Health Literacy, Preventive Health Screening, and Medication Adherence Behaviors of Older African Americans at a PCMH

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ABSTRACT

OBJECTIVES: To determine the health literacy (HL) of older African Americans (AAs) and establish whether associations exist between HL and preventive health screening (PHS) behaviors, disease control (DC), and medication adherence (MA).

STUDY DESIGN: A prospective study using a clustered sampling of older AAs.

METHODS: A total of 99 older AAs seeking care at a patient-centered medical home were given the Newest Vital Sign (NVS), Short Test of Functional Health Literacy in Adults (STOFHLA), and Morisky Medication Adherence Scale (MMAS). Sociodemographic and clinical data were obtained.

RESULTS: The group was 75.8% female, with means of 75 years of age, 12.7 years education, and 29.5 kg/m^2 body mass index and good control over disease markers: For blood pressure, 62.6% had good control; for blood glucose, 82.8%; and for total lipids/cholesterol, 63.6% (high-density lipoprotein, 81.8%; low-density lipoprotein, 73.7%). Compliance rates for primary PHS behaviors were 61.6% for influenza vaccine and 57.7% for pneumococcal vaccine. For secondary PHS behaviors, compliance rates for mammography were 97.3% among women; for colonoscopy, 84%; and for bone densitometry (BD), 62.8%. Performance differences were observed on HL scales, with 31.3% and 73.7% obtaining an adequate NVS score and STOFHLA score, respectively, but no gender differences were noted. HL scales showed positive association among themselves ($P = .001$), patient education (NVS, $P = .001$; STOFHLA, $P = .004$), MMAS ($P = .001$ and $P = .563$, respectively), anthropometry measurements, primary PHS procedures, and 1 secondary PHS procedure (mammography), but they exhibited negative association with colonoscopy and BD. DC achieved using a PHS approach to clinical care was not associated with HL.

CONCLUSIONS: HL was positively associated with patient education, some PHS behaviors, and MA. Performance on HL scales may not enable positive identification of PHS behaviors, DC, and MA. Thus, HL may have limited efficacy as a tool to assess PHS behaviors and DC among older AAs.

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Preventive healthcare has been the focus of human beings from time immemorial. Clichés such as "An ounce of prevention is worth a pound of cure" and "Prevention is better than cure" have been commonly used, especially in the healthcare environment.[1-3] The growth of the aging US population has created an impetus for promoting newer approaches to patient care and disease management, notably, to control healthcare costs and improve health outcomes and patient quality of life.[4-6] Evaluation of patient health literacy (HL) is one such approach to integrating behavioral health management into clinical care.[7,8] HL is defined as the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (ie, decisions that affect healthcare use), aid understanding of health risk behaviors, and enable enhancement of health outcomes and consequent decreased cost of care.[9]

Older African Americans (AAs), a large segment of the US population,[10] face greater health risks with poorer outcomes.[11] Focusing on preventive health screening (PHS) enables detection and treatment of disease prior to progression. The US Preventive Services Task Force (USPSTF) makes recommendations for type and frequency of preventive screenings based on age and gender.[12] But AAs' relatively high distrust of their physicians affects utilization of PHS services, leading to health disparities.[13] Disease prevention goes hand in hand with medication compliance. Following detection, adherence to prescribed medication regimens is essential to achieve any control of disease progression.[14-16] Although the relationship between HL and preventive health has been studied in some subsets of the population,[17,18] social circumstances and distrust of healthcare providers have resulted in the existence of limited information on older AAs.[19-21] This study, assessing the impact of HL of AAs on PHS behaviors, medication adherence (MA), and disease control (DC), is an attempt to bridge the gap in knowledge about the group.

The study objectives were to evaluate HL and PHS behaviors among older AA patients and establish whether an association among HL, PHS behaviors, DC, and MA exists. The results of this

study will provide clinicians with valuable information and enhance management of PHS service delivery and DC of geriatric AA patients.

TAKEAWAY POINTS

This health literacy (HL) study of older African Americans (AAs) at a patient-centered medical home (PCMH) aimed to establish whether associations exist between HL and preventive health screening (PHS) behaviors, disease control (DC), and medication adherence (MA).

- HL was positively associated with patient education, some PHS behaviors, and MA.
- Performance on HL scales may not enable positive identification of PHS behaviors, DC, and MA.
- Thus, HL may have limited efficacy as a tool in assessment of older AAs' PHS behaviors and disease management.
- The study findings could impact PCMH management of older AAs' preventive health screening, clinical time allocation, and economics of care.

METHODS

Study Design and Population

This prospective study was conducted using a clustered sampling of older AAs seeking care at a patient-centered medical home (PCMH) affiliated with Wayne State University (WSU) and Detroit Medical Center that provides healthcare to 4000 patients. The WSU Institutional Review Board approved the study.

