

# Low Caregiver Health Literacy Is Associated With Higher Pediatric Emergency Department Use and Nonurgent Visits

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The authors declare that they have no conflict of interest.

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## ABSTRACT

**OBJECTIVE:** We sought to determine the association between low caregiver health literacy and child emergency department (ED) use, both the number and urgency of ED visits.

**METHODS:** This year long cross-sectional study utilized the Newest Vital Sign questionnaire to measure the health literacy of caregivers accompanying children to a pediatric ED. Prior ED visits were extracted from a regional database. ED visit urgency was classified by resources utilized during the index ED visit. Regression analyses were used to model 2 outcomes—prior ED visits and ED visit urgency—stratified by chronic illness. Analyses were weighted by triage level.

**RESULTS:** Overall, 503 caregivers completed the study; 55% demonstrated low health literacy. Children of caregivers with low health literacy had more prior ED visits (adjusted incidence rate ratio 1.5; 95% confidence interval 1.2, 1.8) and increased odds of a nonurgent index ED visit (adjusted odds ratio 2.4;

95% confidence interval 1.3, 4.4). Among children without chronic illness, low caregiver health literacy was associated with an increased proportion of nonurgent index ED visits (48% vs 22%; adjusted odds ratio 3.2; 1.8, 5.7).

**CONCLUSIONS:** Over half of caregivers presenting with their children to the ED have low health literacy. Low caregiver health literacy is an independent predictor of higher ED use and use of the ED for nonurgent conditions. In children without a chronic illness, low health literate caregivers had more than 3 times greater odds of presenting for a nonurgent condition than those with adequate health literacy.

**KEYWORDS:** child; child, preschool; emergency service; hospital; health literacy; health services accessibility; infant; utilization

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## WHAT'S NEW

Over half of caregivers with their child in the emergency department have low health literacy and seek care more often and for nonurgent conditions. Caregiver health literacy may serve as a potential target for future interventions targeting nonurgent ED utilization.

NINETY MILLION AMERICAN adults have low health literacy, affecting their capacity to “obtain, process, and understand basic health information and services needed to make appropriate health decisions.”<sup>1</sup> Within the pediatric emergency department (ED), an estimated 1 in 3 parents has low health literacy.<sup>2</sup> Health literacy skills are crucial in caring for children during acute illness because low health literacy can affect medication administration, health system navigation, and illness knowledge.<sup>1,3–7</sup> Lack of health literacy skills may lead caregivers to seek care for their children in the ED, even for mild acute illness.

Although the relationship between low health literacy and ED utilization has been shown in adults,<sup>8,9</sup> this outcome has not been fully examined in children, and to our knowledge, no previous study has investigated the

relationship with nonurgent ED use. A recent review found a mixed relationship between low parent health literacy and child ED utilization; the relationship is present in patients with asthma but has not been found in overall ED populations.<sup>2</sup> In most children, acute conditions such as febrile illness, vomiting, or upper respiratory infections are treated at home or the primary care office without an ED visit.<sup>10</sup> Caregivers with low health literacy may seek ED care more often for mild acute illness as a result of lack of health literacy skills. Many of the visits for mild acute illness would be considered nonurgent. Additionally, nonurgent ED users tend to have the same demographic characteristics as those with low health literacy, including low socioeconomic status, ethnic or racial minority, and low educational attainment, suggesting a previously unmeasured similarity with low health literacy.<sup>11–14</sup>

We sought to estimate the prevalence of low health literacy in the pediatric ED and examine the relationship between caregiver health literacy with both prior and nonurgent ED use. We hypothesized that low health literacy would be related to a greater number of prior ED visits and a higher likelihood of nonurgent ED visits at the index ED visit.

## METHODS

### STUDY PARTICIPANTS

Caregivers of children 12 years old or younger presenting to the ED at a Midwest children's hospital serving urban and suburban patients were recruited for participation. Caregivers of children over 12 years old were excluded to avoid the influence of an older child's health literacy. Caregivers other than the parent were eligible if they "(took) care of the child most of the time." If multiple caregivers were present, the caregiver who "brought the child to the doctor most often" was assessed. Subjects were excluded if the caregiver had already completed the study, if the caregiver was non-English or non-Spanish speaking, if the child was in acute distress (eg, highest triage acuity level), or if the child presented for child maltreatment or nonaccidental trauma. The hospital's institutional review board approved this study.

