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At the time of publication, Paula Gardiner was not yet affiliated with the University of Massachusetts Medical School.

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Health Literacy and Complementary and Alternative Medicine Use Among Underserved Inpatients in a Safety Net Hospital

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Little is known about the relationship between health literacy and complementary and alternative medicine (CAM) use in low-income racially diverse patients. The authors conducted a secondary analysis of baseline data from 581 participants enrolled in the Re-Engineered Discharge clinical trial. The authors assessed sociodemographic characteristics, CAM use, and health literacy. They used bivariate and multivariate logistic regression to test the association of health literacy with four patterns of CAM use. Of the 581 participants, 50% reported using any CAM, 28% used provider-delivered CAM therapies, 27% used relaxation techniques, and 21% used herbal medicine. Of those with higher health literacy, 55% used CAM. Although there was no association between health literacy and CAM use for non-Hispanic Black participants, non-Hispanic White (OR = 3.68, 95% CI [1.27, 9.99]) and Hispanic/other

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race (OR = 3.40, 95% CI [1.46, 7.91]) participants were significantly more likely to use CAM if they had higher health literacy. For each racial/ethnic group, there were higher odds of using relaxation techniques among those with higher health literacy. Underserved hospitalized patients use CAM. Regardless of race, patients with high health literacy make greater use of relaxation techniques.

The National Center for Complementary and Alternative Medicine (2011) defines *complementary and alternative medicine* (CAM) as "a group of diverse medical and health systems, therapies, and products that are not presently considered to be part of conventional medicine." According to the National Health Interview Survey (NHIS), 38% of the U.S. population uses CAM; including 26% of African Americans, 28% of Hispanics, and 36% of non-Hispanic Whites (Barnes, Bloom, & Nahin, 2008). Although evidence demonstrates CAM use among minority patients (Barner, Bohman, Brown, & Richards, 2010; Smith, Smith, & Ryan, 2008), facilitators and barriers (e.g., access and out-of-pocket expenses) to the use of CAM among minority hospitalized patients requires further investigation (Decker et al., 2007).

Limited health literacy affects 36% of Americans and disproportionately affects minority groups (Kutner, Greenberg, Jin, & Paulsen, 2006). *Health literacy* is defined as the degree to which individuals possess the capacity to obtain, process, and understand health information and services that are needed to make informed health decisions and take informed actions (Paasche-Orlow, Parker, Gazmararian, Nielsen-Bohlman, & Rudd, 2005). Low health literacy is associated with worse self-reported health status, higher health care costs, more frequent use of health services, hospitalization, and death (Berkman, Sheridan, Donahue, Halpern, & Crotty, 2011).

Knowing the relationship between health literacy and CAM may help (a) health providers determine which patients are more likely to use CAM, (b) health providers understand how patients of varying health literacy levels relate to allopathic care, (c) direct educational interventions related to CAM, and (d) researchers design CAM clinical trials that take into account the health literacy of participants.

Several studies examined health literacy as a predicator of CAM use. Bains and Egede (2011) reported adequate health literacy was associated with increased CAM use among Whites but not among African Americans. Owen-Smith, McCarty, Hankerson-Dyson, and Diclemente (2012) reported that participants with higher health literacy were more likely to use CAM than were those with low health literacy among African Americans with AIDS. Our study aimed to explore the role of race and health literacy in the use of CAM and to determine the prevalence of four subsets of CAM: (a) any CAM use, (b) use of provider-delivered CAM (e.g., acupuncture, massage, or chiropractic), (c) herbal medicine, and (d) use of relaxation therapies with underserved hospitalized patients.

Method

The data for this analysis were extracted from the Re-Engineered Discharge random-ized-controlled trials, an intervention designed to reduce readmission at Boston Medi-cal Center, an inner-city hospital (Jack et al., 2009). Self-reported baseline data was collected when patients enrolled in the study.

Sociodemographic and Clinical Variables

Sociodemographic and clinical characteristics included at baseline were age, sex, race, education, income, employment, insurance, having a primary care provider, being

born in the United States, English as one's primary language, and depressive symptoms as measured by the nine-item Patient Health Questionnaire (Kroenke, Spitzer, & Williams, 2001).

