

Interventions to Improve Health Outcomes for Low Literacy Patients

Systematic Review of the Literature

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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



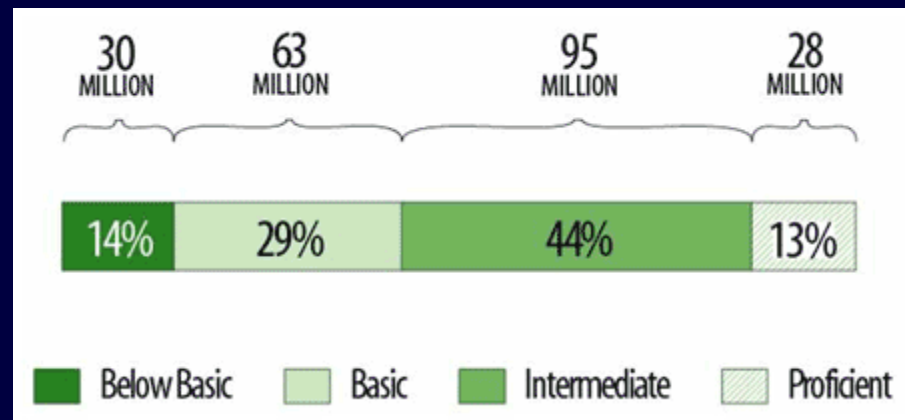
Why is Health Literacy Important?

- High prevalence of “low health literacy”
- Low health literacy associated with:
 - less knowledge about disease
 - greater risk of hospitalization
 - lower odds of receiving preventive services
 - worse control of chronic illnesses



Literacy in America

- National Adult Literacy Survey (NALS, 1992)
 - Over 90 million Americans had inadequate functional literacy
 - Level 1 or 2 (out of 5)
 - More common among elderly, minorities, immigrants, low SES
- National Assessment of Adult Literacy (NAAL, 2003)
 - New categories
 - Prose results:



From <http://nces.ed.gov/naal/>

National Assessment of Adult Literacy (NAAL)

n = 19,714

- Most up to date portrait of literacy in U.S.
- Scored on 4 levels
- Lowest 2 levels cannot:
 - Use a bus schedule or bar graph
 - Explain the difference in two types of employee benefits
 - Write a simple letter explaining an error on a bill

National Center for Education Statistics, U.S. Department of Education

Outcomes Associated with Literacy

Health Outcomes/Health Services

- General health status
- Hospitalization
- Prostate cancer stage
- Depression
- Asthma
- Diabetes control
- HIV control
- Mammography
- Pap smear
- Pneumococcal immunization
- Influenza immunization
- STD screening
- Cost

Behaviors Only

- Substance abuse
- Breastfeeding
- Behavioral problems
- Adherence to medication
- Smoking

Knowledge Only

- Birth control knowledge
- Cervical cancer screening
- Emergency department instructions
- Asthma knowledge
- Hypertension knowledge

DeWalt, et al. JGIM 2004;19:1228-1239



Reducing Health Literacy Disparities

- Approaches
 - Improving literacy in the population
 - Simplifying health education materials
 - Improving patient-provider communication
 - Changing systems of health care management



Review of Intervention Studies: Methods

- Inclusion Criteria:
 - Published after 1980 in English
 - Conducted in developed country
 - Use of controlled or uncontrolled experimental design
 - More than 10 subjects
 - Direct measure of literacy among participants
 - Measure of effect on at least one health outcome

Pignone et al. J Gen Intern Med, 2004

Review of Intervention Studies: Methods

- Search in MEDLINE and CINAHL
- Keywords: literacy, reading ability, reading skill, numeracy, WRAT, wide range achievement, rapid estimate of adult, TOFHLA, test of functional health
- Total of **37** unique studies met criteria

Results

Category	Type of Intervention	Number of Studies
Educational Materials	Written	10
	Video	4
	Computer	3
	Self-management	1
Brief, 1-time Direct Education	Class in group setting	4
	One-on-one	1
Complex Interventions	Disease management / ongoing education	10
Provider Communication	Provider education / awareness	2
Literacy Education	Adult literacy class	1

Educational Materials

18 studies

- Written
 - Use of pictures or graphics
 - Writing at lower grade levels
 - Easy-to-read and understand formats
- Video
 - Graphics, scenarios, patient and provider dramatizations
- Computer
 - Interactive DVD's with self-guided components
 - Graphics, videos and self-assessments
- Self-management
 - Illustrative medication schedule



