

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 ANÁLISIS 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.

Conclusiones. 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.

Palabras clave: Palabras clave: Legebilidad tipográfica. Legebilidad. Educación del paciente. Educación para la salud.

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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.

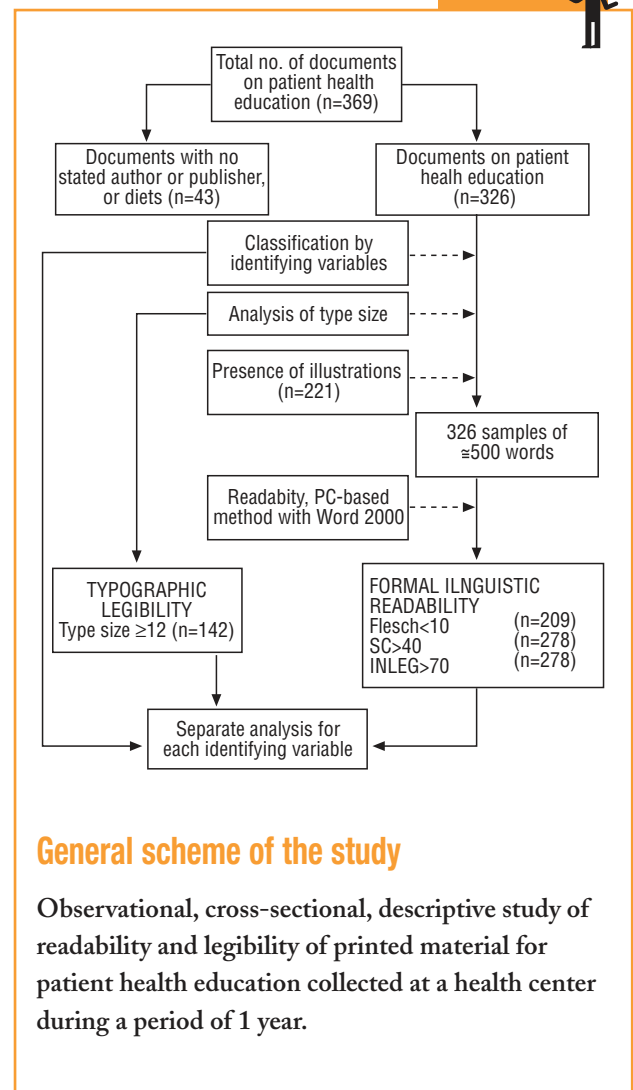
Material and methods

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

Material and methods



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*

readability score on a scale between 0 (very difficult) and 100 (very easy). This score correlates well with the original manual system of Flesch, validated by Simón and Carro in 1993.¹⁷ The program also calculates Sentence Complexity Index (SC), on a scale between 0 (very easy) and 100 (very complicated). As a complement to the Flesch Index and SC we also calculated the Integrated Legibility Index (INLEG) of Simón, Barrio and Concheiro (1996),¹⁸ which provides a mathematical relationship between the two indices described above on a scale from 0 (very difficult) to 200 (very easy). According to these authors, readability is considered appropriate at a Flesch score of 10 or higher, an SC score lower than 40, and an INLEG score higher than 70. Readability is considered optimum when all three criteria are met.

To evaluate typographical legibility we first recorded whether the type size used for the body text (not for titles and headings) was 12 points or larger. This is a common recommendation for this type of printed material,¹⁹ and is therefore considered a standard measure of legibility. We then noted whether the text was accompanied by one or more illustrations that complemented the text rather than serving a simply decorative purpose. Because no objective criteria are available for this, we decided not to consider the role of illustrations as a standard evaluation criterion, but only as a complementary factor.

Variables that identified the documents were recorded as the organism responsible for publishing the material, the target readership, and the subject matter. Year of publication, when stated, was also noted.

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.

TABLE 1 Descriptive analysis of readability for the entire sample (n=326)

Variable	Flesch	SC	LEGIN	Size
Méthod	Word	Word	Word	Manual
Mean	13.56	20.87	92.69	11.37
Standard deviation	8.37	16.37	20.33	1.94
Maximum value	45	68	137	23
Minimum value	0	0	37	7

TABLE 2 Total number of documents that satisfied readability and legibility standards (n=326)

Readability standards	No.	%
Flesch Index Word Office 97>10	209	64
SC Index Word Office 97<40	278	85
INLEG Index Word Office>70	278	85
All three criteria	194	60
Type size ≥12	142	44
All four criteria	91	28

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).

