Oral Abstract Session I: Monday, October 22, 11:00am-12:30pm

Randomized Controlled Trial of a Video Decision Support Tool for CPR Decision-Making in Advanced Cancer. Volandes, Angelo[1]; Paasche-Orlow, Michael K.[2]; Mitchell, Susan L.[3]; El-Jawahri, Areej[1]; Davis, Aretha Delight[4]; Barry, Michael J.[1]; Hartshorn, Kevan L.[2]; Gillick, Muriel R.[5]; Walker-Corkery, Elizabeth S.[1]; Chang, Yuchiao[1]; Lopez, Lenny[1]; Kemeny, Margaret[6]; Bulone, Linda[7]; Mann, Eileen[1]; Misra, Sumi[8]; Peachey, Matt[9]; Abbo, Elmer D.[10]; Eichler, April F.[1]; Epstein, Andrew[11]; Noy, Ariela[11]; Levin, Tomer T.[12]; Temel, Jennifer[13]. [1]Massachusetts General Hospital, Harvard Medical School, Boston, MA; [2]Boston University School of Medicine, Boston, MA; [3]Harvard Medical School, Boston, MA; [4]Mt. Auburn Hospital, Harvard Medical School, Boston, MA; [5]Harvard Pilgrim Health Care Institute, Boston, MA; [6]Mount Sinai School of Medicine, New York, NY; [7]Queens Hospital Cancer Center, New York, NY; [8]Vanderbilt University Medical Center Palliative Medicine Program, Nashville, TN; [9]Vanderbilt University Medical Center, Nashville, TN; [10]University of Chicago, Chicago, IL; [11]Memorial Sloan-Kettering Comprehensive Cancer Center Department of Medicine, Weill Cornell Medical College, New York, NY; [12]Memorial Sloan-Kettering Comprehensive Cancer Center Department of Psychiatry, Weill Cornell Medical College, New York, NY; [13]Massachusetts General Hospital Cancer Center, Harvard Medical School, Boston, MA

Background/Research Question

Several studies have reported that patients from minority backgrounds are more likely than Whites to prefer aggressive treatments such as cardiopulmonary resuscitation (CPR) at the end of life. Since the medical information presented to subjects is frequently complex, we hypothesized that apparent differences in end-of-life preferences and decision-making may be due to disparities in health literacy. Doctors often rely solely on verbal descriptions to communicate information regarding CPR, however, video decision support tools have the potential to improve patients' understanding of CPR by providing visual images of what this intervention entails. The objective of this study was to examine the effect of a CPR video among diverse patients with advanced cancer on their preferences for CPR.

Methods

A randomized controlled trial of 150 subjects with diverse advanced cancers (< 1-year prognosis) recruited from 4 cancer centers in the United States. Subjects were randomized to either a verbal narrative describing CPR, or to a video with verbal narrative. The video depicts CPR and reviews the success rate in advanced cancer. Study endpoints were subjects' CPR preferences, and predictors of preferences against CPR, and perceived value of the video. Chi-square tests were used to compare the distributions of categorical outcomes (Yes CPR, No CPR, or Unsure). Health literacy was measured using the Rapid Estimate of Adult Literacy in Medicine (REALM) and subjects were divided into three literacy categories: low (0-45, 6th grade and below), marginal (46-60, 7th – 8th grade) and high (61-66, 9th grade and above). Unadjusted and adjusted logistic regression models were fit using stepwise algorithms to examine factors related to preferences against CPR.

Results

A total of 150 subjects were randomized to a verbal narrative (n=80) or video with verbal narrative (n=70). Mean age was 62, 49% were women, 47% White, 34% Black, and 47% had lung or colon cancer. Among subjects receiving the verbal narrative, 38 (47.5%) preferred to have CPR attempted; 41 (51.2%) chose not to have CPR; and 1 (1.3%) was uncertain. In the video group, 14 (20%) preferred to have CPR attempted; 55 (78.6%) chose not to have CPR; and 1 (1.4%) was uncertain (P<0.001). In unadjusted analyses, non-Whites were more likely than Whites to have preferences for CPR, OR 2.2 (95% CI 1.1-4.3); subjects with high health literacy OR 4.2 (95% CI 1.9-9.4) or randomized to the video OR 3.5 (95% CI 1.7-7.2) were more likely to forgo CPR. In adjusted analyses, non-White race was no longer significant OR 1.5 (95% CI 0.6-4.0), however,

high health literacy OR 3.8 (95% CI 1.3-10.8) and randomization to the video OR 4.7 (95% CI 4.7-10.7) remained independent predictors of preferences to forgo CPR. Of the subjects who viewed the video, 94.1% stated they were comfortable watching the video, 97.1% found the video helpful, and 100% would recommend the video.

Conclusions/Implications
Health literacy and not race was an independent predictor of CPR preferences for patients with advanced cancer. In addition, after viewing a CPR video there were no longer any differences in the distribution of preferences according to race and health literacy. These findings suggest that clinical practice and research relating to end-of-life preferences may need to focus on a patient education model incorporating the use of decision aids such as video to ensure informed decision-making.

Effect of mild cognitive impairment on relationship between age and health literacy.

Kaphingst, Kimberly A.[1]; Goodman, Melody S.[1]; Lovell, Melissa[1]; Cheng, Meng-Ru[1]; Lin, Margaret J.[1]; Melson, Andrew[1]; Carpenter, Christopher R.[1]; Griffey, Richard T.[1].
[1]Washington University School of Medicine, St. Louis, MO.

Background/Research Question
Previous studies have often found an inverse relationship between health literacy and age. However, many studies have not measured patients' cognitive status or have excluded those with diagnosed cognitive impairment. Limited research has examined how mild cognitive impairment might modify the association between age and health literacy. We examined health literacy levels among three groups: patients 60 years of age or older who did or did not meet screening criteria for mild cognitive impairment and younger patients (less than 60). We then examined the effect of mild cognitive impairment on the correlation between age and health literacy.

Methods
We administered a cross-sectional survey to a convenience sample of 446 adult patients at the Barnes-Jewish Hospital emergency department, an urban academic level one trauma center in St. Louis with over 95,000 annual visits. Exclusion criteria were diagnosed dementia, insurmountable communication barrier, acute psychiatric illness, altered mental status, aphasia, mental handicap, non-English speaking, high patient distress, sexual assault, or corrected visual acuity worse than 20/100. Trained data collectors administered the abbreviated Short Test of Functional Health Literacy in Adults (S-TOFHLA), Rapid Estimate of Adult Literacy in Medicine-Revised (REALM-R), Newest Vital Sign (NVS), and Brief Alzheimer Screen (BAS). Older patients (60+) with a BAS score of 26 or less were considered to screen positive for mild cognitive impairment based on standard scoring. We examined differences in health literacy between groups using chi-squared tests and the relationship between age and S-TOFHLA with Spearman correlation coefficients.

Results
About half (55%) of patients were female; 69% were Black and 68% had no education beyond high school. Mean age was 45 years; 18% were aged 60 or older. The proportion of older patients screening positive for mild cognitive impairment who had inadequate/marginal S-TOFHLA scores (84%) was significantly greater than that of patients over 60 who did not screen positive (25%; $p<.0001$) and younger patients (20%; $p<.0001$). On the REALM, 74% of older patients screening positive for mild cognitive impairment had limited health literacy compared with 21% of older patients who did not screen positive and 50% of younger patients; all three of these groups differed significantly (p-values $<.001$). For NVS, 97% of older patients screening positive for mild cognitive impairment were in the two lower health literacy categories, which was significantly greater than among older patients who did not screen positive (55%, $p=.001$) and younger patients (64%, $p=.003$). We found a moderate negative correlation overall between age and S-TOFHLA score (-0.26, $p<.0001$). When the 38 older patients screening positive for mild cognitive impairment were excluded, the correlation was still significant but attenuated (-0.11, $p<.03$).

Conclusions/Implications
In this study, older adults who did not screen positive for mild cognitive impairment had health literacy levels similar to those of younger adults; mild cognitive impairment among older adults may substantially affect health literacy scores. Health literacy studies that do not screen for cognitive status may conflate the effects of age and cognitive impairment. Older adults with mild cognitive impairment may be a priority population for health literacy interventions.

The Effect of Age on Health Literacy and Cognitive Functioning.. Wilson, Elizabeth A.H[1]; Dahlke, Alison R.[1]; Curtis, Laura M.[1]; Deary, Ian C.[2]; Park, Denise C.[3]; Baker, David W.[1];Wolf, Michael S.[1]. [1]Northwestern University, Chicago, IL; [2]University of Edinburgh, London, UK; [3]University of Texas at Dallas, Dallas, TX.

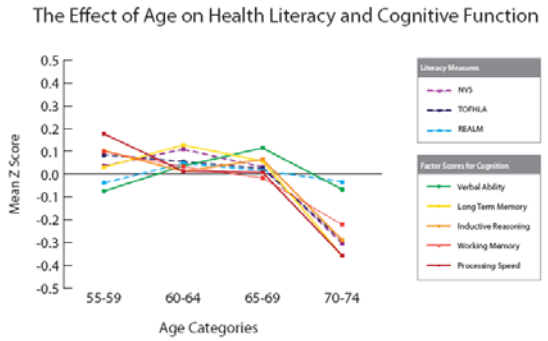
Background/Research Question
Although the health literacy field has typically focused on reading skills, the complex task of self-care likely relies on a broader skill set than solely reading. Rather, effectively engaging as a patient requires cognitive processing to learn and remember health-related information and problem-solve in a healthcare context. Indeed, literacy and cognition have separately been found to be associated with health outcomes. Additionally, although crystallized cognitive domains such as verbal ability remain relatively stable as one ages, fluid cognitive abilities (e.g. processing speed, working and long term memory, and reasoning) decline with age, which can have an especially deleterious effect on older patients who often encounter numerous chronic conditions and complex medical regimens. The current study examined the relationship between health literacy and both fluid and crystallized cognitive functioning and compared how these abilities were each affected by age.

Methods
As part of an ongoing cohort project, 798 primary-care patients ages 55-74 completed a series of cognitive and literacy assessments. Specifically, literacy measures included the Test of Functional Health Literacy in Adults (TOFHLA), the Newest Vital Signs (NVS), and the Rapid Estimate of Adult Learning in Medicine (REALM). Patients also completed cognitive measures assessing the fluid domains of processing speed, working memory, long term memory, inductive reasoning, and the crystallized domain of verbal ability. For each cognitive domain, three distinct assessments were completed and combined to create a factor score. Pearson correlations were completed to examine the relationship between performance in each domain and on each literacy measure. To assess performance cross-sectionally by age (grouped into five year increments) Student's T-tests and one-way ANOVAs were employed as appropriate, and the mean factor scores for each cognitive domain and the three health literacy scores were graphed.

Results
Scores for all health literacy measures and for each cognitive domain were highly correlated ($0.37 \leq r \leq 0.77$, $p < 0.001$). Regarding age-related differences (Figure 1), for all fluid cognitive abilities as well as for the NVS and TOFHLA, scores were significantly different across age groups, with performance being lower among oldest participants ($p < 0.05$). However, differences by age for both verbal ability and the REALM were non-significant, with performance remaining relatively stable across age groups.

