



DETERMINING THE RELIABILITY AND VALIDITY OF THE NEWEST VITAL SIGN IN THE INPATIENT SETTING

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OUTLINE

- Objectives
- Introduction
- Review of Literature
- Methods
- Statistics
- Timeline



INTRODUCTION



DEFINING HEALTH LITERACY

***“The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”
– Institute of Medicine ¹***

¹Institute of Medicine (2004). *Health Literacy: A Prescription to End Confusion*. Washington, DC: Institute of Medicine, Board on Neuroscience and Behavioral Health, Committee on Health Literacy.

LITERACY VS HEALTH LITERACY

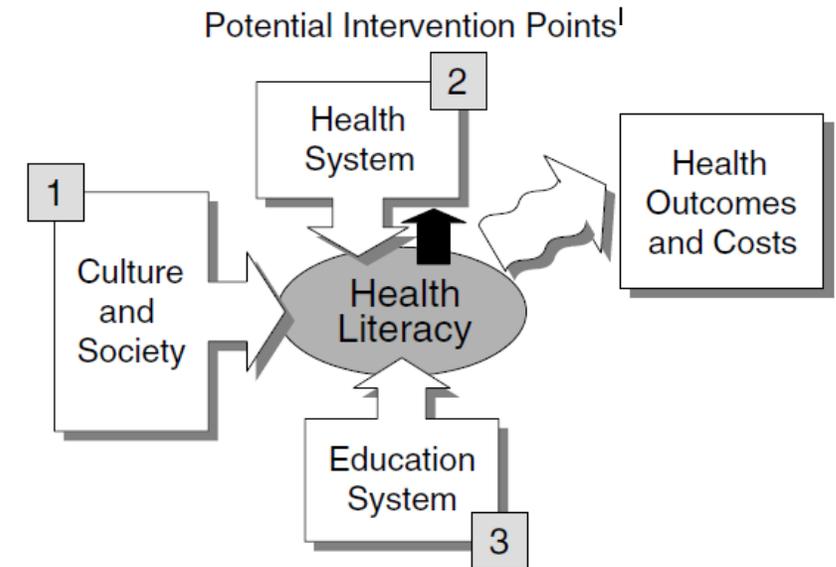
- **Literacy** is the ability to read and write
- **Numeracy** is the ability to understand and work with numbers
- **Health literacy** includes the *literacy* as well as *numeracy*
 - the ability to understand the written word as well as numbers
 - the ability to comprehend and apply basic health information

IMPORTANCE OF HEALTH LITERACY

Why is it important to know a patient's health literacy level?

- Patient is more responsible for their health decisions and need to understand health related information in order to know how to manage medications and appointments²
- If you know a patient has higher health literacy, you can tailor education to that patient and improve health outcomes

“Health literacy is of concern to everyone involved in health promotion and protection, disease prevention and early screening, healthcare maintenance, and policy making.”¹
–Institute of Medicine



¹Institute of Medicine (2004). *Health Literacy: A Prescription to End Confusion*. Washington, DC: Institute of Medicine, Board on Neuroscience and Behavioral Health, Committee on Health Literacy.

²American Medical Association. Ad hoc committee on health literacy for the council on scientific affairs, health literacy: Report of the council on scientific affairs. *JAMA*. 1999;281(6):552-557.

NATIONAL ASSESSMENT OF ADULT LITERACY

National Center for Education Statistics³:

Table 2.1 2003 National Assessment of Adult Literacy categories according to scores^{1 2}				
	<i>Below Basic⁴</i>	<i>Basic⁵</i>	<i>Intermediate⁶</i>	<i>Proficient⁷</i>
Prose ³	0-209	210-264	265-339	340-500
Document ³	0-204	205-249	250-334	335-500
Quantitative ³	0-234	235-289	290-349	350-500

¹Hauser RM, Edley CFJ, Koenig JA, Elliott SW. Measuring literacy: Performance levels for adults, interim report. *National Academies Press*. 2005.

²Kutner M, Greenburg E, Jin Y, Paulsen C. The health literacy of America's adults: Results from the 2003 national assessment of adult literacy. National Center for Education Statistics. <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006483>. Updated September 6, 2006. Accessed September 4, 2013.

