

Health Literacy and Child Health Promotion: Implications for Research, Clinical Care, and Public Policy

abstract

The nation's leading sources of morbidity and health disparities (eg, preterm birth, obesity, chronic lung disease, cardiovascular disease, type 2 diabetes, mental health disorders, and cancer) require an evidence-based approach to the delivery of effective preventive care across the life course (eg, prenatal care, primary preventive care, immunizations, physical activity, nutrition, smoking cessation, and early diagnostic screening). Health literacy may be a critical and modifiable factor for improving preventive care and reducing health disparities. Recent studies among adults have established an independent association between lower health literacy and poorer understanding of preventive care information and poor access to preventive care services. Children of parents with higher literacy skills are more likely to have better outcomes in child health promotion and disease prevention. Adult studies in disease prevention have suggested that addressing health literacy would be an efficacious strategy for reducing health disparities. Future initiatives to reduce child health inequities should include health-promotion strategies that meet the health literacy needs of children, adolescents, and their caregivers. *Pediatrics* 2009;124:S306–S314

AUTHORS: Lee M. Sanders, MD, MPH,^a Judith S. Shaw, EdD, MPH, RN,^{b,c} Ghislaine Guez, BA,^a Cynthia Baur, PhD,^d and Rima Rudd, ScD^e

^aDepartment of Pediatrics, Miller School of Medicine, University of Miami, Miami, Florida; ^bDepartment of Pediatrics, University of Vermont College of Medicine, Burlington, Vermont; ^cVermont Department of Health, Burlington, Vermont; ^dCenters for Disease Control and Prevention, National Center for Health Marketing, Atlanta, Georgia; and ^eDepartment of Society, Human Development, and Health, Harvard School of Public Health, Boston, Massachusetts

KEY WORDS

health literacy, health disparities, disease prevention, health promotion

ABBREVIATIONS

AAP—American Academy of Pediatrics
NAAL—National Assessment of Adult Literacy
OTC—over-the-counter
NHES—National Health Education Standards

The views presented in this article are those of the authors, not the organizations with which they are affiliated.

www.pediatrics.org/cgi/doi/10.1542/peds.2009-1162G

doi:10.1542/peds.2009-1162G

Accepted for publication Jul 20, 2009

Address correspondence to Lee M. Sanders, MD, MPH, University of Miami, Miller School of Medicine, Jay Weiss Center for Social Medicine and Health Equity, Department of Pediatrics, 1601 NW 12th Ave, Suite 4063, Miami, FL 33136. E-mail: leesanders@miami.edu

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2009 by the American Academy of Pediatrics

FINANCIAL DISCLOSURE: The authors have indicated they have no financial relationships relevant to this article to disclose.

Providing all children and families with clear information about health promotion and disease prevention is a national priority. Each of the 10 leading health indicators (physical activity, overweight and obesity, tobacco use, substance use, responsible sexual behavior, mental health, injury prevention, environmental quality, immunizations, and access to care) outlined in Healthy People 2010 requires effective health promotion beginning in early childhood. Several national organizations have developed guidelines for child health promotion, including the US Preventive Services Task Force¹ and the American Academy of Pediatrics (AAP) with its National Center of Medical Home Initiatives² and Bright Futures guidelines.³ Meeting these national health care standards relies on the delivery of actionable information that is easily understood by children and families. Health literacy is an individual's capacity to understand and use health information to meet individual and family health needs.⁴ This capacity includes conventional literacy skills (the ability to understand written information, complete forms, and understand and use numbers) as well as the ability to access health information, communicate with health care providers, and navigate the health care system.

Unfortunately, child health information is frequently written at reading grade levels that exceed the literacy skills of most adults in the United States.^{5–14} The resulting “health literacy burden” may be damaging to the public's health. Controlling for income, gender, and age, several studies have demonstrated that adults with limited literacy skills are significantly less likely than those with stronger skills to receive basic preventive care, including vaccines, weight management, and screening for breast, cervical, and prostate cancer.^{15–18} Eight of the 10

Healthy People 2010 leading health indicators are significantly and independently associated with increased adult literacy skills.^{19–21}

Although less is known about the relationship between literacy and child health, the mismatch between complex health information and low parental literacy skills may be an important moderator of child health disparities. In this article we examine the role of health literacy in child health promotion by (1) reviewing the current evidence concerning the impact of health literacy on pediatric preventive care and (2) recommending priority areas for improving child health promotion by addressing health literacy at the levels of patient care, health systems, educational systems, and community systems.

THE RELATIONSHIP BETWEEN HEALTH LITERACY AND PEDIATRIC PREVENTIVE CARE

Several factors must be considered when assessing the effect of health literacy on preventive care, including the health literacy skills of patients, increasingly complex health information, and subsequent barriers to access, care, and health-promoting action.