Conclusions/Implications
Health literacy and cognitive abilities are closely related. Across age categories, literacy assessments requiring problem solving and processing new information (i.e. the TOFHLA and NVS) showed age differences similar to those for fluid abilities, but the age difference for the REALM, a word-recognition test involving prior knowledge and experience, was similar to that of crystallized cognition and was relatively stable across groups. As such, the REALM may be a poorer choice than the NVS or TOFHLA for examining links between literacy and health outcomes among older patients, especially since many health tasks require active learning and cognitive processing of incoming health-related information. Additionally, as health literacy and cognition are

tightly linked, designers of interventions should broaden their focus to include cognitive constraints in information processing when seeking to mitigate the effects of limited health literacy.



Asthma Beliefs and Literacy in the Elderly (ABLE).

Martynenko, Melissa[1]; O'Conor, Rachel[2]; Wolf, Michael S.[2]; Wilson, Elizabeth A.H.[2]; Halm, Ethan A.[3]; Leventhal, Howard[4]; Wisnivesky, Juan P.[1]; Federman, Alex D.[1]. [1]Mount Sinai School of Medicine, New York, NY; [2]Feinberg School of Medicine, Northwestern University, Chicago, IL; [3]UT Southwestern Medical Center, Dallas, TX; [4]Rutgers, The State University of New Jersey, New Brunswich, NJ

Background

Older adults with asthma typically have worse asthma outcomes than their younger counterparts. Low health literacy is associated with poor asthma outcomes, but pathways leading to asthma morbidity have not been clearly established. This abstract describes the Asthma Beliefs and Literacy in the Elderly (ABLE) study, a longitudinal prospective cohort study designed to examine the association of health literacy with self-management of asthma among older adults.

Methods

ABLE is an ongoing, multi-center prospective cohort study of inner-city adult asthmatics ages 60 years and older who have NHLBI-defined uncontrolled asthma, a smoking history of ≤10 pack-years, no diagnosis of chronic obstructive lung disease or other chronic respiratory illness, and who speak English or Spanish. Patients are recruited from hospital and community-based primary care and pulmonary specialty practices in New York City, NY and Chicago, IL. Data collection began in December, 2009. Enrolled subjects participate in three interviews (in-person at baseline, over the telephone at 3-months, and an in-person at 12-months). At all 3 time-points interviewers assess patients' asthma self-management (medication adherence, trigger avoidance, appointment keeping) and asthma control and quality of life. During in-person interviews, we assess health literacy (HL) using the Short Test of Functional Health literacy in Adults and the Newest Vital Sign, cognition using the Mini-Mental State Exam, Trail Making Tests A & B, Animal Naming Test, WMS II Story A, Letter-Number Sequencing and the pattern comparison test. Data on self-reported resource utilization, health and functional status, physician-patient participatory decision making, social support, and other chronic conditions (diabetes, hypertension, and depression) are also collected. Trained research staff conduct these interviews and abstract additional data on chronic conditions and resource utilization during medical record reviews. The study has recently been expanded to include 18- and 24-month follow up interviews.

Results

To date we have enrolled 442 patients. Follow-up at 3-, 12- and 24-months is 96%, 87%, and 77% respectively. The mean age is 67.5 (6.9) and 84.1% are female; 24.9% are white, 32.1% black, and 33.7% Hispanic; and 33.9% have low HL. HL in this cohort is associated with poor to fair health (63.3% low HL vs. 30.1% adequate HL, $p<0.0001$), less education (i.e., no high school degree) (64.6% low HL vs. 13.2% adequate HL, $p<0.0001$), having a monthly household income of <$1350 (81.4% low HL vs. 36.1% adequate HL, $p<0.0001$) and race/ethnicity (Black: 40.2% low HL vs. 28% adequate HL; Hispanic: 51.2% low HL vs. 24.8% adequate HL; $p<0.0001$). We have published results from several analyses, including the association of: (a) medication adherence and beliefs; (b) language proficiency and asthma outcomes; (c) racial disparities and asthma beliefs; and, (d) depression and asthma outcomes.

Conclusions/Implications
The ABLE study will provide valuable information on the interaction of health literacy, health beliefs, and cognition on the self-management behaviors of older adults with asthma, as well as a unique view of the long term dynamics of health literacy as we extend our observation of patients to two years.

Oral Abstract Session II: Monday, October 22, 11:00am-12:30pm

Nurse practitioners' knowledge, experience and intention to use health literacy strategies in practice. Cafiero, Madeline R.[1]. [1]The Sage Colleges, Troy, NY.

Background/Research Question
Most health literacy research has focused on patients' health literacy and interventions to mitigate the impact of low health literacy. Little is known about providers' knowledge of health literacy, experience with health literacy strategies or their intention to use health literacy strategies in practice. This study investigated the following research questions:

- What do nurse practitioners (NPs) know about health literacy (HL) and related strategies for clinical practice?
- What health literacy strategies are currently used by NPs in clinical practice?
- What is the intention of NPs to use health literacy strategies in future clinical practice?

Methods
Design: Descriptive correlational study
Theoretical framework: The Theory of Planned Behavior (Fishbein & Ajzen, 1975, 2010)
Sample: Nurse practitioners (NPs) who work in an outpatient setting were recruited from the attendees at a national NP conference (n = 456) in 2011.
Variables and instruments:
Knowledge measured with Health Literacy Knowledge and Experience Survey (HLKES), Part I (Cormier, 2006)
Experience measured with Health Literacy Knowledge and Experience Survey (HLKES), Part II, Experience Scale (Cormier, 2006)
Intention measured with Health Literacy Strategies Behavioral Intention (HLSBI) Questionnaire (Cafiero, 2012) Participant demographic data and the relationships between health literacy knowledge, experience, intention, and certain demographic factors were also investigated.

Results
Knowledge: Overall HL knowledge was found to be low. Gaps were noted in regard to HL effect on healthcare status, screening tools for low health literacy, and evaluation measures for patient educational materials.
Experience: 75% of participants reported "never" or only "sometimes" having HL emphasized in NP curriculum. Culturally appropriate written materials were most frequently used for patient education, but 66% of NPs reported "never" or "sometimes" evaluating reading level of these written materials.
Two statistically significant correlations were found between demographic factors and experience with health literacy strategies. A statistically significant difference was found between experience scores of post-master's certificate prepared NPs and doctorally prepared NPs ($p = 0.039$). A statistically significant difference was found between experience scores of NPs working in specialty practices and those working in episodic urgent care settings ($p = .008$).
Intention: A moderately strong intention to use health literacy strategies was found. A statistically significant correlation was found between intention and experience ($p = .01$) and intention and knowledge ($p = .05$).

Conclusions/Implications
This study points to the need to increase NPs' knowledge of health literacy (HL) by including HL in both pre-licensure curriculum and post-licensure continuing education; to standardize written patient education materials to low HL appropriate levels as well as to develop patient education materials in other formats for NP use, and lastly, to support the strong intention of NPs to use health literacy strategies by providing resources, support, and opportunities to practice.

Implementation of health literacy practices in designing training programs for community based transition care coaches to reduce hospital readmissions. Wong, Bet Key[1]; Goodale, Marlene[1]; Schmohl, Pat[1]; Keenan, Amy[1]. [1]Worcester State University, Worcester, MA.

Background/Research Question

According to studies by the 2003 National Assessment of Adult Literacy, adults aged 65 and older have the highest proportion of people with below basic health literacy skills. Poor health literacy skills are associated with poor health outcomes such as increase in hospitalization and readmissions. Innovative collaborations between health care providers and community workers who serve older adults may lead to increase in health literacy skills in this population and decrease in hospital readmission rates. We designed and implemented a training program for community based transition care coaches on 13 diagnoses that are responsible for high hospital readmission rates among Medicare patients. While our ultimate goal is to reduce hospital readmission rates, our objective for this study is to determine if implementation of health literacy practices and utilization of effective health literacy resources has a positive impact on the training of transition care coaches.

Methods

The Central Massachusetts Health Literacy Project (CMHLP) comprises of health care providers who share the vision of a healthier central Massachusetts through health literacy efforts. Four CMHLP members with acute care nursing background (emergency room, operating room, intensive care, and cardiac care) were chosen to serve as faculty. They standardized the training materials with proven effective health literacy resources from MedlinePlus® and CareNotes© and utilized clear and non-medical terms in their presentations. They also use their nursing experience with elderly patients and patient teaching to help transition care coaches look for red flags associated with 13 medical conditions responsible for high rates of hospital readmissions. Transition care coaches are trained by the Coleman Coaching Model which utilizes community workers to help patients develop self-management skills that will ease their transition from hospital to home. Twenty-one coaches from seven community based aging agencies participated in a two half day training program. Evaluation before and after the training were used to assess the success of the program.

Results

Twenty-one coaches from seven community based aging agencies participated in a two half day training program. Coaches identify their client's health literacy needs as grade school competency with limited medical knowledge. Some have multilingual clients who communicate only in Spanish, French, or Vietnamese. The coaches also have limited health care background. All 21 coaches are not familiar with MedlinePlus® resources. As a result of the training, 95% of the participants rated that they can generally identify red flags for medical conditions associated with high hospital readmissions. They have found the clear and simple training materials effective and appropriate. However, coaches rated instructors' acute care experience with elderly patients such as discharge teaching and hospital admissions to be the most beneficial aspect of the training.

Conclusions/Implications

The 2007 CDC Expert Panel on Improving Health Literacy for Older Adults concluded that innovative community partnerships are needed to improve the health and health literacy of older adults. Our training program utilizing health literacy practices by health care providers for transition coaches from regional aging agencies can be an effective partnership model to reach that goal. Our effort to reduce hospital readmissions involving health literacy interventions has just started. Further studies are needed to evaluate the effectiveness of our collaboration.

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Maryland physicians' use of recommended communication techniques. Horowitz, Alice M.[1]; Kleinman, Dushanka V.[1]; Wang, Min Qi[1]; Maybury, Catherine[1]. [1]University of Maryland School of Public Health, College Park, MD.

Background/Research Question
Healthy People 2020 identified several objectives related to improving the health literacy of the population and the communication skills of health care providers. The use of basic recommended communication techniques by health care providers has been shown to increase patient adherence to prevention and treatment regimens and to improve patient health outcomes. Thus communication plays a vital role in the patient-provider education process and is especially important working with patients with limited health literacy, estimated at 90 million adult Americans. Provider use of communication techniques to explain often complex health information in language and ways that help their patients understand and then act on the information is an important part of providing patient-centered care. The purpose of this study was to determine the number and type of communication techniques that family practice physicians and pediatricians use on a routine basis to ensure effective communication with their patients and to determine their perception of the effectiveness of each.

