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Readability and Patient Education Materials Used for Low-Income Populations

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More than 90 million Americans have low levels of health literacy that may contribute to poor health outcomes. Assessment of the readability of patient education materials (PEMs) is a vital component of health education. **Purpose:** The aim of this study was to describe the readability of PEMs used in community healthcare settings serving low-income populations to provide further insight into the complex area of health literacy. **Design:** A descriptive, correlational, and nonexperimental design was used for this study. **Setting:** The setting for this study was 5 free and low-cost community clinics in a Midwestern urban area. **Sample:** Thirty-five unique PEMs produced by professional sources (government agencies, drug companies, and state/national organizations) or by providers comprised the final sample. **Methods:** Readability was measured using Simple Measure of Gobbledygook (SMOG), Flesch-Kincaid, and Flesch Reading Ease. Significance was determined through t tests and Spearman ρ correlations. **Findings:** Variability in grade levels was noted using all measures. Mean Flesch-Kincaid grade level was 7.01, and that for SMOG was 9.89. Mean level for Flesch Reading Ease was 63.40, an estimated eighth and ninth grade level. The SMOG consistently measured 2 to 4 grades levels higher than did Flesh-Kincaid. Professionally developed PEMs had significantly higher reading levels using both SMOG and Flesch-Kincaid and were more difficult to read using Flesch Reading Ease when compared with those prepared by individual providers. **Conclusions:** Patient education materials were written at a level too high for the average adult. All PEMs should be analyzed carefully to ensure that they are at the recommended fifth grade level. Further understanding of available measures of readability is critical in the creation and/or assessment of PEMs that will strengthen services from safety net providers and support positive health outcomes. **Implications:** Nurses must expand their knowledge of all aspects of literacy and readability and take a proactive role in assessment and development of PEMs. Further research is needed to determine the best readability measures.

KEY WORDS: health education, health literacy, low-income, readability, research

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Health literacy is an essential component of the current healthcare delivery system and management of personal health. Persons who access the healthcare system at various points are often provided written patient education materials (PEMs) related to their condition/treatment. Healthcare consumers and/or their caregivers must be able to read and understand materials provided to them to regain, maintain, or work toward higher levels of health. Because of one's varying level of health literacy, PEMs may be interpreted as complex and confusing. Although there are many factors that affect health literacy, reading level is one that has major influence and impact on the overall ability.

BACKGROUND

Health literacy has been identified as a critical element in the management of a person's health and essential to navigate the complex technological healthcare system in the United States.[1–3] The ability to obtain and understand basic information about health in order to make informed decisions is vital and contributes to the complex area of health literacy. Health illiteracy serves as a barrier to the provision and receipt of necessary healthcare information. Approximately 47% of adult Americans have problems in understanding complex health information given to them by healthcare providers.[1] Lower levels of literacy are found across the demographic spectrum but are more common in older adults; those with limited education, low English skills,[4,5] and low income; and those of ethnic or racial minority backgrounds.[5,6]

Multidisciplinary healthcare providers, researchers, and organizations concerned about the public's health recognize the impact of literacy on health outcomes. Healthy People 2010 identifies improved consumer health literacy (Objective 11-2) as a key element of effective health communication and a critical means to reduce health disparities.[7] Healthy People 2010 defines health literacy as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions" and is a critical means to reduce health disparities.

A landmark study, the 2003 National Assessment of Adult Literacy,[5] examined levels of health literacy in more than 19,000 adults (aged ≥16 years) residing in households and prisons in the United States. Reflective of Healthy People 2010 and the Institute of Medicine's definition of health literacy, a 28-item scale was used to assess health literacy tasks in 3 areas: clinical, prevention, and navigation of the healthcare system. Only 22% were found to have a proficient level of health literacy, whereas just more than one-third were at basic (22%) and below basic (14%) levels; the majority (53%) fell into the intermediate category. Language was an important factor; non–English-speaking individuals and those with English as a second language had lower literacy levels than did those who spoke just English. Among racial/ethnic groups, the lowest levels of health literacy were found in Hispanics followed by blacks. Supporting previous research, men, older adults (≥65 years), those with lower educational attainment[6,8–11] and incomes below the federal poverty level poverty,[8,9]

Medicare and Medicaid recipients, and the uninsured had lower health literacy levels.