Health Literacy of Parents With Infants and Young Children

Many caregivers of young children do not have adequate literacy skills to understand and follow child preventive health messages. At least 1 in 3 US adults has limited health literacy.^{4,22,23} According to the 2003 National Assessment of Adult Literacy (NAAL), 78 million US adults (36% of the population) are unable to perform “basic” child preventive health tasks such as using an immunization schedule, following recommendations from a preventive health brochure, and interpreting a growth chart.²⁴ According to the NAAL, just over 1 in 10 adults between

the ages of 16 and 64 years cannot complete “below-basic” health-literacy tasks for their children, such as using the dosage chart on an over-the-counter (OTC) medication.²⁴ A complete discussion of the health literacy of US parents can be found in another article in this supplement to *Pediatrics* by Yin et al.²⁵

Health-Literacy Burden of Child Preventive Health Information

Important information regarding the preventive care of infants and young children is often provided in wordy, multipage documents that are too difficult for most adults to use. National and state information for parents about the expanded newborn genetic screening program is written at the 10th-grade level (range: 9th–12th grade),^{5,6} and primary care providers' verbal communication about newborn screening is hindered by the complex jargon they use.⁷ Twenty-six states have enrollment forms for the State Children's Health Insurance Program (SCHIP) that are written above the 10th-grade level.⁸ Caregiver information brochures produced by the AAP and the Injury Prevention Program are written, on average, at the 10th-grade level (range: 6th–16th grade).^{9,10} The Centers for Disease Control and Prevention's vaccine information pamphlets and 4 handouts in the AAP's new plain-language pediatrics guidebook are among the very few nationally standardized examples of preventive health information for children that are written below the 8th-grade level.^{11–13}

The complexity of child health information is amplified by its volume and diversity, facilitated by the proliferation of often well-intentioned Internet health resources and patient care guidelines. Internet-based child health information designed for parents is written above the 10th-grade reading

level.²⁶ The Internet is the most common source of health information for adolescents and young adults, and access to Internet information is growing rapidly, even among individuals with limited literacy skills. When the third edition of *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*³ was published by the AAP in 2007, the authors recognized that the complexity and volume of health-promotion information exceeded the time available for information exchange at each pediatric office visit. In an attempt to address this conundrum, the AAP identified 5 anticipatory guidance priorities for each visit and provided an extensive toolkit that includes parent/adolescent questionnaires and health-information handouts that summarize the anticipatory guidance information for that visit. These national guidelines acknowledge the challenges of imparting information to individuals with low literacy, yet the mechanisms for doing so are left up to the clinician or health care delivery system to develop.

Associations Between Health Literacy and Child Preventive Health Outcomes

The widening gap between limited health-literacy skills and increasingly complex health information may be responsible for preventable disparities in child health. Controlling for income, gender, and age, several studies have suggested that children of parents with limited literacy skills and adolescents with limited literacy skills are less likely to receive some of the benefits of basic preventive care.

Access to Pediatric Primary Care

Children living in families with low literacy have decreased access to primary preventive care. Compared with children of caregivers with adequate literacy skills, children of caregivers with low health literacy are more likely

to have unmet health care needs²⁷ and to make more unnecessary visits to the emergency department.²⁸ Adjusting for income, age, and English-language proficiency, a recent analysis of the NAAL indicated that children of caregivers with low health literacy are significantly more likely to be uninsured.²⁵

Injury Prevention

Several studies have demonstrated that caregivers with low literacy were significantly less likely to understand other critical aspects of pediatric anticipatory guidance regarding home safety, including how to perform a home-safety check and how to handle common household emergencies.²⁹ In an intervention trial among adults with known intellectual disabilities, home-safety behaviors improved more significantly among caregivers with better reading skills.³⁰

Medication errors may be more likely in families with limited literacy skills. Interpretation of dosing charts for OTC medicines is significantly more difficult for caregivers with limited literacy or numeracy skills.^{31–33} A recent study by Lokker et al³⁴ demonstrated that at least 2 in 3 caregivers considered OTC cough and cold medications appropriate for infants despite viewing package labeling that suggested otherwise; misinterpretation of OTC-product age indication was highest among those with the lowest numeracy skills.

Adolescent Health Behaviors

Adolescent health behaviors are strongly associated with adolescent literacy skills. Four studies have provided good evidence that children and adolescents who read below their grade level are at an increased risk for violent and aggressive behavior when compared with those who read at or above their grade level.^{35–38} Two other studies demonstrated an association between adolescents' reading below

their grade level and 2 additional categories of risky behaviors: substance use and acquisition of sexually transmissible illnesses.^{39,40}

Nutrition and Obesity

Several recent studies have demonstrated independent associations between limited caregiver literacy skills and indicators of poor child nutrition. Breastfeeding is less common among women with limited health literacy even after adjusting for race and family income. One large cross-sectional study indicated a strong, independent association between low maternal health literacy and a decreased likelihood of exclusive breastfeeding 2 months after birth.⁴¹ After reading a page from the breastfeeding guide produced by the AAP, only 17% of mothers accurately understood the information provided.

Several studies have noted that parents with low literacy skills are less able to understand food labels, identify appropriate portion sizes, and mix infant formula correctly. In a multisite study of 200 caregivers of infant children (aged 0–1 year), Rothman et al⁴¹ demonstrated that only 56% of parents could determine if a juice had adequate vitamin C to be eligible for the Supplemental Nutrition Program for Women, Infants, and Children (WIC). In another study, parents with inadequate health-literacy skills were significantly less likely to look at nutrition labels on food products; these results were adjusted for caregiver language, education, ethnicity, and child age and weight.⁴² Health literacy also seems to be associated with inaccurate perception of child weight. Yin et al⁴³ found that nearly 75% of parents of overweight children studied perceived their child to be of normal weight or underweight. Parents with inadequate health literacy were twice as likely to have an inaccurate perception of their

child's weight. In the study by Rothman et al,¹⁸ only 56% of the subjects could interpret a percentile on a Centers for Disease Control and Prevention growth chart.

