Utilizing the Newest Vital Sign (NVS) to Assess Health Literacy at a Regional Academic Medical Center's Family Medicine Clinic

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Abstract

Researchers examined the correlation between the physician's subjective assessment of health literacy rates and actual health literacy rates among patients as determined by the Newest Vital Sign (NVS). A sample of n = 150 patients, 18 years of age or older, were verbally interviewed using NVS tool before seeing their physician. After the physician met with the patient, the physician was asked to measure that patient's level of health literacy on a Likert-type scale and a "yes/no" scale. Frequency and percentage statistics were performed in SPSS to describe the distributions of patient and physician responses. Between-subjects statistics were used. Analysis of the patient surveys revealed one in 4 patients has a high likelihood of low health literacy. Analysis revealed there were significant positive correlations between physician response to perception of a patient's low health literacy risk and NVS survey responses. Despite the risk of limited literacy, 97.3% of physicians perceived the patient to understand what the physician was saying. Physicians should use teach-back and other health literacy principles with each patient, regardless of perceived risk.

Keywords

health literacy, personal health literacy, organizational health literacy, NVS, Newest Vital Sign, teach-back

Key Findings

- The Newest Vital Sign is a tool to identify patients' health literacy risk.
- Physicians scored patients' health literacy risk in line with patient's own NVS score.
- Physicians highly rated their communication regardless of patient health literacy risk.
- More training may improve physician comfort with health literacy and communication.

Introduction

In 2022, the National Academies of Science, Engineering, and Medicine made recommendations for health literacy best practices to be incorporated into the clinical setting.[1,2] Health literacy is defined in 2 ways: personal and organizational. The CDC updated these definitions in August 2020 with the release of the US government's *Healthy People 2030* Initiative [3]. Personal health literacy is "the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others".[3] Health literacy skills include reading, writing, numeracy, communication, and the use of electronic technology.[4] These skills are vital to receiving

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and understanding information from a healthcare professional. Organizational health literacy is "the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others".[3] *Healthy People 2030* updated the organizational health literacy definition to reflect their belief that "personal health literacy is contextual, and that producers of health information and services have a role in improving health literacy".[3] According to the CDC, these definitions reflect the need for people not only to understand health literacy but also to use it to make well-informed decisions.[3] The organizational health literacy definition "also emphasizes organizations responsibility to equitably address health literacy".[3]

Health literacy "occurs when health information and services created for the public match with people's capacity to find, understand, and use them".[5] Only 12% of the US population has proficient health literacy, meaning they have the skills to navigate the healthcare system and understand health information.[5] Having proficient health literacy can help people "prevent health problems, protect their health, and better manage health problems when they arise".[6] Low health literacy affects all people regardless of age and appearance. It can indicate that a person is unable to read a dosage label on a medicine bottle, understand a consent form they are required to sign, or use a medical tool such as a peak flow meter. A patient with low health literacy may not understand their health problem when they leave their physician's office resulting in recurring trips, more hospitalizations, and overall higher health costs.[7] Patients often hide their limited understanding from the provider, therefore, affecting how the provider cares for their patient. The provider may be unaware that they need to change their delivery to a format better suited for their patient. There are techniques a provider can use to help ensure their patient understands the health information.

Teach-back is one way a provider can assess a patient's understanding. With this technique, patients are asked to repeat the instructions they have heard from the provider, allowing the provider to reteach or modify their language. Teach-back is recommended by the American Academy of Family Physicians (AAFP), the Agency for Healthcare Research and Quality (AHRQ), and the Institute for Healthcare Improvement (IHI) as a standard of practice.[8] Even though techniques such as teach-back are available, it would be beneficial to both the provider and the patient if the provider knew their patient was at risk for low health literacy instead of basing it off age, appearance, or first impressions.