Methods
In 2010 a 30-item survey was mailed to a random sample of 1,472 Maryland Family Practice Physicians and Pediatricians. The survey was designed to determine health knowledge and their use of recommended communication techniques. The survey contained 18 items related to communication techniques representing five domains including seven basic skills. Physicians were asked to rate their use of each technique on a scale using "never", "rarely", "occasionally", "most of the time" and "always" during a typical week. The survey items on communication were adapted from Rozier et al. (2011) and based on techniques recommended by the American Medical Association. The data were analyzed using SPSS version v_{18}. Statistical analyses included descriptive statistics, cross tabulation, chi square statistic and analysis of variance. The significance level was set at $p<0.05$.

Results
The response rate was 19 percent (n=294) and consisted of 215 pediatricians and 79 Family Practice Physicians. The Majority of respondents were white (75%); eight percent were black and 16 percent were other. Sixty-two percent were females and the majority (67%) were in private practice. Relatively few respondents (25%) used the "teach back" method "always" or "most of the time"; while 26 percent indicated they used the "teach back" method "rarely" or "never". Forty-nine percent of respondents indicated they had taken a communications course. Physicians who had taken a communications course unrelated to their undergraduate training were more likely than those without such training to have assessed their practice for user friendliness ($p<.001$). Forty-three percent indicated they would be interested in attending a continuing medical education course on communication skills.

Conclusions/Implications
These findings are similar to a previous study conducted with physicians and suggest strongly that undergraduate training and continuing medical education need to include education and training in communication skills. Medical schools and organizations could take a lead role in such efforts.

The use of recommended communication techniques by Maryland dentists. Maybury, Catherine[1]; Horowitz, Alice M.[1]; Wang, Min Qi[1]; Kleinman, Dushanka[1]. [1]University of Maryland School of Public Health, College Park, MD.

Background/Research Question
An estimated 90 million U.S. adults have limited health literacy, which is most commonly defined as the ability to "obtain, process and understand basic health information and services needed to make appropriate health decisions". Healthy People 2020 identified several objectives related to improving the health literacy of the population and the communication skills of

health care providers. The use of basic recommended communication techniques by health care providers has been shown to increase patient adherence to prevention and treatment regimens and to improve patient health outcomes. Thus communication plays a vital role in the patient-provider education process. Dentists can play a critical role in educating patients about their oral health and oral self-care. Their use of communication techniques to explain often complex health information in language and ways that helps their patients understand and then act on the information is an important part of providing patient-centered dental care. Good dentist-patient communication has several potential positive outcomes, including reduced patient anxiety; increased patient satisfaction, motivation and adherence to healthy behaviors; and better oral health outcomes. The purpose of this study was to determine the number and type of techniques that dentists use on a routine basis to ensure effective communication with their patients and to determine their perceived effectiveness of each.

Methods

A 30-item survey was mailed to a random sample of 1,562 Maryland general practice and pediatric dentists in 2010 to determine their use of recommended communication techniques. The survey contained eighteen items related to communication techniques representing five domains including seven basic skills. Dentists reported routine use (never, rarely, occasionally, most of the time, always) during a typical week. The survey items on communication were adapted from Rozier et al. (2011) and based on techniques recommended by the American Medical Association. The data were analyzed using SPSS version v_{18}. Statistical analyses included descriptive statistics, cross tabulation, chi square statistic and analysis of variance. The significance level was set at $p<0.05$.

Results

The response rate was 37 percent (n=605) and was comprised of 525 general dentists and 80 Pediatric dentists. The majority of dentists were white (82%); three percent were black and 15 percent indicated 'other'. Thirty percent were females and nearly all (93%) were in private practice. Maryland dentists reported using relatively few of the 18 techniques on a routine basis. Regarding the use of 'teach back' 44 percent indicated they did so either 'most of the time' (30%) or 'always' (14%) on a routine basis. When asked, 'would you be interested in attending a continuing education course on communication skills 50 percent said 'yes.' Overall, dentists who had taken a communications course were more likely to have assessed their office to determine its user-friendliness than dentists who had not taken such a course (p=.0001).

Conclusions/Implications

Professional education is needed both in dental school curricula and as continuing education courses to improve knowledge and understanding about communication techniques. Dentists' use of recommended communication techniques could help improve the oral health outcomes of their patients, especially patients with low health literacy.

Utilizing Marketing and Psychology Methods to Test Health Messages: A Case-Study of How Gaze Patterns and Psycho-Physiological Measures Can Be Used to Analyze Responses to a "Dirty Bomb" Decision Aid in People with Limited Literacy. Bass, Sarah Bauerle[1]; Gordon, Thomas F.[1]; Nanavati, Aasit[1]; Gordon, Ryan[1]; Kordusky, Kaitlin[1]; Parvanta, Claudia[2]. [1]Temple University, Philadelphia, PA; [2]University of the Sciences, Philadelphia, PA.

Background/Research Question

Eye tracking, EKG, and skin conductance are common physiological methods used in marketing psychology for monitoring physical and psychological experiences. They have not been extensively used in public health or with low literacy populations to evaluate reactions to health communication messages. The purpose of this NIH funded study was to assess whether these approaches are feasible to test the effectiveness of risk communication messages developed for adults with limited literacy.

Methods

Limited literacy adults were tested in a randomized controlled trial to understand physiological responses to a "Dirty Bomb" preparedness guide. Assessed using the REALM-R or over-the-phone screening, participants were randomized to receive either a CDC "factsheet" on a "dirty bomb" (control, n=22) or a decision aid (intervention, n=28) written at a sixth-grade reading level. Subjects were shown the materials on a computer screen as their gaze pattern, pupil diameter, heart rate and pulse were measured. BioInfinity and Eyenal software programs were then used to assess if there were differences between gaze patterns and bio-physical responses. A case study approach was used by comparing matching gaze patterns and EKG readings of control and intervention subjects on content-similar slides.

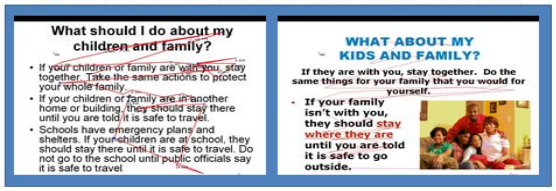
Results

Gaze pattern analysis revealed specific strategies for reading densely written material. On similar slides on what to do with family if a "dirty bomb" explodes, intervention (decision aid) participants took more time to read slide details written at their reading level, compared to control participants whose gaze patterns indicated a large amount of unread text (See Figure). This indicates intervention participants were able to understand material and received key messages about preparedness which did not occur in the control group. EKG data showed that control and intervention participants' heart rates remained relatively constant throughout the duration of the session, indicating a lack of physical reaction to the material. However, heart rates were slightly slower in the intervention group, suggesting they felt more relaxed and comfortable while processing the material they were able to read and understand.

Conclusions/Implications

Using an individual's physiological responses is a novel method that has potential benefits for analyzing and understanding complex responses to educational material in those with limited literacy, allowing for richer understanding of the effects of targeted health communication. Populations with limited literacy are vulnerable to negative health events and in the case of a "dirty bomb", may not be able to understand how to respond based on currently available information. Future studies are needed to better understand the nature of physiological responses to health communication messages and how these methods might be best utilized in health communication research, especially in limited literacy populations.

Figure 1. Gaze Patterns of Content Similar Slides – Control vs. Intervention



Oral Abstract Session III: Monday, October 22, 4:00pm-5:30pm

Association of health seeking behaviors related to cancer prevention and screening among adults with low reading, numeracy and listening skills. Morris, Nancy S.[1]; Field, Terry S.[2;] Wagner, Joann L.[2]; Cutrona, Sarah L.[3;] Mazor, Kathleen M.[2]. [1]University of Massachusetts, Worcester, MA; [2]Meyers Primary Care Institute, Worcester, MA; [3]University of Massachusetts Medical School, Worcester, MA.

Background/Research Question

Health literacy is a complex, multifaceted phenomenon, but most studies of health literacy conducted to date have assessed only one aspect of health literacy. American adults typically get health information from radio, television, friends, family, and health professionals highlighting the importance of considering speaking and listening skills as well as reading and numeracy. Two new instruments, the Cancer Message Literacy Test-Listening (CMLT- Listening) and the Cancer Message Literacy Test–Reading (CMLT-Reading) were recently developed to assess comprehension of spoken and written health messages about cancer prevention and screening. The purpose of this study was to describe the characteristics

of adults who perform poorly on the CMLT-Listening, the CMLT-Reading and a numeracy test, and to explore the association between low performance and attitude toward health care visits, likelihood of seeking health information, and efforts to learn more about cancer prevention and screening.

Methods
A random sample of English speaking adults aged 40-70 were invited to participate from four sites: Kaiser Permanente Georgia (KPGA), Hawaii (KPHI), Colorado (KPCO) and Fallon Community Health Plan (FCHP) Massachusetts. Three instruments were used to assess aspects of health literacy: the CMLT-Reading, the CMLT-Listening, and the Lipkus Numeracy Scale. We also assessed self-efficacy, provider trust, and fatalism. Participants self-reported demographic data, health seeking behavior, and media use. A trained research assistant administered all items orally (except for the reading items). We defined low performers as those who scored in the lowest quartile on all of the following measures: CMLT-Listening, CMLT-Reading, and the Lipkus Numeracy Scale.

Results
A total of 1074 adults completed sessions. Forty eight percent were white, most were relatively well educated (73% educated beyond high school), and the majority (53%) rated their health as very good or excellent. Low performers were more likely to be female, non-white, have less education, and rate their health as good, fair or poor. Low performers scored higher on fatalism items (p = .000), but they did not differ from others on self-efficacy or trust. Low performers reported reading less often (p = .018) and using the computer less often (p =. 000). They were more likely to report avoiding doctor visits (p <.000), to perceive less control over health risks (p < .001), to avoid information about diseases they don't have (p = .017), and were more likely to seek information about cancer prevention or screening from a health care provider than from the internet (p= .001).

Conclusions/Implications
Adults with low health literacy differ from other adults in a number of ways likely to have substantial impact on their participation in preventive cancer care and screening. Strategies are needed to activate this vulnerable population.

A Measure of Listening Health Literacy Predicts Patient Questioning Following Clinical Counseling About Breast Cancer Risk Reduction. Rubin, Donald L. [1]; Han, Paul K. [2]; Thomas, Mallory L.[3]; Mazor, Kathleen M.[3]. [1]University of Georgia, Athen, GA; [2]Maine Medical Center, Portland, ME; [3]Meyers Primary Care Institute, Worcester, MA.

Background/Research Question
Interactive health literacy is the process of exchanging, comprehending and applying health information conveyed in conversation. Patient/Consumer questioning of providers is a key index of interactive health literacy because questioning reflects engagement, empowerment, and discourse competence. Active questioning is central to participative decision-making. Participative decision-making in preventive contexts often requires patients/consumers to weigh (a) disease risks and (b) effectiveness of prophylactic treatment against (c) treatment costs and risks.The decision to undertake Tamoxifen treatment to reduce breast cancer risk in high risk patients demands just such a complex calculus. We posit that a person who functions at a high level of interactive health literacy is likely to ask a wide variety of biomedical questions about Tamoxifen, and not just focus on a single issue (e.g., cost of treatment or genetic risk factors). We hypothesized that a measure of listening health literacy would predict the variety of questions posed following a counseling session about Tamoxifen; a commonly used measure of reading health literacy would be less strongly associated.