The Agency for Healthcare Research and Quality (AHRQ)[2] examined the relationship between literacy and health outcomes through a scientific review of published literature from 1980 to 2003. This report provides direction for development of evidence-based interventions, guidelines, and quality improvement tools to assist individuals to navigate the healthcare system, better understand health-related information, and decrease the risk of poor health outcomes. Lower literacy levels had a negative impact on health outcomes in several key areas. Individuals with lower literacy skills had less knowledge and comprehension of specific health issues (eg, smoking, HIV, hypertension, diabetes, asthma, contraception, and postoperative instructions), lower utilization of healthcare resources and services including preventive care (immunizations and mammograms), and difficulty with adherence to specific medical treatments (eg, medication instructions). Because of the direct relationship of effective communication between the patient and healthcare provider, lower literacy levels may lead to substandard care and a range of adverse health outcomes.

The Joint Commission's National Patient Safety Goals provide a framework for healthcare organizations to address patient-provider communication barriers, specific systems, and process approaches that promote a "culture of quality and safety." The Joint Commission's white paper "What Did the Doctor Say?: Improving Health Literacy to Protect Patient Safety"[3] presents recommendations that focus on prioritization, assessment, and policy changes to address critical relationships between effective communication, patient safety, and improved health outcomes. Literacy levels, culturally competent care, and modification of provider-patient communication and education based on individual abilities and learning styles are specified in numerous standards that address health communication. Although many community agencies providing care to low-income populations may not have Joint Commission accreditation, these recommendations and standards could provide guidance for improved care and outcomes for patients in a variety of settings. No recommendations for reading levels or specific readability level measures of PEMs are specified by the AHRQ or the Joint Commission.

Readability describes comprehension difficulty and is calculated with mathematical formulas that assess language components of word difficulty and sentence length.[12] There are at least 40 different readability formulas; some can be manually calculated and a number are available as a computerized software program. Because of the composition of formulas, they can be used only for text and not for tables, charts, or word lists. These tools provide a reading grade level needed for the material but do not assess other factors related to suitability of materials such as organization, layout, graphics, and cultural appropriateness. Health education materials are recommended to be written at no higher than a fifth grade reading level.[12] Even individuals with higher reading levels have been found to prefer information that is written at lower levels, as it is easier to comprehend and takes less time to read. Educational level alone is not an accurate measure of reading levels as reading grade levels are often 3 to 4 grade levels

below the highest grade completed in school.[13] Health education materials are frequently written above the reading abilities of patients and also lack cultural sensitivity.[11,14] With increasing technology accessibility, many individuals now access healthcare information on the Internet on multiple Web sites that address health concerns. Health educational materials posted on Internet sites consistently are written above the recommended fifth grade reading level.[15–20]

The readability of PEMs and other health information has been studied for a variety of healthcare conditions such as mental health,[17,21] oral health,[22] cancer education,[23] and cardiovascular disorders,[24] but few have focused on community-based settings serving low-income populations. The readability of educational materials available to these at-risk clients is a vital component of the care received.

The purpose of this study was to describe the readability of PEMs used in community healthcare settings that serve low-income populations to provide further insight and understanding into the complex area of health literacy. Two research questions guided this study:

1. What is the readability of written PEMs used in clinics serving low-income populations determined by the Flesch-Kincaid, Simple Measure of Gobbledygook (SMOG), and Flesch Reading Ease (FRE) measures?
2. Is there a difference in readability between PEMs that are produced by the individual clinic and professional sources using the Flesch-Kincaid, SMOG, and FRE measures?

METHODS

Design and Setting

A descriptive, correlational, and nonexperimental design was used for this study. The setting was a Midwestern urban area that hosts 5 free or low-cost community clinics. Each of the clinics served multicultural populations; patients varied in age related to the specific focus of the provider. The clinics included a federally qualified health center with sliding fees and some insurance accepted; a free, no-cost clinic serving uninsured persons; a free, no-cost clinic serving all ages; a government-sponsored clinic providing immunizations and infectious disease services; and a family practice clinic.