³Score out of 500

⁴Indicates no more than the most simple and concrete health literacy scale

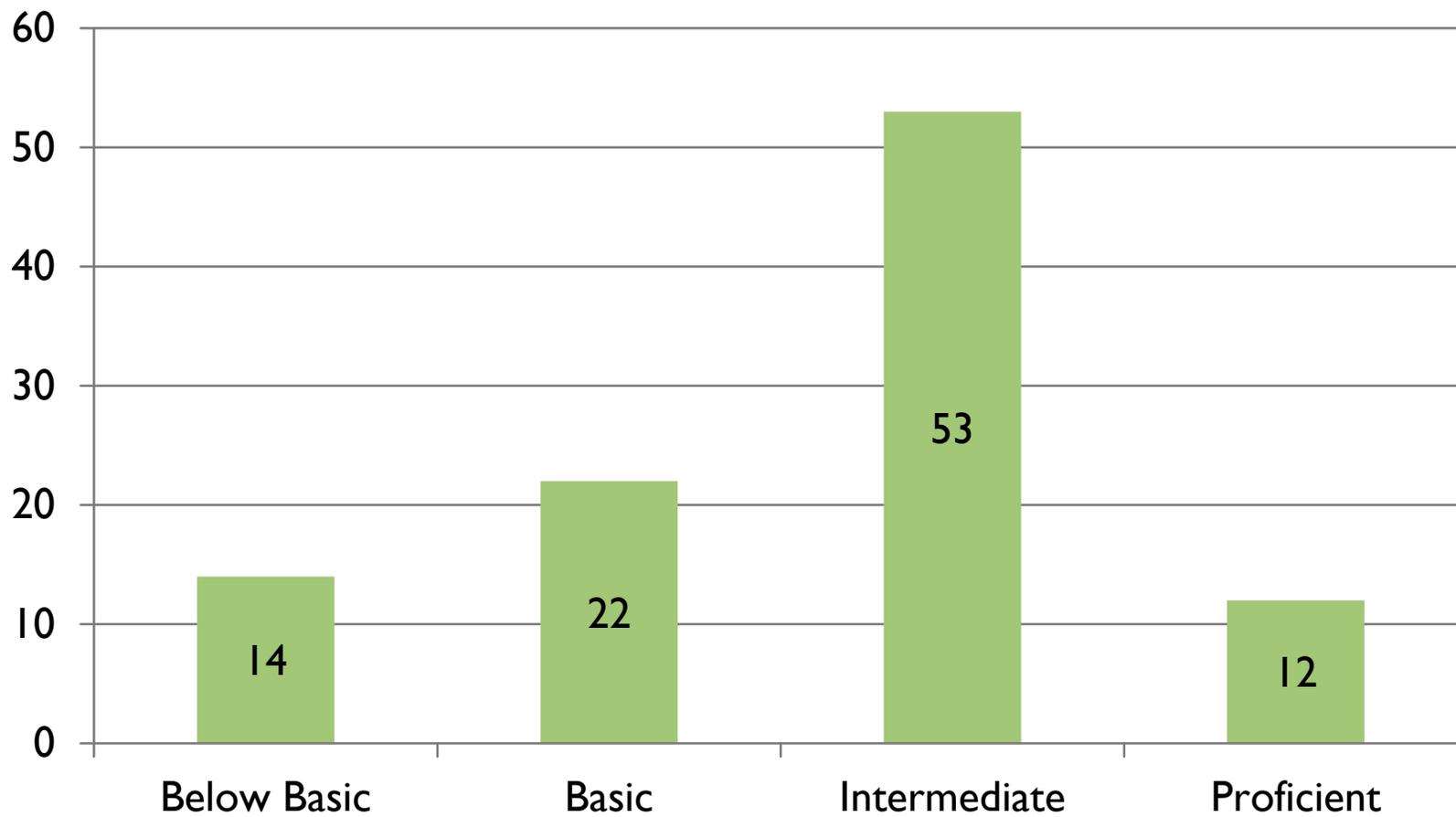
⁵indicates skills necessary to perform simple and everyday literacy activities

⁶indicates skills necessary to perform moderately challenging health literacy activities

⁷indicates skills necessary to perform more complex and challenging health literacy activities

RESULTS OF NAAL

Health Literacy of US 2003



MEASURING HEALTH LITERACY

1991

Rapid Estimate of
Adult Literacy
(REALM)