The Newest Vital Sign (NVS) is a health literacy assessment tool developed by Pfizer.[9] Prior to its development, larger, time-consuming tools were being used. However, physicians recognized the need for a health literacy screening test that was quicker and still accurate. The NVS is a nutrition label that is accompanied by 6 questions and requires 3 min for administration, making it more ideal in a primary care setting.[7] The NVS was originally developed in English and Spanish and has since been adapted and validated for use in more than 8 countries while also appearing in more than 25 peer-reviewed studies.[9,10] The NVS has been previously studied and identified as a viable option for the efficient assessment of patients' health literacy, specifically in family medicine practices. It identified health literacy status in less than 3 min was acceptable to patients and providers, and results were comparable to more extensive tests, revealing its feasibility of use in busy family medicine practices.[11,12] Furthermore, studies have found it to show good internal consistency and correlations with other assessments.[13] Due to its efficiency and previous use in family medicine, the NVS was chosen for this project.

Despite the well-known consequences of low health literacy, it remains a challenge for physicians to recognize in their own patients, possibly due to a lack of skills or confidence surrounding the topic of health literacy.[14] One study revealed that residents felt more comfortable discussing illicit drug use than their patients' health literacy.[15] This may be due to a lack of structured health literacy training in Family Medicine residency training programs. One national survey found that of 138 responses, representing 31% of programs eligible, only 42% reported specifically addressing health literacy in their required curriculum with a median time spent teaching health literacy ranging from 2 to 4.5 h in year one, 2 to 5 h in year 2, and 2 to 4.5 h in year 3.[16] Although the Family Medicine Milestone Committee emphasizes the importance of competency in communication as reflected in their Milestones updated in 2019, programs continue to identify the best ways to ensure competency in health literacy.[17] We wanted to utilize the NVS tool to not only recognize and characterize health literacy rates of patients treated in our family medicine residency clinic to but also identify our physicians' ability to identify patients at risk for low health literacy.

The purpose of this research project was to study the risk of low health literacy of patients being treated on the University of Tennessee Medical Center campus at a family medicine clinic while also examining the correlation between the physician's subjective assessment of the risk of low health literacy and actual risk of low health literacy among patients as determined by the NVS tool. While the campus is located in Knoxville, the family medicine clinic serves 21 counties in East Tennessee, allowing for a representation of urban and rural patients. In regard to insurance, 1/3 are Medicare, 1/3 are private, and 1/3 are Medicaid. Our hypothesis was that there would be no agreement between the physicians' perceived health literacy risk of their patients and their patients' risk score. To complete the study, researchers used the NVS to determine if the patient was at risk for low health literacy. Researchers then asked physicians of the patients 3 short questions about their perceived health literacy risk of their patients.

Methods

This study received IRB approval from the University of Tennessee Graduate School of Medicine (IRB # 4880). Patients in the University of Tennessee Graduate School of Medicine's Department of Family Medicine's University

Family Physicians Clinic were asked to participate in this research project using the NVS tool. The physicians of the patient, which included residents, who agreed to participate were also asked to participate in the study by answering 3 questions based on their perceived health literacy risk of their patients. Patient participants must be 18 years of age or older, seeking medical services at the Family Physicians Clinic OR a physician providing medical care at the Family Physicians Clinic, able to understand and comply with the study requirements, and able and willing to provide consent to participate. Patients who were acutely ill were not included in the research project so as to not put the researchers at risk. The patient participant received a $10 gift card to either Little Caesars or Burger King.

Physicians in the Family Medicine's University Family Physicians Clinic were asked to participate in this research project by considering their interaction with their patient and measuring their patient's risk of low health literacy on a Likert-type scale and a "yes/no" scale. The physician was asked to rate where they perceived their patient's risk of low health literacy to be at, if they thought the patient understood what they were saying, and if they used teach-back with their patient. The physician questions are included in Appendix A.