Primary Independent Variable

The Rapid Estimate of Adult Literacy in Medicine (REALM) measures health literacy by using a medical word pronunciation test consisting of 66 medical terms, arranged in order of complexity by the number of syllables and pronunciation difficulty. The REALM has high criterion validity and test–retest reliability (0.99; $p < .001$; Davis et al., 1993). The REALM score assigns health literacy skills by grade level, clustering four grade levels into two categories: low (score of less than 60) health literacy and high (score of 60 or more) health literacy (Bhat et al., 2012; Green et al., 2011). Subjects unable to take the REALM ($n = 42$) were excluded from the analyses.

Outcome Variables

The four outcome variables were (a) use of any CAM, (b) use of provider-delivered CAM therapies, (c) use of relaxation and mind/body techniques, and (d) use of herbal supplements. We did not include use of vitamins or minerals.

Statistical Analysis

Of the 802 participants in the Re-Engineered Discharge studies, 581 provided data for both the CAM questions and the REALM and were included in these analyses. First, we compared participant characteristics by high versus low health literacy, assessing crude associations between certain characteristics of the participants and their use of CAM. Effect modification of the association between health literacy and the outcomes was tested. Motivated by earlier results from Bains and Egede (2011), we tested for an interaction between health literacy and race for use of any CAM. The Breslow-Day test for interaction indicated that there was a significant interaction between health literacy and race ($p = .03$) for any CAM use. We assessed the crude association between CAM use and health literacy in racial strata. We used multivariate logistic regression models for each outcome, testing the association with health literacy, adjusting for sociodemographic and clinical participant characteristics.

     Because the educational variable was found to be highly associated with health literacy level ($p < .01$), we considered models both with, and without, education; all results for the models with both education and health literacy were comparable to results for models without education; therefore we report results from models that exclude education. We used SAS 9.1 for all analyses (SAS Institute Inc., Cary, NC).

Results

The analyses included data from 581 individuals, of whom 38% had low health literacy. Regarding race, 52% self-identified as non-Hispanic Black, 29% as non-Hispanic White, and 19% as Hispanic/other race. High health literacy was associated with race, higher education, higher income, being employed, being born in the United States, and having English as one's primary language (see Table 1). In addition, 50% reported any CAM use, 28% reported provider-delivered therapies use, 22% used herbal medicine,

Table 1. Percentage of participants, by health literacy score (REALM) according to various demographic and lifestyle variables

Characteristics	Low health literacy n (%) ($n = 222$)	Higher health literacy n (%) ($n = 359$)	Chi-square test (p)
Age (years)			.18
18–29	20 (33.9)	39 (66.1)	
30–39	22 (31.0)	49 (69.0)	
40–49	61 (35.1)	113 (64.9)	
50–59	63 (40.9)	91 (59.1)	
>60	56 (45.9)	66 (54.1)	
Sex			.08
Male	116 (42.0)	160 (58.0)	
Female	106 (34.9)	198 (66.0)	
Race			<.01
Non-Hispanic White	27 (16.0)	142 (84.0)	
Non-Hispanic Black	143 (47.7)	157 (52.3)	
Hispanic/other race[a]	48 (44.4)	60 (55.6)	
Education			<.01
Less than eighth grade	20 (71.4)	8 (28.6)	
Incomplete high school	54 (60.7)	35 (39.3)	
High school degree or equivalent	95 (45.0)	116 (55.0)	
College	46 (19.1)	195 (80.9)	
Income			<.01
None to <$10,000	105 (47.1)	118 (52.9)	
$10,001 to $30,000	81 (40.1)	121 (59.9)	
$30,001 to $50,000	23 (31.9)	49 (68.1)	
$50,000 or greater	10 (18.5)	44 (81.5)	
Other (missing/refused)	3 (10.0)	27 (90.0)	
Employment status			<.01
Employed	49 (27.5)	129 (72.5)	
Unemployed	71 (43.8)	91 (56.2)	
Retired	35 (42.2)	48 (57.8)	
Disabled	67 (42.4)	91 (57.6)	
Insurance			<.01
Private	60 (31.8)	129 (68.3)	
Government/free	146 (42.6)	197 (57.4)	
None	12 (26.7)	33 (73.3)	
Has primary care provider			.82
Yes	182 (38.0)	297 (62.0)	
No	40 (39.2)	62 (60.8)	
Born in the United States			<.01
Yes	156 (34.4)	297 (65.6)	
No	66 (52.6)	62 (48.4)	
English primary language			<.01
Yes	186 (36.1)	329 (63.9)	

(*Continued*)

Table 1. Continued

Characteristics	Low health literacy n (%) (n = 222)	Higher health literacy n (%) (n = 359)	Chi-square test (p)
No	32 (52.5)	29 (47.5)	
Depression status (Patient Health Questionnaire-9)			.41
Severe depression	31 (44.9)	38 (55.1)	
Mild depression	11 (42.3)	15 (57.7)	
No depression	178 (37.0)	303 (63.0)	

Note. Low health literacy = Rapid Estimate of Adult Literacy in Medicine (REALM) score of less than 60; high health literacy = REALM score of 60 or greater.