Sample

A nonprobability purposeful sampling method was used for this study. Providers were asked to submit written PEMs used most frequently for their clients. Inclusion criteria were that materials were in English and written format. Patient education materials were excluded if format consisted of lists, did not use complete sentences, had less than 30 sentences, or were duplications.

Instruments

The readability of PEMs was determined using 3 tools: SMOG formula, Flesch-Kincaid, and FRE. These instruments are commonly used to measure various types of written materials in the English language, including health education information.[15,16,18,25] Readability is determined for these measures through analysis of word and sentence difficulty in running text. Scores for SMOG and Flesch-Kincaid are calculated for reading grade level, and the FRE provides a score that is associated with an estimated grade level.

The SMOG formula[26] is a simple method used to determine the reading grade level of written materials. It is easily calculated without the use of a computerized program by (a) using three 10-sentence samples from the beginning, middle, and end of the text; (b) counting all of the words that have 3 or more syllables in these sentences; (c) calculating the square root of this number; and (d) adding 3 to the square root.[27]

The Flesch-Kincaid scale rates text on a US grade-school level and can be calculated using Microsoft Office Word software ("Spelling & Grammar") or with a formula: $(0.39 \times$ average sentence length$) + (11.8 \times$ average number of syllables per word$) - 15.59$.[28]

The FRE is also calculated using the Microsoft Office Word software ("Spelling & Grammar") or with a formula: $206.835 - (1.015 \times$ average sentence length$) \times (84.6 \times$ average syllables per word$)$. Scores range from 0 to 100; the higher the rating, the easier it is to read the text. In general, scores that are below 30 are "very difficult" to read and best read by college graduates. Scores above 90 need a fifth grade reading level and are "very easy." Table 1 lists the FRE ranking scores and their estimated reading grade levels.[29,30]

Procedures

After receiving university institutional review board approval, all 5 healthcare providers with free or low-cost community clinics in the geographic location were invited to participate by letter. A follow-up telephone call was made to each clinic and written consent received. Providers were asked to provide written PEMs used most frequently for clients and were received by mail.

Patient education materials were scanned using an HP Scan jet as a Text & Image file then saved as Rich Text File. The "Spelling & Grammar" option in Microsoft Office Word was used to evaluate each document. Documents were cleaned related to scanning errors (symbols, unusual fonts) and saved.

Table 1. Flesch Reading Ease Score Interpretation[29,30]

Flesch Reading Ease Score	Style Description	Estimated Reading Grade
0–30	Very difficult	College graduate
30–40	Difficult	13th–16th grade
40–50	Fairly difficult	10th and 11th grade
60–70	Standard	8th and 9th grade
70–80	Fairly easy	7th grade
80–90	Easy	6th grade
90–100	Very easy	5th grade

Data Analysis

Each PEM was analyzed using Microsoft Office Word Readability Statistics (includes Flesch-Kincaid grade level and FRE) located in the "Spelling & Grammar" option in "Tools" area. Hand calculations were used to provide analysis of grade level for SMOG. To determine interrater reliability, a second researcher also used SMOG to calculate the reading grade level; agreement was 100%. The Statistical Package for the Social Sciences (version 15.0 for Windows) was used for data analysis. Measures of central tendency were calculated for all PEMs using Flesch-Kincaid, SMOG formula, and FRE. To determine if there were any differences in the readability of PEMs developed by professional sources or the provider with the 3 measures of readability, t tests were used. A Spearman ρ correlation coefficient was calculated to determine the strength of the relationship between Flesch-Kincaid, SMOG, and FRE. No considerations were included for cultural variables for sample selection or analysis.

RESULTS

Response rate was 100%; 44 documents were received from the 5 providers. The final sample consisted of 35 unique PEMs; 9 were excluded because of duplication and/or format (lists, no sentences, <30 sentences). Materials included single-page documents, trifold and bifold brochures, and booklets ranging from 13 to 33 pages. Topics were diverse and consisted of specific information about the agency, services provided, and information related to specific diseases/conditions. Sixty-three percent (n = 22) were produced by professional sources such as government agencies, drug companies, and state/national organizations; 37% (n = 13) were written by the individual provider.