Data Collection

All patients, on arrival and sign-in, were approached and provided information about the study by research personnel in the PCMH reception lounge. Patients who exhibited a desire to participate underwent a clinical examination to determine study participation suitability and were eligible if they were (1) an AA, 60 years or older, an active clinic patient for a year or more, free from terminal illness and visual impairment, and able to communicate in English and follow directions; (2) not a nursing home resident; (3) not cognitively impaired, on dialysis, on chemotherapy, on radiation therapy, or scheduled for major surgery; and (4) agreeable to participate with written informed consent.

TABLE 1. Characterization of Patients, Based on Preventive Health Screening, Into Controlled-Risk and Uncontrolled-Risk Categories for Each Health Risk Factor

Health Risk Factor	Controlled Risk	Uncontrolled Risk
Body mass index (kg/m^2)	<25	≥25
Systolic blood pressure (mm Hg)	<140	≥140
Diastolic blood pressure (mm Hg)	<90	≥90
Fasting blood glucose (mg/dL)	<126	≥126
Total cholesterol (mg/dL)	<200	≥200
High-density lipoprotein cholesterol (mg/dL)	≥40	<40
Low-density lipoprotein cholesterol (mg/dL)	<130	≥130

Measures

The following data were collected from patients who met the study inclusion criteria: sociodemographic (age, gender, education, and health insurance), clinical (weight; height; body mass index [BMI]; blood pressure [BP]; fasting blood glucose [BG]; lipid profile, total cholesterol [TC], high-density lipoprotein cholesterol [HDL-C], and low-density lipoprotein cholesterol [LDL-C]); primary PHS (influenza vaccine and pneumococcal vaccine); secondary PHS (mammography, colonoscopy, and bone densitometry [BD]); and scores on HL and adherence scales (HL, Newest Vital Sign[22] [NVS] and Short Test of Functional Health Literacy in Adults[23] [STOFHLA]; adherence, Morisky Medication Adherence Scale[24] [MMAS]).

HL assessment, using NVS and STOFHLA scales, takes longer for older patients; therefore, ample time was permitted for completion.[25] The NVS scale measures HL with 6 questions designed to evaluate the patients' understanding of current nutrition labels and includes an actual nutritional label that the patient observes. NVS scores are classified as inadequate (0-1), marginal (2-3), and adequate (4-6).[22] The STOFHLA scale measures the ability to read and understand prose passages (prose literacy), appointment slips (document literacy), and prescription bottles containing numerical information (quantitative literacy). STOFHLA scores are classified as inadequate (0-16), marginal (17-22), and adequate (23-36).[23]

The MMAS was completed by patients to evaluate MA. The MMAS consists of 4 questions (eg, Do you ever forget to take your medicine?), each answered with a dichotomous (yes/no) response. The MMAS score was calculated by tallying the number of "no" answers to the 4 MMAS questions of nonadherence, with scores of 2 or lower classified as low adherence and 3 or higher as high adherence.[24]

PHS Behaviors: Control and Compliance

Patients were characterized based on PHS into controlled-risk and uncontrolled-risk categories for each health risk factor using the American College of Cardiology Practice Guidelines (**Table 1**).[26] Compliance with primary (influenza vaccine and pneumococcal vaccine) and secondary (mammography, colonoscopy, and BD) PHS was documented consistent with the recommendations of USPSTF.[12]

Statistical Analysis

The data were analyzed using SPSS for Windows version 22.0 (IBM SPSS Inc; Chicago, Illinois). For this study, patients were grouped by their scores on the HL scales, NVS (inadequate [0-3] and adequate [4-6]) and STOFHLA (inadequate [0-22] and adequate [23-36]). Continuous data (eg, age) of the 2 groups were analyzed using *t* tests, and categorical data (eg, gender) associations were evaluated using χ^2 tests. Pearson correlation coefficients were used for analysis of associations among HL, MA, and continuous data. Results are presented as mean ± SD or as n (%). Statistical significance for all tests was established at $P < .05$.

TABLE 2. Patient Characteristics by NVS and STOFHLA Scales (N = 99)

