Evaluation of a Single-Item Screening Question to Detect Limited Health Literacy in Peritoneal Dialysis Patients

Deepika Jain,1 Heena Sheth,1 Filitsa H. Bender,1 Steven D. Weisbord,1–3 Jamie A. Green4

Studies have shown that a single-item question might be useful in identifying patients with limited health literacy. However, the utility of the approach has not been studied in patients receiving maintenance peritoneal dialysis (PD).

We assessed health literacy in a cohort of 31 PD patients by administering the Rapid Estimate of Adult Literacy in Medicine (REALM) and a single-item health literacy (SHL) screening question “How confident are you filling out medical forms by yourself?” (Extremely, Quite a bit, Somewhat, A little bit, or Not at all). To determine the accuracy of the single-item question for detecting limited health literacy, we performed sensitivity and specificity analyses of the SHL and plotted the area under the receiver operating characteristic (AUROC) curve using the REALM as a reference standard.

Using a cut-off of “Somewhat” or less confident, the sensitivity of the SHL for detecting limited health literacy was 80%, and the specificity was 88%. The positive likelihood ratio was 6.9. The SHL had an AUROC of 0.79 (95% confidence interval: 0.52 to 1.00). Our results show that the SHL could be effective in detecting limited health literacy in PD patients.

Key words
Health literacy, single-item health literacy question, REALM

Introduction
Health literacy is “the degree to which individuals have the capacity to obtain, process and understand basic health information and services needed to make appropriate health decisions” (1). It is estimated that about one third of U.S. adults lack the necessary skills to function effectively in the health care environment (2).

In a recent systematic review of patients with kidney disease, the pooled prevalence of limited health literacy was 22.7% (3). In addition, limited health literacy has been associated with a variety of adverse outcomes in this patient population, including lesser access to kidney transplantation, increased health resource utilization, and higher mortality (4–6). The ability to quickly and accurately screen for limited health literacy could facilitate the development and implementation of targeted interventions to improve health outcomes in this high-risk low-literacy group.

Traditional health literacy screening methods—such as the Rapid Estimate of Adult Literacy in Medicine (REALM) and the Short Test of Functional Health Literacy in Adults—are difficult to use in clinical practice and can be associated with shame (7). Recently, brief questions developed to screen for health literacy have asked about a patient’s self-reported difficulty in performing certain health-related tasks (8). The single-item question, “How confident are you filling out medical forms by yourself?” has been found to be predictive of limited health literacy in non-dialysis patients (9,10). Hence, we sought to examine the accuracy of this question in detecting limited health literacy in a cohort of patients receiving maintenance PD.

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Methods

Population
Our study included adult patients receiving maintenance PD at a single outpatient dialysis unit staffed by faculty members from the Renal–Electrolyte Division at the University of Pittsburgh School of Medicine in Pittsburgh, Pennsylvania.

Assessment of health literacy
Beginning in May 2012, as a part of routine clinical care, dialysis nurses performed a one-time assessment of patient health literacy. We assessed health literacy with a single-item health literacy (SHL) screening question, “How confident are you filling out medical forms by yourself?” The REALM was also completed for use as a reference standard. Answers on the SHL are scored on a 5-point Likert scale with response options of Extremely, Quite a bit, Somewhat, A little bit, or Not at all. A response of “Somewhat” or less has been suggested as the optimal cut-off for detecting limited health literacy (9). The REALM is a 66-item questionnaire that assesses health literacy based on word recognition. Patients are asked to read and pronounce up to 66 increasingly complex health-related words. Scores on the REALM range from 0 to 66. Limited health literacy is defined by a score of 60 or less. The REALM has been shown to be a valid tool for assessing health literacy in patients, including those receiving hemodialysis (5–6,11).

Clinical variables
All patients receiving maintenance PD at the University of Pittsburgh–affiliated dialysis unit are enrolled in a research registry at the time of treatment initiation. To maintain the registry, designated members of the dialysis treatment team enter data on patient demographics and clinical characteristics. We abstracted data from the registry to link with our study data.

Statistical analyses
We describe demographic and clinical characteristics using frequencies or proportions for discrete variables and medians with interquartile ranges for continuous variables. We plotted the area under the receiver operating characteristic (AUROC) curve to assess the accuracy of the SHL for the detection of limited health literacy, using the REALM as a reference standard. We also used various response thresholds to calculate the sensitivity, specificity, and positive and negative likelihood ratios for the SHL to detect limited health literacy. We used the Stata statistical software application (version 12.1: StataCorp LP, College Station, TX, U.S.A.) for all analyses. This study was approved by the institutional review board of the University of Pittsburgh.

Results

Participant characteristics
Our analysis included 31 patients with a median age of 47 years (range: 21 – 79 years), a median Charlson comorbidity index score of 4 (range: 2 – 8), and a median time on PD of 3.15 years (range: 0.1 – 8.36). Approximately 35% of the group had an education less than or equal to high school. Using the REALM, the prevalence of limited health literacy was determined to be 16% (Table I).