1995

Test of Functional
Health Literacy in
Adults (TOFHLA)

1999

Short-form Test of
Functional Health
Literacy in Adults
(S-TOFHLA)

2005

Newest Vital Sign
(NVS)



OBJECTIVES



OBJECTIVES

1. Determine the reliability of the NVS in the inpatient setting
2. Determine the validity of the NVS in the inpatient setting using the Short Test of Functional Health Literacy in Adults (S-TOFHLA) as the criterion.
3. Compare the performance of the Newest Vital Sign with existing health literacy measurements (S-TOFHLA).
4. Determine if health literacy level of patients differs by demographic characteristics including race, income, and education level.
5. Determine if health literacy level of patients is associated with diabetes mellitus management



REVIEW OF LITERATURE



HEALTH LITERACY AND DEMOGRAPHICS

2003 National Assessment of Adult Literacy categories by demographics³

	Below Basic (%)	Basic (%)	Intermediate (%)	Proficient (%)
All Adults (%) ²	14	22	53	12
Gender				
Male (%)	16	22	51	11
Female (%)	12	21	55	12
Race and Ethnicity				
White	9	19	58	14
Black	24	34	41	2
Hispanic	41	25	31	4
Age				
16-18	11	23	58 ^a	8
19-24	10	21	58 ^a	11
25-39	10	18	55 ^a	16
40-49	11	21	56 ^a	12
50-64	13	21	53 ^a	12
65+	29	30	38 ^b	3
Education				
<High School	49	27	23	1
High School	15	29	53	4
Some College	5	20	67	8
Bachelor Degree	3	10	60	27
Graduate Degree	3	8	57	33

- Gender
 - No statistically significant difference in health literacy status by gender³⁻⁶
- Race and Ethnicity
 - White adults higher health literacy³
 - Blacks have higher prevalence of low health literacy⁷
- Age
 - As age increases, health literacy decreases^{3,5-9}
 - Adults ≥65 had highest proportion of individuals with below basic literacy³

³Kutner M, Greenburg E, Jin Y, Paulsen C. The health literacy of America's adults: Results from the 2003 national assessment of adult literacy. National Center for Education Statistics. <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006483>. Updated September 6, 2006. Accessed September 4, 2013.

⁴Kirk JK, Grzywacs JG, Arcury TA, et al. Performance of health literacy tests among older adults with diabetes. *J Gen Intern Med.* 2012;27(5):534-540.

⁵Piatt GA, Valerio MA, et al. Health literacy among insulin-taking African Americans: A need for tailored intervention in clinical practice. *The Diabetes Educator.* 2014;40(2):240-246

⁶Patel PJ, Steinberg J, Goveas R, et al. Testing the utility of the newest vital sign (NVS) health literacy assessment tool in older African-American patients. *Patient Educ Couns.* 2011;85:505-507

⁷Pasche-Orlow MK, Parker RM, et al. The Prevalence of Limited Health Literacy. *J Gen Intern Med.* 2005;20:175-184.

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. *Patient Educ Couns.* 1999;38:33-42

⁹Dennison CR, McEntee ML, et al. Adequate health literacy is associated with higher heart failure knowledge and self care confidence in hospitalized patients. *J Cardiovasc Nurs.* 2011;26(5):359-367.

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Income

- Some research has shown that those with marginal or inadequate health literacy are more likely to have a lower annual income¹¹
- Other research shows association (compared to low literacy patients, higher percentage of adequate literacy participants had higher annual income)¹²

Education

- Moderate associations between number of years of school completed and functional health literacy⁸
- Mixed evidence in the research – can education level predict health literacy status?
 - Years of school completed is not accurate indicator of actual education attainment¹⁰

³Kutner M, Greenburg E, Jin Y, Paulsen C. The health literacy of America's adults: Results from the 2003 national assessment of adult literacy. National Center for Education Statistics. <http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2006483>. Updated September 6, 2006. Accessed September 4, 2013.

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. Patient Educ Couns. 1999;38:33-42

¹⁰Gazmararian JA, Baker DW, et al. Health Literacy Among Medicare Enrollees in a Managed Care Organization. JAMA. 1999;281:545-551.

¹¹Wolf MS, Gazmararian JA, et al. Health Literacy and Functional Health Status Among Older Adults. Arch Intern Med. 2005;165:1946-1952.

