Health Literacy and Child Health

Darren A. DeWalt, MD, MPH
Ashley Hink, BS

Cecil G. Sheps Center for Health Services Research
University of North Carolina School of Medicine
Exploring Health Literacy and Child Health

• Background
• Measurement
• Health Outcomes: Review of the Literature
• Studied Interventions: Review of the Literature
• Future Directions for Research
What is Health Literacy?

“The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”

-Healthy People 2010

- This concept may not accurately define health literacy in the pediatric population
- We are limited to what the literature has explored
Working Relationship Between Literacy and Child Health Outcomes

Other Factors: Insurance, Transportation, Cultural Influences

Child Literacy

Parent Literacy

Child Knowledge

Parent Knowledge

Child Behaviors

Parent Behaviors

Child Outcomes

Health Care System Effects
Methodological Challenge: Dyadic Roles of Parent and Child

- Which is more influential: child or parental literacy?

- Factors to Consider:
  - Literacy vs. health literacy
  - Child development
    - Intellectual, cognitive, physical
  - The illness or behavior under consideration
  - Transition of self-care activities
    - Often between 11 and 15
    - Complex interaction of factors…
Transition Factors

- **Family**
  - Organization and Support
  - Maternal Self-Efficacy
  - Perception of Child Capacity

- **Child**
  - Maturity and Self-Concept
  - Initiation of self-care
  - Academic Achievement
  - Involvement in Outside Activities

- **Health and Care**
  - Duration of Disease
  - Shared Decision-making with Medical Provider
Transition: Deception of Age

- Age, education level, and possibly literacy can be deceiving...
- Teens sometimes *regress* in their self-care
- Factors other than literacy may be more salient among teens.....
The Current State of Adult Literacy

• 2003: National Assessment of Adult Literacy (NAAL)
  – N=19,714

• Scored on 4 levels

• Levels 1 and 2 cannot
  – Use a bus schedule or bar graph
  – Explain difference in two types of employee benefits
  – Write a simple letter explaining a bill error

National Center for Educational Statistics, U.S. Department of Education
2003 National Assessment of Adult Literacy

- Intermediate: 44%
- Proficient: 13%
- Below Basic: 14%
- Basic: 29%

Basic or Below Basic
- 52% of H.S. Grads
- 61% of Adults ≥ 65

93 Million Adults have Basic or Below Basic Literacy
## Adult Outcomes Associated with Literacy

<table>
<thead>
<tr>
<th>Health Outcomes/Health Services</th>
<th>Behaviors Only</th>
<th>Knowledge Only</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General health status</td>
<td>• Substance abuse</td>
<td>• Birth control knowledge</td>
</tr>
<tr>
<td>• Hospitalization</td>
<td>• Breastfeeding</td>
<td>• Cervical cancer screening</td>
</tr>
<tr>
<td>• Prostate cancer stage</td>
<td>• Behavioral problems</td>
<td>• Emergency department instructions</td>
</tr>
<tr>
<td>• Depression</td>
<td>• Adherence to medication</td>
<td>• Asthma knowledge</td>
</tr>
<tr>
<td>• Asthma</td>
<td>• Smoking</td>
<td>• Hypertension knowledge</td>
</tr>
<tr>
<td>• Diabetes control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• HIV control</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Mammography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pap smear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pneumococcal immunization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Influenza immunization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• STD screening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Measuring Literacy in Health Research: Adults

• Literacy vs. health literacy

• Adults
  – Wide Range Achievement Test (WRAT): word recognition
  – Rapid Estimate of Adult Literacy in Medicine (REALM): medical word recognition
  – Test of Functional Health Literacy in Adults (TOFHLA): health information comprehension and numeracy
    • Short version available
Measuring Literacy in Health Research: Children

- REALM-Teen: medical word recognition test for adolescents and teens
- TOFHLA for teens: health information comprehension and numeracy for teens
  - Both achieved high internal reliability, construct validity and correlation with other tests
  - Need further testing, not widely used
- Most pediatric health studies use basic literacy tests to measure literacy

Davis et al. Pediatrics, 2006
Health Literacy and Child Health: The Need for Further Inquiry

• Previous systematic review
  – 11 pediatric studies from 1980 to 2003
  – Limited understanding of association between literacy and child health

• Association more established among adults

• Need for greater understanding about child health outcomes and effective interventions

DeWalt et al., JGIM. 2004.
Review of the Literature

• Inclusion Criteria:
  – Published after 1980 in English
  – Conducted in developed country
  – Use of controlled or uncontrolled experimental design for intervention studies
  – More than 10 subjects
  – Direct measure of literacy among parents or child
  – Measure of effect on at least one health outcome
Results