Readability scores for the total sample as measured by Flesch-Kincaid, SMOG, and FRE are presented in Table 2. The mean Flesch-Kincaid grade level was 7.01 and that for SMOG was 9.89, both above the recommended fifth grade reading level.[12] Reading grade level by SMOG was found to measure consistently 2 to 4 grade levels higher when the same PEM was measured with Flesch-Kincaid. There was variability of the reading grade levels for the entire sample using both Flesch-Kincaid and SMOG (5 and 7 reading grade levels, respectively). A wide range of FRE scores reflected materials that were considered very easy (fifth grade) to difficult (college level), with mean scores at the

standard (eighth and ninth) grade level for reading. Generally, the association between FRE and Flesch-Kincaid and SMOG was consistent: the lower the Flesch-Kincaid and SMOG measurement (reading grade level), the higher (more readable) the FRE. However, one document had a reading grade level of 7.4-Flesch-Kincaid/8.41-SMOG but had a FRE score of 96.3 (very easy, estimated fifth grade). Other seventh-grade-level materials (Flesch-Kincaid) in the sample had corresponding FRE scores in the 60s range (standard, eighth and ninth grade).

Clinic-produced materials were written at least one reading grade level lower than were professional documents when measured by Flesch-Kincaid and SMOG, although both types of documents had scores at the eighth and ninth grade estimated levels as measured by FRE (Table 3). Materials produced by both professional and clinic sources also had a wide range of scores as measured by all 3 readability measures, SMOG, Flesch-Kincaid, and FRE, with professional documents having the greatest range of grade levels (five to seven). Although there was variability with the range of FRE scores for both clinic- and professional-produced materials, professional materials had a more consistent range of scores. Using Flesch-Kincaid readability measures, 91% of professional and 69% of clinic documents were written above the fifth grade reading level; using SMOG, 100% of both professional and clinic documents were above this level (Table 4). Most clinic- and professional-produced documents were in the 6th to 8th reading grade level as measured with Flesch-Kincaid and 9th to 12th grade as measured by SMOG.

Professional-developed PEMs had significantly higher reading grade levels when compared with PEMs prepared by the clinic for both Flesch-Kincaid and SMOG. An independent-samples t test comparing the Flesch-Kincaid mean scores of professional- and clinic-developed PEMs found a significant difference between the means of the 2 groups ($t_{27.058} = 3.049$, $P = .005$). Similar results using SMOG were noted for professional- and clinic-prepared materials ($t_{25.505} = 2.688$, $P = .012$). In addition, comparison of the professional- and clinic-produced documents using the FRE reflected significant differences in mean scores ($t_{17.547} = 2.4742$, $P = .024$).

Because readability measures were calculated using a computer program for Flesch Kincaid and FRE and manual calculations were used for SMOG, a Spearman ρ correlation coefficient for instruments was calculated. Significantly strong correlations between Flesch-Kincaid and

Table 2. FK, SMOG, and FRE Readability Scores for Total Sample

Total Sample (n = 35)	FK Grade Level	SMOG Grade Level	FRE Score (Estimated Grade Level)
Mean	7.01	9.89	63.40 (8th and 9th grade)
SD	1.30	1.31	10.23
Range	4.50–9.80	6.72–13.00	96.30–39.40 (5th grade to college level)

Abbreviations: FK, Flesch-Kincaid; FRE, Flesch Reading Ease; SMOG, Simple Measure of Gobbledygook.

Table 3. FK, SMOG, and FRE Readability Scores for Professional- and Clinic-Produced Patient Education Materials

	FK Grade Level	SMOG Grade Level	FRE (Estimated Grade Level)
Professional (n = 22)			
Mean	7.46	10.32	60.10 (8th and 9th grade)
SD	1.21	1.21	7.42
Range	5.00–9.80	6.70–13.00	73.10–39.40 (7th grade to college level)
Clinic (n = 13)			
Mean	6.23	9.18	69.21 (8th and 9th grade)
SD	1.12	1.20	11.98
Range	4.50–8.10	6.9–11.00	96.30–47.30 (5th grade to 10th–11th grade)

Abbreviations: FK, Flesch-Kincaid; FRE, Flesch Reading Ease; SMOG, Simple Measure of Gobbledygook.