¹²Aboumatar HJ, Carson KA, et al. The impact of health literacy on desire for participation in healthcare, medical visit communication, and patient prepped outcomes among patients with hypertension. J Gen Intern Med. 2013;28(11):1469-76.

HEALTH LITERACY AND HEALTH CHARACTERISTICS

- Is health literacy associated with higher rates of chronic diseases and poorer disease management?
 - Limitations in the research

Health literacy and Diabetes

- Wolf et al¹¹: participants with lower health literacy, compared to those with higher health literacy, had higher rates of diabetes mellitus (19% vs 13% respectively, $p < 0.001$).
- Piatt et al⁵: patients with diabetes and lower health literacy were 6.2 times more likely, to have an A₁C of $\geq 8\%$ ($p < 0.01$) than those with adequate health literacy.

⁵Piatt GA, Valerio MA, et al. Health literacy among insulin-taking African Americans: A need for tailored intervention in clinical practice. The Diabetes Educator. 2014;40(2):240-246

¹¹Wolf MS, Gazmararian JA, Baker DW. Health literacy and functional health status among older adults. Arch Intern Med. 2005;165:1946-1952

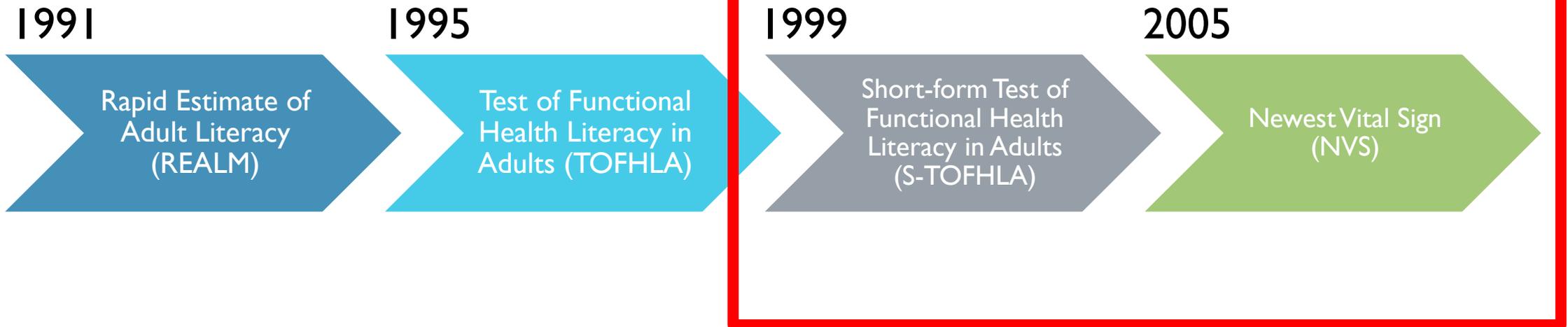
HEALTH LITERACY AND HEALTH DISPARITIES

- **Inverse Information Law¹⁷**
 - Individuals with naturally low levels of health literacy are at a lower likelihood to experience traditional education (noted to be sitting down and teaching) from a physician. They also have decreased ability to understand and apply information that they do receive. Therefore, those with lower health literacy do not receive or understand proper health education or care, and in turn health continues to decline.
- **Ad Hoc Committee 2011²**
 - “groups with the highest prevalence of chronic disease and greatest need for health care had the least ability to read and comprehend information needed to function as a patient”

²American Medical Association. Ad hoc committee on health literacy for the council on scientific affairs, health literacy: Report of the council on scientific affairs. JAMA. 1999;281(6):552-557.

¹⁷Rowlands GP, Nutbeam C. Health literacy and the 'inverse information law'. Brit J Gen Pract. 2013;63(608):120-121.

MEASURING HEALTH LITERACY



SHORT-FORM TEST OF FUNCTIONAL HEALTH LITERACY IN ADULTS (S-TOFHLA)

- Parker et al 1995¹⁸
 - Developed the **Test of Functional Health Literacy in Adults (TOFHLA)**
 - Assessed patient's ability to comprehend numerical information and prose passages
 - Used actual hospital texts widely used by patients to create the comprehension section and numerical section
 - Used REALM as criterion instrument to determine validity
- TOFHLA took over 20 minutes to complete – need for more time efficient assessment
 - Short form Test of Functional Health Literacy in Adults based on items from the TOFHLA

¹⁸Parker RM, Baker DW, et al. The test of functional health literacy in adults: a new instrument for measuring patients' literacy skills. J Gen Intern Med. 1995;10:537-541.