Methods
Data were collected from 419 patients at three sites. Average age was 57.8 (sd=7.6). Participants completed the Rapid Estimate of Adult Literacy in Medicine (REALM), and the Cancer Message Literacy Test-Listening (CMLT-L). The former is a standard measure

based on accuracy of word reading. The latter tests comprehension of spoken health information in clinical and mass media contexts. Participants listened to a 3 ½ minute audio vignette in which a physician counsels a high risk patient regarding Tamoxifen as a prophylactic to reduce her risk of breast cancer. (A subset of participants were also given a brochure on the subject.) After listening to the counseling session, participants generated questions they would ask the physician. Content analysis of the questions yielded 15 categories of questions, including questions about breast cancer risk factors, effectiveness of Tamoxifen, treatment course, risk and severity of side effects, and application of the information to the patient's own case. Intercoder reliability exceeded 80%.

Results

The means and standard deviations for the REALM (maximum=66), CMLT-L (percent correct) and variety of questions (maximum=15) were 64.2 (4.3), 80.2 (14.0), and 1.7 (1.5) respectively. A multiple linear regression was run with variety of questions as the criterion variable and REALM and CMLT-L as predictors, both entered into the equation simultaneously. Total R^2=.58. CMLT-L was a significant predictor (B=.016; p<.001). REALM was not (B=.006; p>.05). Partial correlations were .14 for CMLT-L compared with .04 for REALM. No evidence of gender differences or message exposure modality (video alone vs. video plus brochure) differences emerged. Variety of questions was not correlated with participants' educational level.

Conclusions/Implications

This study explored question-posing following clinical counseling regarding a preventive regimen that requires complex decision-making. Findings confirmed that a measure of listening health literacy--relative to a standard reading health literacy measure--would better predict this aspect of interactive health literacy. Since high-stakes health decision-making often takes place in interactive settings, future studies of the role of health literacy in such situations should adopt appropriate measures of listening (or speaking) health literacy.

A Health Literacy Intervention to Improve Colon Cancer Screening in Federally Qualified Health Centers.

Arnold, Connie L.[1]; Rademaker, Alfred, W.[2]; Davis, Terry C.[1].
[1]LSU Health Sciences Center, Shreveport, LA; [2]Feinberg School of Medicine, Northwestern University, Chicago, IL.

Background/Research Question

Significant disparities persist in colorectal cancer (CRC) screening among individuals who have low-income, fewer years of education, belong to racial/ethnic minority groups, and have inadequate health insurance. The purpose of this study is to: 1) test the effectiveness of a health literacy intervention to improve CRC screening rates in Federally Qualified Health Centers (FQHCs) and 2) compare the effectiveness of the health literacy intervention, with and without a prevention nurse case manager, on patient completion of CRC screening.

Methods

A three-arm, randomized controlled clinical trial was conducted between May 2008 and August 2011. Eight FQHCs were randomized to one of three study arms: 1) enhanced usual care (EUC), 2) health literacy intervention (HL), or 3) health literacy intervention + prevention nurse case manager (HL+ PNCM). In the EUC arm, patients received an FOBT kit with standard instructions, a recommendation from the clinic RA to complete CRC screening and to talk with their primary care provider during their visit that day about screening. In the HL arm, the RA gave patients the same recommendation, suggestion and FOBT kit and additionally provided brief education using a pamphlet, video and simplified FOBT instructions designed using health literacy 'best practices'. In the HL+PNCM arm, a nurse gave patients the same materials and recommendation as those in the HL arm and then followed up by phone to help patients overcome barriers and provide ongoing support to improve screening completion. The clinic RA administered a structured survey and a literacy test.

Results
965 participants ranged in age from 50-89; 77% were female; 67% were African American; 33% lacked a high school diploma. Approximately one-fourth (26%) had low literacy ($\leq 6^{th}$ grade), 29% had marginal literacy (7^{th}-8^{th} grade) and 45% had adequate literacy ($\geq 9^{th}$ grade). At baseline, 39% reported ever receiving a recommendation for an FOBT and 28% ever completing an FOBT. Baseline screening rates for all clinics was very low at 1-2%.

	FOBT Return Rate By Arm			
	EUC	**HL**	**HL + PNCM**	
All Patients	38%	57%	61%	p=0.0003
Low Literate	30%	58%	57%	p=0.0003
Adequate Literate	41%	60%	66%	p=0.0006

When adjusting for race, participants in the HL arm were 1.41 times more likely to be screened (95% CI 1.17 – 1.69, p=0.0003) compared to participants in the EUC arm. Those receiving the HL+ PNCM arm were 1.63 times more likely to be screened (95% CI 1.38-1.92, p<0.0001) compared to those in the EUC arm and 1.16 times more likely to be screened (95% CI 1.01-1.33, p=0.042) compared to those in the HL arm.

Conclusions/Implications
Our HL intervention demonstrated remarkable gains and was effective with patients across all literacy levels. CRC screening rates were highest among those in the HL+PNCM, however, this was the most costly arm.

Low Health Literacy, Limited English Proficiency, and Cancer Screening among Asian Americans in California. Sentell, Tetine, L.[1]; Braun, Kathryn[1]; Davis, Jim[1]; Davis, Terry[2]. [1]University of Hawaii, Honolulu, HI; 2LSU-MC, Shreveport, LA.

Background/Research Question
For Asian American (AA) subpopulations (Chinese, Korean, Vietnamese, Japanese, Filipino, Other AA) and Whites, we examined the relationship between low health literacy (LHL), limited English proficiency (LEP), and meeting the US Preventive Service Task Force (USPSTF) cervical, colorectal, and breast cancer screening guidelines.

Methods
Among AA and White adult respondents from the 2007 California Health Interview, analyses were performed within age/gender grouping relevant to specific USPSTF cancer screening guidelines (cervical: women ages 21-65, unweighted n =14,227; colorectal: men or women ages 50+, unweighted n =18,931; and breast: women ages 50-75, unweighted n =11,930). Chi-square and multivariate logistic models (controlling for LEP, US nativity, age, sex, marital status, insurance, education, living in a rural area, and poverty) examined meeting screening guideline by LHL overall and with specific racial/ethnic subgroups. Overall and in AA groups with high a percentage ($\geq$30%) of LEP, we also tested the combined relationship of LEP and LHL to screening. All measures were self-reported.

Results
Overall, 64% met cervical screening guidelines, 59% met colorectal screening guidelines, and 85% met breast cancer screening guidelines, but these percentages varied significantly (p<0.001) across racial/ethnic groups. Low health literacy also varied significantly (p<0.001) across racial/ethnic groups with Chinese (>30%) and Koreans ($\geq$25%) reporting high levels of subjective LHL and Filipinos (<8%) and Whites ($\leq$10%) reporting the lowest percentages. Adults with LHL were less likely to have each type of screening in descriptive analyses.

In fully adjusted models, LHL significantly (p<0.05) predicted lower odds of meeting colorectal (OR:0.80; 95% CI: 0.67-0.94) and breast cancer (OR:0.69; 95% CI: 0.50-0.95) screening guidelines, but not cervical. Within specific racial/ethnic subgroups, LHL was only a

significant factor in final models for Whites in predicting colorectal cancer screening (OR:0.83; 95% CI:0.70-0.99) and for Chinese in predicting breast (OR: 0.24; 95% CI:0.12-0.49) and cervical (OR:0.39; 95% CI:0.18-0.85) cancer screening.

Overall, respondents who reported both LEP and LHL were the least likely to have each type of cancer screening (cervical: 58%; colorectal: 39% breast: 67%), followed by those with LEP-only (cervical: 61%; colorectal: 52% breast: 78%) or those with LHL-only (cervical: 58%; colorectal: 56% breast: 79%). The group with neither LHL nor LEP (cervical: 65%; colorectal: 62% breast: 87%) had highest screening percentages. In multivariate models, this hierarchy remained significant in predicting colorectal cancer screening.

LEP was particularly high (≥30%) in three groups: Chinese, Korean, and Vietnamese. In subanalyses of these groups, Chinese with both LHL and LEP were significantly less likely to have breast (OR: 0.24; 95% CI: 0.12-0.49) or cervical (OR:0.39; 95% CI:0.18-0.85) cancer screening compared to those with neither LEP nor LHL and Vietnamese with both LHL and LEP were significantly less likely to have breast cancer screening (OR:0.09; 95% CI: 0.01-1.09).

Conclusions/Implications
LHL predicts cancer screening overall across diverse racial/ethnic groups, but associations between LHL and cancer screening appear to vary by race/ethnicity and type of screening. AA individuals with both LEP and LHL appear at particular risk for not meeting cancer screening guidelines.

This study was supported by the National Cancer Institute: 1R03CA158419.

Health Literacy and Usability of Clinical Trial Search Engines. Bickmore, Timothy[1]; Paasche-Orlow, Michael[2]; Aziz, Maryam[1]; Barry, Barbara[1]. [1]Northeastern University, Boston, MA; [2]Boston University School of Medicine, Boston, MA.

Background/Research Question

Several web-based search engines have been developed to increase participation in clinical trials by allowing individuals to more easily find trials for which they may be interested in volunteering. However, these search engines may be difficult for individuals with low health and computer literacy to navigate. We conducted a usability study of the National Cancer Institute (NCI) clinical trial search engine with individuals who had varying health literacy levels.

Methods
Health literacy was assessed using the Rapid Estimate of Adult Literacy in Medicine (REALM). The sample was split into adequate and low health literacy groups, using a REALM score of 9th grade and above. Search engine skill was assessed using a single self-report scale measure (1="I've never used one." to 4="I'm an expert."). Satisfaction and ease of use were assessed using single item 7-point measures.

Participants were given three standardized tasks of increasing complexity to perform using the NCI search engine. For each task, participants were asked to find at least one trial that satisfied stated criteria (e.g., "Amy is a 66 year old appendix carcinoma cancer patient. She would like to participate in a clinical trial that is related to her condition. Location of the trial does not matter.").

To evaluate preferences and decision making processes, participants were shown three pairs of trial descriptions from the NCI site. For each pair the participant was asked to choose which of the two trials they would prefer, along with a justification, which was audio-taped and qualitatively evaluated.

Results
The study is ongoing. To date, twenty-three participants, aged 23-76 (mean 50.3), 65% female, have been recruited from an online recruiting site (n=14, all adequate health literacy) and an urban apartment complex inhabited primarily by older minority adults (n=9, 67% low health literacy). Participants with low health literacy scored significantly lower on

self-reported search engine skill (Mann-Whitney $p<.05$).

Those with adequate health literacy completed 1.25 search tasks on average, while those with low health literacy failed to complete any of the tasks (Mann-Whitney $p<.05$). Participants with adequate health literacy scored the search engine significantly higher on satisfaction (4.3 vs. 1.4, Mann-Whitney $p<.05$) and ease of use (4.5 vs. 1.6, Mann-Whitney $p<.05$) compared to those with low health literacy.

