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An Analysis of the Readability of Educational Materials on the Consumer Webpage of a Health Professional Organization: Considerations for Practice

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ABSTRACT

Context: The readability level of many patient education materials is too high for patients to comprehend, placing the patient's health at risk. Since health professionals often recommend Internet-based patient education resources, they must ensure that the readability of information provided to consumers is at an appropriate level. **Purpose:** The purpose of this study was to determine the readability of educational brochures found on the American Physical Therapy Association (APTA) consumer website. **Methods:** Fourteen educational brochures on the APTA website in March 2008 were analyzed using the following assessments: Flesch-Kincaid Grade Level, Flesch Reading Ease, Fry Readability Formula, Simple Measure of Gobbledygook (SMOG), Checklist for Patient Education Materials, and Consumer Health Web Site Evaluation Checklist. **Results:** According to the Flesch-Kincaid and Flesch Reading Ease, over 90% of the brochures were written at greater than a sixth grade level. The mean reading level was grade 10.2 (range = 3.1 to 12) with a Reading Ease score between 31.5 to 79.9. Using the SMOG formula, the brochures had a mean reading level of grade 11.5 (range = 9 to 13). The Fry Readability showed that 85% of the brochures were written higher than a sixth grade level, with a mean reading level of grade 9.5 (range = 6 to 14). **Conclusion:** Findings suggest that most of the consumer education information available on the website of this health professional organization had readability scores that were too high for average consumers to read.

CONTEXT

Health information available on the Internet plays an important role in health care, as it provides patients the opportunity to be active participants in recovery.[1] Though the recommendation is for health education materials to be written at a fifth to sixth grade level, studies show that the readability of educational materials on the Internet are frequently not appropriate for their audience.[2-5] Due to high incidences of health illiteracy, health professionals must ensure that readability of information provided to consumers is at an appropriate level. The purpose of this study was to determine the readability of patient education brochures from the consumer website of a health professional organization.

Health Literacy

Health literacy is defined 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."[6] Health literacy specifically addresses how well a person is able to read and comprehend health information, such as an educational brochure, medication instructions, and consent forms. Health literacy depends on an individual's health-related reading fluency, health-related vocabulary, familiarity with health concepts presented in the materials, and the complexity and difficulty of the printed and spoken messages.[7] It is vital that health information is presented in a manner that is understandable and useful for the patient. Unlike impaired circulation or pulmonary problems, low health literacy skills are not visible when looking at an individual, nor are they evident through conversation.

The health professional should assume that the average literacy level of a patient is 3 to 5 grade levels below the highest level of schooling completed by the individual.[8] According to Safeer and Keenan, "approximately one-half of adults are unable to understand printed health care materials and approximately 90 million adults have fair to poor literacy."[9]

When consumers of patient educational material are unable to understand the information or apply it, then it is unlikely that the material can make a difference in their care or health outcomes. Health illiteracy can stem from a number of factors including native language, socioeconomic status, gender, race, ethnicity, influence of mass media, listening and speaking skills, ability to read and do math, cognitive delays, memory problems, or psychosocial disorders.[2] It is imperative that information presented matches the patient's reading ability. Providing patients with educational materials empowers them to make informed decisions and assume the responsibility for their own care. Material written at an appropriate level can improve adherence to treatments and overall satisfaction with care.[10]

Impact of Health Illiteracy

Persons with low health literacy are more likely to report poor health, have an incomplete understanding of their health problems and treatment, and be at greater risk of hospitalization. Improving health literacy may decrease both health care costs and hospitalization length.[6,11] Baker et al found that patients with inadequate literacy were twice as likely as patients with adequate literacy to be hospitalized, even when adjusting for age, gender, race, self-reported health, socioeconomic status, and health insurance.[12] Health illiteracy has been linked to patients having less knowledge about common illnesses such as hypertension, diabetes, and asthma.[11] In addition, low literacy has been linked to delays in seeking medical advice and even to increased mortality.[13]

Health literacy not only involves the individual, but also relates to the health care system as well. When health professionals are not cognizant of the reading level of their patients and create written materials that are too complex, they contribute to the health illiteracy problem. All health care professionals need to be conscious of the readability of health literature because patients should be given information that is understandable and easy to read. Two accrediting agencies in the United States, The Joint Commission and the National Committee for Quality Assurance (NCQA), require that health professionals ensure that patient education materials such as informed consent, medication instructions, home exercise programs, and discharge instructions are understood by their patients.[14,15] Thus, when performing a patient assessment, it is mandatory for health professionals to identify, document, and address barriers to learning when educating patients. With the increasing number of people accessing health-related information on the Internet, it is essential to provide both accurate and readable information.

