3% did not test their blood glucose in the previous week, 8.7% tested 1 day, 7.7% 2 days, 7.3% 3 days, 5.2% 4 days, 5.2% 5 days, 2.3% 6 days, and 40.3% all 7 days in the previous week. A total of 72.6% had been told by their health care providers to test their blood glucose. Of the participants, 30.4% had been shown how to test their blood glucose in the past year, and 27.5% had been given information on how to interpret their test results. A total of 39.0% reported having help with testing, and 16.4% had attended an ADA-recognized diabetes education program.

In the simple logistic regression analyses, statistically significant predictors of reporting SMBG 1 or more times/wk (versus 0 times/wk) were diabetes medical regimen (taking oral agents and taking insulin with or without oral agents; both $P < .0001$), being shown how to test ($P = .026$), being helped to understand the results ($P = .0004$), being told by a health care provider to test ($P = .0010$), attending an ADA-recognized class ($P = .011$), log duration of diabetes ($P < .0001$), and perceptions of poorer mental health ($P = .018$; Table 1). In the multiple logistic regression, the only variables that remained statistically significant were taking oral agents only versus no medication ($P = .0014$), taking insulin with or without oral agents versus no medication ($P = .0002$), and being told by a health care provider to test ($P < .0001$).

Among those who performed any SMBG in the previous week, significantly more frequent testing was associated with female gender ($P = .0069$), taking oral agents only versus no medication ($P = 0.0004$), taking insulin with or without oral agents versus no medication ($P < .0001$), not receiving help with testing ($P = .0021$), being told by a health care provider to test ($P < .0001$), having attended an ADA-recognized program ($P = .0095$), log duration of diabetes ($P < .0001$), and perceptions of poorer mental health ($P = .018$; Table 2). Multiple regression procedures identified statistically significant independent predictors of greater SMBG frequency: taking oral agents only versus no medication ($P = .028$), taking insulin with or without oral agents versus no medication ($P = .0033$), not receiving help with testing ($P = .0068$), being told by a health care provider to test ($P < .0001$), and log duration of diabetes ($P = .0047$).

Conclusions

The rate of any SMBG in this study is quite high. This is particularly surprising given the proportion of the participants with low educational attainment and low annual incomes. More than 40% had an eighth-grade education or less, and more than 35% had annual household incomes less than $10,000. However, the rate of routine daily testing is lower than comparable recent national data, which have shown a trend over time toward greater daily testing. In analysis of data from participants with type 2 diabetes from the Third National Health and Nutrition Examination Survey (NHANES III; 1988-1994), Harris[20] found that 33% monitored at least once per week and 15% monitored at least once per day. In both the National Health Interview Survey and NHANES III, those using insulin or diabetes medications performed SMBG more frequently than did those not using medications. A review of national data collected between 1994 and 2002 in the Behavioral Risk Factor Surveillance System shows that the age-adjusted percentage of adults with diabetes self-monitoring their blood glucose every day increased consistently from 36% in 1994 to 57% in 2002.[21]

The high rate of any SMBG found in this study and other more recent surveys may reflect several factors. Availability of insurance reimbursement for testing supplies has increased. Improved SMBG technology is available, and advertising of this technology is greater. Mail-order businesses that assist patients with billing, provide home delivery of supplies, and send reminders regarding supplies are more available and popular. Finally, increased SMBG may reflect a greater adherence of older adults to provider recommendations or more frequent prescription by health care providers of SMBG as a strategy for self-care for older adults.

In contrast to national studies,[5] no ethnic differences in SMBG practices were found. This may reflect the study population. All participants, regardless of ethnicity, were selected from the same rural communities. Therefore, factors assumed to be at least partly responsible for ethnic differences in health behavior on a national scale (eg, environmental factors such as availability of stores to purchase supplies, access to health care facilities, availability of public transportation systems) are relatively homogeneous across the sample.

Two support variables, being told to test and not receiving help with testing in the past year, were associated with greater frequency of testing. As noted, provider recommendation to test may be one factor leading to increasing rates of testing noted in comparison of this analysis with earlier studies. The negative association between frequency of testing and receiving help with testing suggests that participants who receive help are dependent on relatives and friends to assist with testing and are bound by their time constraints, resulting in a decreased frequency of testing. While more than three quarters of the ELDER participants monitored at least once per week, the proportion monitoring every day (40.3%) fell well short of the 57% reported most recently by the Behavioral Risk Factor Surveillance System.[21] This disparity may reflect the different expectations and recommendations among providers for an optimal testing schedule for older adults.

The strengths of this study lie in its focus on older adults with diabetes who are residents of rural communities and the fact that a majority of the participants are members of ethnic minority groups. The data from this study increase the understanding of the extent of SMBG and the factors influencing monitoring in this population. Limitations of the study include the reliance on self-report. The sample was limited to 2 rural counties in the Southeast. While this limits generalizability outside of the rural Southeast, it has the advantage of keeping environmental factors that can influence SMBG similar across the sample.

