

Issues in Methods and Measurement Health Numeracy

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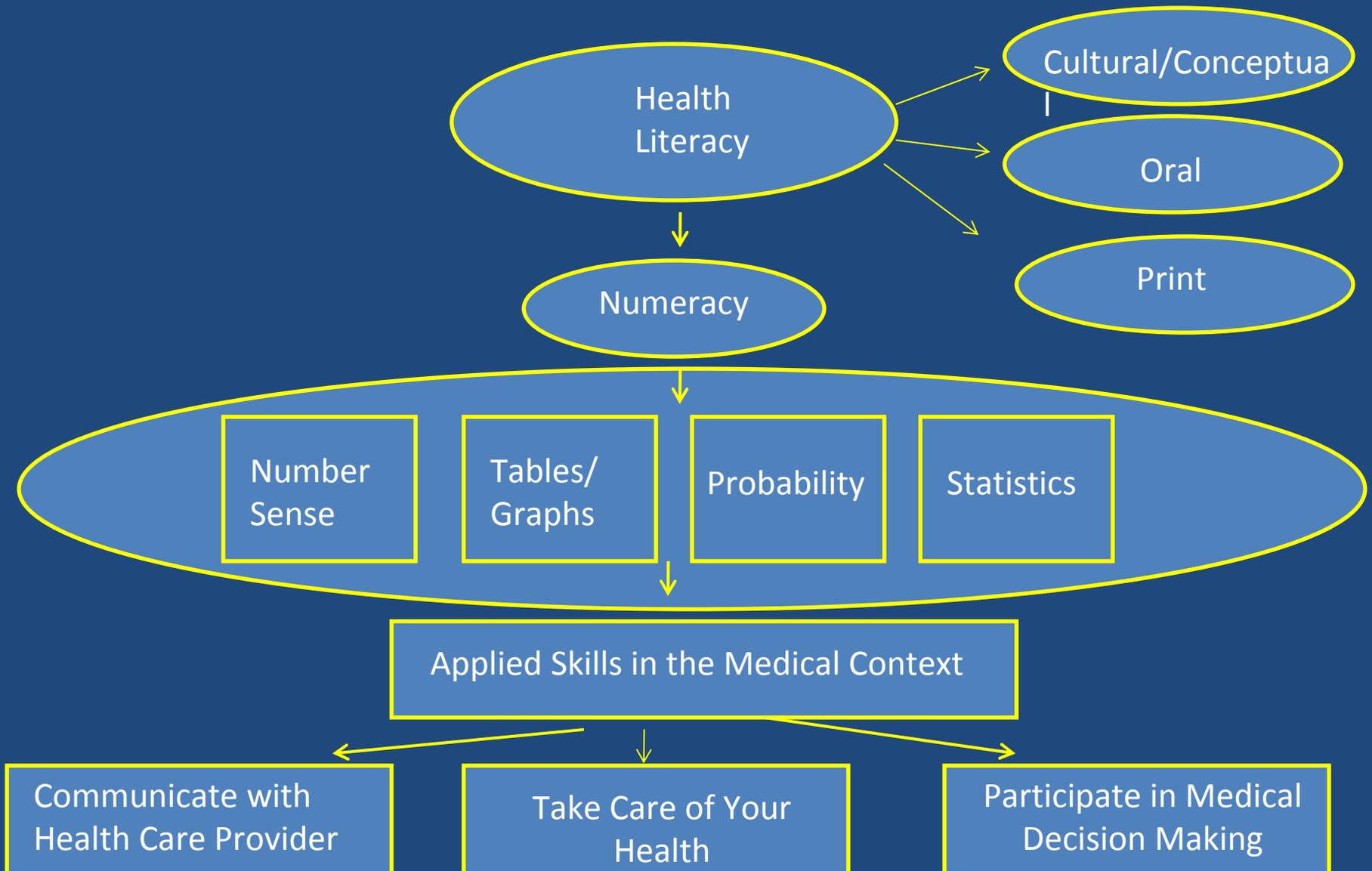
Discussion Points

- A framework for the study of health numeracy
- A framework for the types of skills we measure in health numeracy
- Very brief review of existing health numeracy measures
- Justification for developing the Numeracy Understanding in Medicine Instrument (NUMi)
 - Brief overview of methods
 - Sample of focus group data and test items

