Can Patients Read What We Want Them to Read? 
Analysis of the Readability of Printed Materials for Health Education

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Aim. To analyze readability and legibility of a systematic sample of health education materials made available at a health center, and to propose recommendations for improvement.

Design. Observational, descriptive study.

Setting. An urban health center in Madrid, Spain.

Material. A sample of text from 326 health education documents.

Main measures. The 326 texts were classified according to target reader, organism responsible for publication, topic, and date of publication. A sample of 500 words from each document was analyzed with Microsoft Word 2000 to determine the Flesch readability score and sentence complexity index, and to calculate the INLEG index. Print size and accompanying graphics were also analyzed.

Results. Readability of the materials was generally acceptable, with a mean Flesch score of 13.56. However, the type tended to be too small (mean 11.37 points). In 32% of the documents there were no illustrations, and no date of publication was given in 46%.

Conclusions. The readability and legibility in the group of documents we analyzed could both be improved by following the recommendations offered here. Further research is needed on the techniques used to analyze readability and legibility, especially with regard to the latter.

Key words: Legibility. Readability. Patient education. Health education.

¿PUEDEN LEER LOS PACIENTES LO QUE PRETENDEMOS QUE LEAN? UN ANALISIS DE LA LEGIBILIDAD DE MATERIALES ESCRITOS DE EDUCACIÓN PARA LA SALUD

Objetivo. Analizar la legibilidad lingüística formal y la legibilidad tipográfica de una muestra sistemática de folletos de educación para la salud disponibles en un centro de salud y proponer recomendaciones para mejorarlas.

Diseño. Estudio observacional, descriptivo.

Emplazamiento. Un centro de salud urbano de Madrid.

Material. Una muestra de texto de 326 folletos de EPS.

Mediciones principales. Los 326 textos fueron clasificados según el destinatario, la entidad patrocinadora y temática, y la existencia de fecha de edición. Se analizó una muestra de 500 palabras de cada folleto con el programa Microsoft Word 2000, para determinar su puntuación de Flesch y el índice de complejidad oracional y estimar el índice LEGIN. Se analizó el tamaño de la letra y la presencia de imágenes informativas.

Resultados. Los folletos presentan una legibilidad lingüística de conjunto aceptable, con una media de puntuación de Flesch de 13,56, pero tienden a escribirse con letra pequeña, con un tamaño medio de 11,37. En un 32% no había imágenes informativas y un 46% no tenía fecha de edición.

Conclusions. El grupo de folletos analizados muestra una legibilidad lingüística y tipográfica que es muy mejorable siguiendo las recomendaciones que se proponen. Es preciso seguir investigando en las técnicas de análisis de la legibilidad, especialmente de la legibilidad tipográfica.

**Introduction**

During their lifetime patients receive an enormous amount of printed information, which they often seem to have problems understanding.\(^1\) Comprehension of a given text may depend on factors related to the patient as the receptor. But more often, the problem lies in the sender, i.e., the practitioner, who provides the information in unreadable language that is hard to follow. This undermines the purpose of information, which is to communicate truthfully so that the patient may play an active part in decision-making based on the best available evidence.\(^2\)

According to Aliende, *readability* is the set of characteristics of texts which favor or hinder effective communication between texts and readers, in accordance with a reader’s competence and the conditions under which reading takes place.\(^3\) Each of these characteristics can be identified with a certain type of readability. Two of the most widely studied types are *typographical legibility* and *linguistic readability*. The former analyzes the text per se to evaluate the printing, color and size of the paper and print, the presence of illustrations and their function, the distribution of white space, and other features. The latter analyzes text as a linguistic message, and the techniques used for such evaluations have been based mainly on how the text is constructed (word length, sentence length, grammatical structures, etc.), in what is called *formal-linguistic readability*. These techniques have been widely developed for the English language, and have been applied to analyze patient education materials.\(^4\)\(^-\)\(^13\) In Spain the Flesch technique included with Word Perfect 7 and Microsoft Word 2000 for personal computers had been validated.\(^14\) However, no validated tests are available for typographical legibility.