[a]Other refers to Asian/Pacific Islanders and American Indians.

and 27% used relaxation techniques. Of CAM users, 68% had higher health literacy, and 56% of the non-CAM users had higher health literacy. In the model unadjusted for sociodemographic and clinical participant characteristics, we found that among Hispanic/other race participants, any CAM use ($p = .04$) and provider-delivered therapies ($p = .04$) were statistically significant. We also found statistical significance among non-Hispanic Whites for any CAM use ($p < .01$) and relaxation techniques ($p < .01$).

In our adjusted multivariate analysis, we found a significant interaction between race and health literacy for any CAM use and for provider-delivered therapies (see Table 2). Use of any CAM among non-Hispanic White or Hispanic/other race participants was significantly higher among those with higher health literacy (OR 3.68, 95% CI [1.27, 9.99] and OR 3.40, 95% CI [1.46, 7.91], respectively). Individuals identifying as Hispanic/other race with higher health literacy were more likely to use provider-delivered therapies compared with those with low health literacy (OR 3.59, 95% CI [1.27, 10.19]). No racial or ethnic distinctions were evident in the relationship between health literacy and use of herbs. Use of relaxation techniques was significantly more common among those with higher health literacy regardless of race and ethnicity.

Discussion

This article adds new information on CAM use among a diverse population of low-income hospitalized patients. We found that higher health literacy was associated with more use of any CAM and provider-delivered CAM therapies for all groups other than non-Hispanic Blacks. In addition, those with higher health literacy were three times more likely to use relaxation techniques compared with those with low health literacy, regardless of race or ethnicity.

Our findings related to race and ethnicity and their relationship with health literacy are similar to two past studies (Bains & Egede, 2011; Owen-Smith et al., 2012). However, we also found that those with higher health literacy were more likely to use relaxation techniques compared with those with low health literacy, regardless of race and ethnicity. The reason for this discrepancy is unclear. Clinical studies have demonstrated a positive effect of relaxation techniques on certain medical conditions such as pain and depression. More research, by experts in health literacy, is needed to

Table 2. Adjusted multivariate logistic regression of factors associated with CAM use, provider-delivered therapy, herbal medicine, and relaxation technique use

Characteristics	Any CAM use	Only provider-delivered therapies	Only herbal medicine	Only relaxation techniques
Non-Hispanic Black				
Low health literacy	1	1	1	1
Higher health literacy	1.24 (0.76, 2.02)	0.90 (0.52, 1.56)	1.23 (0.68, 2.23)	2.59 (1.39, 4.85)
Non-Hispanic White				
Low health literacy	1	1	1	1
Higher health literacy	3.68 (1.27, 9.99)	1.22 (0.46, 3.25)	2.77(0.74, 10.31)	3.78 (1.33, 10.73)
Hispanic/other race				
Low health literacy	1	1	1	1
Higher health literacy	3.40 (1.46, 7.91)	3.59 (1.27, 10.19)	1.47 (0.55, 3.92)	3.37(1.09, 10.39)

Note. Adjusted for age, gender, employment status, income, insurance, primary care provider, depression, and birth in the United States. CAM = complementary and alternative medicine.

understand the barriers of low health literacy patients to relaxation techniques. Last, health literacy experts should explore whether current CAM modalities and clinical services are accessible to low health literacy patients, and if not, how to design relaxation interventions to be more appropriate for low health literacy patients.

Our study has several limitations. Because the Re-Engineered Discharge trials included only English-speaking patients, we do not know whether our results would hold for non–English-speaking patients. We also did not have a sufficient numbers of participants to explore differences between Hispanic, Asian, and American Indian patients. Furthermore, the REALM tool carries limitations. REALM does not assess a participant's understanding of words. It also has a narrow focus on word recognition, pronunciation, and has not been validated across health areas (Consumer Health Informatics Research Resource, 2013).