Environmental Tobacco Smoke Exposure

Children of parents with low literacy may be at an increased risk of exposure to environmental tobacco smoke. Adjusted for socioeconomic status and ethnicity, several studies have suggested that mothers with low health-literacy skills are more likely to smoke tobacco.²⁹ This association, however, is not consistent across all studies.²¹

Maternal Mental Health

Maternal mental health is a critical determinant of child health, and the diagnosis and treatment of maternal depression is an important element of child preventive health care. Several studies have demonstrated a strong, independent relationship between low maternal literacy and increased rates of maternal depressive symptoms. One intervention trial and 2 cross-sectional studies documented a strong, independent relationship between maternal depression and maternal literacy skills.^{44–46} Maternal depressive symptoms improved in the context of an intervention that was aimed at improving maternal literacy skills.⁴⁷ Adjusted for socioeconomic status and ethnicity, mothers with low health-literacy skills are also more likely to smoke and to be obese,²⁹ factors that in many studies have been strongly associated with major depression.^{48–50}

AN AGENDA FOR HEALTH LITERACY AND CHILD HEALTH PROMOTION

In 2004, an Institute of Medicine (IOM) report recommended health-literacy interventions at 4 different levels: individual patient care, health systems, educational systems, and community systems. To meet the preven-

tive health needs of children, such interventions must be informed by proven models of health-behavior change,^{51,52} by the experience of families with low literacy, and by a review of the available evidence. In keeping with IOM-recommended levels of intervention we make the following sets of recommendations.

Individual Patient Care

Providing clear, actionable preventive care information should be a critical goal of each child's medical home. Such health information should include not only preventive health topics, such as immunizations, reading aloud, nutrition, car safety, home safety, and breast and testicular examinations, but also critical community services such as early-intervention programs, mental health providers, pediatric dentists, after-school programs, and smoking-cessation classes. For children with special health care needs, this should include condition-specific information for injury prevention, physical activity, and nutrition, as well as how to obtain and carry out individual emergency-care plans and individual education plans.

- **Training:** All members of the pediatric care team (primary care physicians, nurse practitioners, specialty care providers, nursing staff, paraprofessional staff, office staff, social workers, and trained volunteers) should be trained in the effective communication of preventive care information. Such training should emphasize “teach-back,” reduced use of jargon, the effective use of communication and informational materials, and the use of motivational interviewing and shared decision-making.^{53–60}
- **Modeling:** All members of the pediatric care team can model health-literacy behaviors through the active engagement of the child/patient

and by encouraging questioning as well as demonstrations of self-care action.

- **Expanded inquiry:** Pediatric providers should routinely inquire about child literacy skills to determine if a child is reading below his or her grade level. In early childhood, providers should encourage parents to read aloud with their children. In late childhood and adolescence, providers should encourage evaluation and individualized education plans for children who are reading below their grade level.
- **Print materials:** Pediatric office settings should provide easy-to-use forms of written information about preventive health that are audience appropriate. This approach may include revising text and increasing visual cues on commonly used handouts, replacing existing materials with user-friendly versions, and making clear the recommended action by explaining it in easy-to-follow steps.^{61,62}
- **Nonprint options:** Nonprint materials should be used as communication tools at the point of care and thereafter. Video illustrations may be most suitable to demonstrate and reinforce certain health-promotion activities⁶³ such as proper hand-washing techniques, reading aloud with a young child, proper use of “time outs,” dental care for toddlers, or performing a home-safety check. Other examples of nonwritten health information include medication dosing instruments, “sippy cups” that denote the recommended daily intake of fruit juice, plates that outline appropriate portion sizes, or timers for limiting television-viewing.
- **Waiting-room opportunities:** Pediatric offices and clinics should make child health information available during both “active time,” when the

provider and family engage in conversation, and “passive time,” when the family is waiting for clinical care, diagnostic testing, procedures, or results. Some offices may consider other innovative techniques such as group well-child visits to help families learn health-literacy skills interactively with health care providers, as well as from other patients and their families.^{64,65} In waiting or examination rooms, electronic kiosks outfitted with audio headphones may help deliver tailored child health-promotion messages to parents or children with limited literacy skills.^{66,67}

- Research: Controlled studies should assess whether such improvements in the delivery of child preventive health information increase the receipt of preventive care services, decrease the use of urgent care services, or improve the quality of care.

Health Systems

Major reforms to the health care system, particularly to child health and preventive care services, should include standardized approaches to developing and disseminating preventive health information to families and adolescents.

- Leadership: The AAP, along with appropriate pediatric organizations and government agencies, should work to develop standardized, low-literacy health messages for child health promotion.^{68–74}
- Dissemination: The AAP, as well as federal and state health agencies, should provide public access to timely, low-literacy health information for all children and parents.
- Point-of-service information: Electronic health records systems (electronic medical records and personal health records) should include low-literacy child health-

promotion messages. In each system, point-of-care prompts should include low-literacy, family-centered health-promotion messages that are tailored to the child’s health needs, family history, and developmental stage.

- Quality of care: Health-literacy-related metrics should be included in health-systems measures of quality, including the Consumer Assessment of Healthcare Providers (CAHPS), Healthcare Effectiveness Data and Information Set (HEDIS), and measures developed by the National Committee for Quality Assurance (NCQA).^{75,76}

Educational System

The educational system has a vested interest in building each child’s health-literacy skills from preschool through young adulthood. The National Health Education Standards (NHES) are guidelines for developing and assessing health-education information and curricula from prekindergarten through 12th grade.^{77–79} In fact, some school systems are beginning to recommend or require health literacy as a competency for graduation. The specific criteria for achieving competent health literacy, however, are inconsistent, and curricula to teach these competencies vary widely. Several successful child health interventions have demonstrated their efficacy in kindergarten through 12th-grade classrooms,^{80–83} although the role of child or parent health literacy in the success of these interventions has not been examined. Educators and education researchers, partnering with child health researchers, can add critical information to the evidence base in child health promotion by implementing the following recommendations.

