

Brief Questions to Identify Patients With Inadequate Health Literacy

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Background and Objectives: *No practical method for identifying patients with low health literacy exists. We sought to develop screening questions for identifying patients with inadequate or marginal health literacy. Methods:* Patients ($n=332$) at a VA preoperative clinic completed in-person interviews that included 16 health literacy screening questions on a 5-point Likert scale, followed by a validated health literacy measure, the Short Test of Functional Health Literacy in Adults (STOFHLA). Based on the STOFHLA, patients were classified as having either inadequate, marginal, or adequate health literacy. Each of the 16 screening questions was evaluated and compared to two comparison standards: (1) inadequate health literacy and (2) inadequate or marginal health literacy on the STOFHLA. **Results:** Fifteen participants (4.5%) had inadequate health literacy and 25 (7.5%) had marginal health literacy on the STOFHLA. Three of the screening questions, “How often do you have someone help you read hospital materials?” “How confident are you filling out medical forms by yourself?” and “How often do you have problems learning about your medical condition because of difficulty understanding written information?” were effective in detecting inadequate health literacy (area under the receiver operating characteristic curve of 0.87, 0.80, and 0.76, respectively). These questions were weaker for identifying patients with marginal health literacy. **Conclusions:** Three questions were each effective screening tests for inadequate health literacy in this population.

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Health literacy is the ability to perform basic reading and numerical tasks required to function in the health care environment.¹ In studies of health literacy in the United States, approximately one third of English-speaking patients had low health literacy.^{2,3} Studies have shown an association between limited health literacy and worse health outcomes such as poorer knowledge about health conditions,⁴⁻⁶ lower use of preventive services,⁷ higher rates of medication nonadherence,⁸ higher hospitalization rates,^{9,10} and poorer self-reported health.^{11,12}

Despite the important implications of limited health literacy, health care providers are often unaware of patients' reading abilities.¹³ Although some experts discourage the assessment of patients' reading abilities in

health care settings due to potential apprehension regarding confidentiality, patient embarrassment,^{14,15} or lack of evidence of effective interventions, the ability to identify patients with potential literacy problems is important if health care providers are to attempt to overcome the adverse effects of low health literacy. A brief and valid screen for inadequate health literacy could quickly identify patients who may need special methods of communication in busy clinical settings. An easy-to-use screening instrument would also increase the feasibility of conducting large-scale studies to understand the effects of health literacy and the effectiveness of health literacy interventions.

Obstacles to routine screening exist. Patients are often ashamed of their low health literacy, and many adults will attempt to conceal their reading impairments from others.^{16,17} Educational attainment cannot be used as a proxy for literacy because it is not an accurate predictor of health literacy; patients often read several grade levels lower than the highest grade achieved in school.^{18,19} Finally, current validated instruments to assess health literacy²⁰⁻²³ are either too long or potentially

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embarrassing²⁴ to patients to be routinely integrated into clinical care.

This study's goal was to identify clinically useful questions that might be effective for detecting inadequate or marginal health literacy among an adult patient population. We sought to develop and evaluate the performance of interviewer-administered questions for identifying patients with inadequate or marginal health literacy compared to a standard health literacy instrument, the Short Test of Functional Health Literacy in Adults (STOFHLA).

Methods

Study Subjects

This study was conducted at the preoperative clinic of the VA Puget Sound Health Care System in Seattle. This clinic provides evaluations and instructions for patients preparing to undergo ambulatory surgery and relies heavily on written materials to convey information to patients. English-speaking patients who presented to the clinic were eligible for this study. We excluded patients who were unable to complete the interview because they were too ill to participate, had severely impaired vision (worse than 20/100 corrected), severe cognitive impairment, or overt psychiatric illness.

Health Literacy Screening Question Development

We selected the content of questions based on five domains identified in a qualitative study of patients with limited health literacy: navigating the health care system, completing medical forms, following medication instructions, interacting with providers, and reading appointment slips.¹⁶ In addition, previous studies have reported the use of a surrogate reader as a common coping mechanism for patients with low literacy.^{2,16} These six themes guided the development of the screening questions (Appendix 1).

Next, because we suspected that patients were likely to underreport reading difficulties, we applied several methods to our questions that have been successfully used to screen for other stigmatized behavior.²⁵ We first phrased questions to ask patients "how often" they had a problem or "how confident" they were in each of the six themes rather than asking "if" they had a problem. Second, we scaled the response options for each question from zero to four. Third, we did not specify a time frame or visit setting to avoid restricting patient reporting. Sixteen questions were developed, pilot tested, and revised to increase clarity.

