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Health Literacy

The association of health literacy with illness and medication beliefs among older adults with asthma

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ABSTRACT

Objective: Suboptimal health literacy (HL) and asthma beliefs are associated with poor asthma self-management and outcomes. We tested the hypothesis that low HL is associated with inaccurate beliefs.
Methods: Asthmatics ≥60 were recruited from hospital and community practices in New York, NY and Chicago, IL ($n = 420$). HL was measured with the Short Test of Functional Health Literacy in Adults; validated instruments derived from the self regulation model were used to assess beliefs. The association of beliefs with HL was evaluated with multivariate models.
Results: Thirty-six percent of patients had low HL; 54% believed they only have asthma when symptoms are present, 29% believed they will not always have asthma and 20% believed that their doctor can cure asthma. HL was associated with beliefs of not having asthma all the time and that asthma can be cured (OR: 1.84, 95% CI: 1.2–2.82; OR: 2.22, 95% CI: 1.29–3.82, respectively). Patients with low HL were also more likely to be concerned about medication use ($\beta = 0.92$, $p = .05$), despite recognizing their necessity ($\beta = -1.36$, $p = .01$).
Conclusions: Older asthmatics with low HL endorse erroneous asthma beliefs.
Practice implications: Health communications for improving self-management behaviors in asthma should employ both health literacy-appropriate strategies and messages to counter illness-related misconceptions.

1. Introduction

Asthma is a common chronic medical condition in the elderly, affecting up to 9% of adults over age 65 in the United States [1–3], and although it is equally as common among younger adults [4], older asthmatics experience higher rates of mortality and morbidity from the disease [5–8]. Older asthmatics often have difficulty successfully conducting the self-management tasks that are crucial for asthma control [9–11] and such difficulty may contribute to the age-related differences in asthma outcomes that have been observed previously.

Health literacy and health beliefs have emerged as potentially important mediators of successful self-management in asthma [11–19]. For example, patients with low health literacy report lower levels of adherence with asthma controller medications [20] and those with misconceptions about asthma, like believing they only have the disease when symptoms are present (no symptoms no asthma), also have lower levels of adherence [12].

Health literacy levels affect patients' ability to access, process, and effectively utilize health information, including asthma knowledge. By extension, health literacy could influence beliefs about asthma through its impact on information acquisition. However, the connection between health literacy and beliefs has not been previously examined. In this study we test the hypothesis that low health literacy is associated with erroneous asthma beliefs that have been previously linked to poor asthma medication adherence and asthma outcomes.

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2. Methods

2.1. Health literacy

Data for this analysis are taken from the Asthma Beliefs and Literacy in the Elderly (ABLE) study, an ongoing, prospective cohort study of asthma in adults ages 60 years and older. The study began recruiting elderly asthmatics from three inner-city outpatient clinics in New York City, NY and Chicago, IL between December 2009 and August 2012. The New York City practices are based at the Mount Sinai Medical Center located in Manhattan's East Harlem neighborhood, and include the general internal medicine, geriatrics, and pulmonary practices, and an adult primary care practice of the Lutheran Family Health Services network of federally qualified health centers in Brooklyn, NY. The Chicago-based practices include the general internal medicine clinic of Northwestern University Hospital and the Mercy Health Clinic, a federally qualified health center. The study was approved by the Institutional Review Boards of the Mount Sinai School of Medicine, Lutheran Medical Center, and the Northwestern University Feinberg School of Medicine.

Potentially eligible asthmatics were identified by review of the electronic clinic encounter databases at each participating site. We enrolled patients ages 60 years and older who speak English or Spanish, and have persistent asthma based on the definition in the National Heart, Lung and Blood Institute's Expert Panel on Asthma [21]. Individuals with a smoking history of $\geq$10 pack-years or a diagnosis of chronic obstructive lung disease or other chronic respiratory illness were excluded.

Trained, bilingual research assistants recruited patients by telephone. After obtaining verbal consent, the research assistants administered a brief screening assessment to determine final eligibility for the study. Eligible patients were then invited to an in-person baseline interview in English or Spanish followed by a phone interview at 3 months and a second in-person interview at 12 months.