- Skill building: Child health researchers should work together with educators to identify the

most clinically important health-literacy skills in the context of the NHES guidelines. Adapted from both the NHES and the Bright Futures guidelines, Table 1 describes the expected development of health-literacy skills from childhood through young adulthood.

- The NHES: With input from child health professionals, the NHES should guide curricula development from pre-K through 12th grade. Preschool curricula should be designed to reinforce health-promotion activities among both toddlers and their caregivers. Kindergarten through 12th-grade curricula should incorporate health-literacy competencies in all educational disciplines (eg, mathematics, reading, social studies). Adult-education modules should teach pediatric health-literacy competencies within existing general educational development (GED) and English for speakers of other languages (ESOL) curricula.
- Integration: Classrooms should be used more effectively as laboratories to reinforce critical messages about individual health behaviors. Such efforts may be modeled on evidence-based campaigns that target adolescent health behavior, such as the “Choose Respect” campaign to prevent dating abuse, the “Truth” antitobacco campaign, and the “Parents: the Anti-Drug” campaign.

Social Systems and Communities

We know relatively little about the role of health literacy in the context of other social determinants of child health. To target public health strategies most effectively, we must know more about the relationship between health literacy and common child health problems that are known to be sensitive to the psychosocial environment, including preterm birth, malnu-

TABLE 1 Examples of Child Health-Literacy Skills in Health Promotion: A Developmental Perspective

	Prose/Document-Literacy Skills	Oral Literacy Skills	Numeracy Skills	Systems-Navigation Skills
By age 4 y, a child should be able to . . .	NA	Communicate with an adult caregiver or health provider about health behaviors (eg, tooth-brushing, physical activity).	Recognize the relative value of health choices (eg, food portion sizes).	NA
By age 10 y, a child should be able to . . .	Understand the content of a child-oriented handout about bike-helmet use.	Describe ways to prevent common childhood injuries and health problems.	Identify the characteristics of healthy versus nonhealthy foods on the basis of sugar or fat content in nutrition labels.	Describe how the media can influence health behaviors.
By age 14 y, a child should be able to . . .	Develop a written plan to attain a personal health goal that addresses personal strengths, needs, and risks.	Demonstrate refusal, negotiation, and collaboration skills to enhance peer and family influence on health behaviors.	Analyze personal susceptibility to injury, illness, or death if engaging in unhealthy behaviors.	Evaluate the validity of health information, products, and services and access valid health information and counseling services.
By age 18 y, a child should be able to . . .	Complete a document with child's medical history and health needs and read and understand patient bill of rights.	Identify a child or family's health behaviors and establish personal health goals for a family or child.	Understand and use OTC medications and understand results of child health screening tests (eg, newborn screening results, growth chart).	Complete the enrollment process for child health insurance (eg, SCHIP) and obtain school-based health services.

NA indicates not applicable; SCHIP, State Children's Health Insurance Program. Adapted from the Bright Futures³ initiative and the NHES⁷⁷.

trition, obesity, asthma, dental caries, injuries, and developmental and behavioral problems.⁸⁴⁻⁸⁷ One model for the relationship between health literacy and child health is shown in Fig 1. To test this model in the context of community systems, we make the following recommendations.

- Evaluation: Public health, communication, and marketing researchers

should examine the effectiveness of low-literacy, child health-promotion messaging in educational and community settings. This community-based participatory research should include, but not be limited to, home-visiting programs, prenatal classes, parenting classes, early child learning centers, and after-school programs.

- Instrumentation: Health services researchers should develop brief and meaningful instruments to assess parent and child health literacy in the context of child health promotion. The most common measures of health literacy do not capture meaningful pediatric information,⁸⁸⁻⁹² but some newly validated measures may be able to do so.
- Trend data: Large cross-sectional and longitudinal cohort studies of child health should include measures of parent and child literacy skills. This should include the National Children's Study, the Early Childhood Longitudinal Study, the National Longitudinal Study of Youth, the National Health and Nutrition Examination Survey, the Medical Expenditure Panel Survey Medicaid, and other nationally representative health surveys.

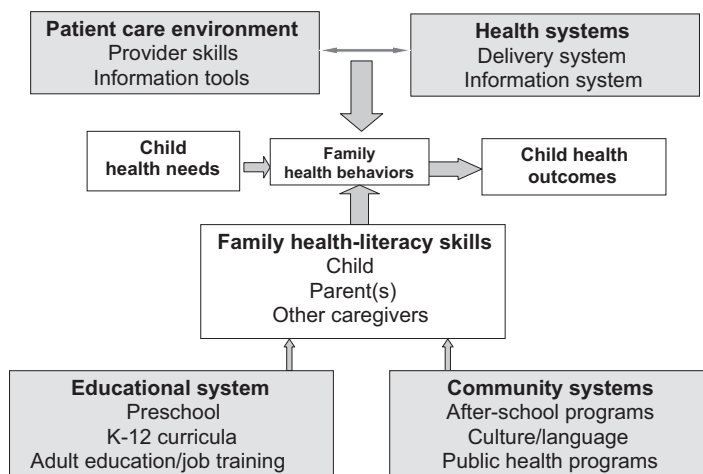


FIGURE 1 Model for health literacy and child health promotion. K indicates kindergarten. (Adapted from Wagner EH. *Eff Clin Pract.* 1998;1(1):2-4.)