Images from PDA video to increase HIV knowledge and adherence

Brock et al. International Journal of Medical Informatics, 2007

Educational Materials: Outcomes


















- Positive Findings
 - Accuracy of self-breast exams
 - Increased receipt of vaccines
- Mixed Findings
 - Comprehension of medical information
 - Adherence to medications
- Negative Findings
 - A1c, BMI, Blood Pressure

Intervention to Improve Medication Adherence

Adherence

- Kripilani et al., 2007
- 209 Received personalized, illustrated pill card
- REALM
 - 41.6% Inadequate
 - 36.9% Marginal
- Those with inadequate or marginal literacy reported greatest use and helpfulness in medication adherence compared to those with adequate literacy ($p < 0.05$)

Date: 03-15-06 Name: Jane Doe GMH# 01234567

Names of Pills	What It's For	 Morning/ Breakfast	 Afternoon/ Lunch	 Evening/ Dinner	 Night/ Bedtime
Lisinopril 20 mg 1 pill once a day	Blood Pressure 				
Simvastatin (Zocor) 40 mg 1 pill at bedtime	Cholesterol 				
Metformin 500 mg 2 pills twice a day	Diabetes/ Sugar 				
Gabapentin (Neurontin) 300 mg 1 pill every 8 hours	Nerve Pain 				
Aspirin EC 81 mg 1 pill once a day	Heart 				

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1-Time In-person Education Interventions

6 Studies

Positive Outcomes

Higher rates of
mammography

Medical information
knowledge

Medication adherence

Asthma medication
administration

Self-care behaviors

Negative Outcomes

Dietary behaviors

- Group Classes
 - Minimal written materials
 - Motivational
 - Use of role play, visuals, videos and entertainment
 - Personalized worksheets, notebooks
- One-on-One
 - Brief verbal instruction from educators
 - Supporting written materials



Intervention to Improve Diabetes and CVD Knowledge

- Hill-Briggs et al., 2008
- 30 Diabetics, high CVD risk
- WRAT-3
 - 40% \leq 6th grade level
- 90-minute group class about diabetes and CVD, received easy-to-read written materials and personalized worksheets
 - Focus on disease information and self-management behaviors

Knowledge about diabetes and CVD increased for *all* subjects, regardless of literacy level ($p < 0.005$)



Complex Interventions

10 Studies

- Disease and Case Management
 - Baseline assessment and education by medical providers or health educators
 - Ongoing follow-up via phone or appointment
 - Use of written, easy-to-read self-management materials
 - Support for addressing barriers to care
 - Social support, employment and literacy training
- Ongoing Classes and/or Follow-up
 - Education in group settings
 - Baseline assessments
 - Boosters and reinforcement via phone or mail



Complex Interventions: Outcomes

Positive

- HF exacerbations, associated costs, hospitalization and death
- Systolic blood pressure
- Self-care behaviors
- Depression
- HIV viral load
- Knowledge about medical information

Mixed

- Diabetes control (HbA1c)
- CD-4 counts
- Medication adherence
- Dietary self-efficacy, behaviors and outcomes

Disease and case management interventions generally had better outcomes than the series of education classes



Intervention to Improve Diabetes Outcomes

- Rothman et al, 2004
- RCT
- Intervention group: 98 Control group: 95 (All adult diabetics)
- REALM: 38% Low, 61.8%
- Intervention group received disease management program: education from clinical pharmacist, clinical interventions, reminder/reinforcement calls, low literacy communication strategies

At 12 months, high and low literacy patients in the intervention group significantly improved their A1c and blood pressure compared to the control group ($p < 0.001$, $p = 0.006$ respectively).



Improving Patient-Provider Communication

2 Studies



- Physicians notified of patients' literacy level and informed of possible barriers b/c of low literacy
- Physicians attended workshops and received feedback on performance

Positive Outcomes

Rates of colorectal cancer screening
Physician use of communication strategies

Negative Outcomes

Self-efficacy
Diabetes control (A1c)

Improving Literacy: Intervention for Depression

- Weiss et al., 2006
- RCT
- Intervention group: 33 Control group: 28
- All participants with REALM <60, PHQ-9 >5
- Intervention group received ongoing literacy training and depression treatment
- Control group received depression treatment only



Outcomes:

At 12 months, those in the intervention group had significantly improved depression symptoms (PHQ-9 scores) compared to the control group ($p=0.04$)