SMOG (ρ = 0.745, P = .000), Flesch-Kincaid and FRE (ρ = −0.826, P = .000), and SMOG and FRE (ρ = −0.701, P = .000) were present.

DISCUSSION

The findings of this study have important implications in all types of settings as nurses educate adults on diverse topics on how to care not only for themselves but also for others. The reading levels of PEMs, as measured by the 3 readability tools in this study, were above the recommended reading level (fifth grade)[12] of written communication for health education materials, making them too difficult for the average adult reader. These findings are consistent with other studies that have assessed the reading levels of PEMs.[11,17–19,21,31] As with previous research,[32–35] SMOG measured reading grade level consistently higher than when the same material was compared with Flesch-Kincaid. Using the SMOG measure, the materials overall were written at the 9th to 10th grade level, with the lowest material at the 6.70 grade level and ranging to a college level. Flesch-Kincaid found the same materials to be written at the seventh grade level overall, substantially below the SMOG formula. The FRE measured the same materials at a "Standard" level, which is an estimated eighth and ninth grade reading level. Similar findings were found in a study of PEMs used by nurses in community settings; materials were written at a ninth grade reading level, but a wide range of grade reading levels (fifth to graduate) were represented in the study sample.[14]

The nursing professional has a responsibility to take a proactive role in the assessment and evaluation of PEMs to positively impact the health outcomes of individuals with all levels of health literacy. Nurses should be aware that most patient educational materials are written at a reading level that is too high. It must not be assumed that materials produced by professional sources such as drug companies, government agencies, and national organizations are written at appropriate reading levels for consumers. Based on the findings of this study, regardless of the method used to measure readability, professional literature was written at a significantly higher grade level than were materials that were produced by the individual providers; however, both groups were still above the fifth grade recommended reading level using all 3 measures. All PEMs (those produced commercially and in-house) must be assessed for appropriate reading levels using set criteria and measures. The accessibility and ease of use of the Flesch-Kincaid formula (computer program) make this method a reasonable choice to determine readability; however, nurses must be aware that this method consistently provides lower estimates of readability measures than do

Table 4. Professional- and Clinic-Produced Patient Education Materials Grade Level Summary by FK and SMOG

	Professional (n = 22)		Clinic (n = 13)	
Grade Level	**FK**	**SMOG**	**FK**	**SMOG**
4th–5th	2 (9%)	0	4 (31%)	0
6th–8th	17 (77%)	1 (5%)	9 (69%)	5 (38%)
9th–12th	3 (14%)	20 (91%)	0	8 (62%)
>12th	0	1 (5%)	0	0

Abbreviations: FK, Flesch-Kincaid; FRE, Flesch Reading Ease; SMOG, Simple Measure of Gobbledygook.

other measures such as SMOG and FRE. The Flesch-Kincaid computerized program could be used as an initial measure of reading grade level, but further analysis must be completed. A readability measure that is easy to use, provides consistent measure, and provides a higher measure of reading grade level (such as SMOG) would the best choice to assure that materials would be at an appropriate reading level for the patient.

All PEMs should identify reading level, how it was measured, and the date on the document to provide further guidance for the healthcare provider. More in-depth analysis of PEMs should also be undertaken using comprehensive tools that assess multiple factors, not just reading grade level, such as the Readability Assessment INstrument (RAIN).[31] The RAIN is a comprehensive tool that assesses reading grade level and readability using 14 variables that affect comprehension, including global coherence, local coherence, unity, audience appropriateness, writing style, illustrations, adjunct questions, and topography.

Although the use of medical terminology in PEMs is often unavoidable, it has a profound impact on readability because of the use of polysyllable medical terms. In a study of 5 PEMs using 2 readability measures, Sand-Jecklin[36] found that reading levels were significantly lower after medical terms were removed but remained above the recommended fifth grade level. Medical terms should always be defined and less complex words should be used when possible.