Study Protocol

We attempted to recruit all patients attending the preoperative clinic between October 2001 and January 2002. Patients were asked by a clinic nurse if they were willing to speak to a research assistant about a study to find out whether written patient information was useful. After obtaining informed consent, research assis-

tants conducted in-person interviews that included 16 screening questions for limited health literacy followed by the STOFHLA.²² The 16 questions were read aloud by interviewers. The STOFHLA was scored at a later time by separate research staff to ensure that interviewers were blinded to the patient's health literacy level. The University of Washington Human Subjects Committee approved the study.

Interview Comparison Standards

We used two comparison standards against which we evaluated each of the 16 questions: (1) inadequate health literacy (STOFHLA score of 0–16) and (2) inadequate or marginal health literacy (STOFHLA score of 0–22). The STOFHLA is a 36-item reading assessment tool that takes up to 7 minutes to administer.²² The STOFHLA measures patients' ability to read and understand two passages: (1) instructions for an upper gastrointestinal tract radiographic procedure (written at grade level 4.3) and (2) the Medicaid "Rights and Responsibilities" passage (grade level 10.4). The STOFHLA is strongly correlated with previously validated health literacy instruments²² and was chosen because of its ability to assess reading and comprehension of health-related materials as well as its brevity.

Possible scores on the STOFHLA range from zero to 36. Using established convention, we categorized patients into three mutually exclusive groups: inadequate, marginal, or adequate health literacy.²² Individuals with scores of 0–16 often misread the simplest materials, including prescription bottles and appointment slips (inadequate health literacy). Individuals scoring 17–22 perform better on the simplest tasks but have difficulty comprehending more complicated passages such as instructions for a radiographic procedure or educational brochures (marginal health literacy). Individuals who score 23–36 successfully complete most tasks required to function in the health care setting (adequate health literacy).²²

Analyses

We compared individual screening questions to the interview comparison standards and computed sensitivity, specificity, and positive and negative likelihood ratio (LR) with 95% confidence interval (CI).²⁶ Positive and negative LRs allowed for simultaneous evaluation of the sensitivity and specificity at each threshold. For positive screening results, multiplying the positive LR times the pretest odds of a disease gives the posttest odds of disease; for negative screening results, multiplying the negative LR times the pretest odds of disease gives the posttest odds of disease.²⁷ Receiver operating characteristic (ROC) curves plot the sensitivity versus (1-specificity), and areas under the ROC curve (AUROC) were used to compare the overall performance of the screening questions.

We present the AUROCs and 95% CI for the screening questions that had point estimates for their AUROCs significantly greater than the null value of 0.5, as judged by a 95% CI that excluded 0.5. To select the optimal individual question(s) or combination of questions, we identified the one question with the highest AUROC and compared that to the AUROC for all other question(s) or combination of questions, taking into account the correlations of AUROC from the same population.²⁸ Given the exploratory nature of this study, we did not adjust for multiple comparisons to avoid masking potentially important findings. Because we were interested in the predictive value of these questions and not issues related to causation, we did not adjust for confounders in our analysis. Analyses were conducted using STATA SE-7.0 (Stata Statistical Software: Release Special Edition 7.0, College Station, Tex, Stata Corporation, 2002) and Excel.

Results

Of 631 patients scheduled for a preoperative visit during our study period, 351 agreed to meet with research staff. Four of these individuals were excluded due to poor visual acuity, and one was excluded due to severe dementia. Of the 346 eligible patients, 14 later declined to participate, and the remaining 332 patients completed the interview. Among 332 participants, prevalence rates of inadequate and marginal health literacy as measured by the STOFHLA were 4.5% and 7.5%, respectively (Table 1).

Detecting Inadequate Health Literacy

Seven of the 16 questions had an AUROC greater than 0.5 and 95% CI that excluded 0.5 for detecting inadequate health literacy (Table 2). For identifying inadequate health literacy, the question, "How often do you have someone help you read hospital materials?" ("Help Read") had a significantly higher AUROC of 0.87 (95% CI=0.78–0.96) compared to all other questions ($P<.05$) except for "How confident are you filling out medical forms by yourself?" ("Confident With Forms") ($P=.32$) and "How often do you have problems learning about your medical condition because of difficulty understanding written information?" ("Problems Learning") ($P=.21$) with AUROCs of 0.80 (95% CI=0.67–0.93), and 0.76 (95% CI=0.62–0.90), respectively.