### STUDY DESIGN

Trained research assistants enrolled patients during predetermined 4-hour blocks encompassing daytime, evening, and weekend hours between June 1, 2011, and May 31, 2012. Enrollment was intentionally spread over a year to account for seasonal variation in pediatric ED utilization patterns. To obtain a cross-sectional sample of the ED population, a room number was selected from a random list of ED room numbers every 30 minutes, and a caregiver in that room was eligible for enrollment. Verbal consent was obtained using a low literacy script written at a fifth grade reading level to ensure understanding of low literacy caregivers. After consent, the research assistant administered the Newest Vital Sign questionnaire to assess health literacy and the Children With Special Health Care Needs (CSHCN) questionnaire<sup>15</sup> to determine chronic illness status, and provided a self-administered survey of sociodemographic information.

### MEASURES

#### HEALTH LITERACY/NUMERACY

The Newest Vital Sign (NVS) is an orally administered 6-question test to assess health literacy.<sup>16</sup> The NVS requires interpretation of a nutrition facts label to answer health-related questions, including the performance of calculations, tasks that are thought to measure the composite skills of both print and numeric literacy. The NVS has been validated for administration in both English and Spanish and is ideal for the ED environment, requiring only 2 to 6 minutes to complete.

The NVS traditionally classified adults as having adequate literacy if they answered 4 to 6 questions correctly.<sup>16</sup> This initial NVS validation occurred in an older primary care adult patient population,<sup>16</sup> leaving uncertainty that the original threshold functions well when investigating outcomes in a younger population.<sup>17</sup> Knowing that health literacy can have dose-dependent and threshold effects,<sup>18</sup> we analyzed the spectrum of NVS scores using ordinal chi-square testing, and we

found both a significant dose-dependent relationship between NVS score and our ED use outcomes. We also conducted a threshold test, the difference between the total chi-square value and the chi-square value for a threshold, as well as an ordinal chi-square test for trend, and found a significant health literacy threshold. We compared thresholds for NVS scores using a threshold of 3 or 4 and found that a threshold score of 4 accounted for almost all of the total chi-square value; therefore, remaining analyses were conducted using an adequate health literacy group (score 5 to 6) and a low health literacy group (score 0 to 4).

#### PRIOR ED USE

A regional ED database including 29 ED sites from multiple health systems in the surrounding city and state was available as part of the medical record. The research assistant reviewed the database and extracted the number of ED visits over the prior 365 days. These data were missing for 25% of subjects when the database was offline for unexpected technological issues. No analysis was available regarding the urgency of prior visits.

#### NONURGENT INDEX ED VISIT

Resources used during the visit at which the subject was enrolled, the index ED visit, were reviewed to classify visits as urgent or nonurgent. Resource use criteria to establish urgency are an accurate measure of ED visit urgency compared to a gold standard of physician chart review<sup>19,20</sup> and has been used in other studies assessing the urgency of ED visits.<sup>21-23</sup> A research assistant, different from the research assistant who enrolled the caregiver, reviewed the ED chart and recorded all resources used. Consistent with prior published standards, visits were considered urgent if the child utilized any diagnostic testing (including blood work, urine studies, electrocardiography, or other fluids such as cerebrospinal fluid or joint aspirate, excluding strep or rapid antigen swabs), radiologic studies, administration of intravenous fluids, or provision of any medication (excluding oral antibiotics and over-the-counter medications).<sup>19</sup> All other visits were considered nonurgent.

#### STATISTICAL ANALYSES

Demographic characteristics were compiled using descriptive statistics. Low and adequate health literacy were compared with ED use outcomes by the chi-square test for categorical data and a Poisson regression model for count data. Multivariable analyses were conducted using logistic regression (for urgency outcome) or Poisson regression (for number of prior visits outcome) with bidirectional stepwise entry of variables related to health literacy and ED use. Variables analyzed included caregiver health literacy, age, ethnicity/race, education, foreign-born status, child insurance, child chronic illness status, and child age. In stepwise multivariable logistic regression, only health literacy and chronic illness were selected into the model. Caregiver ethnicity/race and child insurance status were forced into the model. In the

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