When asked to read pairs of study descriptions and describe which trials they would prefer, participants with low health literacy focused primarily on discomfort and beneficence criteria gleaned from a single phrase they recognized, while disregarding most of the descriptions. Participants with low health literacy also demonstrated many misunderstandings of the study descriptions and misconceptions about clinical trials.

Conclusions/Implications
Current clinical trial search engines are not usable by individuals with low health literacy.

Oral Abstract Session IV: Monday, October 22, 4:00pm-5:30pm

Parent Health Literacy and Injury Prevention Behaviors for Infants. Heerman, William[1]; Yin, H. Shonna[2]; Sanders, Lee[3]; Perrin, Eliana[4]; Patino-Fernandex, AnnaMaria[5]; Coyne Beasley, Tamera[4]; Barkin, Shari[1]; Rothman, Russell L.[1]. [1]Vanderbilt, Nashville, TN; [2]New York University, New York, NY; [3]Stanford, Palo Alto, CA; [4]University of North Carolina, Chapel Hill, NC; [5]University of Miami, Miami, FL.

Background/Research Question
Despite well-established injury prevention strategies, unintentional injury remains a leading cause of infant mortality in the United States. We sought to examine the role of parent health literacy in injury prevention behaviors. We hypothesized that parents with low health literacy would be less likely to adhere to injury prevention guidelines.

Methods
We performed a cross-sectional analysis of survey data for 789 consecutive English and Spanish speaking parents of 2 month-old children at baseline enrolment into the Greenlight Study. The Greenlight Study is a cluster randomized trial of a literacy sensitive obesity prevention intervention conducted at four diverse academic pediatric resident primary care clinics. Parent surveys were administered at the 2 month well-child visit prior to receiving any study intervention. Health literacy was measured using the Short Test of Functional Health Literacy in Adults (S-TOFHLA); parents were categorized as having low (score 0-23) or adequate health literacy (24-36). Injury prevention behaviors were collected by parent self report and were considered adherent or non-adherent based on recommendations from the American Academy of Pediatrics The Injury Prevention Program (TIPP). We examined the relationship between literacy status (low or adequate) and injury prevention behavior (adherent or non-adherent) using three logistic regression models: Model 1 (unadjusted), Model 2 (adjusted for child age and gender, parent age, gender, race, ethnicity, Medicaid status, and number of children in the home) and Model 3 (adjusted for Model 2 covariates and clinic site).

Results
Many parents were non-adherent to injury prevention guidelines (see Table). Most notably, 42.3% of parents inappropriately put their child to sleep prone more than once in the last 30 days, and 89% did not have their hot water heater set below 120 degrees. 11.9% of parents were categorized as having low health literacy. Unadjusted and adjusted odds ratios comparing low health literacy and adherence to injury prevention guidelines are shown in Table 1. In the unadjusted analysis, adequate health literacy was associated with a greater likelihood of correct car seat position (back seat, rear facing) and fire safety (functioning smoke detector), but paradoxically with lower adherence to fall prevention practices. Putting the child to sleep supine, proper hot water heater safety and

firearms safety were not associated with literacy status. In Model 2, adherence to proper car seat placement and fire safety remained significant; however, only adherence to proper car seat placement remained significant after additional adjustment for recruitment site (Model 3).

Table 1: Odds Ratio (95% CI) of High Literacy Being Associated with Adherence

Injury Prevention Behavior	**% Adherent (Low Literacy)**	**% Adherent (Adequate Literacy)**	**Model 1**	**Model 2**	**Model 3**
Correct Car Seat Placement	83.1	93.9	**3.1 (1.6 - 6.2)**	**3.0 (1.5 - 6.2)**	**2.7 (1.2 - 5.9)**
Sleeping Supine	56.7	57.9	1.05 (0.7 - 1.6)	1.2 (0.7 - 1.8)	1.1 (0.7 - 1.8)
Proper Fire Safety	86.8	93.5	**2.2 (1.1 - 4.3)**	**2.2 (1.1 - 4.4)**	1.6 (0.77- 3.2)
Correct Hot Water Heater Setting	8.8	11.3	1.3 (0.6 - 2.8)	1.6 (0.7 - 3.8)	1.3 (0.6 - 3.4)
Practice Fall Prevention	86.8	75.5	**0.5 (0.2 - 0.9)**	0.6 (0.3 - 1.1)	0.7 (0.4 - 1.4)
Firearms Safety*	33.3	37.3	1.2 (0.2 - 7.1)	1.2 (0.1 - 16.1)	1.0 (0.0 - 21.5)

*Analysis for 57 families reporting guns in the home

Conclusions/Implications

Many parents in this study do not routinely follow standard injury prevention guidelines. Parents with low health literacy are less likely to be adherent to car seat and fire safety recommendations, suggesting that it may be especially beneficial to target educational interventions to this group. Further exploration of the effect of health literacy on injury prevention is needed, including using more robust measures of health literacy as well as examining parent injury prevention practices over time.

Maternal Health Literacy, Child Developmental Outcomes and Modern Lifestyle Diseases.

Smith, Sandra A.[1]; Moore, Elizabeth J.[2].
[1]University of Washington, Seattle, WA;
[2]Applied Informatics, Seattle, WA.

Background/Research Question

Non-communicable diseases (NCD) originating in early life (heart and lung diseases, cancer, diabetes) are the leading cause of death worldwide and a major cause of poverty and health disparities. Promoting health literacy (W.H.O. definition) in parents has been specifically recommended as a strategy to reduce the burden of these modern lifestyle diseases and attendant disparities in both developed and developing countries. The recommendation is grounded in theory, but evidence is scant and the mechanism by which improved maternal health literacy may reduce NCD and related disparities remains unclear. This study tested the hypothesis that maternal health literacy predicts child developmental outcomes and therefore is linked to the developmental origins of health and disease so that promoting maternal health literacy might effectively address NCD.

Methods

We analyzed an AHRQ/NIH database of 3476 maternal/child dyads compiled in a 2006-2008 quasi-experimental seven-site nationwide study using multiple waves of measurement and matched comparison groups. Cohort families were socially and economically disadvantaged and medically underserved. They participated in home visitation programs that obtained training in reflective teaching and empowerment

strategies designed to promote interactive (social) and reflective (critical) skills.

Parents and visitors together monitored child development using the Ages and Stages Questionnaire. Visitors monitored health- and healthcare-related practices and surrounding family conditions at baseline and six-month intervals for up to 36 months using the Life Skills Progression instrument (LSP). The LSP includes two previously published maternal health literacy scales, a reading level estimate, and a record of observed developmental delays along with referrals to- and levels of participation in Early Intervention. Using Discriminant Function Analyses and Repeated Measures Analysis of Variance, we examined differences between three groups: dyads with no observed delays, mixed observations, and persistent delays.

Results
At each of three assessments, parents of children with no observed delays were rated significantly higher than those with persistent delays on two measures of maternal health literacy derived from the LSP ($p < .001$). Health literacy scores also predicted participation in Early Intervention ($p < .001$). Among children with observed delays (N=566), 80% participated regularly in Early Intervention compared to national rates of 2 to 5%.

Conclusions/Implications
Results add weight to earlier findings that developing parents‘ reflective skills is a promising practice for health literacy promotion.

Results demonstrate that maternal health literacy predicts child developmental outcomes, and also predicts utilization of Early Intervention. Findings reveal a pathway by which limited maternal health literacy may lead to NCD and disparities by increasing the risk of developmental delays and reducing participation in Early Intervention where delays occur. Therefore promoting maternal health literacy through the existing system of home visitation programs may effectively address NCD and disparities at the very foundations of personal and public health.

Findings support the Worldwide Universities Network/World Health Organization recommendation to promote parents' health literacy in order to reduce the burden of NCD. Longitudinal studies are warranted to elucidate the effects of maternal health literacy on health and disease across the life course.

Health Literacy Domains and Self-Reported Health Over 20 Years: Results from the National Longitudinal Study of Adolescent Health. Sentell, Tetine L.[1]; Farcomeni, Alessio[2]. [1]University of Hawaii, Honolulu, HI; [2]Sapienza, University of Rome, Rome, Italy.

Background/Research Question
Few studies have explored the relationship of health literacy to health status over time, yet the health literacy skills most relevant to adolescent health may vary from those most critical in young adulthood, middle adulthood, and older age. The goal for this study was to quantify the relationship between three health literacy domains (vocabulary, numeracy, and health information) and self-reported health over the life course, specifically from adolescence to mid-adulthood.

Methods
Using National Longitudinal Study of Adolescent Health (AddHealth) data from four time intervals across 20 years (1994-2008) we considered the relationship of the three health literacy domains to self-reported health status. Self-reported health status (excellent, very good vs. good, fair, poor) was measured at four time intervals (1994-1995, 1996, 2001-2002, and 2008). All health literacy domain measures were obtained from the first time interval when subjects were in grades 7-12. Vocabulary was measured by the AddHealth Peabody Picture Vocabulary Test and was dichotomized as high vs. not high. Numeracy was measured from math grades in school and was dichotomized as low vs. not low. Health information was measured as a continuous variable created from 17 items regarding whether topics had been covered in school. Sociodemographics

(including age, sex, education, English language, and race/ethnicity) and health care access were controlled in final mixed-effect multivariate models. Only respondents with full data on key variables (n=3,333) across all four time periods were included.

Results
At time 1, 32.2% of the sample reported poor health compared to 32.5% in time 2, 27.8% in time 3, and 41.9% in time 4. In final models, all three health literacy domains were significantly associated with health status, but their strength varied over time and domains. Vocabulary was not significantly associated with health across times 1-3, but was significantly associated at time 4 (ages 24-32). Specifically, at time 4 there was a double likelihood of having better health with a high vocabulary compared to not having a high vocabulary. Health information was significantly associated with health across all 4 time periods at a similar strength. For each additional item learned at school there was a 5.5% increase in probability of good health status. Numeracy had the strongest effect at time 1, and declined slightly over time, while still remaining significant. At time 1, there was a 230% probability of poor self-reported health for those with low numeracy compared to those without low numeracy, compared to a 60% increase at time 4.

Conclusions/Implications
The three health literacy domains (vocabulary, numeracy, health information learned in school) had distinct relationships with self-reported health over time. High vocabulary became particularly valuable to health as time went on. In contrast, low numeracy was negatively associated with health in adolescence, and became less strongly associated with health over time, while health information learned in school remained equally valuable to health across the life course. Our study should be useful to theory and empirical study in the field of health literacy.

Use of an Advisory Board Model to Promote Health Literate Pediatric Primary Care.
DeCamp, Lisa[1];Thompson, Darcy A.[1]; Polk, Sarah[1]; Sibinga, Erica[1]. [1]Johns Hopkins School of Medicine.