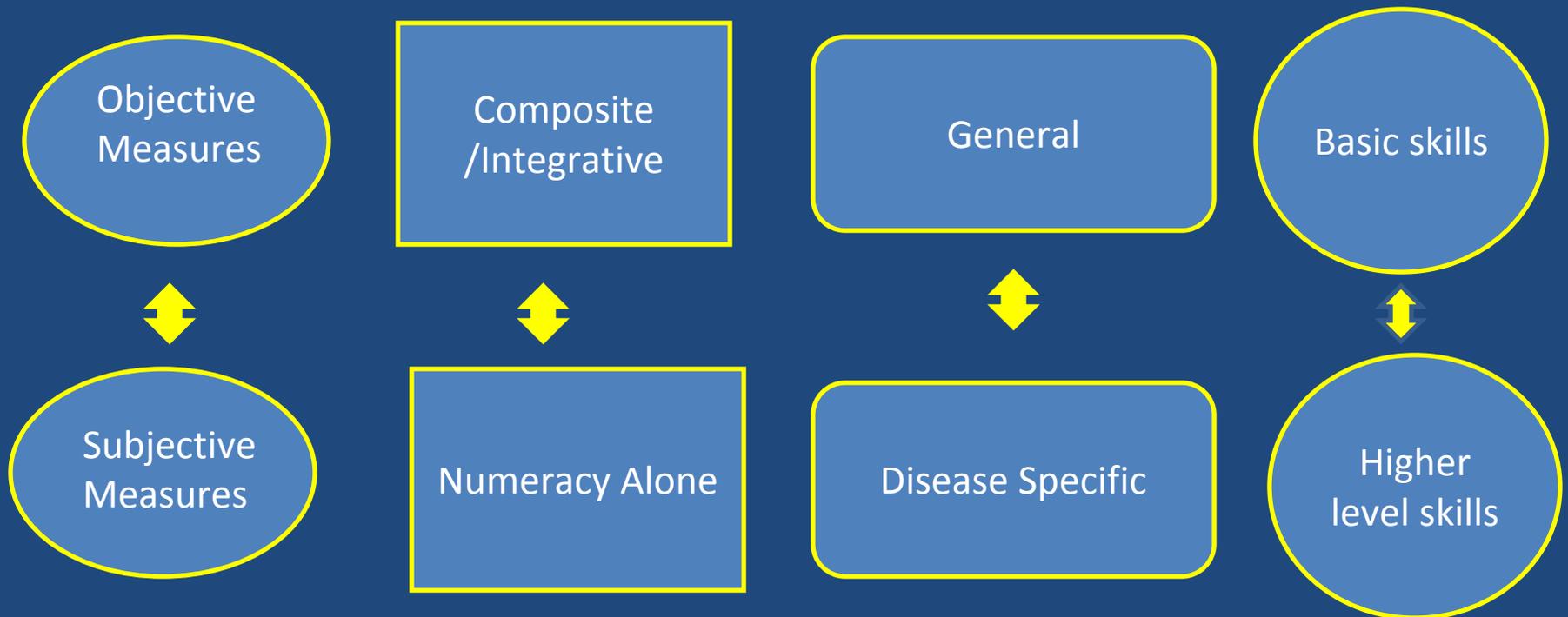
Definition of Health Numeracy

The ability to understand medical information presented with numbers, tables and graphs, probability, and statistics and to use that information to communicate with your health care provider, take care of your health, and participate in medical decisions

Framework for Health Numeracy



Approaches to the Measurement of Numeracy



Existing Health Numeracy Measures: Composite and Integrated Assessments

Test	Skills Assessed
NALS/TALS/HALS (Educational Testing Service)	Basic math operations, use of tables and graphs, use of quantitative data embedded in text.
TOFHLA Numeracy Component (Parker, Baker, et al.)	Functional tasks using numbers such as following a prescription, scheduling an appointment, reading insurance forms.
The Newest Vital Sign (Weis et al.)	Reading and interpreting a nutrition label

General Health Numeracy Measures

Measure	Skills Assessed
Schwartz 3-Item Numeracy Scale	Probability, ratio concepts
Lipkus Expanded Numeracy Scale	Comparison of risk magnitudes, class-inclusion judgments
Decision Research Expanded Numeracy Test (Peters et al.)	Positive predictive value
Medical Data Interpretation Test (Schwartz, Woloshin, Welch, et al.)	Clinical research design, inferential reasoning, framing of risk effects

Disease Specific Health Numeracy Measures

Measure	Skills Assessed
Asthma Numeracy Skills (Apter)	Tapering prednisone correctly Converting % to frequency for risk info. Interpreting levels of Peak Flow Meter
Diabetes Numeracy Test (Huizinga)	Items on nutrition, exercise, blood glucose monitoring, taking oral medications, taking insulin
Warfarin Management (Estrada)	Schwartz 3-Items; taking coumadin pills correctly; interpreting INR

Subjective Numeracy Tests

Test	Skills Assessed
STAT-Interest and STAT-Confidence (Woloshin, Schwartz, & Welch)	Perceived ability to understand and interpret statistics, interest in medical statistics in the medical
Subjective Numeracy Scale (Fagerlin, Zikmund-Fisher, Ubel et al.)	Perceived ability and preferences for working with numbers