ROC curves for these three screening questions in detecting inadequate health literacy are depicted in Figure 1. Sensitivities, specificities, and positive and negative LR with 95% CI for the three strongest screening questions for detecting inadequate health literacy at each threshold are shown in Table 3.

To determine whether combining two or all three of the optimal questions could improve their screening performance, we conducted analyses that evaluated the

performance of various combinations of the three optimal questions. To make these composite screening tests, we first assigned zero (no problems with reading) to four points (highest problems with reading) to the scaled responses for each question. We then summed the scores to obtain an 8- or 12-point scale and used the same methods as in the main analyses to evaluate these composite screening tests. No combination of the screening questions significantly increased the AUROC for inadequate health literacy beyond what was achieved by the single items.

Detecting Inadequate and Marginal Health Literacy

In comparison to identifying patients with inadequate health literacy, performance of the screening questions was weaker for identifying patients with either inad-

Table 1

Characteristics of Study Participants (n=332)

	n (%)
Age, years	
18–45	60 (18)
46–64	161 (49)
65+	111 (33)
Gender	
Men	314 (95)
Women	18 (5)
Race	
White	269 (81)
Black	34 (10)
Other	29 (9)
Income	
<\$20,000	112 (34)
\$20,000–39,000	111 (33)
\$40,000+	80 (24)
Did not know/refused	29 (9)
Education	
<Third grade	13 (4)
Fourth–eighth grade	9 (3)
Some high school	26 (8)
High school/GED	126 (38)
>High school	158 (48)
Working status	
Working full time	83 (25)
Working part time	22 (7)
Retired	113 (34)
Disabled	78 (23)
Currently not working	36 (11)
Health literacy level*	
Adequate	292 (88)
Marginal	25 (7.5)
Inadequate	15 (4.5)

* Health literacy level based on STOFHLA (Short Test of Functional Health Literacy in Adults) score: inadequate health literacy (0–16), marginal health literacy (17–22), and adequate health literacy (23–36).

Table 2

Areas Under the Receiver Operating Characteristic Curve for the Health Literacy Screening Questions

Health Literacy Screening Questions	Inadequate Health Literacy	Inadequate or Marginal Health Literacy
How often are appointment slips written in a way that is easy to read and understand?	0.70 (0.56–0.84)	0.63 (0.55–0.72)
How often are medical forms difficult to understand and fill out?	0.68 (0.52–0.84)	0.63 (0.54–0.72)
How often do you have difficulty understanding written information your health care provider gives you?	0.69 (0.55–0.83)	0.65 (0.56–0.74)
How often do you have problems learning about your medical condition because of difficulty understanding written information?	0.76 (0.62–0.90)	0.60 (0.51–0.69)
How confident are you filling out medical forms by yourself?	0.80 (0.67–0.93)	0.66 (0.57–0.76)
How confident do you feel you are able to follow the instructions on the label of a medication bottle?	0.70 (0.57–0.83)	0.62 (0.54–0.71)
How often do you have someone help you read hospital materials?	0.87 (0.78–0.96)	0.68 (0.60–0.77)

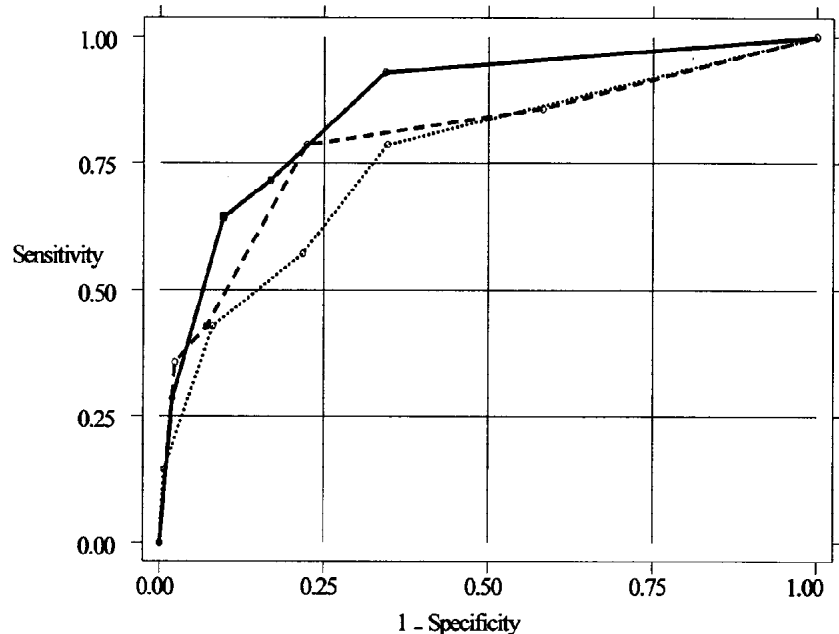
Health literacy level based on STOFHLA (Short Test of Functional Health Literacy in Adults) score: inadequate health literacy (0–16), marginal health literacy (17–22), and adequate health literacy (23–36).

equate or marginal health literacy (Table 2). Again, combining questions resulted in no meaningful improvement in their screening performance of detecting inadequate or marginal health literacy.