Background/Research Question
Patient engagement is promoted as a means to reduce health and healthcare disparities for vulnerable populations. The inclusion of populations with limited health literacy in the design, implementation, and evaluation of health information and services is also considered a key attribute of a health literate organization. Among Latino parents with limited English proficiency (LEP), there is often co-occurring limited health literacy, placing Latino children with LEP parents at high risk for experiencing disparities. Models of engaging LEP families in healthcare improvement are limited, thus how to effectively use patient engagement to promote a health literate organization and address disparities is not known.

Methods
We implemented and sustained family engagement at an urban, general pediatric practice serving primarily publicly-insured children by creating an advisory board composed of LEP Latino families. Employing community-based participatory research principles, board activities and structure were guided by member input. We completed an evaluation of the initial year of board activities, including periodic member surveys, qualitative interviews, structured meeting observation, assessment of activities, and group reflection. We obtained sociodemographic information from advisory board members and assessed parental health literacy using the 8 question Spanish Parental Health Literacy Activities Test (SPHLAT).

Results
Thirteen LEP Latina mothers attended at least one board meeting and 10 mothers attended at least 5 of the 7 meetings from September 2011-June 2012. Mothers on the board were immigrants from 5 different Spanish-speaking countries; mean number of years in the US was 11, and 80% had less than a high school education. All of these mothers' insured children had public coverage. Mean score on the SPHLAT was 60%. Qualitative analysis of

individual initial interviews (*n*=10) revealed members joined to learn something and because of unmet healthcare needs in their community. In group reflection at the final meeting of the initial year members assessed their participation positively; the opportunity to influence change at the clinic and a feeling of camaraderie with other board members were common themes. Qualitative analysis of follow-up interviews (*n*=9) revealed members felt privileged to provide feedback to the clinic, and wanted to continue as a board member. Board activities that directly addressed health literacy included 1) design of a low-literacy Spanish-language oral health brochure, modified from a brochure that included mostly text and had pictures that did not enhance understanding, and 2) redesign of the forms for the clinic's family support services. Per board member feedback, form content was reduced and simplified for ease of use in a low-literacy population, and the accompanying brochure was redesigned to provide a pictorial display of how to fill out the form.

Conclusions/Implications

Continuous engagement of Latina mothers with LEP and limited health literacy using an advisory board model increased suitability of clinic programming and educational materials for low-literacy populations. Board member input on board activities promoted family engagement over a one year period. Use of an advisory board model for patient engagement may contribute to a more health literate organization. Further evaluation is needed to determine specific impact on healthcare disparities.

Randomized Controlled Experiment to Assess Whether Use of a Low Literacy, Pictogram-based Written Asthma Action Plan Can Improve Provider Asthma Counseling.

Yin, Hsiang Shonna[1]; Gupta, Ruchi[2]; Tomopoulos, Suzy[1]; Van Schaick, Linda[1]; Wolf, Michael S.[2]; Mendelsohn, Alan L.[1]; Egan, Maureen[1]; Sanchez, Dayana[1]; Dreyer, Benard[1]. [1]NYU School of Medicine, New York City, NY; [2]Northwestern University School of Medicine, Chicago, IL;

Background/Research Question

Written asthma action plans, which convey patient regimen-specific information regarding how to manage asthma daily and with exacerbations, have previously been associated with reduction in asthma-related hospitalizations and ED visits. However, there are concerns about their effectiveness when used with low literacy families. Providers' perceptions that existing action plans are too complex for families to understand is one barrier to their use; studies have shown that <50% of physicians routinely give out these plans. We developed a low literacy, pictogram and photograph-based asthma action plan, and sought to examine whether providers who used this low literacy action plan (with no prior training) would be more likely to incorporate low literacy principles in counseling compared to those who used a standard asthma action plan.

Methods

We enrolled pediatric providers (residents/attendings) who care for children with asthma at one urban public hospital pediatric clinic. Providers were block randomized (by training level) to receive the low literacy or standard action plan (from AAAAI (American Academy of Allergy and Immunology)), and asked to use the plan to counsel a hypothetical parent of a child with moderate persistent asthma on the following regimen: Singulair 5 mg once a day, Flovent 110 mcg/actuation twice a day, Albuterol 90 mcg/actuation 2 puffs every 4 hours as needed. The low literacy action plan uses plain language principles with respect to content and format, and includes pictographic illustrations (eg. line drawing of child using inhaler with spacer) and photographs (eg. color photograph of inhalers). Provider counseling was audio-recorded and transcribed. Two raters, blinded to intervention status, reviewed transcriptions and independently completed checklists with predetermined criteria (kappa>0.8). Chi square analyses were performed to examine outcomes by randomization status.

Results

To date, 119 providers have been enrolled. Providers randomized to the low literacy (n=61)

and AAAAI (n=58) action plans were similar with respect to age, gender, race/ethnicity, and prior experience with asthma patients. Providers who received the low literacy plan were more likely to: 1) recommend an explicit time for taking daily medications (eg. Flovent "in the morning and at night" instead of "twice a day") (96.7% vs. 51.7%, p<0.001)), 2) discuss continuing to give daily medications even when sick (93.4% vs. 36.2%, p<0.001), and 3) recommend spacer use (Flovent (82.0% vs. 39.7%, p<0.001); Albuterol (83.6% vs. 48.3%, p<0.001)). Number of symptoms mentioned in the Green and Yellow Zones were comparable across groups (mean(SD) Green:1.9(2.1); Yellow: 4.1(1.9)), however those who received the low literacy plan mentioned more symptoms in the Red Zone (5.2(2.6) vs. 3.0(1.9), p<0.001), and were more likely to describe specific respiratory signs and symptoms such as "ribs show when breathing" (54.1 vs. 1.7%, p<0.001) and "neck pulls in" (47.5 vs. 0%, p<0.001).

Comclusions/Implications
Provider use of a low literacy pictographic and photographic written asthma action plan improves the quality of asthma counseling by facilitating the use of plain language principles. Additional study is needed to examine whether this improved counseling leads to enhanced parent knowledge and ability to manage their child's asthma.

Oral Abstract Session V: Tuesday, October 23, 9:30am-11:00am

Effect of Redesigned Prescription Drug Labels on Medication Use: A Randomized Controlled Trial. Kripalani, Sunil1[1]; Riley, R. Brian[2]; Mohan, Arun[3]; Trochez, Karen, M.[2]; Mashburn, Jennie[2]; Jennings, Callie[2]; Boyington, Dane, R.[2]. [1]PictureRX, LLC; Vanderbilt University, Nashville, TN; [2]PictureRx, LLC, Chattanooga, TN; [3]PictureRx, LLC; Emory University, Cattanooga, TN.

Background/Research Question
Traditional prescription drug labels suffer from poor design and readability, which limits their utility for the average consumer and contributes to medication errors. Labels are especially problematic for patients with low health literacy or limited English proficiency. Recommendations to reformat labels are being developed by state pharmacy boards and national organizations. We tested whether providing patients with a redesigned, evidence-based, illustrated medication label, could improve patients' satisfaction, self-efficacy, and adherence.

Methods
Patients were recruited from 5 retail pharmacies in Tennessee and Florida. Patients who were filling at least 1 new prescription were randomized to receive either the pharmacy's standard prescription label or a newly designed PictureRx label. The PictureRx label was developed according to best practices in health communication, published evidence, and emerging regulations, and the design was refined iteratively in focus groups. The label layout was patient-centered and included a picture of the medication, its purpose, dosing instructions in plain language and larger print (11 point font), a simple grid to show how much should be taken at each time of day (morning, noon, evening, and night), and common side effects. The PictureRx label was provided in the patient's preferred language (English or Spanish). All patients received routine pharmacist counseling. Outcomes were assessed by telephone interview approximately 1 week later, using the Satisfaction with Information about Medications Scale (SIMS), Self-Efficacy for Appropriate Medication use Scale (SEAMS), and Adherence to Refills and Medications Scale (ARMS). Analysis was performed by intention to treat, using independent samples t-tests.

Results
The 500 enrolled participants had a mean age of 50.4 years and 11.7 years of education; 63% were women, 66% were White, and 33% were Latino. Their mean number of prescription medications was 4.9. Participants were randomized to usual care (N=255) or intervention (N=245) groups, and 464 (92.8%) completed follow-up. Nearly all intervention patients reported being satisfied with the PictureRx labels (99%), noting they were clear

and easy to read (97%), and the directions were easy to understand (100%). Using the SIMS, however, there was no significant difference between study groups in patients' satisfaction with the information they received about the medication name, purpose, dosing, or side effects. Self-efficacy for taking medications correctly was significantly higher in the intervention group, $p<0.05$. Self-reported adherence did not differ significantly.

Conclusions/Implications
Patients randomized to receive a redesigned, evidence-based, illustrated prescription drug label reported high levels of satisfaction, and they reported greater self-efficacy for taking their medications correctly, compared to patients receiving traditional drug labels.

A Health Literacy-Informed Strategy to Promote Medication Reconciliation in Ambulatory Care. Bailey, Stacy Cooper[1]; Bergeron, Ashley R. [1]; Makoul, Gregory[2]; Baker, David W. [1]; Wolf, Michael S. [1]. [1]Northwestern University, Chicago IL; [2]St. Francis Hospital and Medical Center, Hartford, CT.

Background/Research Question
Discrepancies between self-reported medication lists and those recorded in patients' medical charts are common and constitute a patient safety concern. Previous studies have shown a link between low health literacy skills and poor medication reconciliation in ambulatory care settings. In response, we developed and tested a health literacy-informed, electronic health record (EHR) strategy to promote patient-provider communication on medication use and to reduce discrepancies in EHR medication lists.

Methods
319 adult, English-speaking patients were recruited from one academic general internal medicine clinic in Chicago, IL. Patients were assigned to either the intervention or usual care arm based upon physician randomization. Those in the intervention arm received a medication reconciliation tool (MRT) upon check-in for their clinic visit; this tool was created using health literacy 'best practices' to promote ease of use and was automatically generated via the EHR. The MRT included a list of patients' prescribed medications along with directions on how to update the list and provide information on any medication-related concerns. Patients were advised to give the MRT to their physician to prompt medication review and counseling. Following the clinic visit, a trained research assistant conducted an in-person interview with patients to collect socio-demographic information, self-reported medications taken, receipt of the MRT and receipt of medication review and counseling during their clinic visit. Medical charts were reviewed 2 and 6 weeks post interview to determine the number and type of medication discrepancies present between patient self-report and the medical record.

Results
More than two-thirds of patients in the intervention arm received a medication reconciliation form at check-in. Although not statistically significant, patients receiving the intervention were more likely to have medication reconciled by 6 weeks post visit compared to usual care (49% v. 31%, $p=0.15$), with omission discrepancies being 7 fold more likely to be reconciled in the intervention arm compared to usual care (46% v. 8%, $p=0.06$). In multivariable analyses, discrepancies that were linked to medicines that were prescribed by other doctors (Odds Ratio (OR) 2.91, 95% Confidence Interval (CI) 1.48 – 5.76), over-the-counter (OR 4.40, 95% CI 2.37 - 8.17), or commissions (OR 7.44, 95% CI 3.61 – 15.34) were less likely to be reconciled.