Performance of the SHL
Using the REALM as a reference standard, the AUROC for the SHL was 0.79 [95% confidence interval (CI): 0.52 to 1.00] for detecting limited health literacy (Figure 1). Table II shows sensitivities, specificities, and positive and negative likelihood ratios at each tested threshold. The SHL response threshold of “Somewhat” or less had a sensitivity of 80% and a

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Baseline patient characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Value</td>
</tr>
<tr>
<td>Cohort (n)</td>
<td>31</td>
</tr>
<tr>
<td>Sex [n (%): women]</td>
<td>14 (45)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>47</td>
</tr>
<tr>
<td>Median</td>
<td>21–79</td>
</tr>
<tr>
<td>IQR</td>
<td></td>
</tr>
<tr>
<td>Race [n (%): African American]</td>
<td>10 (32)</td>
</tr>
<tr>
<td>Education [n (%): ≤high school]</td>
<td>11 (35)</td>
</tr>
<tr>
<td>Time on PD (years)</td>
<td>3.1</td>
</tr>
<tr>
<td>Median</td>
<td>0.1–8.4</td>
</tr>
<tr>
<td>IQR</td>
<td></td>
</tr>
<tr>
<td>Health literacy (REALM) [n (%): Limited]</td>
<td>5 (16)</td>
</tr>
<tr>
<td>Adequate</td>
<td>26 (84)</td>
</tr>
<tr>
<td>Median CCI score</td>
<td>4</td>
</tr>
</tbody>
</table>

IQR = interquartile range; PD = peritoneal dialysis; REALM = Rapid Estimate of Adult Literacy in Medicine; CCI = Charlson comorbidity index.
specificity of 88% for detecting limited health literacy, with a positive likelihood ratio of 6.9. Using that cut-off in the SHL, the prevalence of limited health literacy in our cohort was determined to be 23% (7 of 31).

Discussion
Health literacy is now recognized to be an important issue in kidney disease care (12). A brief and accurate method of screening for limited health literacy could help in targeting resources and interventions to those in need. Using the REALM as a reference standard, we examined the performance of the question “How confident are you filling out medical forms by yourself?” to detect limited health literacy in PD patients. We found that the SHL is able to detect patients with limited health literacy with good accuracy. The cut-off point that maximized sensitivity and specificity was an answer of “Somewhat” or less.

Our findings are consistent with those in previous studies examining the utility of the SHL in other populations. In a large study of 1796 patients, conducted in a Veteran Affairs hospital, Chew et al. compared the performance of 3 health literacy screening questions. Using the REALM as a reference standard, the SHL (“How confident are you filling out medical forms by yourself?”) had the largest AUROC, at 0.84 (95% CI: 0.79 to 0.89), and using a cut-off of “Somewhat” or less, the sensitivity and specificity were 83% and 82% respectively (10). Similar results were also documented by Wallace et al. in 305 patients attending a university-based primary care clinic. Using the REALM as a reference standard, they found the SHL to be accurate in detecting limited health literacy (AUROC: 0.82; 95% CI: 0.77 to 0.86). The SHL question had significantly greater AUROC than either of the other 2 questions tested and also a greater AUROC than questions based on demographic characteristics. The optimal cut-off in that study was also “Somewhat” or less (9).

Other studies of health literacy in PD patients have used the REALM or Short Test of Functional Health Literacy in Adults to measure health literacy (13–15). Those tools have been widely used for research purposes, but are difficult to apply in clinical practice. The REALM and the Short Test of Functional Health Literacy in Adults take, respectively, approximately 3 and 7 minutes to administer; the SHL takes less than 1 minute. The SHL also has the advantage of being administered verbally and therefore does not rely on print stimuli for assessment. In addition, because it asks about a patient’s subjective “confidence” to perform a task, the SHL is felt to be less stigmatizing (8).

As demonstrated in the present study, the SHL can easily be integrated into routine clinical practice,

![Figure 1](image)

**FIGURE 1** Area under the receiver operating characteristic (ROC) curve for a single-item health literacy question.

<table>
<thead>
<tr>
<th>Response threshold</th>
<th>AUROC</th>
<th>95% CI</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Likelihood ratio (+)</th>
<th>Likelihood ratio (–)</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤Extremely</td>
<td>0.79</td>
<td>0.52 to 1.00</td>
<td>1.00</td>
<td>0.00</td>
<td>1.00</td>
<td>—</td>
</tr>
<tr>
<td>≤Quite a bit</td>
<td>0.80</td>
<td>0.54</td>
<td>1.73</td>
<td>0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤Somewhat</td>
<td>0.80</td>
<td>0.88</td>
<td>6.93</td>
<td>0.23</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤A little bit</td>
<td>0.40</td>
<td>0.92</td>
<td>5.20</td>
<td>0.65</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤Not at all</td>
<td>0.00</td>
<td>0.96</td>
<td>0.00</td>
<td>1.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

AUROC = area under receiver operator characteristic curve; CI = confidence interval.

a “How confident are you filling out medical forms by yourself?”
allowing dialysis personnel to identify patients whose limited health literacy can be addressed with more tailored care. Suggested strategies for addressing low health literacy include the use of clear verbal communication, written materials targeted to the 4th – 6th grade level, alternative presentations using audio or video, and referrals to appropriate support services (16, 17).

Our study has several limitations. First, we enrolled patients from an urban population attending a single dialysis center. Our results might therefore not be generalizable to other populations. Second, our sample size was small, which might decrease the accuracy of our results. Third, our results take their validity from the use of the REALM as a reference standard. The REALM is a well-validated health literacy measurement tool and correlates highly with other measures of literacy, but it is possible that the use of alternative reference standards might have led to different results. Finally, we examined the performance of only a single literacy screening question. It is possible that other questions (or combinations of questions) might perform better in the PD population.

Conclusions
The SHL might be an effective way to identify limited health literacy in patients receiving maintenance PD. The ability to incorporate a brief health literacy screen into routine clinical care could guide the implementation and evaluation of targeted low-literacy interventions to improve care in this vulnerable high-risk population.

Disclosures
The authors of this paper declare that no financial conflict of interest exists.

References

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