Because educational attainment is often used to estimate health literacy, we conducted analyses to compare the performance of these three screening questions to self-reported education. We categorized self-reported education into five categories (third grade, fourth–eighth grade, some high school, completed high school/GED, and > high school) and calculated AUROCs for identifying inadequate health literacy (0.77; 95% CI: 0.65–0.90) and inadequate or marginal health literacy (0.62; 95% CI: 0.53–0.72). Although no significant differences between the performance of self-reported education and the three screening questions were found, “Help Read” and “Confident With Forms” had a higher AUROC than self-reported education in detecting inadequate health literacy.

Figure 1

Receiver Operating Characteristic (ROC) Curves of Three Questions for Identification of Inadequate Health Literacy



- “Help Read” area under ROC curve (95% CI): 0.87 (0.78–0.96)
- - - - - “Confident With Forms” area under ROC curve (95% CI): 0.80 (0.67–0.93)
- “Problems Learning” area under ROC curve (95% CI): 0.76 (0.62–0.90)

Discussion

To our knowledge, this is the first report of screening questions that were effective for identifying patients with inadequate health literacy. However, for identification of the broader group of patients with inadequate or marginal health literacy, the performance of these screening questions was weaker.

This study has several limitations. First, our sample was comprised predominantly of white, male veterans in an ambulatory surgery setting. Therefore, our results may not be generalizable. Second, our sample size was too small to determine whether one of the three questions performed significantly better and whether these questions performed significantly better than self-reported education. Third, although we did not tell patients this was a health literacy study, patients with poor literacy skills may have avoided participation. Finally, the exploratory nature of the study with multiple comparisons increases the likelihood of a Type I error. Future studies are needed to validate our findings.

Despite these limitations, the findings of this study are important because we demonstrate that a single screening question may be able to identify 80% of adult patients with inadequate health literacy. Although Bennett et al identified a three-item screening instrument for low literacy among adult caregivers of pediatric patients,²⁹ previous efforts to identify briefer tools have been unsuccessful in adult patient populations. Williams et al evaluated questions as a simple health literacy screen that included asking patients if they were able to read a newspaper, if they could read forms and other written hospital materials, and if they usually ask someone to help them read materials they receive from the hospital.² Although the specificity of these questions was high, their sensitivity for detecting inadequate health literacy was low.² We asked patients “how often” rather than “if” they had reading difficulties and

Table 3

Performance of Health Literacy Screening Questions for Detecting Inadequate Health Literacy

Question	Sensitivity	Specificity	+LR (95% CI)	-LR (95% CI)
“Problems Learning”*				
Never	1.00	0.00	1.00	—
Occasionally	0.79	0.65	2.26 (1.65–3.08)	0.33 (0.17–0.82)
Sometimes	0.57	0.78	2.61 (1.58–4.29)	0.55 (0.36–1.12)
Often	0.43	0.92	5.11 (2.52–10.37)	0.62 (0.45–1.21)
Always	0.14	0.99	22.14 (3.36–145.90)	0.86 (0.51–1.52)
“Confident With Forms”†				
Extremely	1.00	0.00	1.00	—
Quite a bit	0.87	0.41	1.47 (1.18–1.83)	0.32 (0.11–0.80)
Somewhat	0.80	0.77	3.51 (2.54–4.86)	0.26 (0.15–0.70)
A little bit	0.40	0.93	5.55 (2.64–11.45)	0.65 (0.47–1.21)
Not at all	0.33	0.98	15.05 (5.40–41.90)	0.68 (0.44–1.26)
“Help Read”‡				
Never	1.00	0.00	1.00	—
Occasionally	0.93	0.65	2.69 (2.20–3.29)	0.10 (0.03–0.50)
Sometimes	0.73	0.83	4.30 (2.91–6.36)	0.32 (0.20–0.79)
Often	0.67	0.90	6.60 (4.06–10.73)	0.37 (0.25–0.85)
Always	0.27	0.98	14.09 (4.44–44.69)	0.75 (0.49–1.34)

LR—likelihood ratio; plus sign, positive; minus sign, negative
CI—confidence interval

* “Problems Learning:” “How often do you have problems learning about your medical condition because of difficulty understanding written information;” specifies responses that are equal to or indicate a higher frequency of problems learning about their medical condition than that response level.