	Entire Sample	NVS Inadequate (0-3)	NVS Adequate (4-6)		STOFHLA Inadequate (0-22)	STOFHLA Adequate (23-36)	
Variable	Mean ± SD or n (%)	Mean ± SD or n (%)	Mean ± SD or n (%)	*P*	Mean ± SD or n (%)	Mean ± SD or n (%)	*P*
Patients	99 (100.0)	68 (68.7)	31 (31.3)		24 (24.2)	73 (73.7)	
Age (years)	75.0 ± 9.8	77.7 ± 8.7	69.1 ± 9.5	.001	80.1 ± 8.0	73.0 ± 9.6	.001
Gender				.999			.999
Female	75 (75.8)	52 (76.5)	23 (74.2)		18 (75.0)	55 (75.3)	
Male	24 (24.2)	16 (23.5)	8 (25.8)		6 (25.0)	18 (24.7)	
Education (years)	12.7 ± 2.3	11.8 ± 1.9	14.5 ± 1.9	.001	11.5 ± 2.4	13.1 ± 2.1	.004
Weight (kg)	80.0 ± 20.8	76.9 ± 17.3	86.9 ± 25.9	.025	76.1 ± 14.1	81.9 ± 22.5	.241
Height (cm)	164.8 ± 9.4	164.3 ± 8.7	165.9 ± 10.7	.430	164.4 ± 9.0	165.1 ± 9.6	.756
BMI (kg/m^2)	29.5 ± 7.4	28.5 ± 6.2	31.6 ± 9.3	.050	28.3 ± 5.5	30.0 ± 7.9	.330
Health screening							
Blood pressure	62 (62.6)	42 (61.8)	20 (64.5)	.969	13 (54.2)	48 (65.8)	.438
Blood glucose	82 (82.8)	56 (82.4)	26 (83.9)	.999	21 (87.5)	59 (80.8)	.662
Lipids							
Total cholesterol	63 (63.6)	44 (64.7)	19 (61.3)	.918	15 (62.5)	47 (64.4)	.999
HDL-C	81 (81.8)	55 (80.9)	26 (83.9)	.939	21 (87.5)	58 (79.5)	.564
LDL-C	73 (73.7)	49 (72.1)	24 (77.4)	.752	15 (62.5)	56 (76.7)	.272
Primary prevention							
Influenza vaccine	61 (61.6)	41 (60.3)	20 (64.5)	.859	10 (41.7)	49 (67.1)	.048
Pneumococcal vaccine	56 (57.7)	37 (55.2)	19 (73.1)	.179	10 (41.7)	45 (67.2)	.051
Secondary prevention							
Mammography	72 (97.3)	49 (96.1)	23 (100.0)	.851	17 (94.4)	53 (98.1)	.999
Colonoscopy	79 (84.0)	57 (87.7)	22 (75.9)	.254	21 (91.3)	56 (81.2)	.415
Bone densitometry	59 (62.8)	44 (67.7)	15 (51.7)	.007	16 (72.7)	41 (58.6)	.347
MMAS	2.6 ± 1.1	2.5 ± 1.2	2.7 ± 1.1	.563	1.8 ± 1.4	2.8 ± 0.9	.001
NVS	2.3 ± 2.2	1.0 ± 1.1	5.1 ± 0.8	–	0.6 ± 1.1	2.9 ± 2.1	.001
STOFHLA	26.8 ± 7.8	24.2 ± 7.8	32.5 ± 3.7	.001	16.5 ± 5.2	30.5 ± 3.8	–

BMI indicates body mass index; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; MMAS, Morisky Medication Adherence Scale; NVS, Newest Vital Sign; STOFHLA, Short Test of Functional Health Literacy in Adults.

RESULTS

A total of 150 older AA patients were identified for the study. Among them, 32 did not meet the study criteria and 19 refused to participate, most often citing time constraints and lack of interest as reasons. **Table 2** summarizes the characteristics of the 99 AA patients partitioned by NVS and STOFHLA scores.

The group was 75.8% female; had means of 75 years of age, 12.7 years of education, and 29.5 kg/m^2 BMI; was devoid of current smokers; and possessed public/private health insurance. Screening for chronic diseases, such as obesity, hypertension, diabetes, and hyperlipidemia, showed that most participants had good control over disease markers (BP [62.6%], BG [82.8%], and lipids [TC, 63.6%; HDL-C, 81.8%; LDL-C, 73.7%]). Among the primary and secondary PHS measures, influenza vaccine was obtained by 61.6%, pneumococcal vaccine by 57.7%, mammography by 97.3% of women, colonoscopy by 84%, and BD by 62.8%.

The overall performance of the group on NVS and STOFHLA was quite different, with a minority (31.3%) obtaining an adequate score on NVS but the majority (73.7%) performing well on STOFHLA. However, no gender differences in HL scale performance were observed. The HL scales, NVS and STOFHLA, showed a strong positive association among themselves ($P = .001$) and also with patient education (NVS, $P = .001$; STOFHLA, $P = .004$). Anthropometry measurements (weight, height, and BMI) correlated positively with HL scales; nevertheless, NVS had a stronger positive association with weight ($P = .025$) and BMI ($P = .050$) than did STOFHLA. Primary PHS procedures displayed a positive association with HL scales; however, the association of influenza vaccine ($P = .048$) and pneumococcal vaccine ($P = .051$) was much stronger with STOFHLA than with NVS. Even though a positive association was evident between HL scales and 1 secondary PHS procedure (mammography), the others, colonoscopy and BD, exhibited a negative association, which was notably stronger between NVS and BD ($P = .007$).