Implications for Diabetes Educators

Examination of factors associated with testing suggests potential points of intervention for diabetes educators to increase testing and testing frequency. A specific recommendation to test can be readily addressed as part of ongoing clinical care. However, beyond simply testing, optimal use of SMBG requires proper interpretation of data by the patient to adjust his or her diet, physical activity, or pharmacological therapy.[12] In this study, only 27.5% of the participants had been shown how to interpret the results of their testing during the previous year. This indicates that although health care providers are advising patients to test their blood glucoses, better diabetes education is needed to provide guidance on how to interpret the results. An increase in education about the interpretation of SMBG data may provide additional motivation to patients to increase the frequency of testing. Effective diabetes management using SMBG data requires an informed patient-provider team and ongoing assessment of the patient's knowledge and skills.[22]

The association of diabetes education and self-monitoring of blood glucose practices approached statistical significance in this study after adjusting for other variables; diabetes education has been associated with greater frequency of SMBG in other studies. Harris and colleagues[5] found that diabetes patient education was associated with an almost 3-fold greater probability that subjects monitored their blood glucoses at least once a day. Only 16.4% of participants in this study had attended a class or program that taught them about their diabetes. Other factors influencing the lack of association in this study may be the relative dearth of ADA-recognized programs in rural areas as well as problems with cost and arranging transportation.

While the usefulness of SMBG is recognized, there are no evidence-based recommendations for use of SMBG in stable, diet-treated individuals or for the optimal frequency and timing for testing in persons with type 2 diabetes.[1,16,20,22] Further research is needed to determine how older adults use the information from SMBG to change their self-care regimen and the relationship of SMBG to other self-care practices. While a goal of monitoring is always the improvement of metabolic status, the importance of empowering older adults with diabetes should not be overlooked. Giving patients the skills to monitor and the skills to use the data from their testing to make changes in their regimen is an important goal of diabetes education and requires an ongoing patient-health care provider team approach.

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References

1. American Diabetes Association. Standards of medical care in diabetes. Diabetes Care 2004;27:S15–S35. [PubMed: 14693923]
2. Franciosi M, Pellegrini F, De Berardis G, et al. The impact of blood glucose self-monitoring on metabolic control and quality of life in type 2 diabetic patients: an urgent need for better educational strategies. Diabetes Care 2001;24:1870–1877. [PubMed: 11679449]
3. Zimmerman, B., editor. Medical Management of Type 2 Diabetes. 4th ed.. American Diabetes Association; Alexandria, Va: 1998.
4. Clement S. Diabetes: self-management education. Diabetes Care 1995;18:1204–1214. [PubMed: 7587866]
5. Harris MI, Crowe CC, Howie LJ. Self-monitoring of blood glucose by adults with diabetes in the United States population. Diabetes Care 1993;16:1116–1123. [PubMed: 8375241]

6. Harris MI, Eastman RC, Cowie CC, Flegal KM, Eberhardt MS. Racial and ethnic differences in glycemic control of adults with type 2 diabetes. Diabetes Care 1999;22:403–408. [PubMed: 10097918]
7. Glasgow RE, Toobert DJ, Riddle M, Donnelly J, Mitchell DL, Calder D. Diabetes-specific social learning variables and self-care behaviors among persons with type II diabetes. Health Psychol 1989;8:285–303. [PubMed: 2767020]
8. Nagasawa M, Smith MC, Barnes JH Jr, Fincham JE. Meta-analysis of correlates of diabetes patients' compliance with prescribed medications. Diabetes Educ 1990;16:192–200. [PubMed: 2139601]
9. Hampson SE, Glasgow RE, Foster LS. Personal models of diabetes among older adults: relation to self-management and other variables. Diabetes Educ 1995;21:300–307. [PubMed: 7621732]
10. Ruggiero L, Glasgow R, Dryfoos JM, et al. Diabetes self-management: self-reported recommendations and patterns in a large population. Diabetes Care 1997;20:568–576. [PubMed: 9096982]
11. Glasgow RE, Hampson SE, Stryker LA, Ruggiero L. Personal-model beliefs and social-environmental barriers related to diabetes self-management. Diabetes Care 1997;20:556–561. [PubMed: 9096980]
12. American Diabetes Association. Tests of glycemia in diabetes. Diabetes Care 2004;27:S91–S93. [PubMed: 14693937]
13. Rubin RR, Peyrot M, Saudek CS. The effect of a diabetes education program incorporating coping skills training on emotional well-being and diabetes self-efficacy. Diabetes Educ 1993;19:210–214.
14. Babione L. SMBG: the underused nutrition counseling tool in diabetes management. Diabetes Spectrum 1994;7:196–197.
15. Jones PM, Remley C, Engberg RA. Development and testing of the Barriers to Self-Monitoring Blood Glucose Scale. Diabetes Educ 1996;22:609–616. [PubMed: 8970292]
16. Franz, M., editor. A Core Curriculum for Diabetes Education. 4th ed.. American Association of Diabetes Educators; Chicago: 2001. Diabetes management therapies; p. 153-159.163-167
17. Toobert DJ, Hampson SE, Glasgow RE. The summary of diabetes self-care activities measure: results from 7 studies and a revised scale. Diabetes Care 2000;23:943–950. [PubMed: 10895844]
18. Ware, JE.; Kosinski, M.; Keller, SD. How to Score the SF-12 Physical and Mental Health Summary Scales. 2nd ed.. The Health Institute, New England Medical Center; Boston: 1994.
19. Ware JE, Kosinski M, Keller SD. A 12-item Short-Form Health Survey (SF-12): construction of scales and preliminary tests of reliability and validity. Med Care 1996;34:220–233. [PubMed: 8628042]
20. Harris M. Frequency of blood glucose monitoring in relation to glycemic control in patients with type 2 diabetes. Diabetes Care 2001;24:979–982. [PubMed: 11375356]
21. Data & Trends, Diabetes Surveillance System, Preventive Care Practices. Age-adjusted rates of annual dilated-eye exam, daily self-monitoring of blood glucose, foot examination in the last year, and doctor visit for diabetes in the last year per 100 adults with diabetes, United States, 1994-2002. Available at: http://www.cdc.gov/diabetes/statistics/preventive/figureXData.htm Accessed February 11, 2004
22. American Diabetes Association. Consensus statement: self-monitoring of blood glucose. Diabetes Care 1996;19:S62–S66.