Limitations of Current Measures

- Limited input from the patient perspective in the development of numeracy framework
- Limited study of numeracy in different race/ethnic and cultural groups
- Limitations of classical test theory
 - Difficult to validate measures in different race/ethnic or other groups
 - Can have a high respondent burden

Numeracy Understanding in Medicine Instrument (NUMi) Objectives

- To establish the content validity of the health numeracy construct from the patient perspective and a cross cultural point of view
- To develop a measure to assess the full spectrum of skills in the health numeracy construct
- To utilize IRT psychometric methods to develop an efficient and accurate numeracy measure
 - Computer Adapted Testing
 - Differential Item Functioning

Scale Development Methods

- Content Validity
 - Focus groups in the Hispanic Population
 - Convening of an expert panel
- Item generation
 - Test specification table
 - Review of items by expert panel
- Psychometric Scaling
 - Administer items to large (n=1000) sample
 - Determine item function using IRT linear models
 - Develop a test with optimal test information function

Focus Group Themes

- Primary Domains
 - How numbers are in medical care
- Modifying Factors
 - Socio-demographic factors
 - Emotions
 - Language and culture
- Types of skills
 - Number sense and measurement
 - Tables/graphs
 - Probability
 - Statistics

How Numbers are Used in Health Care

- Setting goals, motivation
- Risk communication
- Communicating symptoms
- Decision making and disease management
- Understanding natural history of disease
- Assessing credibility of information
- Considering how much to pay for ones health

Focus Group Data

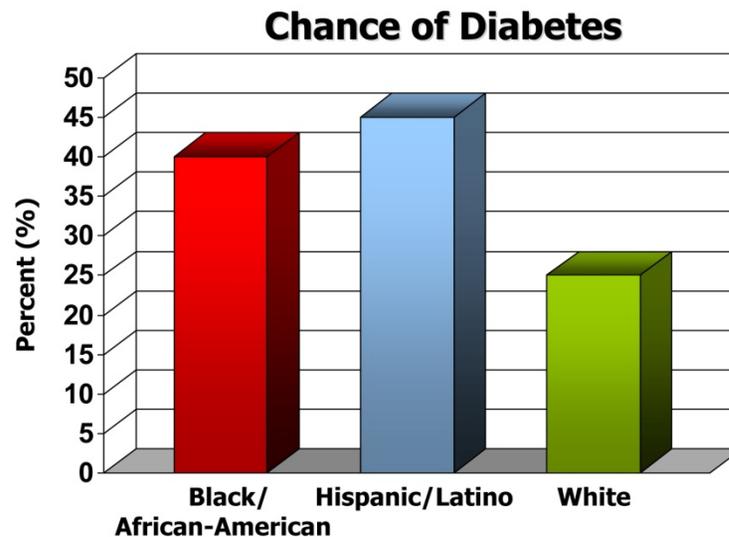
- *“If twenty people were, let’s say, us were testing this new drug. I would want to see, you know, the statistics about Jose, here. ‘cause I think we have a pretty similar body build, a pretty similar weight, we’re probably around the same age so I’m interested in his statistics. I’m not interested in generally. You know, I want to see the person closer that could resemble me.”*

– Credibility of Information, Statistics

Tables/Graphs

According to the graph below, which race or ethnic group is most likely to develop diabetes?

- a. Black/ African American
- b. Hispanic/Latino
- c. White



Focus Group Data

- *“When they give you percentages or say “oh, you have seventy percent chance of becoming a diabetic,” then you think back to school and a seventy, you know, that was a C back then. You’re like, oh, I’m all right. I’m good, seventy percent ain’t that bad, you know...”*
 - Communicating Risk of Disease, Probability

Probability

Maria was told that she had a very low risk of having colon cancer at her age. Which of the following numbers best conveys a very low risk?

- a. -0.50
- b. 0.01
- c. 0.60
- d. 1.10

Focus Group Data

- *“I think about numbers that way. Um, the...the type of vitamins especially, if they're name-brand uh, are they tested and what are the side effects and what is the, what is the ups and downs...”*
 - *Decision Making, Probability*

Probability

Ann starts a new blood pressure medicine. The chance of leg swelling on the medicine is 10% and the chance of a cough is 10%. One side effect does not change the chance of getting the other side effect. What is the chance that Ann will have both side effects?

- a. 1%
- b. 10%
- c. 20%
- d. 100%

Summary

- Health numeracy reflects skills in using, interpreting, and applying quantitative information in the health care context
- The patient's perspective and cross-cultural research can help to define and validate the health numeracy construct
- Applications of health numeracy measurement
 - Tailor approaches to patient communication and decision making
 - Assess interventions designed to improve numeracy

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