Health Literacy is Associated with Asthma Beliefs Among Older, Inner-City Adults

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Asthma common among older adults

- Prevalence: 4% to 9%

Mortality/morbidity higher in the elderly

- 14x higher asthma mortality than adults 18-34y (54% of deaths)
- 2x higher hospital admission rates
Background—Asthma Control

Asthma morbidity and mortality avoidable

• Good self-management is critical
• Medication adherence, avoidance of triggers, self-monitoring of symptoms
Background—Barriers to Self-Management

Asthma beliefs

- Suboptimal (inaccurate) beliefs common
- More common among older adults
- Poorer self-management and asthma outcomes
- Example
  - No symptoms-no asthma, 53%
  - 1/3 less adherent
  - 3x more common among adults ≥65 y
Background—Barriers to Self-Management

Health literacy (HL)

• Degree to which individuals can obtain, process, understand information for health decisions

HL $\rightarrow$ poorer disease self-management and outcomes
Research Objective

Examine the relationship between health literacy and asthma disease and medication beliefs.

Hypothesis: Low health literacy is associated with sub-optimal asthma beliefs.
Theoretical Construct

Common Sense Model of Self-Regulation (CSM)

- **Identity**: wheezing or cough indicating disease activity
- **Timeline**: asthma as an acute or chronic disease
  - No Symptoms-No Asthma
- **Consequences**: effect of steroid medications on asthma control
- **Control**: curability of asthma
- **Cause**: role of inflammation and mediating effects of steroids

Health literacy

- Provides opportunity for factual information to mitigate beliefs
Methods—Setting and Subjects

General medicine practice, tertiary care hospital, East Harlem, NYC

Inclusion

- Age ≥50 years
- Chart documented asthma
- English and Spanish speakers

Exclusions

- Other chronic pulmonary diseases (e.g., emphysema)
- Dementia

Recruitment

- Convenience sample, recruited and interviewed in waiting area
Methods—Outcome Measures

Asthma illness beliefs

- Brief-Illness Perceptions Questionnaire (B-IPQ)
- 9-item assessment, based on CSM
- Adapted for asthma
- Items examined individually

Asthma medication beliefs

- Role of steroid medications
Methods—Secondary Outcome Measures

Asthma controller medication use

- Inhaled corticosteroids (ICS) and oral leukotriene inhibitors (LTI)

Asthma-related health services

- Emergency department visits, hospitalizations (past 12 months)
Methods—Independent Variables

Health literacy

- Short Test of Functional Health Literacy in Adults (S-TOFHLA)
  - Prose passages (English or Spanish)
  - Modified Cloze procedure (36 items)
  - Timed (7 minutes)
  - Scoring: Inadequate (0-16), Marginal (17-22), Adequate (23-36)
    → Inadequate: struggle with basic medical information
Methods—Independent Variables

Other variables

- Asthma control questionnaire (asthma symptoms)
- Socio-demographics and health status
Methods—Analyses

Multivariable analyses

- Asthma beliefs = inadequate HL + age + sex + race
## Results—Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean years (sd)</td>
<td>61 (8)</td>
</tr>
<tr>
<td>Female</td>
<td>81</td>
</tr>
<tr>
<td>Non-Hispanic black</td>
<td>32</td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>6</td>
</tr>
<tr>
<td>Hispanic</td>
<td>62</td>
</tr>
<tr>
<td>English proficiency, v. poor</td>
<td>28</td>
</tr>
<tr>
<td>Education, ≤ 8th grade</td>
<td>23</td>
</tr>
<tr>
<td>General health, poor-fair</td>
<td>61</td>
</tr>
<tr>
<td># Chronic diseases, ≥ 6</td>
<td>22</td>
</tr>
</tbody>
</table>
## Results—Asthma Beliefs

<table>
<thead>
<tr>
<th>CSM Domain</th>
<th>Belief</th>
<th>Total Sample (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timeline</strong></td>
<td>No symptoms—no asthma</td>
<td>43</td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>Asthma can be cured</td>
<td>35</td>
</tr>
<tr>
<td><strong>Consequences</strong></td>
<td>Medications work better when not used all the time</td>
<td>24</td>
</tr>
</tbody>
</table>

CSM, Common Sense Model of Self-Regulation
Results—Health Literacy & Asthma Beliefs