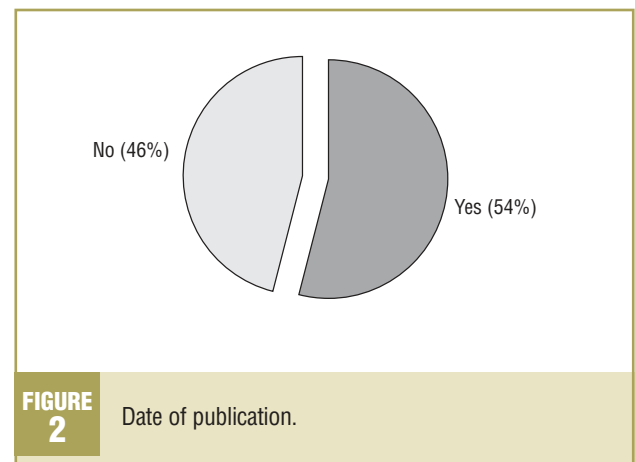
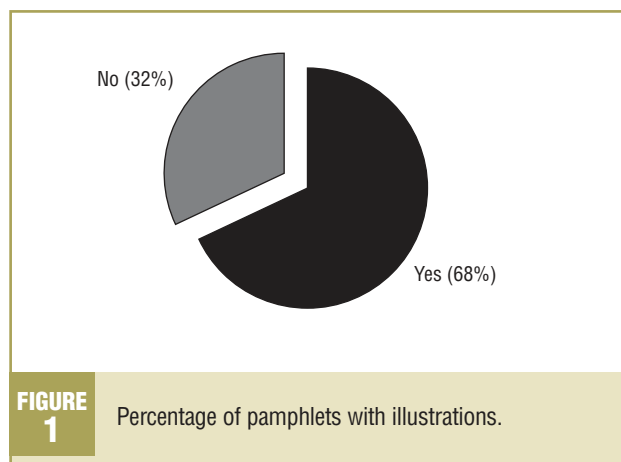


TABLE 3 Classification of documents according to target readership, organism responsible for publication, and subject matter: total, percentage and mean (with confidence intervals) for readability and legibility standards