Conclusions/Implications
This EHR-based strategy could be an efficient and sustainable means of promoting reconciliation and education. However, the effectiveness of the strategy was limited. Future modifications should seek out more robust means to promote more timely reconciliation (at the same visit). Studies should also consider pairing the MRT with a counseling encounter (e.g. nurse, pharmacist) to ensure a comprehensive medication review.

Take, Wait, Stop: Improving patient use of PRN prescription drugs. McCarthy, Danielle

M.[1]; King, Jennifer P.[1]; Jacobson, Kara L.[2]; Parker, Ruth M.[1]; Wolf, Michael S. [1].
[1]Northwestern University, Chicago, IL; [2]Emory University, Atlanta, GA

Background/Research Question
This study tested a low literacy approach to providing explicit, clear guidance on prescription bottle labeling for how to safely take an as needed (PRN) medication.

Methods
As part of a larger study assessing actual use of acetaminophen containing pain medicines, 87 patients were shown a hypothetical bottle of prescription pain medicine, asked to imagine they had pain that lasted the whole day, and to demonstrate how they would take the maximum dose of the medicine over 24 hours. Forty-four patients were shown standard labeling reading "Take 1-2 pills by mouth every 4 hours as needed for pain. Do not exceed 6 pills in 24 hours." Another 43 patients were shown an enhanced label with low literacy appropriate instructions of "Take: 1 or 2 pills; Wait: 4 hours before taking again; Stop: Do not take more than 6 pills in 24 hours" with a hard carriage return between each of the components (Take, Wait and Stop). Patients were scored as overdosing if they demonstrated taking more than 6 pills in 24 hours, dosing at unsafe intervals if there were less than 4 hours between doses, and taking too many pills at one time if they demonstrated taking more than 2 pills at a time. Socio-demographic information and health literacy using the Rapid Estimate of Adult Literacy in Medicine (REALM) were also collected. To assess the associations of label type, health literacy, and sociodemographic characteristics with demonstration of overdose, generalized linear models with a Poisson distribution and log link function with robust variance estimates were used to estimate prevalence ratios and 95% confidence intervals.

Results
The mean age of participants was 39.8 years, 62.1% were female, 43.7% were white, 40.2% were African American and 72.4% had adequate literacy. There were no significant differences in characteristics between the two groups. Patients demonstrated taking between 2 and 19 pills in 24 hours with 49.4% of the sample correctly dosing the correct maximum of 6 pills. 31.8% of participants shown the standard label exceeded 6 pills in 24 hours compared to only 14.0% of participants shown the enhanced label ($p=0.048$). Only 1 person (in the standard label group) took more than 2 pills per time. 20.5% of the group shown standard labels demonstrated dosing intervals of less than 4 hours compared to 23.3% shown the enhanced label ($p=0.752$). In a multivariate model including literacy level, age, gender, race, education and income, standard labeling had a relative risk of overdosing of 2.8 (95% CI 1.1-7.7).

Conclusions/Implications
The enhanced labeling was beneficial in preventing participants from dosing more than the maximum dose in 24 hours. Although it was not significantly beneficial for each of the components of proper dosing (pills per dose, spacing) it appears that there may have been some benefit to separating the maximum dose information from the rest of the instructions compared to standard labeling where the stopping point may not be presented or may be incorporated into the overall instructions. This format can be applicable to OTC medicines as well as the majority are PRN.

Patient Beliefs and Inadequate Counseling as Barriers to Medication Safety

Serper, Marina[1]; McCarthy, Danielle[1]; King, Jennifer P. [1]; Bailey, Stacy C. [1]; Przytula, Kamila[1]; Ladner, Daniela[1]; Wolf, Michael S[1].
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Background/Research Question
Inadequate patient knowledge of prescription medication regimens has been well documented, as has its impact on medication reconciliation and safe use. In this study, we examined: 1) patient self-reports of the prevalence and nature of physician and pharmacist counseling, 2) patient beliefs about provider awareness of their medication use, 3) patient self-report of medication-related communication with their provider and 4) the impact of health literacy on these outcomes.

Methods

We conducted cross-sectional, structured interviews among 500 adult, English-speaking patients seeking care at two academic general internal medicine clinics and two federally qualified health centers in Chicago, IL and Shreveport, LA (N=4 clinics; n=125 patients per clinic). Patients were recruited via consecutive sampling; approximately 92% of approached, eligible patients participated in the study. Trained research assistants conducted brief, structured interviews with patients to assess study outcomes. Specifically, survey items inquired about patients' perceptions about their physician's understanding of their medication use and whether or not patients had spoken with their doctors regarding use of prescription medications, over-the-counter (OTC) medicines, herbal supplements or vitamins. Patients who had received a new prescription medication in the past three months were asked additional items to assess the prevalence of physician and pharmacist communication on the use of the new prescription medication. Additionally, research assistants collected data on patients' socio-demographic and clinical characteristics, as well as their literacy skills via the Rapid Estimate of Adult Literacy in Medicine (REALM).

Results

Almost all patients believed that their physician was aware of all prescription and OTC medications they were currently taking, including those prescribed by other doctors (90.2% for prescription, 85.4% for OTC, and 91.3% for prescriptions by other physicians). However, less than half patients reported telling their doctor about current use of OTC drugs or herbal supplements. 51.3% of patients reported that their physician had reviewed their medications and 77.4% reported receiving physician instructions on proper use; while 43.3% received similar information from their pharmacist. Side effects were discussed by physicians 42.9% of the time and less often by pharmacists (25.8%). Differences in patient reports were observed according to gender, recruitment site, age, health literacy, and presence of electronic health record.

Conclusions/Implications

There is a sizable gap between patient beliefs of physician awareness of their medication regimen and patient reporting of medications to their physician. The low rates of medication review and discussion of side effects by providers have implications for patient safety and quality of care.

Table 1: Sample Characteristics

Variable		All Patients (N=500)	Patients with Recent Prescription (N=190)
Age, Mean (SD)		48.9 (14.4)	48.0 (14.2)
Male, %		39.6	35.1
Race, %			
	Black	63.6	58.4
	White	32.8	36.8
	Other	3.6	4.8
Years of Education, %			
	< High School	19.4	22.0
	High School	33.2	31.3
	Some College	20.4	20.9
	College Graduate	26.6	25.8
Literacy Level, %			
	Inadequate (≤ 6th grade)	20.9	19.5
	Marginal (7th – 8th grade)	31.6	26.5
	Adequate (≥ 9th grade)	47.5	54.0
Daily Medications, Mean (SD)		2.9 (3.1)	4.0 (3.6)
# of Prescribing Physicians			
	0	11.4*	1.6**
	1	65.6	67.0
	2	16.3	20.5
	≥ 3	6.7	10.8
Clinic Type, %			
	Academic	50.0	35.1
	Safety Net	50.0	64.9

Table 2: Medication Related Beliefs

Patient Beliefs About Provider Medication Awareness (N=500)	
Item	Total %
Doctor is aware of all medicines I am taking	90.2
Doctor is aware of all OTC drugs I am taking	85.4
Doctor is aware of medicines prescribed by other doctors	91.3

Table 3: Medication Related Communications as Reported by Patients

Patient Communication		Physician Communication		Pharmacist Communication	
Item	%	Item	%	Item	%
Told doctor about OTC drugs currently taking	46.0	Reviewed medication list	51.3	Explained how to take medicine	43.3
Told doctor about supplements or vitamins currently taking	34.1	Explained how to take medicine	77.4	Described side effects	25.8
		Described side effects	42.9		

A Consumer-Led Process for Improving FDA Medication Guides. Russell, Allison L.[1]; Medici, Cammeo[2]; King, Jennifer P.[1]; Wilson, Elizabeth A.H.[1]; Bailey, Stacy C.[1]; Lambert, Bruce[2]; Wolf, Michael S.[1]. [1]Northwestern University, Chicago, IL; [2]University of Illinois Chicago, Chicago, IL.

Background/Research Question

Medication Guides (Med Guides) are required by the Food and Drug Administration (FDA) to be issued to consumers for prescription medications viewed to possess "serious and significant public health concerns." These industry-developed, FDA-approved materials are intended to be read by the consumer prior to taking the prescribed drug, as they 1) provide specific dosing administration instructions that could prevent serious adverse effects associated with taking the medication, 2) warn individuals about significant health risks that could affect one's decision to take the medication, or 3) underscore the importance of taking the prescribed medication to the patient's health, and the need for proper adherence. Research conducted by this team has found the majority, if not all, of Medication Guides are too complex and are inadequate in effectively conveying this information to patients. The purpose of this study is to utilize a consumer-led process to develop a new patient-centered Med Guide prototype.

Methods

Six focus groups were conducted in Chicago with 47 participants recruited from two primary care clinics and one adult basic education center. Participants first completed a brief, private, cognitive interview in which socio-demographic, health literacy (using the Newest Vital Sign) and preferences for modes of receiving health information were collected. Participants then joined the larger discussion group, were provided a packet containing multiple pairwise comparisons of 6 different formats of Med Guides (3 FDA, 2 Northwestern, 1 European prototype), and were directed to choose for each pair, which of the two, they preferred. After all comparisons were completed by the individuals, the group provided qualitative feedback on attributes of each of the guides that were viewed as positive or negative.

Results

The mean age of participants was 40.6 years, 66.0% of participants had a high school education or less, 68.1% were African American, and 40.4% reported currently taking 1-4 prescription medicines. The results of the pairwise comparisons showed two of the guide formats were clearly preferred by participants with one (FDA prototype) chosen 54.5% (138/235) of the times it was shown (across all participants/combinations) and a second (Northwestern prototype) chosen 54.0% (127/235) of the times it was shown. Additionally, qualitative feedback showed overwhelming support of the proposed one-page format that highlights Med Guide contents, and both recommended as well as discouraged attributes of the guides. Participants recommended formatting that differentiated the information, such as bolding text, text boxes, shading, and bulleted lists. Participants did not, however, agree on the information that they thought should be most highlighted with such formatting. Participants rejected guides where they found the text to be small or "cluttered." Taken together, participants found Med Guides that made it easy to find specific information, by

differentiated text without having text too close together, favorable.

Conclusions/Implications
Through a systematic, consumer-led approach, feedback from a diverse sample of participants was gathered to help refine existing prototypes of FDA approved Medication Guides in an effort to improve their usability for consumers. Next steps for our research group include utilizing eye tracking technology to assess how consumers navigate information on the guides and comprehension testing to compare the efficacy of the two preferred guides, selected in this process, to current standard Med Guides.

Oral Abstract Session VI: Tuesday, October 23, 9:30am-11:00am

Translation and Cross-Cultural Adaptation of the German, French and Italian version of the S-TOFHLA: Conceptual and Methodological Considerations. Mantwill, Sarah[1]; Connor, Melanie[1]; Schulz, Peter[1].
[1]University of Lugano, Ticino, Switzerland.

Background/Research Question
Research around the concept of health literacy has largely evolved in the English-speaking parts of the world and standardized tools to measure health literacy have been mainly developed in English. In the last years research in this area also has become more prominent in other cultural and linguistic areas but the translation and adaptation of tested measurement tools are still few. Ensuring translational equivalence of health literacy measures is not only important with regard to cross-cultural comparisons but also in order to control for culture specific practices and experiences of the constructs under investigation.