Patient Education Resources Provided by Health Professional Organization Websites

Approximately 70 million persons use the Internet for health-related reasons.[6] Flynn et al found that one-third of older adults used it to research information about their health care.[16] With this large volume of Internet consumers, health professionals must ensure that the information presented is not only accurate, but understandable. One barrier to a patient's achieving adequate health literacy can be the readability level and format that on-line mediums exhibit.

Badarudeen and Sabharwal[4] found that though 113 million Americans searched on-line for health-related information each day, one-fourth found the information overwhelming. According to these authors, the reading levels of patient education websites of the American Academy of Orthopaedic Surgeons and the Pediatric Orthopaedic Society of North America had a mean Flesch-Kincaid Grade Level of grade 8.9 and only 1 of 42 items was found to be less than the seventh grade level. With similar findings, D'Allessandro and colleagues examined the readability of 89 pediatric web-based patient education documents.[5] These researchers found that none of the documents had a mean reading level below the 10.6 grade level.[5] The sudden surge in Internet health consumers has amplified the need for appropriate steps to be set into place to evaluate on-line sources.

Cutilli suggests that website evaluation should be based on: (1) accuracy: examining whether provided information is current and from a reputable source; (2) design: whether the website is easy to navigate, if the links are active, or the graphics serve a

purpose, and (3) whether authors or sponsors are clearly identified and credentials provided.[17] Educational materials on many health professions' websites do not follow these guidelines or have an appropriate readability level.[4,5] Subsequently, the purpose of this study was to determine the readability of patient education brochures from the consumer website of an allied health profession, the American Physical Therapy Association (APTA).

METHODS

Sample

During the time period of this study, the consumer section of the APTA website had an array of information including topics ranging from arthritis to urinary incontinence.[18] To express these concepts, the website used pictures, exercises, and the evaluation process that may accompany physical therapy management of these conditions. Brochures were excluded if the material available was only in pictorial form or if the length of the information was not adequate to use the readability tools. On March 26, 2008, 14 brochures were downloaded, printed, and saved to the primary author's (Falconer) computer. A listing of these brochures can be found in Table 1. To enhance reliability of the results of the analysis, multiple math-based readability measures were utilized. In addition, the use of the tools was standardized by health literacy and educational experts (Chesbro, Reicherter, and Billek-Sawhney). The readability of these brochures was assessed using the following tools: Flesch-Kincaid Grade Level (Flesch-Kincaid), Flesch Reading Ease Score (FRES), Simple Measure of Gobbledygook (SMOG) Readability Formula, Fry Readability Formula (FRF), Checklist for Patient Education Materials, and the Consumer Health Website Evaluation Checklist.[2,19,20,21] Brief descriptions of each of these tools are provided in the following section.

Instruments

The Flesch-Kincaid is a widely used readability assessment tool.[19] The tool computes readability based on average number of syllables per word and average number of words per sentence and provides a U.S. grade equivalency. The higher the text complexity, the higher the grade level score. The FRES also examines the number of syllables per word and words per sentence. Scores on this tool range from 0 to 100; the higher the score, the easier the document is to understand.[19] For example, scores of 90 to 100 equate to the reading ability of an average 11 year-old child, while scores between 0-30 are equivalent to the reading ability of a college graduate. The Flesch-Kincaid and FLES were assessed converting each brochure into a MS Office 2003 Word™ document and using the automatic computerized calculations tools available in this software.[23]

The SMOG formula, developed in 1969 by McLaughlin, is a tool designed to estimate the years of education needed to understand a piece of writing.[20] The *SMOG* examines 10 consecutive sentences from the beginning, middle, and end of a text. In the 30 selected sentences, all words containing three or more syllables were counted. A conversion table was then used to calculate the reading level.

The FRF, readability metric for English texts, was also used in this study.[21] This tool calculates the grade reading level, from 1 to 17, by ascertaining the average number of syllables and sentences per 100 words. The FRF is helpful for large texts, as three different sample sizes can be taken from the text and analyzed.[21] Next, to assess not only the readability, but the appearance and visual appeal of the patient education brochures, several additional tools were required.

Billek-Sawhney and Reicherter developed a 20-item Checklist for Patient Education Materials for assessment of readability of patient educational materials.[2] This checklist differs from other readability tools in that it addresses other factors that can impact readability, such as font style and size and use of white space. Some criteria on the checklist were not applicable and therefore not utilized in this study. The criteria used are depicted in Table 4. If the items on the checklist correlated to the brochure, they were coded a "**+**", and if they did not correlate, they were coded a "**-**". To assess the unique readability of websites, another tool was required.

For specifically evaluating web-based patient education materials, the Consumer Health Web Site Evaluation Checklist was used to assess each of the 14 brochures.[22] This checklist has two main sections. The first, *Content*, includes criteria on the value, quality, authority, and currency of the information. The second section, *Usability*, evaluates the website's graphics, design, navigation, speed, and access. Within each of these broad categories the various items are rated, with scores ranging from -2 to 5. After all the items had been rated for each section, the numbers were summed. There are 90 total possible points for the checklist. Using a scale for qualifying the website, scores of 81-90 are considered "excellent," while scores < 50 are considered "poor."