	No. doc		3 Read. +leg.		4 Read. +leg.		Imagen		Mean (M)/confidence interval (95% CI)							
	Total	%*	Total	%	Total	%	Yes	%	Flesch (M)	Flesch (95% CI)	SC (M)	CO (95% CI)	LEGIN (M)	LEGIN (95% CI)	Type size (M)	Type size (95% CI)
Population																
Adolescents/children	31	10	22	71	8	26	18	58	17.4	14.1-20.7	22	15.5-28.5	95.4	87.2-103.6	11.6	10.8-12.4
Children and parents	23	7	16	70	9	39	22	96	16.7	13.1-20.3	23.4	17.3-29.5	93.3	84.7-101.9	12	10.9-13.1
Adults	66	20	37	56	12	18	56	85	13.4	11.6-15.2	22.9	18.8-27	90.5	85.4-95.6	11.3	10.8-11.8
Women	22	7	12	55	5	23	15	68	15.8	12.1-19.5	25.9	18.5-33.3	90	80.7-99.3	11.3	10.4-12.2
Older persons	15	5	8	53	6	40	13	87	13.3	9.6-17	25.3	15.3-35.3	88.1	76.3-99.9	11.4	10.4-12.4
Patients	90	28	48	53	31	34	51	57	12.8	11.2-14.4	16.5	14-19	96.2	93-99.4	11.5	11.1-11.9
Men	2	1	1	50	1	50	2	100	7	(-)-6.7-20.7	30	(-)-15-75	77	18.2-135.8	11	7.1-14.9
General population	77	24	37	48	19	25	44	57	11.7	9.8-13.6	20.5	16.5-24.5	91.3	86.5-96.1	11	10.6-11.4
Organism																
INSALUD	12	4	9	75	8	67	3	25	14.1	11.4-16.8	11.4	5.2-17.6	102.7	96.5-108.9	13.4	12-14.8
Several organisms	31	10	21	68	14	45	21	68	15.9	12.2-19.6	20.9	15.5-26.3	95	87.2-102.8	11.8	11.2-12.4
Other official institutions	31	10	20	65	7	23	22	71	13.7	11.2-16.2	17.3	12.1-22.5	96.4	90.3-102.5	11.4	10.9-11.9
Pharmaceutical	176	54	106	60	47	27	127	72	13.1	11.9-14.3	18	15.9-20.1	95.1	92.6-97.6	11.2	10.9-11.5
Madrid City Council	17	5	10	59	6	35	13	76	16.6	12-21.2	21.1	14.2-28	95.6	85.1-106.1	11.6	10.6-12.6
Associations	31	10	18	58	4	13	8	26	13.1	10.1-16.1	25.5	19.4-31.6	87.3	79.3-95.3	10.5	11.0-10.0
Ministries	14	4	5	36	2	14	11	79	12.9	8-17.8	36.7	24.8-48.6	76.1	62-90.2	12.1	11.1-13.1
Community of Madrid	14	4	4	29	2	14	10	71	11	6.0-16	46.5	37.6-55.4	64.5	51.9-77.1	11.07	10.3-11.9
Subject																
Drug information	16	5	14	88	11	69	4	25	14	11.4-16.6	14.5	11.4-17.6	99.5	95-104	12.2	11.3-13.1
AIDS	27	8	20	74	9	33	17	63	16.6	13.2-20.0	18.4	13-23.8	98.2	91.1-105.3	11.4	10.5-12.3
Respiratory problems	14	4	9	64	0	0	10	71	10.1	6.6-13.6	19.6	13.2-26	90.6	83-98.2	10.2	9.7-10.7
Diabetes	45	14	28	62	19	42	33	73	13.7	11.2-16.2	17	13.4-20.6	96.8	91.6-102	12.5	11.8-13.2
Peripheral circulation	21	6	13	62	2	10	18	86	13	10.2-15.8	16.8	10-23.6	96.2	87.9-104.5	10.3	9.7-10.9
General health education	95	29	54	57	25	26	72	76	14.6	12.8-16.4	26.4	22.6-30.2	88.2	83.4-93	11.3	10.9-11.7
Prevention of cardiovascular disease	39	12	22	56	13	33	22	56	12.6	9.9-15.3	20.6	15.5-25.5	92	86.3-97.7	11.3	10.7-11.9
Musculoskeletal disorders	18	6	10	56	1	6	18	100	13.7	9.9-17.5	18.4	9.5-27.3	95.2	84.3-106.1	9.9	9.3-10.5
Other specific diseases	41	13	20	49	9	22	19	46	11.7	9.1-14.3	19.3	14.6-24	92.3	86.5-98.1	11.5	10.9-12.1
Infectious diseases	7	2	3	43	1	14	5	71	10.1	6.6-13.6	19.7	4.5-34.9	90.4	73.8-107	10.9	9.5-12.3
Cancer	3	1	1	33	1	33	3	100	14	9.9-18.1	36.7	31.5-41.9	77.3	71.5-83-1	12.3	10.9-13.7

* Referred to a total n=326 documents. 3 Read. indicates satisfied all 3 PC-based criteria for readability; 4 Read.+leg., satisfied all 3 PC-based criteria+type size≥12; CI, confidence interval.

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

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

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
Write in short sentences
Write with commonplace but not coarse words
Avoid technical jargon and replace it with simple descriptions
3. 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
4. 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 inadvisable
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
Paragraphs should be aligned only on the left, not on both the left and right margins
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 fulfil a merely decorative function!
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.

(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

Discussion
Key points

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.

materials provided by the (now dismantled) national health service (INSALUD). We noted that materials published by the Community of Madrid or by any of the government ministries contained high-quality illustrations but scored poorly for readability. No date of publication was given in almost half of the pamphlets, which made it impossible to judge how current they were—a problem that limits their credibility and effectiveness.

We found only one article in Spanish similar to the present study: a report on the readability of educational materials about breastfeeding.²² This study used the SMOG and FOG formulas but did not validate the method, hence its results are difficult to evaluate. The SMOG formula and Bernier's BIDS scale were proposed by the Grupo de Educación Sanitaria del PAPPs to evaluate patient health education materials, although these methods were not validated.²³ However, the present study also has important limitations, e.g., the nonrandom text sampling used for each document, and difficulties in generalizing our findings to all printed documents for patient health education in Spain or in our community. Further studies are needed to obtain additional evidence, and to develop new, validated techniques to analyze readability and particularly typographical legibility.

In conclusion, 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.^{24,25}

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