Table 1

Results of Modeling Self-monitoring of Blood Glucose (SMBG) Monitored at Least 1 d/wk Versus No SMBG, Based on Personal and Support Predictor Variables

	Simple Logistic Regression				Multiple Logistic Regression (N = 664)		
Variable	**n**	**Odds Ratio**	**95% CI**	**P**	**Odds Ratio**	**95% CI**	***P***
Female vs male	698	1.1	0.78, 1.6	.58	1.0	0.67, 1.6	.87
African American vs white	698	0.89	0.59, 1.3	.56	0.66	0.40, 1.1	.094
Native American vs white	698	1.1	0.73, 1.8	.57	1.0	0.59, 1.7	.98
Pills only vs no diabetes medication	698	4.9	3.0, 7.9	<.0001	2.6	1.4, 4.6	.0014
Insulin and pills vs no diabetes medication	698	12	6.4, 22	<.0001	4.3	2.0, 9.4	.0002
Log duration of diabetes	698	1.4	1.2, 1.6	<.0001	1.1	0.87, 1.3	.55
SF-12 Physical Health/10	665	0.87	0.74, 1.0	.080	1.1	0.88, 1.3	.48
SF-12 Mental Health/10	665	0.81	0.68, 0.96	.018	0.85	0.69, 1.1	.14
Shown how to test	698	1.6	1.1, 2.4	.026	0.95	0.55, 1.6	.84
Helped to test	698	1.4	0.96, 2.0	.082	1.2	0.74, 1.9	.48
Helped to understand results	698	2.2	1.4, 3.5	.0004	1.4	0.79, 2.5	.25
Health care provider recommended	698	9.1	6.2, 14	<.0001	6.4	4.1, 10	<.0001
Attended diabetes class	697	2.1	1.2, 3.6	.011	1.3	0.69, 2.5	.40

Table 2

Results of Modeling Self-monitoring of Blood Glucose Frequency 6 to 7 Days in Previous Week Versus 3 to 5 Days Versus 1 to 2 Days, Based on Personal and Support Predictor Variables*

	Simple Logistic Regression				Multiple Logistic Regression (N = 508)		
Variable	**n**	**Odds Ratio**	**95% CI**	**P**	**Odds Ratio**	**95% CI**	**P**
Female vs male	535	1.6	1.1, 2.2	.0069	1.4	1.0, 2.1	.053
African American vs white	535	0.91	0.62, 1.3	.64	0.76	0.50, 1.2	.22
Native American vs white	535	0.78	0.53, 1.2	.23	0.74	0.47, 1.2	.19
Pills only vs no diabetes medication	535	3.2	1.7, 6.2	.0004	2.3	1.1, 4.6	.028
Insulin and pills vs no diabetes medication	535	6.5	3.2, 13	<.0001	3.3	1.5, 7.2	.0033
Log duration of diabetes	535	1.5	1.3, 1.7	<.0001	1.3	1.1, 1.6	.0047
SF-12 Physical Health/10	509	0.89	0.77, 1.0	.12	0.98	0.82, 1.2	.86
SF-12 Mental Health/10†	509	0.83	0.71, 0.97	.018	0.85	0.71, 1.0	.062
Shown how to test	535	0.86	0.61, 1.2	.40	1.0	0.66, 1.6	.90
Helped to test	535	0.59	0.43, 0.83	.0021	0.58	0.39, 0.86	.0068
Helped to understand results	535	0.98	0.69, 1.4	.90	0.83	0.53, 1.3	.39
Health care provider recommended	535	5.0	3.3, 7.7	<.0001	4.3	2.7, 6.8	<.0001
Attended diabetes class	534	1.8	1.2, 2.8	.0095	1.5	0.93, 2.5	.092

*Self-monitoring of blood glucose (SMBG) outcome was analyzed using logistic regression and the proportional odds model among participants who reported SMBG in the previous week.

†The proportional odds assumption was not satisfied ($P < .05$) for the simple regression model only.