CONCLUSIONS

In 2002, the Institute of Medicine released the report *Unequal Treatment: Confronting Racial and Ethnic Dispari-*

ties in Health Care,⁹³ which identified health literacy as an important, cross-cutting theme to address in any efforts to reduce ethnic and racial health disparities. It is premature to conclude that low parent or adolescent health literacy is an important cause of preventable child health disparities. In the peer-reviewed medical literature, we could identify no rigorous studies of literacy-based interventions in child preventive care. Still, children of parents with higher literacy skills and adolescents with higher literacy skills are more likely to have better outcomes in child health promotion and disease prevention. These outcomes include primary care access, sexually transmissible illness, substance use, obesity, behavioral health problems, maternal depression, and environmental tobacco smoke.

The child health-promotion agenda should include evidence-driven approaches to developing, delivering, and evaluating clear health communication in 4 settings: patient care, health systems, educational systems, and community systems. These approaches should include training all child health providers to more effec-

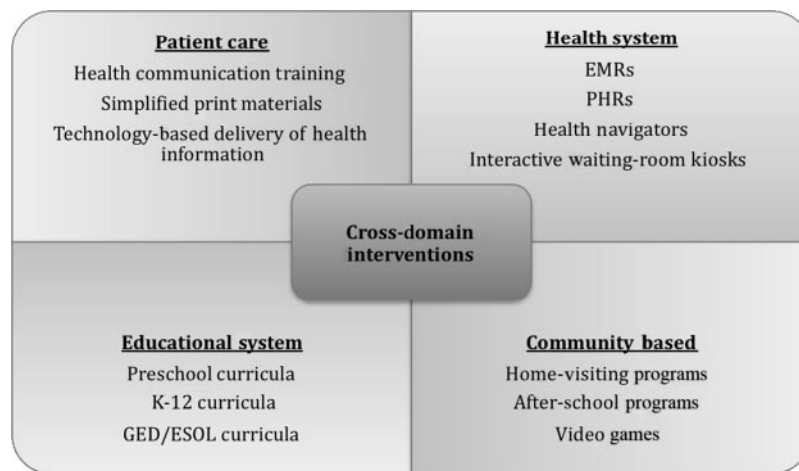


FIGURE 2

Five domains for literacy-based intervention in child health promotion. EMRs indicates electronic medical records; PHRs, personal health records; K, kindergarten; GED, general educational development; ESOL, English for speakers of other languages.

tively deliver anticipatory guidance, integration of low-literacy child health-promotion messages in electronic medical records systems, integration of the NHEC into prekindergarten through 12 curricula, and longitudinal cohort studies to examine the independent role of health literacy as a social determinant of child and adult health (see Fig 2).

Leadership and cross-disciplinary partnership are needed to make this agenda a reality. Leadership may arise

from the child health community, but partnership will be necessary with policy makers, health systems leaders, education advocacy groups, professional educators, health services researchers, and the adult low-literacy community. Integrating a health-literacy perspective with the activities of federal, state, and local agencies, as well as large health systems, will be necessary to turn these health-promotion innovations into real gains in the lives of children.

REFERENCES

1. US Preventive Services Taskforce. The community guide. Available at: www.thecommunityguide.org/index.html. Accessed October 20, 2008
2. American Academy of Pediatrics, National Center of Medical Home Initiatives for Children With Special Needs. What is a medical home? Available at: www.medicalhomeinfo.org. Accessed March 8, 2009
3. Hagan JF, Shaw JS, Duncan P. *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*. 3rd ed. Elk Grove Village, IL: American Academy of Pediatrics; 2008
4. Ratzan SC, Parker RM. Introduction. In: Selden CR, Zorn M, Ratzan SC, Parker RM, eds. *National Library of Medicine Current Bibliographies in Medicine: Health Literacy*. Bethesda, MD: National Institutes of Health, US Department of Health and Human Services; 2000. NLM publication No. CBM 2000-1
5. Davis TC, Humiston SG, Arnold CL, et al. Recommendations for effective newborn screening communication: results of focus groups with parents, providers, and experts. *Pediatrics*. 2006;117(5 pt 2):S326-S340
6. Arnold CL, Davis TC, Frempong JO, et al. Assessment of newborn screening parent education materials. *Pediatrics*. 2006;117(5 pt 2):S320-S325
7. Farrell M, Deuster L, Donovan J, Christopher S. Pediatric residents' use of jargon during counseling about newborn genetic screening results. *Pediatrics*. 2008;122(2):243-250
8. Sanders L, Federico S, Abrams MA, et al. Readability of enrollment forms for the State Children's Health Insurance Program (SCHIP). Presented at: Pediatric Academic Societies annual meeting; May 5-8, 2007; Toronto, Ontario, Canada
9. Davis TC, Mayeaux EJ, Fredrickson D, et al. Reading ability of parents compared with reading level of pediatric patient education materials. *Pediatrics*. 1994;93(3):460-468
10. Davis TC, Crouch MA, Wills G, et al. The gap between patient reading comprehension and the readability of patient education materials. *J Fam Pract*. 1990;31(5):533-538
11. Centers for Disease Control and Prevention. Polio vaccine: what you need to know. Available at: www.cdc.gov/vaccines/Pubs/vis/downloads/vis-ipv.pdf. Accessed May 26, 2007
12. Forbis SG, Aligme CA. Poor readability of written asthma management plans found in national guidelines. *Pediatrics*. 2002;109(4). Available at: www.pediatrics.org/cgi/content/full/109/4/e52