RESULTS

The Flesch Analysis for each of the 14 brochures can be found in Appendix 1. The mean grade level for the 14 brochures was at a 10.2 grade level and ranged from a low of 3.1 for the brochure on "Posture Tips for Mom" to a high of 12.0 for the brochures on

"Hand, Wrist, and Elbow" and "Arthritis." Similarly, the FRES found that the mean readability was 49.5, which is considered difficult. FRES scores ranged from a high of 31.5 with the brochure titled "Arthritis" to a low of 79.9 for "Posture Tips for Moms" brochure.

The SMOG reading level for each brochure can be found in Table 1. Based on the SMOG formula, the "Arthritis" brochure had a reading level of grade 13. A SMOG readability of 9th grade was found for two brochures, "Scoliosis" and "Posture Tips for Mom." The mean SMOG reading level was 11.5.

Table 1. SMOG Analysis of the Educational Brochures

Topic of Brochure	SMOG Reading Level
Arthritis	13
Carpal Tunnel	13
Foot and Ankle	12
Hand/Wrist/Elbow	12
Incontinence	12
Knees	13
Neck Pain	11
Osteoporosis	13
Posture Tips for Mom	9
Posture	10
Scoliosis	9
Shoulder	12
Women of All Ages	12
Young at Heart	10
MEAN	**11.5**

As illustrated in Table 2, the FRF revealed the "Posture Tips for Mom" brochure had the lowest reading level of 6th grade and the "Hand, Wrist and Elbow" had the highest reading level of 14. A mean FRF reading level of grade 9.5 was found for all brochures.

Table 2. Fry Readability Analysis of the Educational Brochures

	100-Word Samples _syllables_ sentences			
Topic of Brochure	**1st**	**2nd**	**3rd**	**Reading Level**
Arthritis	181 / 6.5	163 / 4	156 / 5.5	**12.5**
Carpal Tunnel	154 / 6.7	140 / 5	141 / 4.3	**8.5**
Foot and Ankle	168 / 4.5	136 / 3.5	147 / 4.5	**11**
Hand/Wrist/Elbow	164 / 6.7	160 / 7	209 / 7	**14**
Incontinence	152 / 4	161 / 5	123 / 5	**8.5**
Knees	143 / 5	178 / 7	160 / 5.8	**10**
Neck Pain	142 / 4	150 / 5	187 / 5.5	**11**
Osteoporosis	160 / 6	152 / 3.5	146 / 7.5	**9**
Posture Tips for Mom	123 / 6	125 / 5	115 / 6	**6**
Posture	142 / 7.4	148 / 6	140 / 6.6	**9.5**
Scoliosis	163 / 8	128 / 6	146 / 7	**7**
Shoulder	161 / 4.3	160 / 5	154 / 5	**10.5**
Women of All Ages	151 / 5.5	152 / 3	148 / 5	**9.3**
Young at Heart	161 / 4.5	127 / 8.5	125 / 8	**6.3**
MEAN				**9.5**

The results from the Checklist for Patient Education Material are presented in Table 3. Two criteria, material at 5th grade level or lower and use of larger font size (14-18) were not met in any of the 14 brochures. Seven items were found in all of the brochures. These included: active language, key concepts, headings and subheadings, white space, logical, illustrations, diagrams, and the distribution of material over time.

Table 3. Analysis of Educational Brochures by Patient Education Material Checklist[2]

Checklist Items	Arthritis	Carpal Tunnel	Foot and Ankle	Hand /Elbow/Wrist	Incontinence	Knees	Neck Pain	Osteoporosis	Posture Tips for Mom	Posture	Scoliosis	Shoulder	Women of All Ages	Young at Heart
Readability at ≤ 5th grade level	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Font size ≥ 14-18	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 - 2 syllable words	-	+	-	-	-	-	-	-	+	-	+	-	-	-
Short sentences	-	-	-	-	-	-	-	-	-	-	+	-	-	-
Active voice	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Headings/subheadings	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Bulleted points	-	-	-	-	-	+	-	-	-	-	+	-	-	-
White space	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Easy-to-read fonts	-	+	-	-	-	+	-	+	-	+	+	-	-	-
Avoid left-right justify	-	-	+	-	-	-	-	-	+	+	-	-	-	-
Logical arrangement	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Bold font for emphasis	+	-	+	+	+	+	+	+	-	+	+	+	+	+
Illustrations, diagrams age- sensitive	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Focus on key concepts	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Distributed material over time	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Kept it simple	-	-	-	-	-	-	+	-	+	+	+	-	-	-

Key: + brochure met criterion
- brochure did not meet criterion

Using the Consumer Health Website Evaluation Checklist, the APTA website scored a 50, which is indicative of poor quality.[22] The section that scored the lowest on this checklist was the "Information Quality" section. This section included things such as whether sources or publications were referenced.