CREATING THE S-TOFHLA

Baker et al 1999⁸

- Data used from Williams et al² to determine which items from the TOFHLA would be best for the S-TOFHLA
 - Based on frequency of use in health care setting and what percentage of patients completed the item correctly in Williams et al¹⁹
- Comprehension section
 - 36 items that use a modified Cloze procedure
 - 2 prose passages,
 - Passage A 4th grade reading level
 - Passage B 10th grade reading level
- Numerical section
 - 4 numeracy items selected from original TOFHLA

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. *Patient Educ Couns.* 1999;38:33-42

¹⁹Williams MV, Parker R, Baker D. Inadequate functional health literacy among patients at two public hospitals. *J Am Med Assoc* 1995;274:1677-82

COMPREHENSION QUESTION FROM S-TOFHLA

Your doctor has sent you to have a _____ X-ray.

- a. stomach
- b. diabetes
- c. stitches
- d. germs

NUMERICAL QUESTION FROM S-TOFHLA

GARFIELD IM 16 Apr 93
FF941858 Dr. LUBIN, MICHAEL

PENICILLIN VK
250MG 40/0
Take one tablet by mouth four
times a day

02 (4 of 40)

PROMPT 1:

If you take your first tablet at 7:00am, when should you take
the next one? _____

And the next one after that? _____

What about the last one for the day, when should you take
that one? _____

*Be sure you read 7:00 am and not “in the morning.” Part of
the test intention for this prompt is to determine if the
patient understands that “a.m.” means “morning”

SCORING THE S-TOFHLA

Correct Answers

- Comprehension questions only have 1 correct answer
- Answers for numeracy questions may vary depending on the prompt
 - *Prompt 1: Variations in lifestyles, therapeutic results of medications, and preferences among physicians necessitate accepting a range of responses as correct. Any time interval that is ≥ 3 hours or ≤ 6 hours is acceptable for all three questions about this prompt. This takes into account calculating does intervals from a 12-hour through a 24- hour day.*

Scoring the questions

- Fewer items than the TOFHLA, scoring each individual item could not be the same
- Linear regression used to determine the weight of each selected items
 - 2 points for each comprehension item (72 points total)
 - 7 points for each numeracy item (28 points total)
- 100 points possible

INTERPRETING SCORES

SCORE	LITERACY CATEGORY
0-53	INADEQUATE
54-66	MARGINAL
67-100	ADEQUATE

RELIABILITY AND VALIDITY THE S-TOFHLLA

Baker et al 1999⁸:

- Methods
 - Participants recruited when arrived for appointments with physicians, convenience sample
 - Demographic information collected first
 - S-TOFHLLA administered, then REALM administered (criterion)
- Statistics
 - Internal consistency reliability assessed using Cronbach's α
 - Criterion validity using Spearman's correlation coefficient , REALM as criterion

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. Patient Educ Couns. 1999;38:33-42

RELIABILITY AND VALIDITY THE S-TOFHLA

Baker et al 1999⁸:

- Results
 - N = 211
 - Internal consistency
 - Reading comprehension portion, $\alpha = 0.97$
 - Numeracy portion, $\alpha = 0.68$
 - Criterion validity
 - Total S-TOFHLA, $\rho = 0.80$
 - Reading comprehension portion, $\rho = 0.81$
 - Numeracy portion, $\rho = 0.61$
 - Takes approximately 12 minutes to administer

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. Patient Educ Couns. 1999;38:33-42

RELIABILITY AND VALIDITY THE S-TOFHLA

- Author Conclusions⁸
 - Reliability and validity of S-TOFHLA was strong
 - S-TOFHLA is a better resource than the TOFHLA fro the clinical setting because it requires less time
- Limitations
 - Good agreement between S-TOFHLA and REALM on extremes (adequate vs inadequate)
 - Difficult to test associations between middle range on REALM with marginal range on S-TOFHLA
 - No statistics were done to validate these specific associations

⁸Baker DW, Williams MV, Parker RM, et al. Development of a brief test to measure functional health literacy. Patient Educ Couns. 1999;38:33-42