- No symptoms-No asthma: % Patients
  - Inadequate: 60
  - Adequate/Marginal: 30
  - P = .01

- Asthma can be cured: % Patients
  - Inadequate: 40
  - Adequate/Marginal: 20
  - P = .004

- Medications work better when not used all the time: % Patients
  - Inadequate: 40
  - Adequate/Marginal: 20
  - P = .03
## Results—Health Literacy & Asthma Beliefs

<table>
<thead>
<tr>
<th>CSM Domain</th>
<th>Asthma Belief</th>
<th>Adjusted OR (95% CI)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timeline</td>
<td>No symptoms-no asthma</td>
<td>2.5 (1.0-6.1)</td>
<td>.05</td>
</tr>
<tr>
<td>Control</td>
<td>Asthma can be cured</td>
<td>3.3 (1.3-8.3)</td>
<td>.01</td>
</tr>
<tr>
<td>Consequences</td>
<td>Medications work better when not used all the time</td>
<td>3.8 (1.3-11)</td>
<td>.02</td>
</tr>
</tbody>
</table>

CSM, Common Sense Model of Self-Regulation
## Results—Asthma Steroid Medication Beliefs

<table>
<thead>
<tr>
<th>CSM Domain</th>
<th>Beliefs About What Steroids Do</th>
<th>Total Sample (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cause</strong></td>
<td>Steroids reduce airway inflammation</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Steroids cool off the lungs</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Steroids decrease number of attacks</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Steroids decrease symptoms</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>23</td>
</tr>
</tbody>
</table>

CSM, Common Sense Model of Self-Regulation
Results—Health Literacy & Medication Beliefs

- Reduce Inflammation
- Cool off lungs
- Decrease attacks
- Decrease symptoms
- Don't know

% Patients

P = NS  P = NS  P = NS  P = NS  P = NS
# Results—Health Literacy & Medication Beliefs

<table>
<thead>
<tr>
<th>CSM Domain</th>
<th>Steroid Medication Beliefs</th>
<th>Association with Inadequate HL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CSM</strong></td>
<td></td>
<td>Adjusted OR (95% CI)</td>
</tr>
<tr>
<td><strong>Domain</strong></td>
<td></td>
<td><strong>P</strong></td>
</tr>
<tr>
<td><strong>Cause</strong></td>
<td>Steroids reduce airway inflammation</td>
<td>1.0 (0.4-2.9) NS</td>
</tr>
<tr>
<td></td>
<td>Steroids cool off the lungs</td>
<td>2.0 (0.8-5.5) NS</td>
</tr>
<tr>
<td></td>
<td>Steroids decrease # of attacks</td>
<td>0.8 (0.1-5.3) NS</td>
</tr>
<tr>
<td></td>
<td>Steroids decrease symptoms</td>
<td>1.1 (0.4-3.1) NS</td>
</tr>
<tr>
<td></td>
<td>Don’t know</td>
<td>0.6 (0.2-1.7) NS</td>
</tr>
</tbody>
</table>

CSM, Common Sense Model of Self-Regulation

NS, not significant
Results—Health Literacy & Asthma Outcomes

- **Using asthma controller medication**: Inadequate vs. Adequate/Marginal, \( P = .04 \)
- **ED visits, past 12 months**: Inadequate vs. Adequate/Marginal, \( P = NS \)
- **Hospital stay, past 12 months**: Inadequate vs. Adequate/Marginal, \( P = NS \)
Conclusions

Inadequate health literacy associated with suboptimal asthma beliefs

• No symptoms-No asthma
• Asthma can be cured
• Asthma meds work better when not used all the time

Inadequate health literacy **not** associated with:

• Beliefs about effects of steroid medications
Limitations

Pilot study

• Small sample size
• Cross-sectional
• Convenience sample
Implications

Beliefs based on experience

Medical messages: traditionally abstract information

To promote effective self-management:
  • Provide low literacy messages
  • Understand patients’ health experiences
  • Reframe health beliefs

Additional research needed
  • Examine pathways linking health literacy and disease outcomes
  • Objective measures of med adherence, disease outcomes
Acknowledgements

Research support

• Helen Cole, MPH
• Diego Chiluisa, BA

Funding

• Paul B. Beeson Career Development Award in Aging-Related Research
  - National Institute on Aging
  - American Federation of Aging Research
Additional Slides
## Results—Characteristics by Health Literacy

