

# Readability Levels of Patient Education Material on the World Wide Web

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**BACKGROUND.** Patient education is an important component of family practice. Pamphlets, verbal instructions, and physicians' self-created materials have been the most common resources for patient education. Today, however, the popularity of the World Wide Web (Web) as a ready source of educational materials is increasing. The reading skills required by a patient to understand that information has not been determined. The objective of our study was to assess the readability of medical information on the Web that is specifically intended for patients.

**METHODS.** An investigator downloaded 50 sequential samples of patient education material from the Web. This information was then evaluated for readability using the Flesch reading score and Flesch-Kinkaid reading level.

**RESULTS.** On average, the patient information from the Web in our sample is written at a 10th grade, 2nd month reading level. Previous studies have shown that this readability level is not comprehensible to the majority of patients.

**CONCLUSIONS.** Much of the medical information targeted for the general public on the Web is written at a reading level higher than is easily understood by much of the patient population.

**KEY WORDS.** Patient education; reading; scale. (*J Fam Pract* 1999; 48:58-61)

Patient education is an essential part of medical practice. It enhances the ability of a patient to participate in his or her own care and may also increase compliance,<sup>1,4</sup> although the data are not uniformly positive.<sup>4,5</sup> Traditionally, patient education has been accomplished with pamphlets, verbal instructions, or materials of a practitioner's own creation. Recently, however, the World Wide Web (Web) has become a ready source of educational materials.

Estimates of Web use vary widely. By one estimate, there are currently 87 million regular users of the Web in North America.<sup>6</sup> Of these, 50% have looked for medical information on the Web in the past 12 months, accessing at least one of the more than 15,000 health-related sites.<sup>7</sup> Even the lowest estimates have 30 million consumers seeking medical information on-line in the next 2 years.<sup>8</sup> Users generally access information on more than one topic. One medical information site, Talk to a Physician, reports more than 200 million requests for information in the last year alone.<sup>7</sup> However, it has not been studied whether the information on the Web is comprehensible to patients.

The reading ability of patients varies widely and is generally below the level of school they completed. For example, a study of patients with diabetes who were proficient in English found that 60% of the patients could understand information written at a 6th grade level while only 21% could comprehend information written at a 9th grade level.<sup>9</sup> Other studies have found a 9.8 grade (9th grade, 8th month) reading level in emergency department patients<sup>10</sup> and a 7th to 8th grade reading level in cancer patients,<sup>11</sup> patients in urban clinics,<sup>12</sup> and parents of pediatric patients at a university hospital.<sup>13</sup> Only 77% of the hospitalized patients in a multicenter trial could comprehend material written at the 5th grade level, and only 30% could comprehend information written at the 9th grade level.<sup>14</sup> The reading level of users of the Web tends to be somewhat higher than that of patients in general. The methodology of most surveys of Web users is somewhat suspect, because they are done in a nonrandomized fashion. However, approximately 48% of Web users have less than a college education.<sup>15</sup>

The purpose of this paper is to examine the reading level of materials on the Web and compare it with previously measured reading levels of patients.

## METHODS

A researcher without Web experience (B.K.) searched for patient information on topics of her choosing. The sites were identified by performing searches with

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Webcrawler ([www.webcrawler.com](http://www.webcrawler.com)) and Excite ([www.excite.com](http://www.excite.com)). The researcher was free to follow any hits that seemed to be relevant to the question asked. Each site was visited only once to ensure that a wide spectrum of information sources were entered into the evaluation. Information intended for patient education was downloaded from 50 consecutive sites. The patient information reviewed encompassed a range of topics from all aspects of family medicine, including obstetrics and gynecology, pediatrics, internal medicine, and psychiatry (Table 1). Information sources varied and included commercial sites (eg, <http://www.medconnect.com>), academic sites (Mayo O@SIS, <http://www.mayohealth.org>), government sites (World Health Organization, <http://www.who.int>), sites of professional organizations (American Academy of Family Medicine, <http://www.aafp.org>), and sites for organizations dedicated to a specific illness. The researcher's lack of experience with retrieving material from the Web

prevented any inadvertent bias that could have resulted from visiting favorite sites.