The assessment of literacy levels of patients using tools specifically designed with appropriate criteria is a critical component of health literacy. Reliable and valid objective measures must be used to assess literacy levels, as patients may be embarrassed or ashamed to identify that they have problems with literacy.[37,38] The most commonly used instruments to assess literacy levels in healthcare environments (acute care and community settings) include the Rapid Estimate of Adult Literacy in Medicine (REALM),[39] the Test of Functional Health Literacy in Adults (TOFHLA),[40] and the Wide Range Achievement Test (WRAT-R).[41] Although these tools are used with greatest frequency to assess literacy, a major disadvantage is the time needed for adequate administration because of length: WRAT-R, 57 items; REALM, 66 items; and TOFHLA, 67 items. The REALM-R, a shortened version of the original tool, has been shown to be a reliable literacy assessment instrument when compared with WRAT-R and consists of 8 items taking less than 2 minutes to administer.[42] The Newest Vital Sign (NVS) is another literacy assessment test that was developed for rapid assessment in the clinical area. Taking 3 minutes to administer, a nutritional label is used to ask 6 items. The NVS has been shown to be reliable when compared with the TOFHLA.[43]

All healthcare providers should increase their knowledge and understanding of health literacy and the many effects that it can have on the health of patients. Since 1999, October has been designated as "Health Literacy Month," and multiple resources are available to facilitate promotion of health literacy (http://www.healthliteracy.com/hl_month.asp). Table 5 lists Web sites that one can use to learn more about this important topic.

Health literacy is a complex set of skills that include being able to read, understand, and make decisions that affect health outcomes. It includes not only PEMs but also items such as prescription instructions on medication bottles, consent forms, and appointment information. Because nurses are responsible for the creation and dissemination of health education materials in their practice areas, better understanding of the diverse components related to health literacy, including tools to measure the readability of materials, will assist healthcare providers in the design and implementation of improved PEMs. Interdisciplinary collaboration is needed to reach those at risk. Libraries are in a key position to collaborate with multidisciplinary health providers to deliver appropriate health information.[44] Partnerships formed with universities with healthcare programs could provide valuable experiences for students as well as the positive outcomes for providers.

Future research should focus on continued assessment of health education materials used for diverse populations and settings and investigation of readability measures. Although the 3 measures in this study were significantly correlated with each other, methods research that focuses on comparison of readability measures for accuracy, precision, and efficacy is warranted using statistical tests specifically designed to compare methods. Readability measures and tools for the design of Web pages, video

Table 5. Web Sites to Learn More About Health Literacy

National Institute for Literacy	http://www.nifl.gov
Harvard School of Public Health	http://www.hsph.harvard.edu/healthliteracy
Healthy People 2010	http://www.health.gov/healthypeople
Institute of Medicine of the National Academies	http://www.iom.edu/CMS/3793/31487/34403.aspx
Center for Health Care Strategies	http://www.chcs.org
Pfizer Clear Health Communication Initiative	http://www.pfizerhealthliteracy.com
National Network of Libraries of Medicine	http://nnlm.gov/outreach/consumer/hlthlit.html
USDHHS Office of Disease Prevention and Health Promotion Heath Communication Activities	http://www.health.gov/communication/literacy/default.htm
National Institutes of Health	http://www.nih.gov/icd/od/ocpl/resources/improvinghealthliteracy.htm
World Education Health and Literacy Special Collection	http://healthliteracy.worlded.org/

and audio materials, and PEMs that are non-English and reflect cultural competence are also needed.

Limitations of this study are that only English-language materials were included and sample size was small when comparing professional- and clinic-produced materials. Although the readability measures used in this study do address reading grade level and ease of reading through assessment of word difficulty and sentence length, they do not take into account other factors that may affect comprehension of health education materials such as layout, graphics, cultural appropriateness, learning stimulation, and motivation. Although the suitability of PEMs includes many factors, reading grade level is foundational to any PEM.

CONCLUSIONS

With the use of the Flesch-Kincaid, SMOG, and FRE measures, this study found that PEMs used for low-income populations at community clinics were written at a reading level that is too high for most adults and that materials developed by professional sources had a significantly higher reading level when compared with materials developed by the clinics. Health literacy is not well understood by healthcare providers in all types of settings. The relationship between reading ability and health outcomes is influenced by many variables, and with further understanding of the issues related to health literacy and health education materials, nurses can help design and use materials that are at appropriate reading levels, written in clear and understandable language, and are culturally sensitive. Further research must comprehensively examine all aspects of health literacy, including readability, to describe and improve materials used to increase positive patient outcomes. Educational programs for all healthcare providers must include health literacy as a key component in curricula and can provide continuing education to others in acute care and community settings.