Physicians consented through an email distribution informing them about the study. The Physician Notice of Research was included in this email. A Physician Notice of Research was also hung in the clinic. For the patients, researchers went into their exam room following their nurse obtaining their vital signs. The researcher discussed the project with the patient and asked for verbal consent. If they said yes, they were handed a Patient Notice of Research and had an opportunity to ask questions.

After the consent process, the NVS tool was used to assess the subject's level of health literacy. The study team assigned a study number and recorded the date, subject's gender, age, and county of origin. The NVS is included in Appendix B. Following the assessment, their part in the research study was over. The patient then saw their physician for their routine visit. After the physician conducted their routine patient encounter, the researcher asked the treating physician to consider their previous interaction with their patient and assess their patient's perceived level of health literacy on a Likert and yes/no scale by answering 3 questions. The physician then answered if they were faculty or resident and if a resident, what year they were. Following completion of the form, their part in the research study was over.

The information from the 2 questionnaires was transcribed into the REDCap database. The paper questionnaires were locked in the PI's office within a locked cabinet.

Descriptive and frequency statistics were used to describe the characteristics of the sample, as well as to establish the proportions associated with physician ratings of health literacy and NVS criterion groups. Cross-tabulation tables were used to establish the level of agreement between physician ratings and the NVS scoring criteria. Spearman's rho analysis was used to compare the Likert-type physician ratings and

the NVS criterion values. One-way analysis of variance (ANOVA) was used to compare the average age of the health literacy NVS criterion groups and physician rating groups. Post hoc testing was performed using Tukey's test when a significant main effect was detected. Means and standard deviations were reported and interpreted for the ANOVA analysis. The correlation coefficients associated with physician ratings and NVS scores were compared between faculty and residents using the Z test. Chi-square analysis was performed when comparing groups on categorical outcomes. Unadjusted odds ratios (ORs) with 95% confidence intervals (95% CIs) were calculated when a significant main effect was detected for a chi-square analysis. Statistical significance was assumed at an alpha value of .05.

Results

The demographic characteristics of the sample are presented in Table 1. In contrast to the hypothesis, there were significant positive correlations between the first physician question which asked, "where do you perceive your patient's low health literacy risk to be at," and the patients' NVS numerical score of 1 to 6 (total score 6, $r = 0.49$, $P < .001$) as well as the scoring criteria set forth in the NVS document that determines if the patient was at risk for low health literacy (total score 6, $r = 0.48$, $P < .001$). Please see Table 2. For the overall health literacy of patients in regards to NVS scores, n

Table 1. Demographics.

Analysis	Variable	Level	Frequency (%)[a] or M (SD)[b]
Physicians			
	Academic level[a]		
		PGY-1	19 (12.6%)
		PGY-2	34 (22.7%)
		PGY-3	46 (30.7%)
		PGY-4	3 (2.0%)
		Faculty	48 (32.0%)
Patients			
	Gender[a]		
		Male	46 (30.7%)
		Female	103 (68.7%)
		Missing	1 (0.6%)
	Age[b]	-	50.2 (18.8)

[a]Values are frequency (percentage).
[b]Values are mean (standard deviation).

Table 2. Correlations With Physician Question.

Variable	Physician question	Total score	Criterion score
Physician question	-		
Total score	0.492[a]	-	
Criterion score	0.484[a]	0.955[a]	-

[a]Statistically significant, $P < .05$, Spearman correlations used.

= 41 (27.3%) participants scored at a level denoting "high likelihood of limited literacy." A further $n = 40$ (26.7%) participants scored at a level described as having a "possibility of limited literacy," and n = 69 (46.0%) scored at the level of "adequate literacy." When looking at physician ratings, they rated n = 28 (18.78%) participants as having "high likelihood of limited literacy," n = 55 (35.7%) participants as having the "possibility of limited literacy," and n = 67 (44.7%) participants as having "adequate literacy." See Table 3. For the Likert-type physician question 1, the median (Mdn) is 2.0 and the interquartile range is 2.0 to 3.0. An interesting finding was that within individuals that scored on the NVS denoting "high likelihood of limited literacy," the physicians rated that patients understood what they were saying 97.3% of the time.