DEVELOPMENT OF THE NEWEST VITAL SIGN (NVS)

- Phase 1: Development²⁰
 - Experts created scenarios with subsequent questions to test an individual's ability to read, comprehend, and apply health-related information (each scenario emphasized a different literacy skill needed to understand the material)
 - All scenarios were given to 1000 patients
 - Patients gave feedback on whether the scenarios were understandable and relevant
 - Interviewers gave feedback on the ease of the scoring
- Phase 2: Validation¹
 - After feedback was collected, 5 scenarios were selected and validated against the TOFHLA

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

CHOOSING THE SCENARIO FOR THE NVS²⁰

SCENARIO	Cronbach's α	Pearson's r
Prescription for headache medication	0.23	0.43
Consent form for coronary angiography	0.40	0.51
Heart failure self-care instructions	0.38	0.20
Nutrition label from an ice cream container	0.76	0.59
Instructions for asthma medication	0.66	0.35

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

SCORING NVS

Correct Answers²⁰

- Every question has 1 correct answer, without exceptions
- Each question counts for 1 point
 - Correct answer = 1
 - Incorrect answer = 0

Scoring the questions¹

- When assessment is complete, combine scores for each question
- 6 points possible

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

SENSITIVITY AND SPECIFICITY

Sensitivity refers to the people who have low health literacy who are actually identified as having low health literacy

Specificity refers to the people who do not have low health literacy who are actually identified as not having low health literacy

- Receiver Operating Characteristic (ROC) curve used to determine the sensitivity and specificity of the literacy cut-off scores²⁰
 - Score < 2 had 72% sensitivity and 87% specificity (72% chance that individual truly had limited health literacy and 87% chance that individual truly did not have adequate health literacy)
 - Score < 4 had 100% sensitivity and 64% specificity

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

INTERPRETING SCORES²⁰

SCORE	LITERACY CATEGORY*
0-1	>50% chance of having inadequate health literacy
2-3	Possibility of limited health literacy
4-6	Adequate health literacy

*Author does not describe what to expect from patients with possible limited health literacy and >50% chance of having inadequate health literacy

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

NVS CONCLUSIONS

- Author Conclusions²⁰
 - NVS with the ice cream label has good sensitivity and reliability to qualify it as an appropriate assessment tool
 - Specificity may overestimate those with limited literacy, but using the test can alert physicians to patients who may need more attention and help physicians focus on communication
 - Specificity similar to other screening methods used in the clinical setting,
 - only clinical literacy screening method to be administered in 3 minutes or less
- Limitations
 - Sample used in the study did not represent all primary care practices in the US

²⁰Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: The newest vital sign. *Annals of Family Medicine*. 2005;3(6):514-522.

VALIDATING THE NEWEST VITAL SIGN: OSBORN ET AL 2007²¹

- Purpose
 - To compare the performance of the NVS with existing literacy measures
- Methods
 - 2 studies: NVS vs REALM and NVS vs S-TOFHLA
 - Recruited from group of patients who scheduled an appointment in a primary care clinic
 - Demographic information collected *before* administering the assessment tools
 - S-TOFHLA was administered first, then NVS
 - Order of test administration was not randomized, same for every patient
- Statistics
 - Pearson's coefficient was used to determine internal consistency
 - Spearman's rank correlation coefficient was used to determine criterion validity between the NVS and S-TOFHLA categories
 - ROC curve used to determine sensitivity and specificity of NVS scoring cut-offs as pre-determined by Weiss et al 2005

²¹Osborn CY, Weiss BD, Davis TC, et al. Measuring adult literacy in health care: performance of the newest vital sign. Am J Health Behav. 2007;31:S36-S46.

OSBORN ET AL 2007²¹

- Results
 - n = 119
 - Sample: predominantly middle aged, women, African American, education of high school or lower
 - Pearson's coefficient, **r = 0.61**
 - Spearman's rank correlation coefficient, **rho = 0.59**
 - Area under the ROC curve = **0.73 (95% CI 0.70- 0.78)**

²¹Osborn CY, Weiss BD, Davis TC, et al. Measuring adult literacy in health care: performance of the newest vital sign. Am J Health Behav. 2007;31:S36-S46.