† “Confident With Forms:” “How confident are you filling out medical forms by yourself?”; specifies responses that are equal to or indicate lower confidence filling out medical forms than that response level.

‡ “Help Read:” “How often do you have someone help you read hospital materials?”; specifies responses that are equal to or indicate a higher frequency of having someone help them read than that response level.

used scaled responses that may have encouraged the reporting of reading difficulties and more accurate classification of inadequate health literacy by our screening questions.

Each of these three questions offers advantages over currently available formal health literacy instruments. If validated in other populations, a screening question for inadequate health literacy could be asked rapidly and unobtrusively by clinical staff with varying levels of experience in busy clinical settings. Patients identified as having inadequate health literacy could be offered further formal health literacy assessment and special methods of communication and assistance to effectively navigate the health care system. Although they do not directly assess health literacy through word recognition or comprehension testing, these questions may be less likely to induce anxiety and shame. Finally, a single question that rapidly and inexpensively identifies patients with inadequate health literacy would increase the feasibility of conducting large-scale studies

that further identifies the consequences of inadequate health literacy and effective low health literacy interventions for patients.

The optimal cut point of a screening test in a particular setting depends on test accuracy, prevalence of inadequate health literacy, costs of testing and false-positive classification, and benefits of identifying true positives. If the objective is to identify most patients with inadequate health literacy, we would choose a cutoff with high sensitivity and low negative LR so that persons who tested negative would be very likely to have adequate reading skills. However, the implications of a positive test vary dramatically depending on the prevalence of inadequate health literacy in the screened population. For example, using "Help Read" in our sample (4.5% with inadequate health literacy), a response of "often" or greater would result in a posttest probability of inadequate health literacy of 25%. In a setting with a prevalence of inadequate health literacy of 35%,² the same response would raise the posttest probability to 78%. Studies are needed to determine the optimal cutoff responses to these questions in other clinical settings with varying prevalence of inadequate health literacy. Although the prevalence of inadequate health literacy in our study population is low, the implications of inadequate health literacy in the preoperative setting are important. Patients with inadequate health literacy may be at risk of patient nonadherence to preoperative instructions, leading to increased morbidity, delays in surgery, or surgery cancellations that are costly to the patient and the hospital. A single question that can rapidly identify patients with inadequate health literacy would allow health care providers to tailor educational materials and communication styles to improve patient comprehension of the risk and benefits of surgery and adherence to preoperative instructions among patients with inadequate health literacy.

These three screening questions were not as effective for detecting patients with marginal health literacy. Patients with marginal health literacy may not recognize that they have reading difficulties and may be less likely to use coping strategies such as a surrogate reader.

In summary, each of these three screening questions appears to be useful for detecting inadequate health literacy in a VA population. Although our findings need to be confirmed in other populations, we believe they are an important advance toward developing a practical method for identifying patients with inadequate health literacy in busy clinical or research settings.

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Appendix 1

All 16 Health Literacy Screening Questions

1. How often are appointment slips written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
2. How often are medical forms written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
3. How often are medication labels written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
4. How often are patient educational materials written in a way that is easy to read and understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
5. How often are hospital or clinic signs difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
6. How often are appointment slips difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
7. How often are medical forms difficult to understand and fill out?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
8. How often are directions on medication bottles difficult to understand?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
9. How often do you have difficulty understand written information your health care provider (like a doctor, nurse, nurse practitioner) gives you?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
10. How often do you have problems getting to your clinic appointments at the right time because of difficulty understanding written instructions?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
11. How often do you have problems completing medical forms because of difficulty understanding the instructions?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
12. How often do you have problems learning about your medical condition because of difficulty understanding written information?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
13. How often are you unsure on how to take your medication(s) correctly because of problems understanding written instructions on the bottle label?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never
14. How confident are you filling out medical forms by yourself?
(1) Extremely (2) Quite a bit (3) Somewhat (4) A little bit (5) Not at all
15. How confident do you feel you are able to follow the instructions on the label of a medication bottle?
(1) Extremely (2) Quite a bit (3) Somewhat (4) A little bit (5) Not at all
16. How often do you have someone (like a family member, friend, hospital/clinic worker, or caregiver) help you read hospital materials?
(1) Always (2) Often (3) Sometimes (4) Occasionally (5) Never