When comparing the age of the 3 groups of NVS scores (high likelihood of limited literacy, possibility of limited literacy, and adequate literacy), a significant main effect was detected, $F_{(2147)} = 3.29$, $P = .04$. Post hoc testing with

Tukey's test found a difference in age with the "high likelihood of limited literacy" being significantly older (M = 55.93, SD = 20.55) than those with "adequate literacy" (M = 46.55, SD = 17.00), $P = .03$. There was not a significant difference in age between the ratings (high likelihood of limited literacy, possibility of limited literacy, and adequate literacy) given by physicians, $F_{(2147)} = 0.96$, $P = .39$. See Table 4.

Residents tended to use teach-back (n = 68, 66.7%) more often than faculty members (n = 19, 39.6%), OR = 3.05, 95% CI 1.50 to 6.21, $P = .002$. When comparing faculty and resident scores, there was not a difference between the correlations between their ratings and NVS scores (resident $r_s = 0.52$, $P < .001$, n = 102; faculty $r_s = 0.41$, $P = .004$, n = 48; $Z = 0.77$, $P = .44$). See Table 5. The relationship between using teach-back and physician ratings of patient literacy was not significant, $\chi 2(2) = 1.05$, $P = .59$. When comparing physician rankings of patient literacy to their belief that patients understand what is being told to them, a rather interesting and counterintuitive

Table 3. Survey Findings.

Surveys	Questions	Response	Frequency (%)[a] or M (SD)[b]
Physician ratings			
	Question 1[a]		
		High likelihood of limited literacy (50% or more)	28 (18.7%)
		Possibility of limited literacy	55 (36.7%)
		Adequate literacy	67 (44.7%)
	Question 2[a]		
		No	4 (2.7%)
		Yes	146 (97.3%)
	Question 3[a]		
		No	63 (42.0%)
		Yes	87 (58.0%)
NVS score			
	Final score[b]	-	3.9 (2.0)
	Score criteria[a]		
		High likelihood of limited literacy (50% or more)	41 (27.3%)
		Possibility of limited literacy	40 (6.7%)
		Adequate literacy	69 (46.0%)

Abbreviation: NVS, Newest Vital Sign.
aValues are frequency (percentage).
bValues are mean (standard deviation).

Table 4. Comparisons of Age.

Outcome		Groups	Values	P value
Age				
	Physician ratings			
		High likelihood of limited literacy (50% or more)	53.2 (17.4)	
		Possibility of limited literacy	51.4 (20.48)	
		Adequate literacy	47.9 (18.4)	.39
	NVS criterion groups			
		High likelihood of limited literacy (50% or more)	55.9 (20.6)	
		Possibility of limited literacy	50.5 (19.0)	
		Adequate literacy	46.6 (17.0)	.04

Abbreviation: NVS, Newest Vital Sign.

Table 5. Comparison of Correlation Coefficients Between Faculty and Resident.

Group	Correlation (r_s) between ratings and NVS scores	P value for correlation	Z value for comparison of correlations	P value for comparison of correlations
Residents (n = 102)	0.52	<.001		
Faculty (n = 48)	0.41	.004	0.77	.44

Abbreviations: r_s, Spearman correlation; NVS, Newest Vital Sign.

finding was yielded. Of the n = 28 patients that physicians ranked as having a high likelihood of limited literacy, the vast majority of those physicians (n = 25, 89.3%) also believed that the patients understood what they were being told in the clinic, $P = .012$.