13. Abrams MA, Dreyer BP, eds. *Plain Language Pediatrics: Health Literacy Strategies and Communication Resources for Common Pediatric Topics*. Elk Grove Village, IL: American Academy of Pediatrics; 2009
14. Sanders LM, Federico S, Klass P, Dreyer B, Abrams MA. Literacy and child health: a systematic review. *Arch Pediatr Adolesc Med*. 2009;163(2):131–140
15. Scott TL, Gazmararian JA, Williams MV, Baker DW. Health literacy and preventive health care use among Medicare enrollees in a managed care organization. *Med Care*. 2002;40(5):395–404
16. Bennett CL, Ferreira MR, Davis TC, et al. Relation between literacy, race, and stage of presentation among low-income patients with prostate cancer. *J Clin Oncol*. 1998;16(9):3101–3104
17. Schillinger D, Grumbach K, Piette J, et al. Association of health literacy with diabetes outcomes. *JAMA*. 2002;288(4):475–482
18. Rothman RL, Housam R, Weiss H, et al. Patient understanding of food labels: the role of literacy and numeracy. *Am J Prev Med*. 2006;31(5):391–398
19. Williams MV, Baker DW, Parker RM, Nurss JR. Relationship of functional health literacy to patients' knowledge of their chronic disease: a study of patients with hypertension and diabetes. *Arch Intern Med*. 1998;158(2):166–172
20. Battersby C, Hartley K, Fletcher AE, et al. Cognitive function in hypertension: a community based study. *J Hum Hypertens*. 1993;7(2):117–123
21. Arnold CL, Davis TC, Berkel HJ, Jackson RH, Nandy I, London S. Smoking status, reading level, and knowledge of tobacco effects among low-income pregnant women. *Prev Med*. 2001;32(4):313–320
22. Nielsen-Bohlman L, Panzer A, Kindig DA. *Health Literacy: A Prescription to End Confusion*. Washington, DC: National Academies Press; 2004
23. Kutner M, Greenberg E, Baer J. *A First Look at the Literacy of America's Adults in the 21st Century*. Washington, DC: National Center for Education Statistics. NCES publication No. 2006-470
24. Kutner M, Greenberg E, Jin Y, Paulsen C. *The Health Literacy of America's Adults: Results From the 2003 National Assessment of Adult Literacy*. US Department of Education. Washington, DC: National Center for Education Statistics; 2006. NCES publication No. 2006–483
25. Yin HS, Johnson M, Mendelsohn AL, Abrams MA, Sanders LM, Dreyer BP. The health literacy of parents in the United States: a nationally representative study. *Pediatrics*. 2009;124(5 suppl 3):S289–S298
26. D'Allesandro DM, Kingsley P, Johnson-West K. The readability of pediatric patient education materials on the World Wide Web. *Arch Pediatr Adolesc Med*. 2001;155(7):807–812
27. Sanders LM, Lewis J, Brosco JP. Low caregiver health literacy: risk factor for child access to a medical home. Presented at: Pediatric Academic Societies annual meeting; May 15, 2005; Washington, DC
28. Sanders LM, Thompson VT, Wilkinson JD. Caregiver health literacy and the use of child health services. *Pediatrics*. 2007;119(1). Available at: www.pediatrics.org/cgi/content/full/119/1/e86
29. Fredrickson DD, Washington RL, Pham N, Jackson T, Wiltshire J, Jecha LD. Reading grade levels and health behaviors of parents at child clinics. *Kans Med*. 1995;96(3):127–129
30. Llewellyn G, McConnell D, Honey A, Mayes R, Russo D. Promoting health and home safety for children of parents with intellectual disability: a randomized controlled trial. *Res Dev Disabil*. 2003;24(6):405–431
31. Yin HS, Dreyer BP, Foltin G, van Schiack L, Mendelsohn AL. Association of low caregiver health literacy with reported use of nonstandardized dosing instruments and lack of knowledge of weight-based dosing. *Ambul Pediatr*. 2007;7(4):292–298
32. Wolf MS, Davis TC, Shrank W, et al. To err is human: patient misinterpretations of prescription drug label instructions. *Patient Educ Couns*. 2007;67(3):293–300
33. Davis TC, Wolf MS, Bass PF, et al. Literacy and misunderstanding prescription drug labels. *Ann Intern Med*. 2006;145(12):887–894
34. Lokker N, Sanders L, Perrin EM, et al. Parental misinterpretations of over-the-counter pediatric cough and cold medication labels. *Pediatrics*. 2009;123(6):1464–1471
35. Davis TC, Byrd RS, Arnold CL, Auinger P, Bocchini JA Jr. Low literacy and violence among adolescents in a summer sports program. *J Adolesc Health*. 1999;24(6):403–411
36. Stanton WR, Feehan M, McGee R, Silva PA. The relative value of reading ability and IQ as predictors of teacher-reported behavior problems. *J Learn Disabil*. 1990;23(8):514–517
37. McGee R, Prior M, William S, Smart D, Sanson A. The long-term significance of teacher-rated hyperactivity and reading ability in childhood: findings from two longitudinal studies. *J Child Psychol Psychiatry*. 2002;43(8):1004–1017
38. Miles SB, Stipek D. Contemporaneous and longitudinal associations between social behavior and literacy achievement in a sample of low-income elementary school children. *Child Dev*. 2006;77(1):103–117
39. Hawthorne G. Pre-teenage drug use in Australia: the key predictors and school-based drug education. *J Adolesc Health*. 1997;20(5):384–395
40. Fortenberry JD, McFarlane MM, Hennessy M, et al. Relation of health literacy to gonorrhoea related care. *Sex Transm Infect*. 2001;77(3):206–211
41. Kaufman H, Skipper B, Small L, Terry T, McGrew M. Effect of literacy on breast-feeding outcomes. *South Med J*. 2001;94(3):293–296
42. Kyvelos E, Mendelsohn AL, Tomopoulos S, et al. Use of food labels by low socioeconomic status (SES) parents: associations with material hardship and health literacy. Presented at: Pediatric Academic Societies meeting; May 3–6, 2008; Honolulu, HI. *E-PAS*. 2008;635811.10
43. Yin HS, Dreyer BP, van Schaick L, et al. Factors associated with overweight status in low SES children: role of parent health literacy. Presented at: Pediatric Academic Societies Meeting. May 3–6, 2008; Honolulu, HI. *E-PAS*. 2008;634474.49
44. 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):823–828
45. Bennett I, Switzer J, Aguirre A, Evans K, Barg F. "Breaking it down": patient-clinician communication and prenatal care among African American women of low and higher literacy. *Ann Fam Med*. 2006;4(4):334–340
46. Sanders LM, Shone LP, Conn KM, Fagnano M, Halterman JS. Parent depression and low health literacy: risk factors for child health disparities? Presented at: Pediatric Academic Societies annual meeting; May 5–8, 2007; Toronto, Ontario, Canada
47. Poresky RH, Daniels AM. Two-year comparison of income, education, and depression among parents participating in regular Head Start or supplementary Family Service Center services. *Psychol Rep*. 2001;88(3 pt 1):787–796
48. Anda RF, Williamson DF, Escobedo LG, et al. Depression and the dynamics of smoking. *JAMA*. 1990;264(12):1541–1545
49. Breslau N, Peterson EL, Schultz LR, Chilcoat HD, Andreski P. Major depression and stages of smoking: a longitudinal investigation. *Arch Gen Psychiatry*. 1998;55(2):161–166
50. Markowitz S, Friedman MA, Arent SM. Understanding the relation between obesity