Nurses must serve as patient advocates, have a key role in educating, and take responsibility to incorporate literacy assessment and health education techniques for health literacy into daily practice. Patient education materials must be at appropriate literacy levels, demonstrate cultural competence, and use multiple strategies to convey educational topics. Policy changes within the safety net system include evidence-based procedures/interventions for health literacy assessment and health education, systemwide changes that affect all levels of literacy such as modified consent forms and appointment information, which will contribute to positive health outcomes for patients.

References

1. Institute of Medicine. *Health Literacy: A Prescription to End Confusion*. Washington, DC: National Academies Press; 2004.
2. Berkman ND, DeWalt DA, Pignone MP, et al. *Literacy and Health Outcomes. Evidence Report/Technology Assessment No. 87* (Prepared by RTI International—University of North Carolina Evidence-Based Practice Center under contract no. 290-02-0016). Rockville, MD: Agency for Healthcare Research and Quality; 2004. AHRQ Publication No. 04-E007-2. http://www.ahrq.gov/downloads/pub/evidence/pdf/literacy/literacy.pdf. Accessed March 21, 2008.
3. Joint Commission. What did the doctor say?: Improving health literacy to protect patient safety. 2007. http://www.jointcommission.org/NR/rdonlyres/D5248B2E-E7E6-4121-8874-99C7B4888301/0/improving_health_literacy.pdf. Accessed March 21, 2008.
4. The Nation's Health. *Millions of Americans Suffer From Low Health Literacy*. Washington, DC: American Public Health Association; 2004.
5. Kutner M, Greenberg E, Jin Y, Boyle B, Hsu Y, Dunleavy E. *Literacy in Everyday Life: Results From the 2003 National Assessment of Adult Literacy (NCES 2007–480). U.S. Department of Education*. Washington, DC: National Center for Education Statistics; 2006.
6. Gazmararian JA, Baker DW, Williams MV, et al. Health literacy among Medicare enrollees in a managed care organization. *JAMA*. 1999;281:545–551.
7. USDHHS. *Healthy People 2010*. Washington DC: US Government Printing Service; 2000.
8. Baker DW, Gazmararian JA, Williams MV, et al. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. *Am J Public Health*. 2002;92:1278–1283.
9. Chew L, Bradley K, Flum D, et al. The impact of low health literacy on surgical practice. *Am J Surg*. 2004;188:250–253.
10. Sudore R, Mehta K, Simonsick E, et al. Limited literacy in older people and disparities in health and healthcare access. *J Am Geriatr Soc*. 2006;54:770–776.
11. Wilson FL, Racine E, Tekieli V, Williams B. Literacy, readability and cultural barriers: critical factors to consider when educating older African Americans about anticoagulation therapy. *J Clin Nurs*. 2003;12:275–282.
12. Doak L, Doak CC, Root JH. *Teaching Patients With Low Literacy Skills*. Philadelphia, PA: Lippincott Williams & Wilkins; 1996.
13. Cutilli DD. Health literacy in geriatric patients: an integrative review of the literature. *Orthop Nurs*. 2007;26(1):43–48.
14. Wilson FL. Patient education materials nurses use in community health. *West J Nurs Res*. 1996;18(2):195–205.
15. Friedman DB, Hoffman-Goetz L. A systematic review of readability and comprehension instruments used for print and Web-based cancer information. *Health Educ Behav*. 2006;33:352–373.
16. Friedman DB, Hoffman-Goetz L, Arocha JF. Health literacy and the World Wide Web: comparing the readability of leading incident cancers on the Internet. *Med Inform Internet Med*. 2006;31(1):67–87.
17. Adkins AD, Elkins EN, Singh NN. Readability of NIMH easy-to-read patient education materials. *J Child Fam Stud*. 2001;10:279–285.
18. D'Alessandro DM, Kingley P, Johnson-West. The readability of pediatric patient education materials on the World Wide Web. *J Arch Pediatr Adolesc Med*. 2001;155:807–812.
19. Badarudeen S, Sabharwal S. Readability of patient education materials from the American Academy of Orthopaedic Surgeons and Pediatric Orthopaedic Society of North America Web Sites. *J Bone Joint Surg*. 2008;90:199–204.
20. Kisely S, Ong G, Takyar A. A survey of the quality of Web based information on the treatment of schizophrenia and attention deficit hyperactivity disorder. *Aust N Z J Psychiatry*. 2003;37:85–91.
21. Adkins AD, Singh NN. Reading level and readability of patient education materials in mental health. *J Child Fam Stud*. 2001;10(1):1–8.
22. Hendrickson R, Huebner CE, Riedy CA. Readability of pediatric health materials for preventive dental care. *BMC Oral Health*. 2006;6:14. http:www.biomedcentral.com/1472-6831/1/14. Accessed March 23, 2008.