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Inadequate</th>
<th>Adequate or Marginal</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>100</td>
<td>35</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td><strong>Age, mean (sd)</strong></td>
<td><strong>61 (8)</strong></td>
<td><strong>64 (8)</strong></td>
<td><strong>60 (8)</strong></td>
<td><strong>.008</strong></td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>81</td>
<td>83</td>
<td>80</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Black</strong></td>
<td>32</td>
<td>23</td>
<td>37</td>
<td>NS</td>
</tr>
<tr>
<td><strong>Latino</strong></td>
<td>32</td>
<td>74</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td><strong>English proficiency, v. poor</strong></td>
<td>28</td>
<td>51</td>
<td>15</td>
<td>&lt;.001</td>
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<tr>
<td><strong>Education, ≤ 8th grade</strong></td>
<td>23</td>
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<td>6</td>
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<td><strong>General health, poor-fair</strong></td>
<td>61</td>
<td>77</td>
<td>52</td>
<td>.02</td>
</tr>
<tr>
<td><strong># Chronic diseases, ≥ 6</strong></td>
<td>22</td>
<td>17</td>
<td>25</td>
<td>NS</td>
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# Results—Asthma Self-Care and Control

<table>
<thead>
<tr>
<th>Health Literacy</th>
<th>Adequate or Marginal</th>
<th>P</th>
</tr>
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<tbody>
<tr>
<td><strong>Total</strong></td>
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<td><strong>Adequate or Marginal</strong></td>
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<thead>
<tr>
<th><strong>Self-Management and Control</strong></th>
<th><strong>Total</strong></th>
<th><strong>Inadequate</strong></th>
<th><strong>Adequate or Marginal</strong></th>
<th><strong>P</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma Medication Adherence Score, <em>mean (sd)</em> †</td>
<td>3.8 (0.8)</td>
<td>3.6 (0.8)</td>
<td>3.9 (0.7)</td>
<td>.17§</td>
</tr>
<tr>
<td>Poor asthma medication adherence †</td>
<td>73</td>
<td>83</td>
<td>68</td>
<td>.10</td>
</tr>
<tr>
<td>Asthma Control Questionnaire Score, <em>mean (sd)</em> ‡</td>
<td>3.1 (1.5)</td>
<td>3.0 (1.4)</td>
<td>3.3 (1.5)</td>
<td>.19§</td>
</tr>
<tr>
<td>Poor asthma control</td>
<td>86</td>
<td>89</td>
<td>84</td>
<td>.57</td>
</tr>
<tr>
<td>Frequent use of short-acting beta-agonist</td>
<td>43</td>
<td>49</td>
<td>41</td>
<td>.74</td>
</tr>
</tbody>
</table>

†MARS, Medication Adherence Rating Scale, measured in subset prescribed an asthma controller medication (n=64); higher values → better adherence.
‡Higher values → worse asthma control.
## Results—Health Literacy & Asthma Beliefs

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<td>.03</td>
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## Results—Health Literacy & Asthma Beliefs

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<thead>
<tr>
<th>Asthma-Related Health Care Use</th>
<th>Total</th>
<th>Inadequate</th>
<th>Adequate/Marginal</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribed asthma controller medication</td>
<td>65</td>
<td>51</td>
<td>72</td>
<td>.04</td>
</tr>
<tr>
<td>ED visits, past 12 months</td>
<td>47</td>
<td>51</td>
<td>45</td>
<td>NS</td>
</tr>
<tr>
<td>Hospital stay, past 12 months</td>
<td>19</td>
<td>23</td>
<td>17</td>
<td>NS</td>
</tr>
</tbody>
</table>
No Symptoms-No Asthma Belief Question

Do you think asthma is something you have all the time or only when you're having symptoms?

- I have it all the time
- Most of the time
- Some of the time
- Only when I have symptoms
Other Asthma Belief Questions

If you use [NAME CONTROLLER MED] all the time they do not work as well.

*Strongly disagree; Disagree; Uncertain; Agree; Strongly agree*

Do you expect the doctor to cure you of your asthma?

*Definitely; Probably; Possibly; No*
Medication Belief Question

People have different ideas about how steroids actually work in the body to treat asthma. What do you think they do?

- Don't know, don't remember.
- Reduce airway inflammation / irritation
- Cool off / calm the lungs
- Decrease the number / frequency of attacks
- Decrease symptoms
- Other