24 Studies Total

Health Outcomes: 22 studies

Interventions: 5 studies

Knowledge: 9

Health Services: 5

Health Behaviors: 9

Health Status: 6
Health Outcomes

- **22 Studies**

- **Study characteristics**
  - Most cross-sectional or longitudinal cohorts
  - Sample size 30 – 3019
  - Literacy measurement:
    - Adult literacy: 15
    - Child literacy: 6
    - Both: 1
  - REALM and TOFHLA used most
Knowledge Overview:

- 9 studies, 7 health topics
- In all but 1 study, LL associated with less knowledge / comprehension

LL worse off

Family Planning
  - Prenatal screening
  - Oral contraceptive pills

Prevention and chronic care
  - Immunizations
  - Asthma knowledge
  - Liquid medication dosing

Services Knowledge
  - Consent forms

No Literacy Relationship

  Health services needed
Health Services

- **LL worse off**
  - Asthma hospitalizations

- **No Literacy Relationship**
  - All cause hospitalization
  - Total health service use

- **LL better off**
  - Patient perceived quality of communication

- 4 Studies
- All measure parental literacy
- Mixed Findings
Health Behaviors

Overview:

- 9 studies; 5 measured child literacy
- All except 2 studies found that LL was associated with negative health behaviors
- One study found LL associated with tobacco use among boys only

LL worse off

Violence
  Gun carrying
  “Problem behavior”

Substance use
  Tobacco use
  Smoking among parents

Breast feeding

Medication taking
  LL more barriers
  Use of non-standard dosing

No Literacy relationship

Pre-teen EtOH use

Adherence to oral contraceptives
## Health Status

**Overview:**

- 5 studies; 2 measured child literacy
- 3 studies found LL related to worse health outcome of interest
- Special mention: diabetes study by Ross

### LL worse off

- Asthma severity, ED, hospitalization
- Diabetes control
- Depressive symptoms

### No relationship

- Migraines
- Dental health
## Summary of Findings

<table>
<thead>
<tr>
<th>Association with Low Literacy</th>
<th>No Association with Low Literacy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Poor Knowledge</strong></td>
<td></td>
</tr>
<tr>
<td>Prenatal screening</td>
<td>Health care services</td>
</tr>
<tr>
<td>Oral contraceptives</td>
<td></td>
</tr>
<tr>
<td>Childhood immunizations</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td></td>
</tr>
<tr>
<td>Medication dosing</td>
<td></td>
</tr>
<tr>
<td>Consent forms</td>
<td></td>
</tr>
<tr>
<td><strong>Health Services</strong></td>
<td></td>
</tr>
<tr>
<td>Asthma ED visits and hospitalizations</td>
<td>All-cause admissions</td>
</tr>
<tr>
<td></td>
<td>Access, use and cost</td>
</tr>
<tr>
<td></td>
<td>Quality of well-child care (negative association)</td>
</tr>
<tr>
<td><strong>Behaviors</strong></td>
<td></td>
</tr>
<tr>
<td>Gun carrying and fighting</td>
<td>Adolescent alcohol use</td>
</tr>
<tr>
<td>“Problem” behaviors</td>
<td>OCP adherence</td>
</tr>
<tr>
<td>Tobacco use</td>
<td></td>
</tr>
<tr>
<td>Maternal breast feeding</td>
<td></td>
</tr>
<tr>
<td>Medication barriers</td>
<td></td>
</tr>
<tr>
<td>Non-standardized dosing instruments</td>
<td></td>
</tr>
<tr>
<td><strong>Health Status</strong></td>
<td></td>
</tr>
<tr>
<td>Depressive and withdrawn symptoms</td>
<td>Migraines</td>
</tr>
<tr>
<td>Asthma severity</td>
<td>Dental health</td>
</tr>
<tr>
<td>Poor diabetes control</td>
<td></td>
</tr>
</tbody>
</table>
Interventions

• 5 Studies

• Study characteristics
  – 4 controlled trials, 3 stratified results by literacy level
  – 4 targeted interventions to the parents
  – 4 measured caregiver literacy
  – Outcome variables: knowledge (4), behavior (1), health outcomes (1)
  – Interventions: modified print materials, multi-media, teach-back method, literacy/asthma classes
## Interventions: Health-Related Knowledge Outcomes