The source files were downloaded from each site, and the hypertext markup language (HTML) codes were stripped from the files to eliminate the effect of this code on the readability evaluation. Each document was opened in Microsoft Word 97, and a readability level was generated using the Flesch reading score and the Flesch-Kinkaid reading level. Mean and median readability scores of all sites were calculated using a Microsoft Excel spreadsheet.

The Flesch score and Flesch-Kinkaid reading level are 2 of the most widely used systems for scoring readability. The Flesch score ranges from 0 (most difficult to read) to 100 (most easy to read),<sup>16</sup> The Flesch-Kinkaid score converts the Flesch scale into a grade level estimate.<sup>17</sup> A Flesch-Kinkaid score of 9 corresponds to a 9th grade reading level, and a Flesch-Kinkaid score of 9.3 corresponds to a 9th grade, 3rd month reading level. The Flesch-Kinkaid score assigns 3rd to 12th grade reading levels and cannot differentiate between information that is more difficult or easier than those levels. The validity of converting the Flesch score to the Flesch-Kinkaid scale to derive a grade level has been demonstrated<sup>18</sup> and the Flesch-Kinkaid scale has been adopted by the United States Armed Services as their standard readability scale. These scales were chosen for this paper because of their wide acceptance among scholars who study reading and because they have remained in use for more than 40 years. Their validity has been well demonstrated.

## RESULTS

The topics of the Web information examined are listed in Table 1. The mean reading level using the Flesch reading score (47.1) was on the difficult to read side, and the mean reading level using the Flesch-Kinkaid score was 9.9, corresponding to a 9th grade, 9th month reading level (Flesch score range = 25.7 - 70.3; Flesch-Kincaid scale range = 6th grade, 1 month - 12th grade). The medians were 44.1 for the Flesch scores and 10th grade, 2nd month for the Flesch-Kinkaid grade level (Table 2). The reading ability of many patients is substantially below these levels.<sup>6-11</sup> Thus, much of the patient education material on the Web is not at a reading level that is comprehensible to many patients.

## DISCUSSION

This study shows that much of the patient education material on the Web is not at an appropriate reading level for most patients. Although it is true that the more educated individuals in our society currently have access to the Web, if the information on the Web is to become universally accessible, it will need to be at a reading level comprehensible to the majority of the individuals in society. Additionally, as more physicians use

TABLE 1

### Topics of the Educational Materials on the World Wide Web That Were Evaluated for Readability

- Alzheimer's disease
- Anorexia nervosa
- Ataxia-telangiectasia
- Attention deficit disorder
- Back pain
- Bipolar disorder
- Cataracts
- Cervical cancer
- Cholesterol
- Common cold
- Diabetes
- Ebola
- Ectopic pregnancy
- Finding a doctor
- Genital herpes
- Influenza
- Kidney disease
- Lupus
- Narcolepsy
- Obsessive-compulsive disorder
- Ovarian cancer
- Panic disorder
- Postpartum depression
- Scoliosis
- Seasonal affective disorder
- Sleep disorders
- Tick-borne illness
- Tourette syndrome
- Ulcer
- Urinary tract infections
- Vitamins

Note: The number of topics does not equal 50, because patient information on some topics was taken from more than one site.



**TABLE 2**

**The Readability Levels of Patient Information from 50 Sample Sites on The World Wide Web**

	Flesch Score*	Flesch-Kinkaid Grade Level
Mean	47.1	9.9
Median	44.1	10
Range	25.7 - 70.3	6.1 - 12

\*A scale of 0 (most difficult to read) to 100 (most easy to read).

the Web as a source of information for patients in their own practices, they should consider the reading level of the information they recommend.

