Evaluation of health literacy tools for correct prescription understanding

Jane L. Loueng, Alicia L. Fitz, Brody J. Maack, and Donald R. Miller

Abstract

Objectives: To evaluate two brief health literacy prediction tools for understanding of a prescription label and using a drug correctly.

Methods: Patients who visited the Family HealthCare Pharmacy were asked to complete the Newest Vital Sign (NVS) and Rapid Estimate of Adult Literacy in Medicine (REALM-R) and to interpret a prescription medication label. Each patient received a bottle of amoxicillin suspension with one of four prescription labels randomly varied in directions for frequency and amount. Patients were also asked to calculate the days' supply and demonstrate their ability to draw up the required dose using an oral syringe.

Results: A total of 150 patients consented to participate. Only the NVS score was associated with ability to fully interpret the label correctly. Neither tool was related to ability to draw up the correct amount using an oral syringe but both had some correlation to successfully calculating the days' supply provided. The NVS and REALM-R literacy scores had a modest correlation with each other.

Conclusion: The NVS may be useful in predicting prescription label understanding and a patient's ability to do a simple dosage calculation. Neither the NVS nor the REALM-R correlated well with ability to draw an amount using an oral syringe correctly.

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The Institute of Medicine defines health literacy 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."[1] In the United States, more than one-third of the population has a basic or below basic level of literacy with a proficient level of literacy being achieved by only 13%, most of whom have college degrees.[2]

The impact of low health literacy on health care costs and medication misadventures are evident as the cost of low health literacy is estimated at $106 billion to $238 billion per year.[3] Low health literacy is associated with higher use of emergency care and hospitalization, and lower use of mammography and influenza vaccination. In addition, higher mortality and poorer overall health status among the elderly are seen with lower health literacy, along with increased frequency of medication errors and adverse reactions.[4–8]

Several validated tools for measuring patients' understanding of health information have been evaluated. The Rapid Estimate of Adult Literacy in Medicine (REALM), a list of 66 medical words in English, may be used to assess participants' ability to read common terms that correspond to anatomy or illnesses.[8] Efforts have been made to shorten the REALM test with use of the REALM-R.[9,10] Patients are given a list of 11 medical words to read out loud, which takes approximately 2 to 3 minutes. Eight words are scored, with a score of 6 or fewer correct suggesting poor literacy. Background information on the REALM tool is provided in Appendix 1, available on JAPhA.org in the Supplemental Content section. REALM-R only tests patients' ability to recognize words and not necessarily their comprehension skill,[9] but it correlates with other literacy tools.[11]

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The Newest Vital Sign (NVS), available in English and Spanish, is another health literacy tool. Patients examine a standard nutritional label and are then asked six questions.[12] Patients' ability to read and analyze a nutritional label requires the same analytical and conceptual skills needed to understand and follow a provider's medical instructions. The six questions assess reading, reasoning, and math skills. Four or more correct answers suggest adequate literacy, while 0 or 1 correct answer indicates a high likelihood of health illiteracy. The NVS test takes 3 to 5 minutes and is validated against the Test of Functional Health Literacy in Adults (TOFHLA), an established tool.[13] Background information on NVS is provided in Appendix 2, available on JAPhA.org in the Supplemental Content section.

The full REALM tool, but not REALM-R or NVS, has been investigated specifically in relation to patients' understanding of prescription drug label instructions. Davis et al. studied 359 patients from primary care clinics and determined that more explicit language to describe the dosage and frequency of prescribed drugs improved comprehension.[14] Patients with lower literacy as assessed by REALM were more likely to interpret 7 of 10 labels incorrectly compared with those with higher literacy. Instructions with frequency in hourly intervals (i.e., take one tablet by mouth every 12 hours) or the number of times per day (i.e., take two tablets by mouth twice daily) were most commonly misunderstood. On the other hand, instructions that used explicit time periods (i.e., take two tablets in the morning and two tablets in the evening) achieved the highest percentage of correct interpretation. Davis's group also found that low literacy patients were less likely to interpret prescription medication warning labels correctly than those with high literacy.[5]

Wolf et al. also analyzed patients' interpretations of prescription label instructions.[15] Among 395 patients, 46% misunderstood one or more dosage instructions, with a positive correlation between literacy level and understanding of the dosage instructions. Patients achieved better understanding when interpreting explicit dosage frequencies (i.e., take one tablet at 8 am and one at 5 pm) compared with more vague instructions (i.e., take one teaspoonful three times daily).[15]

Objectives

The purpose of this study was to evaluate these two brief literacy prediction tools—NVS and REALM-R—for association with understanding of a prescription label. Our hypothesis was that patients with a low score on the NVS or REALM-R would have a lower probability of interpreting the prescription information correctly. We also tested the influence of label wording on the interpretation of instructions.

Methods

Amoxicillin suspension (250 mg/5 mL, 100 mL bottle) was used to determine label interpretation. Two variables, dosage description and frequency, for communicating the dosage instruction were examined in a factorial design in four labels. Successful interpretation of label instructions meant correctly stating back both dose and frequency. We also studied patients' ability to calculate the days' supply and successfully draw up the correct drug amount using an oral syringe.

The study was conducted at the Family HealthCare Pharmacy, which serves patients within a federally qualified health center in Fargo, ND, with approval by the Institutional Review Board of North Dakota State University. This pharmacy serves a diverse population of predominantly low income patients. Patients waiting for a prescription were informed about the study and asked to volunteer to participate. If they provided consent, they were taken to a private office and demographic information was collected. Next, their health literacy was assessed using the NVS and then the REALM-R test.

Patients were asked to interpret a prescription medication label (Figure 1). Each patient randomly received a bottle of amoxicillin suspension with one of four standard prescription labels typed in 12 point Times New Roman font. Label 1 had the dosage amount in teaspoon and milliliters with general frequency (1 teaspoonful [5 mL] two times daily), label 2 had the dosage amount in teaspoons with general frequency (1 teaspoonful two times daily), label 3 had the dosage amount in teaspoonfuls and milliliters with specific frequency (1 teaspoonful [5 mL] at 8 am and 8 pm), and label 4 had the dosage amount in teaspoons with specific frequency (1 teaspoonful at 8 am and 8 pm). The questions were administered as follows:

- **Question 1:** In your own words, tell me how you would take this medication. (If the answer was incomplete or unclear, follow-up could include prompted questions such as "Anything else?" or "Exactly, how would you take this medication?"). Correct responses had to include both the correct time of day and frequency. If any part of the label was interpreted incorrectly or omitted, the response was considered incorrect.
- **Question 2:** Could you show me with the syringe the amount that you would take? Correct demonstration had to be within 0.2 mL above or below the dose amount (5 mL) on the oral syringe. The syringe contained graduated measurements in both milliliters and teaspoons.
- **Question 3:** How long would the bottle of amoxicillin last? (Correct response was exactly 10 days.)

Data for NVS and REALM-R scores were correlated with Pearson Product Moment correlation coefficients. Cross-tabulations between variables and scores were analyzed with Fisher's Exact Test, and independent *t*