OSBORN ET AL 2007²¹

■ Author Conclusions

- NVS would be useful in the clinical setting (sensitive enough), but should not be used in research (specificity and sensitivity are required to both be high)
 - Items on NVS were more difficult for patients to answer correctly, only 19% of those who scored high on S-TOFHLA were able to adequately perform on the NVS
- NVS correctly identified practically all patients with inadequate literacy as determined by S-TOFHLA

■ Limitations

- No randomization for which test was administered, confounding variable of interview fatigue

²¹Osborn CY, Weiss BD, Davis TC, et al. Measuring adult literacy in health care: performance of the newest vital sign. Am J Health Behav. 2007;31:S36-S46.

VALIDATING THE NEWEST VITAL SIGN: KIRK ET AL 2011⁴

- Purpose
 - Evaluate and compare three measures of health literacy and performance **among older patients with diabetes**
- Methods
 - After demographic information was collected, patient assigned to complete S-TOFHLA and *either* NVS or REALM-SF
 - Recruited from sites (places, organizations, services) used by members of older adults with diabetes
 - Demographic information collected before administering the assessment tools
 - S-TOFHLA was administered to all participants, NVS administered to half (randomly assigned)
- Statistics
 - Only participants who were able to complete all assigned health literacy tests were included in statistical analysis
 - Only Pearson's coefficient was used

⁴Kirk JK, Grzywacs JG, Arcury TA, et al. Performance of health literacy tests among older adults with diabetes. J Gen Intern Med. 2012;27(5):534-540.

KIRK ET AL 2011⁴

- Results
 - n = 563
 - 200 participants completed both the numeracy portion of the S-TOFHLA and the NVS
 - Sample description: Older Adults with diabetes, older American (>65 years), majority female and above poverty level
- Statistics
 - Only participants who were able to complete all assignments were included in statistical analysis
 - Pearson bivariate correlation between S-TOFHLA and NVS, **r = 0.54**
 - Pearson bivariate correlation between NVS and comprehension portion of S-TOFHLA, **r = 0.50**
 - Pearson bivariate correlation between NVS and numeracy portion of S-TOFHLA, **r = 0.39**

⁴Kirk JK, Grzywacs JG, Arcury TA, et al. Performance of health literacy tests among older adults with diabetes. J Gen Intern Med. 2012;27(5):534-540.

KIRK ET AL 2011⁴

- Author Conclusions
 - NVS is not a valid tool to use with older adults
 - Suggests that age may have had an impact on the ability to complete the assessment, and incompleteness did not necessarily imply inadequate health literacy level
 - Differences in assessment content may provide explanation for low correlation
 - S-TOFHLA is intended to capture entire domain of health literacy, NVS is heavily numeracy
- Limitations
 - Author over-extends the data by assuming the fatigue, and even differences between completers and non-completers are because of age only

⁴Kirk JK, Grzywacs JG, Arcury TA, et al. Performance of health literacy tests among older adults with diabetes. J Gen Intern Med. 2012;27(5):534-540.

SUMMARY

- There are mixed conclusions/mixed evidence that the NVS is a valid and reliable instrument to assess health literacy
- Associations between demographic information and health literacy status may depend on what instrument is measuring health literacy
- Need for validation of the NVS in the inpatient setting
- Strategies we will take from these studies:
 - Collect demographic info first
 - We will randomize which test is administered first to avoid confounding variable of fatigue
 - Statistical analysis for NVS against whole S-TOFHLA, as well as separately against comprehension and numeracy portion



METHODS



STUDY DESIGN

- Design:
 - Non-experimental, cross-sectional design
- Study Setting
 - Rush University Medical Center (RUMC)
- Sampling Frame
 - Convenience sampling frame
 - Diet technician and graduate student will use EPIC to identify patients who have been admitted