Patient health education is an activity inherent in primary care, and is an interactive process in which all forms of language play a part.\(^15\) However, printed materials undoubtedly occupy an important position, and should thus be readable and understandable by patients.

The aim of this study was to analyze readability and some features of legibility in printed documents for patient health education used by practitioners especially nurses at a health care center in Madrid.

**Material and methods**

This was an observational, descriptive study.

**Setting**
The Avenida de Daroca Health Center, serving IMSALUD (Madrid Health Service) Primary Health Care Area 4 in Madrid, Spain. This urban health care center employs more than 50 professionals and provides primary care to approximately 40,000 persons.

**Material**

Between 1 June 2000 and 1 June 2001 we systematically collected copies of all printed materials for patient health education aimed at health center users and made available to patients anywhere in the health center. We also collected copies of materials provided by pharmaceutical sales representatives for professionals. The materials analyzed consisted of pamphlets, leaflets, loose sheets, «mini-guides», books, and material in any other printed format. We excluded diet sheets for various total daily kilocalorie intakes, and materials in which no author or publisher could be reliably identified.

**Analytical tools and variables analyzed**

To evaluate formal-linguistic readability we used the tool that accompanies Microsoft Word 2000,\(^16\) which estimates the *Flesch*
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**Results**

A total of 369 documents were collected, of which only 326 fulfilled the inclusion criteria and were subsequently analyzed. Table 1 shows the results of our analysis of formal-linguistic readability in the 326 documents, and of type size. Table 2 shows the number of documents that fulfilled each readability and legibility standard. Figure 1 illustrates the percentages of documents that contained illustrations, and figure 2 shows the percentages that stated the year of publication. Readability and legibility were also analyzed according to target readership, organism responsible for publication, and topic (Table 3).

**TABLE 1**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Flesch</th>
<th>SC</th>
<th>LEGIN</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Method</td>
<td>Word</td>
<td>SC</td>
<td>Word</td>
<td>Manual</td>
</tr>
<tr>
<td>Mean</td>
<td>13.56</td>
<td>20.87</td>
<td>92.69</td>
<td>11.37</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>8.37</td>
<td>16.37</td>
<td>20.33</td>
<td>1.94</td>
</tr>
<tr>
<td>Maximum value</td>
<td>45</td>
<td>68</td>
<td>137</td>
<td>23</td>
</tr>
<tr>
<td>Minimum value</td>
<td>0</td>
<td>0</td>
<td>37</td>
<td>7</td>
</tr>
</tbody>
</table>

**TABLE 2**

<table>
<thead>
<tr>
<th>Readability standards</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flesch Index Word Office 97&gt;10</td>
<td>209</td>
<td>64</td>
</tr>
<tr>
<td>SC Index Word Office 97&lt;40</td>
<td>278</td>
<td>85</td>
</tr>
<tr>
<td>INLEG Index Word Office&gt;70</td>
<td>278</td>
<td>85</td>
</tr>
<tr>
<td>All three criteria</td>
<td>194</td>
<td>60</td>
</tr>
<tr>
<td>Type size ≥12</td>
<td>142</td>
<td>44</td>
</tr>
<tr>
<td>All four criteria</td>
<td>91</td>
<td>28</td>
</tr>
</tbody>
</table>

**Data processing and statistical analysis**

The documents were classified according to the variables used to identify source, readership and subject. Type size was noted, and illustrations were recorded. The first 500 words of text from each document were sampled for readability, on the assumption that the beginning of the text played a key role in attracting the reader’s attention. The document was scanned and prepared according to previous recommendations20 for analysis with Microsoft Word 2000, and the results were transferred to an Excel table21 for processing. Data for qualitative variables were expressed as absolute numbers, and those for quantitative variables were expressed as absolute numbers for readability of the text sample from each document, and as the mean and standard deviation, maximum and minimum values and 95% confidence interval for pooled results.

**FIGURE 1**

Percentage of pamphlets with illustrations.