<table>
<thead>
<tr>
<th>Target</th>
<th>Intervention</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polio vaccine knowledge</td>
<td>Polio vaccine pamphlets written below 9th grade and 6th grade reading levels compared to CDC version</td>
<td>Generally better comprehension of revised pamphlets, but not for those with lowest levels of literacy</td>
</tr>
<tr>
<td>(2 studies)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research consent comprehension</td>
<td>Consent information for high and low risk studies presented via modified print, video or laptop presentation</td>
<td>Overall better comprehension of modified print version compared to other formats</td>
</tr>
<tr>
<td>Liquid medication knowledge</td>
<td>Pictogram medication sheet with brief counseling and teach-back method</td>
<td>Intervention parents had better knowledge about medication and dosing (similar effect size for HL and LL)</td>
</tr>
</tbody>
</table>
## Interventions: Health Behaviors and Status Outcomes

<table>
<thead>
<tr>
<th>Target</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid medication adherence</td>
<td>Pictogram medication sheet with brief counseling and teach-back method</td>
<td>Intervention parents more likely to correctly dose medicine and adhere to regimen (similar effect size for HL and LL, per author)</td>
</tr>
<tr>
<td>Asthma self-efficacy, ED visits and hospitalization</td>
<td>Children with asthma enrolled in weekly literacy and asthma classes for 6 months</td>
<td>Children had improved self-efficacy and fewer ED visits and hospitalizations Those with greater improvements in literacy were least likely to have repeat ED visits</td>
</tr>
</tbody>
</table>
Intervention Example:
Yin et al., 2008

- **Objective:** To evaluate the efficacy of a pictogram-based intervention to decrease liquid medication errors by caregivers

- **Intervention:** *Medication counseling with a pictogram-based instruction sheet teach-back method*

- **RCT**

- 245 caregivers of children 30 days to 8 years-old from public hospital

- Caregiver literacy measured (TOFHLA)

- **Outcome measures:**
  - Medication knowledge
  - Dosing accuracy
  - Adherence

Pictogram Instruction Sheets
Yin et al., 2008

Name: Maria
Information on your prescription for:
Amoxicillin
To treat an infection of the throat
5 mL (1 teaspoon) by mouth 3 times a day for 10 days

Nombre: María
Información sobre su receta para:
Amoxicillin
Para tratar una infección de la garganta
5 mL (1 cucharadita) por la boca 3 veces al día por 10 días

Shake well
Agite bien
Take 3 times a day by mouth
Tome 3 veces al día por la boca
Store in refrigerator
Guarde en el nevera

Give this medicine for 10 days,
even if your child is feeling better.
Dé la medicina por 10 días, aunque su niño(a) empiece a sentirse mejor
If you have questions call the clinic (212) 562-5524 Si tiene preguntas llame a la clínica (212) 562-5524

Read instructions from your pharmacist about your prescription. Lea las instrucciones de su farmacéutico acerca de su receta.

The H.E.L.P. Project
Bellevue Hospital
Pediatric Resource Center (212) 562-5524
© 2006 NYU School of Medicine Department of Pediatrics *Modified with permission from the USP Pictogram Library

Results

Yin et al., 2008

Discussion: Health Outcomes

• Knowledge and behavior most frequently measured outcomes

• Parental low literacy often associated with poor health knowledge and behaviors

• Adolescent low literacy associated with adverse “risk taking” behaviors

• Fewer studies between LL and health-related services and health status, mixed results

  – Still difficult to draw conclusions about the cause and effect relationship between literacy and child health outcomes
Discussion: Interventions

• Modified print information most common intervention
• Knowledge most frequently measured outcome
• Interventions generally improved outcomes of interest (knowledge or dosing)
• One intervention looked at actual health outcomes (hospitalization) but not a controlled trial

– Opportunities still exist for development of effective interventions for children and their parents
Limitations

• Quality of Literature
  – Most cross-sectional
  – Lack of control for covariates
  – All different, unable to combine data

• Search Methods
  – Excluded those without valid literacy measure, possibly missed effective interventions

• Quality Ratings
  – Approximate
Implications for Future Research

• Focus parental literacy study on younger children to avoid mixed effects

• Present results of interventions with subgroup analysis in those with low literacy

• Identify key health literacy skills children need for transition to self-care

• Explore and understand the roles of caregiver and child literacy
Thinking About Who to Measure

Parent or Caregiver Literacy

Infancy & Childhood
- Ages Newborn – 9: Measure Caregiver Literacy

Early Adolescence
- Ages 10 – 15: Measure Caregiver & Child Literacy

Teenage & Early Adulthood
- Ages 16 – 19: Measure Child Literacy
Implications for Future Research

• Focus on behaviors and knowledge questions should directly correspond to behaviors

• Design and study interventions that improve outcomes for all, but especially minimize the health disparities between low and high literacy


Reviewed Studies


The End

Last updated 12.09.08

Individuals are welcome to use the slides in this presentation. Please credit authors and the presentation creators. Thank you.