The purpose of this paper is to describe and discuss the linguistic issues of the translation and adaptation process of the Short Test of Functional Health Literacy in Adults (S-TOFHLA) into three different languages (German, French and Italian). As part of a validation study the paper addresses the assumption of the cross-cultural universality of its underlying concept and subsequently at which level scores obtained can be compared across cultures and countries.

Methods
A study was conducted to validate the translated German (n = 248), French (n = 134) and Italian (n = 271) version of the S-TOFHLA (Baker et al.,1999) in Switzerland. Validity was assessed by testing known predictors for health literacy levels, such as education, age or existence of a chronic condition.

The translation process involved two independent coders who screened the test for linguistic peculiarities. Meanwhile, the test was translated into the respective target languages and successively back translated. The committee approach was used in order to ensure that different types of equivalences, such as linguistic or functional equivalence, were taken into consideration. Consequently the different translations were compared and adapted according to the linguistic findings.

Results
The German, French and Italian version of the S-TOFHLA showed to be valid measures for functional health literacy, which now can be used to assess patients' level of understanding of basic health information across three main language regions in Europe.
However, the translation process revealed differences in the usage of test formats across different regions as well as the need to adapt the difficulty level (metric equivalence) according to e.g. word frequencies.

Conclusions/Implications
In the light of Schulz and Nakamoto's (2012) proposed health literacy and empowerment framework the paper discusses implications for the conceptual equivalence of the S-TOFHLA across different culture/language systems. It poses the question whether its format and conceptualization is rooted too deeply in the US-American reality and suggests that health literacy measures may have to be developed detached from cultural context or, vice versa, have to be specifically conceptualized within a specific cultural setting.

Development of a new measure of health literacy. Ownby, Raymond L.[1]; Waldrop-Valverde, Drenna[2]; Acevedo, Amarilis[1]; Caballero, Joshua[1]; Davenport, Rosemary[1]; Jacobs, Robin[1]; Loewenstein, David[3]. [1]Nova Southeastern University, Fort Lauderdale, FL; [2]Emory University, Atlanta, GA; [3]University of Miami, Miami, FL.

Background/Research Question
Current measures of health literacy have been useful in the exploration of its relation to health status and outcomes in a variety of medical conditions. They have been criticized, however, for having a limited range of content and for their formats. Further, no existing measure has an equivalent form in both Spanish and English. The purpose of this report is to present data on the initial development of a new health literacy measure designed to incorporate a broad range of content, have equivalent Spanish and English forms, and be computer administered and scored.

Methods
Initial development of 225 items was completed by a group of experts from diverse healthcare professions who prepared candidate items. Content included a broad range of topics that ranged from medication instructions to reading a map of a hospital to using a web site to calculate body mass index. It also included questions about video simulations of health care encounters related to medications, participation in clinical research, nutrition, and getting health information from the Internet. Skills tapped by questions included knowledge, reading comprehension, reading tables, completing forms, and applying critical thinking and judgment. Some items were originally written in Spanish and others in English; each group was translated to be as similar as possible in each language. Questions included multimedia content as appropriate and followed a multiple choice format.

Items were administered via touch screen computer to 73 Spanish- and 69 English-speaking participants; half of each group was 50 years of age or older. Nonparametric item response theory (IRT) analyses included assessment of differential item functioning in Spanish and English speakers. Exploratory and confirmatory factor analyses assessed the extent to which a reduced set of items reflected a single or several abilities. The final measure comprises 85 items.

Results
IRT analyses allowed us to identify a subset of items with a wide range of difficulties and that functioned equivalently for both Spanish and English speakers. These items did not show evidence of differential item functioning and thus could be used to assess both Spanish and English speaking participants.

Factor analyses showed that two subscales (verbal and quantitative health literacy) underlie the measures. They have excellent internal reliability (Cronbach's alpha = 0.91 for verbal and 0.86 for quantitative). In a subset of 50 English-speaking participants who had previously completed the Test of Functional Health Literacy in Adults (TOFHLA), the new measure's scales were significantly correlated with TOFHLA reading and numeracy scales (correlation for TOFHLA reading with new health literacy = 0.69, $p < 0.001$; TOFHLA numeracy and new quantitative = 0.38, $p = 0.007$). These correlations are moderately strong but significant in light of the differences in content, format, and skills assessed by the two measures which might have reduced the relation.

Conclusions/Implications
Initial development of the new measure, using touch screen computer technology, substantially more diverse item content than other measures, and a rigorous psychometric approach to development in both Spanish and English shows promise for improving the efficiency and validity of health literacy assessment.

Evaluating a Tool for Rapid Clinical Assessment of Health Literacy in Hospitalized Patients. Press, Valerie G.[1]; Shapiro, Madeleine I.[2]; Mayo, Ainoa M.[1]; Meltzer, David O.[1]; Arora, Vineet M.[1].

[1]University of Chicago, Chicago IL; [2]Pritzker School of Medicine, Chicago, IL.

Background/Research Question

A "universal precautions" approach is the gold standard for communicating with patients about disease information, patient education and necessary health care follow-up appointments. However, due to limited resources in the hospital setting, identification of vulnerable, high-risk (e.g. low health literacy) patients, may at times be necessary, to provide resource-heavy interventions to those that need it most. An effective clinical screening tool is needed, however, to identify these high-risk patients. Chew and colleagues have validated a brief, 3-item, verbal screening health literacy tool in the outpatient setting. Our objective is to provide an update on our efforts to evaluate the validity of the Chew screening questions for hospitalized patients.

Methods

General medicine inpatients were enrolled from an ongoing study of resource allocation and quality of care at our hospital. Eligible patients (cognitively intact, English-speaking) were asked the Chew screening questions: (q1) "How often do you have problems learning about your medical condition because of difficulty understanding written information?"; (q2) "How confident are you filling out medical forms by yourself?"; (q3) "How often do you have someone help you read hospital materials?" Participants were considered "at-risk" for poor health literacy if they answered "sometimes, often, or always" (q1, 3) or "somewhat, a little bit, or not at all" (q2) (Likert scale from 0-4). To validate these questions, we administered the REALM-R to participants who had sufficient vision (> 20/50) on the Snellen screening chart.

Results

To date, 841 participants have been enrolled; the majority were African-American (81%) and female (57%); mean age was 53 years. Just under half (388/841) screened "at-risk" on the Chew tool. Both health literacy screening tools (Chew and REALM-R) were completed by 530 participants; of these, 39% (239/530) were considered "at-risk" based on the Chew tool, while 255 (48%) had inadequate health literacy based on the REALM-R ($p<0.001$). The Chew tool had a sensitivity of 52% (Figure 1). Of note, more than one-third of participants approached for the REALM-R (311/841) were unable to complete it due to insufficient vision. Of these participants, 36% (111/311) did not have their glasses with them in the hospital. Participants with insufficient vision were more likely to be "at-risk" for poor health literacy on the Chew tool compared to those with sufficient vision (58% vs. 39%, $p<0.001$).

Conclusions/Implications

In this study we have demonstrated that among a low-income, primarily African-American urban hospitalized population, two health literacy tools found differing prevalence of low health literacy. Our data suggest that the Chew screening tool may have low sensitivity among hospitalized and/or African-American patients; as such, further evaluation of this and other clinically relevant tools is needed. Additionally, the high prevalence of poor vision in this population is non-trivial and may be an under-recognized risk factor for hospitalized patients. Physicians should take into account the implications of the dual risks of poor health literacy and poor vision: up to 63% of patients may have difficulty reading, and/or understanding written material provided in the hospital setting, which may impede high-quality care transitions.

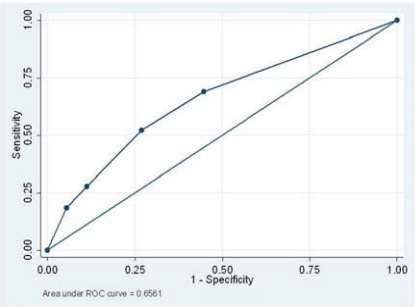

Figure 1. Receiver Operator Characteristic Curve of Combination of Three Chew Screening Questions for Identification of Inadequate Literacy
"Likert scales: either: "never (0), occasionally (1), sometimes (2), often (3), or always (4)" or "extremely (0), quite a bit (1), somewhat (2), a little bit (3), or not at all (4)"

Developing an Instrument to Assess the Understandability and Actionability of

Health Information Materials: Results, Challenges and Lessons for the Field.

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Background/Research Question

Many studies have shown that available health information materials are often poorly understood by patients, especially those with limited health literacy. Despite the availability of numerous assessments to support the development of low literacy-appropriate materials, none have been accepted by researchers and healthcare professionals alike as a gold standard. Spearheaded by the Agency for Healthcare Research and Quality (AHRQ), we aimed to develop a reliable and valid Health Information Rating System (HIRS) to provide a systematic approach for untrained, lay professionals to rate and compare the understandability and actionability of health information materials, across different modalities (print, video and web) on different health topics.

Methods

Our systematic approach to developing the HIRS included: 1) reviewing existing instruments and guides for assessing/developing health information materials, which were identified from a literature search of Pubmed, online scans of health literacy-related organizations' websites, resources provide by an expert panel and others in the field, 2) identifying constructs relevant to the two distinct domains for measurement – understandability and actionability, 3) constructing an item pool and identifying gaps, 4) assessing the face and content validity using experts in the field, 5) determining reliability - internal consistency (Cronbach's alpha) and external consistency (percentage agreement and Fleiss' Kappa), and 6) assessing the construct validity of the HIRS by conducting testing with 48 consumers.

Results

Of the 31 instruments/tools/guides identified, we reviewed 22, from which we culled 64 potential items for the HIRS. We determined that 36 of these were relevant to the domains of understandability (28 items) and actionability (8 items). Nine experts reviewed the items for face and content validation. We discussed with the experts whether a material's performance on each item would affect its understandability or actionability, refined items, and developed new items for the actionability domain based on identified gaps. We completed two rounds of reliability testing with multiple untrained non-expert raters (4 and 12 raters, respectively). We found strong internal consistency (Cronbach's alpha) for both the understandability and actionability scales, but only poor (understandability) to fair (actionability) external consistency (Fleiss' Kappa). For both internal and external consistency, our results for the actionability items were better than those for understandability. We are conducting a third round of reliability testing in August 2012, and will assess the construct validity with consumers in Spring 2013. We will present the results to date.

Conclusions/Implications

Developing a reliable instrument for measuring understandability and actionability of materials that can be administered by untrained, lay professionals is a challenging task. We discovered that although raters prefer to have a selection of ratings, dichotomous items produced greater inter-rater reliability. Furthermore, a great deal of precision was required in items, and the use of examples helped increase external consistency. The HIRS offers a reliable and valid tool for use by untrained, lay professionals to assess actionability – a key dimension for health information materials not addressed in other instruments, and also allows users to assess different modalities for presenting health information.