Discussion

- Variety of interventions tested for different disease states and purposes
 - Diabetes
 - CVD
 - Depression
 - Heart failure
 - HIV
 - Preventive care
 - Health knowledge
 - Adherence
 - Self-care behaviors
- Many mixed findings:
 - Knowledge
 - Adherence
 - Dietary behaviors
 - Health outcomes
- Improved health education materials do not always improve knowledge
- Classes and direct education can improve knowledge and some behaviors
- Complex, disease-management interventions show most improved outcomes in health status



Limitations and Gaps

- Variable quality of studies
 - Many uncontrolled, pre-post designs
- Only a subset of the studies stratified results by literacy level
 - Difficult to ascertain if intervention specifically helps low literacy population
- Studies without direct literacy measure excluded
 - Potentially more interventions that may improve outcomes
- Few studies on patient-provider communication and literacy improvement



Reviewed Studies

Health Education Materials

Written

1. Coleman EA, Coon S, Mohrmann C, Hardin S, Stewart B, Gibson RS, et al. Developing and testing lay literature about breast cancer screening for African American women. *Clinical Journal of Oncology Nursing*. 2003;7(1):66-71.
2. Davis TC, Holcombe RF, Berkel HJ, Pramanik S, Divers SG. Informed consent for clinical trials: a comparative study of standard versus simplified forms. [see comments.]. *Journal of the National Cancer Institute*. 1998;90(9):668-74.
3. Davis TC, Fredrickson DD, Arnold C, Murphy PW, Herbst M, Bocchini JA. A polio immunization pamphlet with increased appeal and simplified language does not improve comprehension to an acceptable level. *Patient Educ Couns* 1998;33(1):25-37.
4. Davis TC, Bocchini JA, Jr., Fredrickson D, Arnold C, Mayeaux EJ, Murphy PW, et al. Parent comprehension of polio vaccine information pamphlets. *Pediatrics* 1996;97(6 Pt 1):804-10.
5. Eaton ML, Holloway RL. Patient comprehension of written drug information. *American Journal of Hospital Pharmacy*. 1980;37(2):240-3.
6. Hayes KS. Randomized trial of geragogy-based medication instruction in the emergency department. *Nursing Research*, 1998;47(4):211-8.
7. Jacobson TA, Thomas DM, Morton FJ, Offutt G, Shevlin J, Ray S. Use of a low-literacy patient education tool to enhance pneumococcal vaccination rates. A randomized controlled trial. *JAMA*. 1999;282(7):646-50.
8. Michielutte R, Bahnson J, Dignan MB, Schroeder EM. The use of illustrations and narrative text style to improve readability of a health education brochure. *Journal of Cancer Education*. 1992;7(3):251-60.
9. Raymond EG, Dalebout SM, Camp SI. Comprehension of a prototype over-the-counter label for an emergency contraceptive pill product. *Obstetrics & Gynecology*. 2002;100(2):342-9.
10. Yates K, Pena A. Comprehension of discharge information for minor head injury: a randomised controlled trial in New Zealand. *N Z Med J* 2006;119(1239):U2101.

Computer

1. Green MJ, Peterson SK, Baker MW, Harper GR, Friedman LC, Rubinstein WS, et al. Effect of a computer-based decision aid on knowledge, perceptions, and intentions about genetic testing for breast cancer susceptibility: a randomized controlled trial. *Jama* 2004;292(4):442-52.
2. Kim SP, Knight SJ, Tomori C, Colella KM, Schoor RA, Shih L, et al. Health literacy and shared decision making for prostate cancer patients with low socioeconomic status. *Cancer Investigation*. 2001;19(7):684-91.
3. Gerber BS, Brodsky IG, Lawless KA, Smolin LI, Arozullah AM, Smith EV, et al. Implementation and Evaluation of a Low-Literacy Diabetes Education Computer Multimedia Application. *Diabetes Care* 2005;28(7):1574-1580.
4. Wydra EW. The effectiveness of a self-care management interactive multimedia module. *Oncology Nursing Forum*. 2001;28(9):1399-407.

Video

1. Meade CD, McKinney WP, Barnas GP. Educating patients with limited literacy skills: the effectiveness of printed and videotaped materials about colon cancer. *Am J Public Health* 1994;84(1):119-21.
2. Murphy PW, Chesson AL, Walker L, Arnold CL, Chesson LM. Comparing the effectiveness of video and written material for improving knowledge among sleep disorders clinic patients with limited literacy skills. *Southern Medical Journal*. 2000;93(3):297-304.
3. Brock TP, Smith SR. Using digital videos displayed on personal digital assistants (PDAs) to enhance patient education in clinical settings. *Int J Med Inform* 2007;76(11-12):829-35.
4. Pepe MV, Chodzko-Zajko WJ. Impact of older adults' reading ability on the comprehension and recall of cholesterol information. *Journal of Health Education*, 1997;28(1):21-7.