The readability level of information on the Web is not the only potential problem. Other studies have examined the reliability of patient information on the Web and found it lacking.<sup>19</sup> The Health on the Net (HON) criteria<sup>20</sup> (Table 3) are an attempt to insure the quality of the information on the Web. Although it is no guarantee that the information is accurate, sites that bear the HON seal have at least attempted to be objective and reveal their biases, if any. The lack of the HON seal, however, should not exclude sites from consideration. Sites maintained by an organization, such as the American Academy of Family Practice, are generally reliable. The HON criteria can be useful when evaluating unknown sites.

**LIMITATIONS**

There are several limitations to this study. The Web contains an extraordinary amount of information, and 50 randomly selected sites many not be representative of the Web as a whole. We tried to minimize the possibility of bias by having an inexperienced user look for sites. This eliminated the temptation for the investigator to access favorite sites.

A second limitation is that readability levels may be appropriate for the people that currently use the Web, since those levels are higher than that of the general population. However, practitioners are beginning to use the Web as a source of information for patients (printing out information from various sites). The unintended effect of this is that patients of all educational levels are being expected to use materials written at a level appropriate to Web users.

A third limitation concerns the use of readability formulas to estimate the difficulty of texts. The Flesch formula and other similar formulas rely chiefly on average sentence length and average number of syllables per word to estimate difficulty. The basic assumption is that longer sentences and longer words make reading more difficult. Although this is generally true, many other factors may influence the readability of text. In the case of medical prose, one could argue that readability formulas might underestimate difficulty because even short words may be

**TABLE 3**

**Health on the Net Foundation Code of Conduct\* for Medical and Health Web Sites**

**Principle 1**

Any medical/health advice provided and hosted on this site will only be given by medically/health trained and qualified professionals unless a clear statement is made that a piece of advice offered is from a nonmedically/health qualified individual/organisation.

**Principle 2**

The information provided on this site is designed to support, not replace, the relationship that exists between a patient/site visitor and his/her existing physician.

**Principle 3**

Confidentiality of data relating to individual patients and visitors to a medical/health Website, including their identity, is respected by this Website. The Website owners undertake to honour or exceed the legal requirements of medical/health information privacy that apply in the country and state where the Website and mirror sites are located.

**Principle 4**

Where appropriate, information contained on this site will be supported by clear references to source data and, where possible, have specific HTML links to that data. The date when a clinical page was last modified will be clearly displayed (eg, at the bottom of the page).

**Principle 5**

Any claims relating to the benefits/performance of a specific treatment, commercial product or service will be supported by appropriate, balanced evidence in the manner outlined in Principle 4 above.

**Principle 6**

The designers of this Website will seek to provide information in the clearest possible manner and provide contact addresses for visitors that seek further information or support. The Webmaster will display his/her E-mail address clearly throughout the Website.

**Principle 7**

Support for this Website will be clearly identified, including the identities of commercial and noncommercial organisations that have contributed funding, services or material for the site.

**Principle 8**

If advertising is a source of funding it will be clearly stated. A brief description of the advertising policy adopted by the Website owners will be displayed on the site. Advertising and other promotional material will be presented to viewers in a manner and context that facilitates differentiation between it and the original material created by the institution operating the site.

\*From <http://www.hon.ch/HONcode/Conduct.html>.



unfamiliar to the reader. Typical adults have little exposure to medical terminology, so syllable length may not capture all of the difficulty associated with unfamiliar words and concepts. For example, the terms lupus and cervix are only 2 syllables; thus, readability scales will score them as easy to read. However, since they lack any associations or references familiar to the general public, it is more difficult to determine their meaning *de novo* than a word such as government, where the root of the word (govern) is clear. Thus, the comprehension level required by medical materials on the Web might actually be higher than we determined with the Flesch and Flesch-Kinkaid formulas.

## CONCLUSIONS

Much of the patient education material on the Web is not written at a grade level that is comprehensible to many of our English-speaking American patients. Physicians should be aware of this limitation before providing materials printed from the Web or referring patients to the Web for information. Additionally, writers of information for the Web should be aware of the limited reading ability of much of the population and write accordingly.