- and depression: causal mechanisms and implications for treatment. *Clin Psychol Sci Pract*. 2008;15(1):1–20
51. Bandura A. *Social Learning Theory*. New York, NY: General Learning Press; 1977
 52. Berwick D. Eleven worthy aims for clinical leadership of health system reform. *JAMA*. 1994;272(10):797–805
 53. Newes-Adeyi G, Helitzer DL, Roter D, Caulfield LE. Improving client-provider communication: evaluation of a training program for women, infants and children (WIC) professionals in New York state. *Patient Educ Couns*. 2004; 55(2):210–217
 54. Williams MV, Davis TC, Parker RM, Weiss BD. The role of health literacy in patient-physician communication. *Fam Med*. 2002; 34(5):383–389
 55. Whitlock EP, Orleans CT, Pender N, Allan J. Evaluating primary care behavioral counseling interventions: an evidence-based approach. *Am J Prev Med*. 2002;22(4):267–284
 56. Towle A, Godolphin W. Framework for teaching and learning informed shared decision making. *BMJ*. 1999;319(7212):766–771
 57. Flowers L. Teach-back improves informed consent. *OR Manager*. 2006;22(3):25–26
 58. Mayeaux EJ Jr, Murphy PW, Arnold C, Davis TC, Jackson RH, Sentell T. Improving patient education for patients with low literacy skills. *Am Fam Physician*. 1996;53(1):205–211
 59. Mellins RB, Evans D, Clark N, Zimmerman B, Wiesemann S. Developing and communicating a long-term treatment plan for asthma. *Am Fam Physician*. 2000;61(8):2419–2428, 2433–2434
 60. Rider EA, Keefer CH. Communication skills competencies: definitions and a teaching toolbox. *Med Educ*. 2006;40(7):624–629
 61. Kripalani S, Robertson R, Love-Ghaffari MH, et al. Development of an illustrated medication schedule as a low-literacy patient education tool. *Patient Educ Couns*. 2007;66(3): 368–377
 62. Wolff K, Cavanaugh K, Malone R, et al. The Diabetes Literacy and Numeracy Education Toolkit (DLNET): materials to facilitate diabetes education and management in patients with low literacy and numeracy skills. *Diabetes Educ*. 2009;35(2):233–236, 238–241, 244–245
 63. Dunn RA, Shenouda PE, Martin DR, Schultz AJ. Videotape increases parent knowledge about poliovirus vaccines and choices of polio vaccination schedules. *Pediatrics*. 1998; 102(2). Available at: www.pediatrics.org/cgi/content/full/102/2/e26
 64. Masley S, Sokoloff J, Hawes C. Planning group visits for high-risk patients. *Fam Pract Manag*. 2000;7(6):33–37
 65. Houck S, Kilo C, Scott JC. Improving patient care: group visits 101. *Fam Pract Manag*. 2003;10(5):66–68
 66. Bunik M, Glazner JE, Chandramouli V, Emsermann CB, Hegarty T, Kempe A. Pediatric telephone call centers: how do they affect health care use and costs? *Pediatrics*. 2007; 119(2). Available at: www.pediatrics.org/cgi/content/full/119/2/e305
 67. Gielen AC, McKenzie LB, McDonald EM, et al. Using a computer kiosk to promote child safety: results of a randomized, controlled trial in an urban pediatric emergency department. *Pediatrics*. 2007;120(2):330–339
 68. Davis TC, Fredrickson DD, Bocchini C, et al. Improving vaccine risk/benefit communication with an immunization education package: a pilot study. *Ambul Pediatr*. 2000; 2(3):193–200
 69. Edwards A, Elwyn G, Mulley A. Explaining risks: turning numerical data into meaningful pictures. *BMJ*. 2002;324(7341):827–830
 70. Rand CM, Conn KM, Crittenden CN, Halterman JS. Does a color-coded method for measuring acetaminophen doses reduce the likelihood of dosing error? *Arch Pediatr Adolesc Med*. 2004;158(7):625–627
 71. Frush KS, Luo X, Hutchinson P, Higgins JN. Evaluation of a method to reduce over-the-counter medication dosing error. *Arch Pediatr Adolesc Med*. 2004;158(7):620–624
 72. Doak CC, Doak LG, Root JH. *Teaching Patients With Low Literacy Skills*. 2nd ed. Philadelphia, PA: Lippincott; 1996
 73. Davis TC, Gazmararian J, Kernen EM. Approaches to improving health literacy: lessons from the field. *J Health Commun*. 2006; 11(6):551–554
 74. Rich M. Health literacy via media literacy: video intervention/prevention assessment. *Am Behav Sci*. 2004;48(2):165–188