23. Singh J. Reading grade level and readability of printed cancer education materials. *Oncol Nurs Forum*. 2003;30: 867–870.
24. Estrada CA, Hryniewicz MM, Higgs VB, Collins C, Bryd JC. Anticoagulant patient information material is written at high readability levels. *Stroke*. 2000:2966–2970.
25. Ley P, Florio T. The use of readability formulas in health care. *Psychol Health Med*. 1996;1:7–28.
26. McLaughlin GH. SMOG grading: a new readability formula. *J Read*. 1969;1:639–646.
27. Meade CD, Smith CF. Readability formulas: cautions and criteria. *Patient Educ Counsel*. 1991;17:53–158.
28. Kincaid JP, Fishburne RP, Rogers RL, Chisson BS. *Derivation of New Readability Formula for Navy Enlisted Personnel*. Millington, TN: Memphis Naval Research Branch; 1975.
29. Flesch R. A new readability yardstick. *J Appl Psychol*. 1948;32:221–233.
30. Dubay WH. The principles of readability. 2004. http:// www.impact-information.com/impactinfo/readability02.pdf. Accessed April 13, 2008.
31. Singh J. *Readability Assessment Instrument User's Manual*. 2nd ed. Midlothian, VA: ONE Publications; 2005.
32. Brock TP. Assessment of the readability and comprehensibility of a DFC-transition brochure. *Ann Allergy Asthma Immunol*. 2008;4:211–214.
33. Freda MC. The readability of American Academy of Pediatrics patient education brochures. *J Pediatr Health Care*. 2005;19:151–156.
34. Friedman DB. Reliability of cancer information on the Internet. *J Cancer Educ*. 2004;19:117–122.
35. Gottlieb R, Rogers JL. Readability of health sites on the Internet. *Int Electron J Health Educ*. 7:38–42. http://www. iejhe.org. Accessed March 21, 2008.
36. Sand-Jecklin K. The impact of medical terminology of readability of patient education materials. *J Community Health Nurs*. 2007;24(2):199–129.
37. Speros C. Health literacy: concept analysis. *J Adv Nurs*. 2005;50:633–640.
38. Parikh NS, Parker RM, Nurss JR, et al. Shame and health literacy: the unspoken connection. *Patient Educ Counsel*. 1996;27:33–39.
39. Davis TC, Long SW, Jackson RH, et al. Rapid estimate of adult literacy in medicine: a shortened screening instrument. *Fam Med*. 1993;25:391–395.
40. Parker RM, Baker DW, Williams MV, et al. The test of functional health literacy in adults: a new instrument for measuring patients' literacy skills. *J Gen Intern Med*. 1995;10:537–541.
41. Jastak S, Wilkinson GS. *Wide Range Achievement Test Revised 3*. Wilmington, DE: Jastak Associates; 1993.
42. Bass PF, Wilson JF, Griffith CH. A shortened instrument for literacy screening. *J Gen Intern Med*. 2003;1:1036–1038.
43. Weiss BD, Mays MZ, Martz W, et al. Quick assessment of literacy in primary care: the Newest Vital Sign. *Ann Fam Med*. 2005;3:514–522.
44. Burnham E, Peterson EB. Health information literacy: a library case study. *Libr Trends*. 2005;53:422.