## REFERENCES

1. Seals TD, Keith MR. Influence of patient information leaflets on anticonvulsant drug compliance in prison. *Am J Health Syst Pharm* 1997; 54:2585-7.
2. Lowe CJ, Raynor DK, Courtney EA, et al. Effects of self medication programme on knowledge of drugs and compliance with treatment in elderly patients. *BMJ* 1995; 310:1229-31.
3. Likar LL, Panciera TM, Erickson AD, et al. Group education sessions and compliance with nasal CPAP therapy. *Chest* 1997; 111:1273-7.
4. Haynes RB, McKibben KA, Kanani R. Systematic review of randomised trials of interventions to assist patients to follow prescriptions for medications. *Lancet* 1996; 348:383.
5. Powell KM, Edgren B. Failure of educational videotapes to improve medication compliance in a health maintenance organization. *Am J Health Syst Pharm* 1995; 52:2196-9.
6. Nua Online Relationship Management. Survey of Web use in North America. Available at [http://WWW.nua.net/surveys/how\\_many\\_online/index.html](http://WWW.nua.net/surveys/how_many_online/index.html). Accessed November 7, 1998.
7. Intel Corporation. Internet Health Day Keynote Speech by Andrew Grove, Intel Chairman. Available at <http://WWW.intel.com/pressroom/archive/speeches/ag102798.htm>. Accessed November 7, 1998.
8. Nua Online Relationship Management. Internet surveys. Available at [http://WWW.nua.ie/surveys?f=VS&art\\_id=905354453&rel=true](http://WWW.nua.ie/surveys?f=VS&art_id=905354453&rel=true). Accessed November 7, 1998.
9. Overland JE, Hoskins PL, McGill MJ, et al. Low literacy: a problem in diabetes education. *Diabet Med* 1993; 10:847-50.
10. Williams DM, Counselman FL, Caggiano CD. Emergency department discharge instructions and patient literacy: a problem of disparity. *Am J Emerg Med* 1996; 14:19-22.
11. Foltz A, Sullivan J. Reading level, learning presentation preference, and desire for information among cancer patients. *J Cancer Educ* 1996; 11:32-8.
12. Wilson FL. Measuring patients' ability to read and comprehend: a first step in patient education. *Nurs Connections* 1995; 8:17-25.
13. Murphy PW. Reading ability of parents compared with reading level of pediatric patient education materials. *Pediatrics* 1994; 93:460-8.
14. Estey A, Musseau A, Keehn L. Patient's understanding of health information: a multihospital comparison. *Pat Educ Counsel* 1994; 24:73-8.
15. Georgia Tech Research Corporation. Graphic, Visualization, and Utilization Centers 9th WWW User survey. Available at [http://www.gvu.gatech.edu/user\\_surveys/survey-1998-04/graphs/general/q28.htm](http://www.gvu.gatech.edu/user_surveys/survey-1998-04/graphs/general/q28.htm). Accessed November 7, 1998.
16. Flesch R. A new readability yardstick. *J Appl Psychol* 1948; 32:221-33.
17. Kincaid JP, Fishburne R, Rogers RL, et al. Derivation of new readability formulas: Automated Reliability Index, Fog Count, and Flesch Reading Ease formula for Navy enlisted personnel (Branch Report 8-75). Chief of Naval Training. Millington, Tenn, 1975.
18. Klare GR. Readability standards for Army-wide publications (Evaluation Report 79-1). Fort Benjamin Harrison, Ind. Directorate of Evaluation, US Army Administration Center, 1979.
19. Impicciatore P, Pandolfini C, Casella N, Bonati M. Reliability of health information for the public on the World Wide Web: systematic survey of advice on managing fever in children at home. *BMJ* 1997; 314:1875-9.
20. Health on the Net Foundation. Health on the Net Foundation code of conduct (HONcode) for medical and health web sites. Available at <http://WWW.hon.ch/HONcode/Conduct.html>. Accessed November 7, 1998.