 75. Cooley WC, McAllister JW, Sherrieb K, Clark RE. The Medical Home Index: development and validation of a new practice-level measure of implementation of the medical home model. *Ambul Pediatr*. 2003;3(4): 173–180
 76. Shaller D. Implementing and using quality measures for children's health care: perspectives on the state of the practice. *Pediatrics*. 2004;113(1 pt 2):217–227
 77. American Cancer Society. *National Health Education Standards Pre-K-12*. 2nd ed. Atlanta, GA: American Cancer Society; 2007
 78. Marx E, Hudson N, Deal TB, Pateman B, Middleton K. Promoting health literacy through the health education assessment project. *J Sch Health*. 2007;77(4):157–163
 79. Golbeck AL, Ahlers-Schmidt CR, Paschal AM. Health literacy and adult basic education assessments. *Adult Basic Educ*. 2005;(15): 151–168
 80. Kropf JA, Keckley PH, Jensen GL. School-based obesity prevention programs: an evidence-based review. *Obesity (Silver Spring)*. 2008;16(5):1009–1018
 81. Flynn BS, Worden JK, Secker-Walker RH, Badger GJ, Geller BM, Costanza MC. Prevention of cigarette-smoking through mass-media intervention and school programs. *Am J Public Health*. 1992;82(6):827–834
 82. Kolbe L, Kann L, Patterson B, Wechsler H, Osorio J, Collins J. Enabling the nation's schools to help prevent heart disease, stroke, cancer, COPD, diabetes, and other serious health problems. *Public Health Rep*. 2004;119(3):286–302
 83. Kann L, Brener N, Wechsler H. Overview and summary: school health policies and programs study 2006. *J Sch Health*. 2007;77(8): 385–397
 84. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q*. 1996;74(4):511–544
 85. Halfon N, DuPlessis N, Inkelas M. Transforming the U.S. child health system. *Health Aff (Millwood)*. 2007;26(2):315–329
 86. Arah OA, Westert GP, Hurst J, Klazing NS. A conceptual framework for the OECD Health Care Quality Indicators Project. *Int J Qual Health Care*. 2006;18(suppl 1):5–13
 87. Wagner EH. Chronic disease management: what will it take to improve care for chronic illness? *Eff Clin Pract*. 1998;1(1):2–4
 88. Chew D, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. *Fam Med*. 2004;36(8):588–594
 89. Parker RM, Baker DW, Williams MV, Nurss JR. The test of functional health literacy in adults: a new instrument for measuring patients' literacy skills. *J Gen Intern Med*. 1995; 10(10):537–541
 90. Nurss J. Difficulties in functional health literacy screening in Spanish-speaking adults. *J Read*. 1995;38(8):32–37
 91. Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Fam Med*. 1993;25(6):391–395
 92. Lee SY, Bender DE, Ruiz RE, Cho YI. Development of an easy-to-use Spanish health literacy test. *Health Serv Res*. 2006;41(4 pt 1): 1392–1412
 93. Institute of Medicine. *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*. Washington, DC: National Academies Press; 2002

Health Literacy and Child Health Promotion: Implications for Research, Clinical Care, and Public Policy

Lee M. Sanders, Judith S. Shaw, Ghislaine Guez, Cynthia Baur and Rima Rudd

Pediatrics 2009;124;S306

DOI: 10.1542/peds.2009-1162G

Updated Information & Services

including high resolution figures, can be found at:
http://pediatrics.aappublications.org/content/124/Supplement_3/S306

References

This article cites 69 articles, 11 of which you can access for free at:
http://pediatrics.aappublications.org/content/124/Supplement_3/S306#BIBL

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Community Pediatrics
http://www.aappublications.org/cgi/collection/community_pediatrics_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Health Literacy and Child Health Promotion: Implications for Research, Clinical Care, and Public Policy

Lee M. Sanders, Judith S. Shaw, Ghislaine Guez, Cynthia Baur and Rima Rudd

Pediatrics 2009;124;S306

DOI: 10.1542/peds.2009-1162G

The online version of this article, along with updated information and services, is located on the World Wide Web at:

http://pediatrics.aappublications.org/content/124/Supplement_3/S306

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2009 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