Self-Management

1. Kripalani S, Robertson R, Love-Ghaffari MH, Henderson LE, Praska J, Strawder A, et al. Development of an illustrated medication schedule as a low-literacy patient education tool. *Patient Education and Counseling* 2007;66(3):368-377.

1-time In-Person Interventions

Groups

1. Davis TC, Berkel HJ, Arnold CL, Nandy I, Jackson RH, Murphy PW. Intervention to increase mammography utilization in a public hospital. *J Gen Intern Med* 1998;13(4):230-3.
2. Hartman TJ, McCarthy PR, Park RJ, Schuster E, Kushi LH. Results of a community-based low-literacy nutrition education program. *Journal of Community Health*. 1997;22(5):325-41.
3. Hill-Briggs F, Renosky R, Lazo M, Bone L, Hill M, Levine D, et al. Development and pilot evaluation of literacy-adapted diabetes and CVD education in urban, diabetic African Americans. *J Gen Intern Med* 2008;23(9):1491-4.
4. Hussey LC. Minimizing effects of low literacy on medication knowledge and compliance among the elderly. *Clinical Nursing Research*. 1994;3(2):132-45.

One-on-One

1. Paasche-Orlow MK, Riekert KA, Bilderback A, Chanmugam A, Hill P, Rand CS, et al. Tailored Education May Reduce Health Literacy Disparities in Asthma Self-Management. *Am. J. Respir. Crit. Care Med*. 2005;172(8):980-986.

Complex Interventions

1. Dewalt DA, Malone RM, Bryant ME, Kosnar MC, Corr KE, Rothman RL, et al. A heart failure self-management program for patients of all literacy levels: A randomized, controlled trial [ISRCTN11535170]. *BMC Health Serv Res* 2006;6(1):30.
2. Holzemer WL, Bakken S, Portillo CJ, Grimes R, Welch J, Wantland D, et al. Testing a nurse-tailored HIV medication adherence intervention. *Nurs Res* 2006;55(3):189-97.
3. Howard-Pitney B, Winkleby MA, Albright CL, Bruce B, Fortmann SP. The Stanford Nutrition Action Program: a dietary fat intervention for low-literacy adults. *Am J Public Health* 1997;87(12):1971-6.
4. Kalichman SC, Cherry J, Cain D. Nurse-delivered antiretroviral treatment adherence intervention for people with low literacy skills and living with HIV/AIDS. *J Assoc Nurses AIDS Care* 2005;16(5):3-15.
5. Kim S, Love F, Quistberg DA, Shea JA. Association of Health Literacy With Self-Management Behavior in Patients With Diabetes. *Diabetes Care* 2004;27(12):2980-2982.
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9. Rothman R, Malone R, Bryant B, Horlen C, DeWalt D, Pignone M. The relationship between literacy and glycemic control in a diabetes disease-management program. *Diabetes Educ* 2004;30(2):263-73.
10. van Servellen G, Nyamathi A, Carpio F, Pearce D, Garcia-Teague L, Herrera G, et al. Effects of a treatment adherence enhancement program on health literacy, patient-provider relationships, and adherence to HAART among low-income HIV-positive Spanish-speaking Latinos. *AIDS Patient Care STDS* 2005;19(11):745-59.

Patient-Provider Communication

1. Ferreira MR, Dolan NC, Fitzgibbon ML, Davis TC, Gorby N, Ladewski L, et al. Health care provider-directed intervention to increase colorectal cancer screening among veterans: results of a randomized controlled trial. *J Clin Oncol* 2005;23(7):1548-54.
2. Seligman HK, Wang FF, Palacios JL, Wilson CC, Daher C, Piette JD, et al. Physician Notification of Their Diabetes Patients' Limited Health Literacy. A Randomized, Controlled Trial. *Journal of General Internal Medicine* 2005;20(11):1001-1007.

Improving Literacy

1. Weiss BD, Francis L, Senf JH, Heist K, Hargraves R. Literacy education as treatment for depression in patients with limited literacy and depression: a randomized controlled trial. *J Gen Intern Med* 2006;21(8):823-8.



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