2.2. Health literacy

Health literacy was assessed at baseline and 12-months, and was measured using the Short Test of Functional Health Literacy in Adults (S-TOFHLA). The S-TOFHLA is composed of a 36-item reading comprehension section and a 4-item numeracy exercise. The reading comprehension section is presented as two timed (7-min) clinically oriented reading passages that are designed to omit key words and phrases from every line. Four multiple choice answers are provided under each missing section of the text and the participant is required to choose the response which contextually fits into the blank. The numeracy section assesses the patient's ability to read and interpret the information encountered when navigating the healthcare system, by presenting appointment slips and instructions for medication use, and requesting the participant to respond to related questions. The reading comprehension items are multiplied by 2 for a total score range of 0–72 and the numeracy items are multiplied by 7 for a range of 0–28. These items are then summed for a total S-TOFHLA score of 0–100, where higher scores represent higher health literacy. In this analysis scores were divided into two levels of health literacy: adequate (score $\geq$67) and marginal and low (score $<$ 67) [20]. The S-TOFHLA has been validated for use in both English and Spanish [22].

2.3. Asthma disease and medication beliefs

Asthma perceptions and beliefs were collected at baseline and at 12 months. The measures were based on the common sense model of self-regulation (CSM) [23,24], which describes how people's mental models or representations of illnesses provide the frameworks within they make decisions to seek health care and adopt treatments and at home procedures for disease management [12]. The five domains or content areas of illness representation – identity, timeline, cause, control, and consequences – are based to a substantial degree on patients' life-time experience with acute conditions. The CSM has been used to examine the mechanisms underlying patient behaviors for a wide range of chronic illnesses, including asthma [12,25,26]. For this analysis, we examined beliefs which have been linked to medication non-adherence as well as poor asthma outcomes [12,25,26]. Specifically, we focused on the identity, timeline, and control domains of the CSM and three beliefs representative of these domains. We have previously found lesser and non-significant associations between measures in the cause and consequence domains and health outcomes [12,25,26] and therefore excluded them from analysis in this study.

Identity refers to the symptoms that asthmatics use as indicators of disease activity, for example wheezing. The no symptoms no asthma belief, wherein the patient believes that their asthma is present only when they have asthma symptoms, is a perceptual belief based on a prior experience with acute conditions and is strongly associated with asthma controller medication adherence [12]. The timeline domain reflects beliefs about the duration of asthma, specifically, whether it is acute or chronic. The belief that a patient may not always have asthma, a characteristic of acute and episodic conditions, is a second timeline belief that is also associated with adherence. Control encompasses beliefs and expectations that symptoms and illness can be cured [12]. The belief that a physician can cure asthma rather than simply control it is an example of a control domain belief.

2.4. Medication beliefs

To assess asthma controller medication beliefs, we used the beliefs about medications questionnaire (BMQ) [27]. The BMQ assesses whether the patient beliefs that taking their asthma medications is necessary or whether they are concerned about the side effects. Responses are summed for a total score ranging 5–25. Higher scores indicate more negative beliefs, specifically, that the patient believes less strongly in the necessity of taking their medication and has more concerns about the negative consequences of taking their medications.

2.5. Covariates

Other covariates included in our analyses were the socioeconomic indicators age, sex, race, education, and income, and asthma history (number of years since diagnosis, history of chronic use of oral steroids, and history of intubation).

2.6. Statistical analysis

We first compared characteristics of the study sample by health literacy level (adequate vs. marginal or low) using the chi-square test, student's *t*-test or Wilcoxon rank-sum test, as indicated. We then fitted generalized estimating equation (GEE) models to test the hypothesis that health literacy is associated with asthma beliefs at baseline and 12-month follow-up while account for clustering by repeated measures within participants. Models were fitted with an exchangeable correlation structure and the sandwich estimator to obtain robust standard errors. Analyses were performed with SAS statistical software (SAS Institute, Cary, NC), using two-sided *p*-values.