As national CAM research moves forward, it is necessary to study modalities among underserved populations, particularly those with low health literacy.

References

Bains, S. S., & Egede, L. E. (2011). Association of health literacy with complementary and alternative medicine use: A cross-sectional study in adult primary care patients. *BMC Complementary and Alternative Medicine*, *11*, 138. doi: 10.1186/1472-6882-11-138

Barner, J. C., Bohman, T. M., Brown, C. M., & Richards, K. M. (2010). Use of complementary and alternative medicine for treatment among African Americans: A multivariate analysis. *Research in Social & Administrative Pharmacy*, *6*, 196–208. doi: 10.1016/j.sapharm.2009.08.001

Barnes, P. M., Bloom, B., & Nahin, R. L. (2008). Complementary and alternative medicine use among adults and children: United States, 2007. *National Health Statistics Reports*, *12*, 1–23.

Berkman, N. D., Sheridan, S. L., Donahue, K. E., Halpern, D. J., & Crotty, K. (2011). Low health literacy and health outcomes: An updated systematic review. *Annals of Internal Medicine*, *155*, 97–107. doi: 10.1059/0003-4819-155-2-201107190-00005

Bhat, A. A., DeWalt, D. A., Zimmer, C. R., Fried, B. J., Rangachari, P., Seol, Y. H., & Callahan, L. F. (2012). Associations between low literacy and health status measures: Cross-sectional analyses of two physical activity trials. *Journal of Health Communication*, *17*, 230–245. doi: 10.1080/10810730.2011.585688

Consumer Health Informatics Research Resource. (2013). *Health literacy.* Retrieved from http://chirr.nlm.nih.gov/health-literacy.php

Davis, T. C., Long, S. W., Jackson, R. H., Mayeaux, E. J., George, R. B., Murphy, P. W., & Crouch, M. A. (1993). Rapid Estimate of Adult Literacy in Medicine: A shortened screening instrument. *Family Medicine*, *25*, 391–395.

Decker, C., Huddleston, J., Kosiborod, M., Buchanan, D. M., Stoner, C., Jones, A., … Spertus, J. A. (2007). Self-reported use of complementary and alternative medicine in patients with previous acute coronary syndrome. *American Journal of Cardiology*, *99*, 930–933. doi: 10.1016/j.amjcard.2006.11.041

Green, J. A., Mor, M. K., Shields, A. M., Sevick, M. A., Palevsky, P. M., Fine, M. J., … Weisbord, S. D. (2011). Prevalence and demographic and clinical associations of health literacy in patients on maintenance hemodialysis. *Clinical Journal of the American Society of Nephrology*, *6*, 1354–1360. doi: 10.2215/CJN.09761110

Jack, B. W., Chetty, V. K., Anthony, D., Greenwald, J. L., Sanchez, G. M., Johnson, A. E., … Culpepper, L. (2009). A reengineered hospital discharge program to decrease rehospitalization: A randomized trial. *Annals of Internal Medicine*, *150*, 178–187.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*, 606–613.

Kutner, M., Greenberg, E., Jin, Y., & Paulsen, C. (2006). *The health literacy of America's adults: Results from the 2003 National Assessment of Adult Literacy (NCES 2006–483)*. Washington DC: U.S. Department of Education, National Center for Education Statistics.

National Center for Complementary and Alternative Medicine. (2011). *Defining CAM.* Retrieved from http://nccam.nih.gov/health/whatiscam

Owen-Smith, A., McCarty, F., Hankerson-Dyson, D., & Diclemente, R. (2012). Prevalence and predictors of complementary and alternative medicine use in African Americans with Acquired Immune Deficiency Syndrome. *Focus on alternative and complementary therapies.* FACT/Department of Complementary Medicine, Postgraduate Medical School, University of Exeter. doi: 10.1111/j.2042-7166.2011.01140.x

Paasche-Orlow, M. K., Parker, R. M., Gazmararian, J. A., Nielsen-Bohlman, L. T., & Rudd, R. R. (2005). The prevalence of limited health literacy. *Journal of General Internal Medicine*, *20*, 175–184. doi: 10.1111/j.1525-1497.2005.40245.x

Smith, T. C., Smith, B., & Ryan, M. A. (2008). Prospective investigation of complementary and alternative medicine use and subsequent hospitalizations. *BMC Complementary and Alternative Medicine*, *8*, 19. doi: 10.1186/1472-6882-8-19