Disease control achieved using a PHS approach to clinical care, as measured by BP, BG, and lipids (TC, HDL-C, and LDL-C), was not associated with performance on HL scales. The MMAS, a measure

of MA, was positively associated with both HL scales; however, there was a stronger association with STOFHLA ($P = .001$) compared with NVS ($P = .563$).

DISCUSSION

The principal aims of this study were to evaluate the PHS behaviors among an older AA patient population and establish whether there exists an association of HL—measured by NVS and STOFHLA, each using a different approach for measurement—with PHS behaviors, DC, and MA. Our PCMH patient sample of elderly AAs had a higher number of women, which is consistent with the geriatric population, wherein females are healthier, have a longer life span, and make up the majority.[27] Also, there was a total lack of gender-distinguishing characteristics exhibited by both of the HL scales, a noteworthy observation that needs further verification. The strong negative association of patient age with education and HL, documented earlier, was another characteristic of this older group similar to previous reports.[28,29] Overall, with no strong trends, our research offers weak support for using HL scales to positively identify PHS behaviors, DC, and MA. More research to confirm these inferences is necessary.

The preventive health and chronic disease management focus of our PCMH was validated by the high PHS and DC rates.[30] Furthermore, although the disease markers for hypertension, diabetes, and hyperlipidemia (ie, BP, BG, and lipids) were not distinguishable by HL level measured using 2 HL scales, weight and, consequently, BMI showed a significant positive association with NVS but not STOFHLA. This is interesting on 2 fronts; primarily, NVS uses an understanding of a nutrition label to measure HL,[22] and BMI measuring obesity is, in a way, a measure of food consumption or eating behaviors. Secondly, those who scored adequately on NVS were more overweight or obese than those who scored inadequately. Although this seems contradictory and may not bode well for NVS, verification of these findings may enable use of the scale in identification of obesity and eating disorders, especially among older AAs.

Primary and secondary PHS compliance are important components of USPSTF-recommended annual screening guidelines for older adults.[12] An adequate score on STOFHLA and NVS was associated with higher compliance with both influenza and pneumococcal vaccines, the primary PHS indicators studied, with compliance rates matching recent US surveillance reports.[10] However, STOFHLA exhibited stronger compliance-distinguishing characteristics. This aspect of STOFHLA, which uses the ability to read and understand prose passages and appointment slips to measure HL,[23] may find application in identifying primary PHS compliance among an older AA population subset. Nonetheless, BD, a nutrition-related indicator of bone health and a secondary PHS procedure, displayed a strong negative association with NVS, pointing once again to the nutritional health identification abilities of NVS. Among other secondary PHS tests, mammography and colonoscopy both recorded high compliance rates. Even though in this study HL scales were unable to distinguish between PHS compliance rates of patients, findings of another study associated adequate self-reported HL with mammography, health-promoting behaviors, and health-related beliefs.[31] However, whereas occupational status was found to be a compliance predictor for colonoscopy, being fearful and having an uncomfortable feeling during the procedure were cited as compliance barriers with mammography in another study.[32]

MA, as measured by MMAS, had a strong positive association with the patient's education level and STOFHLA but a weak relationship with NVS. Additionally, as confirmed by other studies, the HL scales in this research, NVS and STOFHLA, were significantly associated with the patient's education level but simultaneously had a very limited ability for positive identification of PHS behaviors, DC, and MA, thereby providing insufficient justification for their use among the elderly.[28,33-38] In a healthcare environment, where cost containment and delivery of quality healthcare in a cost-effective manner are the needs of the hour—often preached at all levels of healthcare management—employing scales to measure HL may not be an efficient use of clinical time, especially when older patients need far greater time for screening, evaluation, and delivery of healthcare. Thus, HL may have limited efficacy as a tool in the arsenal of geriatric healthcare.

Strengths and Limitations

Although results of this study could significantly affect PCMH management of older AA patients, especially in PHS, clinical time allocation, and economics of care, the study does have limitations. The sample was selected from among voluntary participants, making it impossible to determine the characteristics of nonparticipants and the potential impact on study findings. Also, this study was carried out at an urban PCMH where care is provided by university-based clinical personnel with a focus on preventive care and therefore may not represent the care generally available. Thus, although the AA participant sociodemographics are representative of an older minority population seeking care at an urban university PCMH, it may not be possible to generalize the results. Nevertheless, the findings are unique, bear importance, have not been reported earlier, and warrant further investigation.

CONCLUSIONS

The study shows that HL had strong positive associations with patient education level, some PHS behaviors, and MA; nevertheless, performance on the scales may not enable positive identification of PHS behaviors, DC, and MA. Consequently, HL may have limited efficacy as a tool in assessment of PHS behaviors and disease management among older AAs. ■

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