Discussion

Through this research, we found that physician ratings correlate moderately and significantly with how the patients scored on the NVS, meaning there was a significant positive correlation between the physicians' perceptions of patients' risk of low health literacy and actual patient NVS score. Using the NVS in a family medicine clinic provided researchers with a better understanding of their patient populations' risk of low health literacy with over 1 in 4 patients in our study having a high likelihood of low health literacy in the population treated at the University Family Physicians Clinic in Knoxville, TN. This aligns with research stating that "nearly 36% of adults in the U.S. have low health literacy".[18] When comparing the patients' risk score with the physicians' perceived risk score, physicians tended to score accurately at the level of "adequate literacy." At the level of "high likelihood of limited literacy," physicians underscored their patients as they believed that only 18.78% had a risk of low health literacy, while 26.7% of patients scored as being at risk. This discrepancy in scoring reflects what was previously mentioned by Davis in that our physicians may not be recognizing the risk of low health literacy in their patients, or they lack the confidence in identifying at-risk patients.[14]

Physicians in this study felt they effectively communicated with their patients as 97.3% of physicians scored that their patient understood what they were saying. More specifically, even when physicians scored their patients as having a "high likelihood of limited literacy," they still rated that their patients understood what they were saying. This might be due to the physician using teach-back, which has been shown to increase retention;[19] however, 35.7% of physicians did not use teach-back within this patient risk group, even though it is recommended as a standard of practice by the AAFP, the AHRQ, and the IHI.[8] Additionally, it is known that physicians tend to overestimate their communication skills which could explain why they stated that their patients in that risk group understood what they were saying.[20]

While there was not a difference in the correlations between their ratings and NVS scores comparing residents and faculty, residents were more likely to use teach-back with their patients and thus follow the recommendations from AAFP, AHRQ, and IHI. This could be due to the emphasis placed on teach-back either in medical school or within their graduate medical education curriculum in which case it would be fresher on residents' minds than faculty's minds.

Researchers found that patients who scored as a "high likelihood of limited literacy" on the NVS were significantly older than those with adequate literacy. This is in agreement with the literature stating that the risk of low health literacy increases with age.[21] Physician ratings of low health literacy risk did not correlate with age and were not significant. This may indicate that physicians were not basing their perception of risk of the patient's age.

We found that our Family Medicine physicians and residents may need further training to better identify patients that are at risk for low health literacy. Many studies have reported an improved understanding of health literacy, increased communication skills, and more frequent use of communication techniques like teach-back as a result of a health literacy workshop or integrated curriculum in medicine.[22–24] Researchers hope to offer health literacy and teach-back training to residents in the near future.

A strength of this research included using NVS to find the risk of low health literacy among the population that uses the University Family Physicians Clinic. In addition, it highlighted that physicians believed they were strong communicators, regardless of their patients' health literacy risk.

Limitations

There were some limitations to this research. One limitation was that this was a small sample of patients that attend the University of Family Physicians Clinic. The population from which this sample was taken is not representative of the entire population, but the study does generate some evidence related to Appalachian populations in the Southeastern United States. Causal inferences cannot be made from this study due to the lack of randomization in selecting participants. Measurement error is also a possibility with the lack of psychometric validation for the questions asked to physicians. The NVS is a validated instrument, and some significance was detected with the physician ratings, but future studies should use validated instrumentation when assessing the physicians' perception of health literacy. Confounding phenomena that may alter the association between physician ratings and NVS scores, if those phenomena exist, were not accounted for in a multivariate fashion.

Conclusion

Over 1 in 4 patients at the University Family Physicians Clinic from our study had a high likelihood of limited health literacy. Physicians correctly scored their patients' health literacy risk 55.3% of the time; however, 97.3% of the time they believed their patient understood what they were saying, regardless of their perceived health literacy risk of their patient. The NVS is a useful tool to identify which patients might be at risk for low health literacy. It is beneficial to analyze physicians' perceived risk of their patients' health literacy as well as their perceptions on if their patient understood what they were saying.

Authors' Note

Sarah E. Burton is also affiliated at US Department of Energy Office of Scientific and Technical Information, 1 Science.gov Way, Oak Ridge TN, USA.

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Supplemental Material

Supplemental material for this article is available online.

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