**FIGURE 2**

Date of publication.
4 of every 10 pamphlets failed to comply with at least one criterion for formal-linguistic readability, particularly the Flesch score excessively long sentences and words), and that 6 of every 10 were printed in typeface that was too small to be comfortably legible. Writers and graphic designers seem to be aware of the need for simple language, but appear to be less aware of the need for a visible type size. Nonetheless they appear to be sensitive to the inclusion of explanatory illustrations, in view of the results shown in Figure 1. Documents aimed at children and adolescents

**Discussion**

A surprising result was the large number of patient health education materials collected during the 1-year study period. This indicates that considerable resources are devoted to the production of such materials; this in turn makes it necessary to ensure their efficacy and quality. As shown in Table 1, formal-linguistic readability appeared to be acceptable. However, the findings for typographic legibility were worse. The detailed breakdown in Table 2 shows that
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(Table 3) were the most legible. In contrast, the low scores for materials aimed at older persons, particularly with regard to type size, were surprising. Legibility was worse in materials aimed at the general public. There appeared to be no large differences in legibility between materials that dealt with different subjects. Surprisingly, readability was best for medications, which tend to be associated with complex information. Drugs for musculoskeletal disorders are interesting because the readability of information on this group of drugs was low and legibility was poor (small type size); although these problems were offset by the large number of illustrations. With regard to publishing entities, the most important finding was the overwhelming superiority of the pharmaceutical industry. However, their printed materials did not appear to be the most readable, and were much less so than

**TABLE 4**

Recommendations for ensuring readability and legibility of patient health education materials

1. Pay attention to the content of the text
   - Be brief. Conciseness is a virtue
   - Include summaries with key concepts of the text
   - Give practical examples to illustrate complex concepts
   - Use questions, which require the reader to get involved in the text

2. Improve the readability of your writing
   - Organize the contents into sections
   - Write as you would speak: use the active voice rather than the passive voice
   - Write short sentences of no more than 10 words
   - Avoid compound sentences, especially subordinate clauses, whenever possible
   - Do not use double negatives. They are not infrequently found, although they are also not often absent (see what we mean?)
   - Use a period to separate sentences; avoid semicolons

3. Improve the typographic legibility of your layout
   - Use typefaces that are easy to read. Many are attention-getting but hard to read
   - Don’t use more than 2 or 3 typefaces; otherwise readers will be distracted from the content
   - Type size should be no smaller than 12 points. Ideally, larger sizes such as 14 points should be used
   - Black printing on a white or very light background is best
   - Avoid printing light text on dark backgrounds. Even worse are graphics or overprinted text on a dark background, or text watermarks. Negative images are also unadvisable
   - Use boldface, underlining and italics in moderation. Reserve them for very important messages
   - Messages printed in capital letters are harder to read. It is better to use upper and lower case together as needed
   - Use generous line spacing and expanded characters like this
   - With large type sizes use more blank space between words. If you don’t the text will be hard to read
   - Leave white spaces on the page to rest the eyes
   - Margins should be generous enough to keep folding, stapling or binding from making text hard to see
   - In materials consisting of folded sheets, the reading sequence should be clear throughout
   - Use images that clarify the text. Remember that a good picture is worth a thousand words. But don’t overload the document with images that fulfill a merely decorative function!

4. Evaluate the formal-linguistic readability of what you write
   - Use readability analysis tools on your PC to evaluate the text. If you use Word Perfect 7, Word Office 97 or Word 2000, you can consider readability to be good if the Flesch score is >10 or if the Sentence Complexity Index is <40

5. Make it a participatory process
   - Invite target readers to help write and design the material
   - Patients, users and citizens are the ultimate arbiters of the readability and legibility of what you have written! They alone can show you whether your efforts achieve the goals you set out to achieve.
What is known about the subject

- The analytical techniques to evaluate readability included in Word Perfect 7 and Microsoft Word 2000 have been validated for use with Spanish texts.
- These techniques have been used to evaluate informed consent documents, but not to evaluate health education materials.
- No validated techniques are available to analyze legibility.

What this study contributes

- We report on an initial approach to analyzing linguistic readability and typographic legibility of a group of health education documents.
- We provide recommendations for improving the readability and legibility of these materials.

Discussion

Key points

Table 4 lists some empirical recommendations for improving the readability of patient health education materials. Of these recommendations, derived from the lessons of the present study, the most important, we feel, is the last one in the table.