

Letter to the Editor

Inadequate health literacy is associated with increased asthma morbidity in a population sample

To the Editor:

Health literacy enables patients to understand and to act in their own interests. Limited functional health literacy is associated with lower health status, adverse health outcomes, less frequent preventive health behaviors, less active self-treatment of chronic conditions, and higher health care costs.¹ There have been few studies examining health literacy in adult asthma, and these have been predominantly limited to smaller convenience samples. One study found less health literacy was associated with worse asthma-related quality of life, worse physical function, and more emergency department use.² Inadequate health literacy was associated with lower asthma medication knowledge and worse metered dose inhaler (MDI) technique in hospitalized inner-city adults.³ We aimed to measure the level of functional health literacy in adults with asthma from a representative population sample and explore associations with health status and morbidity.

Data were obtained from the South Australian Health Omnibus Survey during spring 2008. Within Australian Bureau of Statistics collector districts, a random starting point was selected, and 10 households were sampled by using a fixed skip interval. In a nonreplacement sample, 1 adult age 15 years or older, whose birthday was next, was selected for interview in the home by trained health interviewers. The South Australian Health Omnibus Survey methodology has been described in detail elsewhere.⁴ The participation rate was 61.2% (n = 2824).

Functional health literacy was assessed with the Newest Vital Sign,⁵ a screening test developed specifically for use in primary care. It consists of a nutrition label for ice cream that is accompanied by 6 questions that probe the participant's ability to read and apply information from the label and has a very high sensitivity for detecting limited health literacy,⁶ beyond that of education and age alone.⁵ The Newest Vital Sign is scored out of 6, with a score of 4 to 6 indicating adequate health literacy, a score of 2 to 3 indicating an individual is at risk of inadequate health literacy, and a score of 0 to 1 indicating inadequate health literacy.⁵

General health status was assessed by asking respondents to rate their general health on a scale of excellent to poor. Single-item measures have demonstrated good reproducibility and reliability, and strong concurrent and discriminant scale performance with an established health status measure (Short-Form 12),⁷ and have shown a strong relationship with mortality. Current doctor diagnosed asthma was determined by a yes response to the questions, "Have you ever been told by a doctor that you have asthma?" and "Do you still have asthma?" Questions regarding asthma morbidity were included. No lung function data were available. Demographic data included sex, education level, employment status, household income, and country of birth.

Data were analyzed by using SPSS (Version 15.0; SPSS Inc, Chicago, Ill) and weighted to the individual's probability of selection and to Australian Bureau of Statistics population estimates. Bivariate associations of health literacy levels with demographics, chronic conditions, and health service use were

determined with χ^2 tests. Multiple logistic regression models were developed for outcome variables of inadequate health literacy (Newest Vital Sign scores of 0-1) compared with those with adequate health literacy (scores 4-6), and also for adequate health literacy compared with those at risk (scores 2-3) or with inadequate health literacy.

Of the 2824 participants, 1358 (48.1%) were male. The overall prevalence of at-risk health literacy was 24.0% and of inadequate health literacy was 21.0%. Among the 385 (13.6%; 44.3% male) people reporting current asthma, inadequate health literacy was found in 15% overall, but in 47% of those age ≥ 65 years compared with 11% in those younger. At-risk health literacy was noted in 25% of those with asthma and 28% of those age ≥ 65 years. Inadequate/at-risk health literacy was not more common among people with asthma in analyses adjusted for age, sex, income, and education (odds ratio, 0.9; 95% CI, 0.7-1.1; Table I). Compared with those with adequate health literacy among people with asthma, those with inadequate health literacy were more likely to report waking at night weekly or more often and hospitalizations in the past year, and significantly more likely to report days lost from usual activities in the past 12 months, adjusted for age, sex, and education. Those with at-risk health literacy were significantly more likely to report hospitalizations and to possess a written asthma action plan, but days lost from usual activities did not reach statistical significance. There were no significant associations of at-risk or inadequate health literacy levels and self-rated fair to poor general health.