DISCUSSION

Consistent with previous studies of websites, the results from this study found that most of the 14 pamphlets reviewed from the APTA website in March 2008, were written at a level too complex for many consumers to understand.[4,5] The Flesch-Kincaid, FRES, FRF, and SMOG calculations all showed that at least 85% of educational brochures were written at a greater than 6th grade level.

Using the Checklist for Patient Education Materials, there were several items that were met by all brochures.[2] Those items included headings and subheadings, active voice, white space, logical sequence, illustrations, and distribution of material over time. Areas that proved to be absent in the brochures included readability at 5th grade level, larger font size, shorter sentences, one to two- syllable words, bullets instead of paragraphs, and avoiding left-to-right justification. According to the Consumer Health Website Evaluation Checklist, the APTA website scored very low (score of 50/90), indicating the website was not well-designed.

There were several limitations to this study. These brochures incorporated many pictures; the use of these pictures as an enhancement was only addressed in the checklists. All tests were performed by a single investigator (first author); interrater reliability was not assessed. However, since all readability calculations were math-based, it would be appropriate to assume that intrarater reliability was strong. Lastly, this study examined the APTA website at only one point in time. Following the 2008 retrieval of brochures analyzed for this study, the APTA has updated and significantly improved its consumer website.

CONCLUSION

Allied health professionals are a critical component in improving the overall health of their consumers. For patient education information to be valuable and effective, the content and design, as well as the information, needs to be appropriate for the targeted audience. If consumers are not able to read, interpret, and apply the information shared through our written brochures, the clinician and profession are failing to address health illiteracy. Frequently, health care consumers do not report that they have low literacy. It is the responsibility of health professionals to ensure that the information is being understood. This study provides insight as to why our patients may find it difficult to understand information intended for them.

Since most of the APTA brochures studied were written at levels far beyond the recommended 6th grade reading level, measures must be taken to ensure better methods of creating consumer materials. Patient education is the key to helping a client feel in control of the problem that they are having. When consumers of patient educational material are unable to understand the information or apply it, it is unlikely that the patient educational material can make a difference in care or health outcomes. Through education, patients can become their own healthcare advocates and can actively participate in the health professional-patient relationship.

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KEY TERMS
Literacy, Human Rights, Health Literacy; Patient Education, Patient Education Handout, Electronic Publishing, Self-Care, Process Assessment (Health Care), Readability Formulas, Patient Adherence

APPENDIX A
Flesch Analysis of the Educational Brochures

Brochure Topic	Words	Characters	# Paragraphs	# Sentences	Sentence/ Paragraph	Words/ Sentence	Characters/ Word	Passive Sentences	Reading Ease	Grade Level
Arthritis	3,966	21,655	73	204	3.6	18.8	5.3	12%	**31.5**	**12.0**[a]
Carpal Tunnel	1,327	6,932	30	66	2.6	19.6	5.1	7%	**44.3**	**11.6**
Foot and Ankle	2,807	14,149	53	128	3.0	21.4	4.9	21%	**46.0**	**11.9**
Hand/Wrist/ Elbow	2,212	11,496	51	106	2.9	20.2	5.0	10%	**42.6**	**12.0**[a]
Incontinence	1,787	9,481	67	85	3.0	18.8	5.0	2%	**44.1**	**11.7**
Knees	1,150	6,046	39	63	2.1	17.2	5.1	7%	**42.9**	**11.4**
Neck Pain	2,670	13,117	75	137	2.9	18.0	4.7	11%	**52.0**	**10.3**
Osteoporosis	2,695	14,282	94	169	3.2	14.8	5.1	7%	**44.0**	**10.7**
Posture Tips for Mom	402	1,795	53	20	4.0	4.1	4.3	0%	**79.9**	**3.1**
Posture	1,453	7,373	63	86	1.7	16.1	4.9	9%	**57.0**	**8.9**
Scoliosis	1,462	7,130	85	111	1.5	12.2	4.7	15%	**60.7**	**7.8**
Shoulder	2,476	12,751	52	125	3.1	18.8	5.1	14%	**40.3**	**11.9**
Women of All Ages	2,765	14,295	58	143	2.8	19.1	5.0	6%	**45.0**	**11.6**
Young at Heart	2,018	9,765	71	139	2.6	13.6	4.6	1%	**62.8**	**7.8**
MEAN	2,085	10,733.4	61.7	113	2.8	16.6	4.9	8.7%	**49.5**	**10.2**

a. 12th grade is the maximum grade level calculated, thus scores at the 12th grade level may actually be higher.