RECRUITMENT

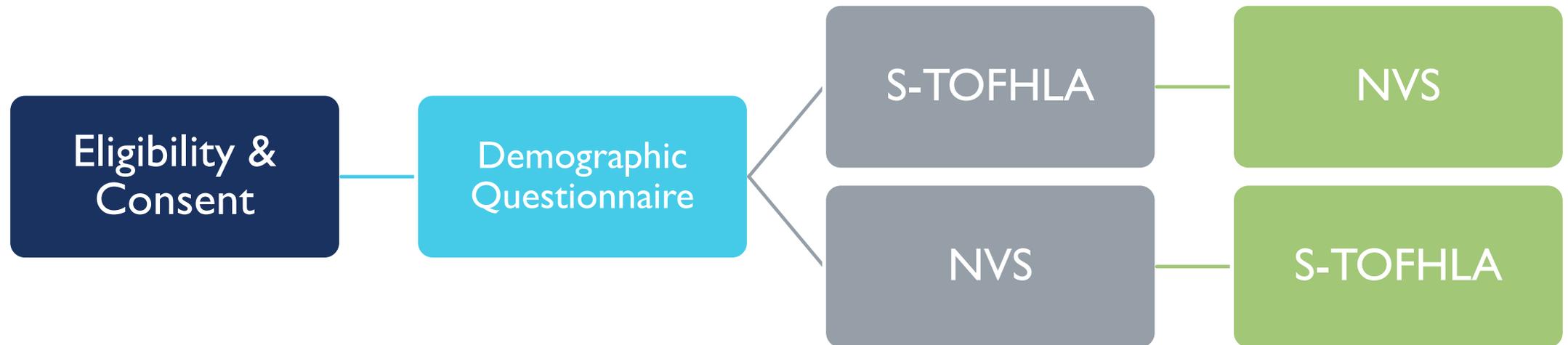
Clinician of record will use EPIC to identify new patients, will approach patient to determine if they are interested

- If patient is not available after 3 approaches, patient will not be recruited and will not be eligible
- Will emphasize that participants will be required to read text (hopefully reduce drop out)

Graduate student will determine eligibility using a script and screening tool to assess coherence

- Inclusion criteria
 - 18 years or older
 - Ability to read and speak English
 - Oriented to time, place
 - Accept an invitation to the study at any time during admission
- Exclusion Criteria
 - Patients in the intensive care unit, OB floors, and psych floors

DATA COLLECTION



ADMINISTERING THE S-TOFHLA

- Participants will be given a hard-copy of the comprehension portion of the S-TOFHLA with a sanitized pencil
 - Participants will fill it out and answers will be recorded on Survey Monkey after interview
 - Comprehension portion is timed, 7 minutes according to S-TOFHLA instructions. When 7 minutes is up, graduate student will tell the participant “That should give us what we are looking for. Thank you for your cooperation.”
- Participants will be given prompts (prescription bottle, appointment slip, etc) for numeracy portion and the NVS
 - All prompts will be laminated and sanitized between each interview
 - Graduate student will read questions to the participant, participant will answer orally and answers will be recorded in Survey Monkey by graduate student.
 - Numeracy portion is not timed. Time to answer questions will be recorded.



STATISTICS



OBJECTIVES

1. Determine the reliability of the NVS in the inpatient setting
 - We will conduct a Cronbach's α test to measure reliability. An acceptable value will be considered 0.8
2. Determine the validity of the NVS in the inpatient setting using the Short Test of Functional Health Literacy in Adults (S-TOFHLA) as the criterion.
 - A Spearman's rho (nonparametric) or Pearson's r (parametric) between the NVS and total S-TOFHLA to assess agreement between the two tests. Same tests will be conducted between the NVS and the sub scores of the S-TOFHLA (comprehension and numeracy). Cohen's kappa will also be conducted to assess agreement between NVS and S-TOFHLA final score

OBJECTIVES

3. Compare the performance of the Newest Vital Sign with existing health literacy measurements (S-TOFHLA).
 - Mann Whitney or Kruskal-Wallis one-way analysis of variance (abnormal distribution)
 - T-test or chi-square for categorical variables (normal distribution)
4. Determine if health literacy level of patients differs by demographic characteristics including race, income, and education level.
 - Mann Whitney or Kruskal-Wallis one-way analysis of variance (abnormal distribution)
 - T-test or chi-square for categorical variables (normal distribution)
5. Determine if health literacy level of patients is associated with diabetes mellitus
 - Mann Whitney or Kruskal-Wallis one-way analysis of variance (abnormal distribution)
 - T-test or chi-square for categorical variables (normal distribution)

OBJECTIVES

5. Determine if health literacy level of patients is associated with diabetes mellitus



TIMELINE



October - December

- DATA COLLECTION

January - February

- STATISTICAL ANALYSIS

March - April

- WRITE THESIS

May 2015

- DEFEND THESIS



QUESTIONS?