We have identified that inadequate and at-risk functional health literacy is common and is associated with adverse asthma outcomes in a representative sample of adults with asthma. Increased symptoms, functional impairment, and significant health care use were more common in people with less health literacy in analyses adjusted for age, sex, and education. This suggests that health literacy is not merely acting as a proxy for education. Asthma itself, however, was not increased in people with low health literacy, consistent with the notion that health literacy affects asthma management and interactions with health services rather than factors associated with the development of asthma.

These findings have clear implications for asthma self-treatment programs. Less health literacy has been linked to low asthma knowledge and self-care,³ but was not a barrier to learning these skills in a tailored education program.³ Current asthma self-treatment programs do not always explicitly consider health literacy in their design or implementation. This may particularly disadvantage minority groups, with 1 review concluding that such programs are "not culturally sensitive, linguistically sensitive, or relevant, which creates further difficulties for ethnocultural communities and minority groups in many Western countries."⁸ However, the finding of widespread at-risk/inadequate health literacy in our study implies that specifically considering health literacy across all asthma clinical practice and self-treatment education should be a priority in attempts to address the ongoing community burden of asthma morbidity.

This study is limited by the use of self-reports of asthma and morbidity; however, this is a common practice in community

TABLE I. Demographics, asthma and asthma morbidity (% [n]) in relation to levels of health literacy and adjusted associations of asthma morbidity with functional health literacy

Demographics	Health literacy level			χ^2 P
	Adequate	At risk	Inadequate	
Female	58.1 (126)	58.3 (56)	45.2 (33)	.13
Age ≥ 65 y	6.9 (15)	15.8 (15)	39.7 (29)	<.01
Household income <\$20,000/y	11.1 (24)	13.7 (13)	35.1 (26)	<.01
High school education or less	26.6 (64)	41.7 (40)	56.7 (42)	<.01
Non-English-speaking country of birth	2.3 (5)	10.4 (10)	21.9 (16)	<.01
Asthma	14.0 (217)	14.0 (95)	12.3 (73)	.59
OR* (95% CI)	1.0 (Ref)	1.0 (0.7-1.3)	0.9 (0.6-1.2)	
Wakening at night $\geq$ weekly	13.8 (188)	8.4 (8)	21.9 (16)	.04
OR† (95% CI)	1.0 (Ref)	0.7 (0.3-1.6)	1.6 (0.7-3.5)	
Asthma admissions past year	4.1 (9)	12.6 (12)	11.0 (8)	.02
OR† (95% CI)	1.0 (Ref)	3.7 (1.4-9.7)	3.0 (1.0-9.1)	
Days lost from usual activities	18.4 (40)	26.3 (25)	23.3 (17)	.26
OR† (95% CI)	1.0 (Ref)	1.9 (0.9-3.1)	2.5 (1.2-5.3)	
Action plan ownership OR† (95% CI)	28.1 (61)	38.9 (37)	37.0 (27)	.11
OR† (95% CI)	1.0 (Ref)	1.8 (1.02-3.0)	1.5 (0.8-2.7)	
Fair-poor self-rated health status OR† (95% CI)	30.9 (67)	35.8 (34)	45.2 (33)	.08
OR† (95% CI)	1.0 (Ref)	1.3 (0.8-2.4)	1.2 (0.6-2.2)	

OR, Odds ratio.

*Adjusted for age, sex, income, education, and country of birth.

†Adjusted for age, sex, and education.

studies. The use of the Newest Vital Sign is a potential limitation of the study. However, it has been well validated in primary care populations and has the advantage of examining both literacy and numeracy aspects of health literacy. Numeracy, but not scores on another health literacy instrument, has been associated with asthma hospitalization,⁹ emphasizing the value of assessing numeracy in health literacy instruments.⁵

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Supported by the University of Adelaide and the National Health and Medical Research Council of Australia.

Disclosure of potential conflict of interest: R. J. Adams receives research support from the National Health and Medical Research Council and the Australian Research Council. R. E. Ruffin receives research support from the National Health and Medical Research Council and the Australian Research Council. D. H. Wilson receives research support from the National Health and Medical Research Council and the Australian Research Council. The rest of the authors have declared that they have no conflict of interest.

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doi:10.1016/j.jaci.2009.05.035