“When I got my prescription filled at the pharmacy, I thought I was just going to be taking some pills like last time. So when the pharmacist asked if I had any questions, I said no. When I got home and opened my prescription, the medicine didn’t look anything like normal pills. I tried to read the paper the pharmacy gave me on the medicine, but I have never been a good reader and couldn’t read most of the words. I gave up trying to understand it and just put the medication in my mouth and chewed. When I went back to the doctor for my follow-up visit, she asked me if the suppository had worked. I couldn’t believe I taken a suppository by mouth and I started crying as I told her what I had done. None of this would have happened if I could have read the sheet from the pharmacy.” – Mrs. D

Mrs. D is not alone when she said she “[had] never been a good reader.” According to the National Center for Education Statistics, about 22 percent of the population has basic health literacy and 14 percent has below basic health literacy. Basic health literacy is defined as being able to perform simple and everyday health literacy activities; whereas below basic health literacy is defined as knowing no more than the most simple and concrete health literacy skills. Both basic and below basic readers are at risk for making a mistake similar to the one made by Mrs. D. (1)

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What makes a document easy to read?

A text is considered easy-to-read when certain issues are accounted for both by the readers and by the text. The readers’ reading ability, interest in the subject, motivation, and prior knowledge of the subject must match that of what they are reading. For example, if the readers’ interest levels are low, they might find the document harder to read than if it were something that interested them. (2)
Why is readability important to you as a health care professional?

Every person at more than one time in their life is going to need the expertise of a health care provider. This makes it imperative that health care providers be able to communicate with their patients on many different levels. With the average physician spending less than 7 minutes per patient, the need for simple, easy-to-read patient education materials is greatly increasing. If a patient does not understand his or her illness and / or necessary instructions regarding that illness, the job of the health care provider was not accomplished.

Prompted in part by the threat of litigation, all healthcare documents have increased in length and decreased in readability, often defeating their own purpose. A study was conducted to evaluate the length and readability of notice of private practices forms used by top ranked U.S. healthcare institutions. The average length of the notice of privacy practices contained 2915 words and was at a college reading level. Researchers determined an average of 80.0% of people in the surrounding area would have difficulty understanding the information. (3)

As healthcare documents grow in length, readability becomes more important than ever especially with the aspect of informed consent. A survey was given to 1,900 subjects enrolled in a clinical study at one of sixteen U.S. research institutions. The survey results revealed that over half of the subjects were not even aware they were enrolled in a clinical trial. (4) It is only a matter of time before readability becomes a determining factor in a case for physical injury. If the court determines that the informed consent form was not understandable or readable to the patient, that the health care provider made little or no effort to make it easier to read, and to ensure the patient’s complete understanding, the patient’s signature on the informed consent will become meaningless. (5)
How do I test for readability?

A readability test is a simple technique used to predict the reading level of written materials. There are several different formulas that may be used to determine the readability of the materials. Most of the formulas determine readability by measuring the average length of words and sentences because these are the most important factors in determining one’s reading ability. The more syllables in a word or the more words in a sentence, the harder it is to read and understand. Words that have more syllables and passages with fewer sentences are given a higher rating. A set of mathematical formulas are used to produce a numerical score. This score is usually expressed as a grade level; hence, reflecting the difficulty of the text. For example, a score of “7” indicates the reader must read at a 7th grade level in order to understand the text. Generally, the writer wants to aim for a reading level of less than 8th grade. (6)

However, assessing the readability of the text does not guarantee its effectiveness. Most readability tests only measure the structural difficulty of the text, but do not measure such things as material organization and conceptual or content difficulty. The readability tests also do not account for the characteristics of the population or their eagerness to learn. If written documents are not catered to the intended audience, the materials will fail to engage that particular population, even if the materials are at their reading level. (6)

The benefits of using readability tests

- They are simple and easy to use.
- They encourage writers to use simple vocabulary and shorter sentences.
- They provide a good baseline of the text’s current reading level.
- They can be used throughout editing to continually assess readability and indicate if rewriting is necessary.

The limitations of using readability tests

- They do not account for the organization of the text including design and layout.
- They do not measure complexity and difficulty of concepts.
- They do not determine if the text is culturally appropriate or relevant.
- They do not calculate the readers’ previous background on the content of the text.
- They do not account for the readers’ interest to learn the information.
SMOG Grading Formula

The SMOG formula was developed by G. Harry McLaughlin in 1969. This formula is one of the easiest and fastest predictors of readability that does not forfeit accuracy of prediction. It can be performed by hand in about 15 minutes or it can be found on some readability software programs. It scores written material by using a score equivalent to the grade level of the material. If a person reads at or above the determined grade level, they will understand 90-100% of the information. The standard error of predictions for the SMOG formula is 1.5. This means that 68% of the population who have reached a reading level within 1.5 grade levels of the SMOG score will fully understand the text. (7)

SMOG for longer texts (30 sentences or greater)

You need to begin with the entire written text that needs to be evaluated then follow the four following steps.

1. Choose and count off 10 consecutive sentences at the beginning, middle, and end of the text.

2. Using only these 3 sections, circle all of the words that contain three or more syllables (polysyllabic) then add up the number of words circled for each section. All repetitions of polysyllabic words should be counted as separate words.

3. Estimate the square root of the total number of polysyllabic words counted. (Find the nearest perfect square and take its square root.)

4. Add a constant of 3 to the square root. This number will give the SMOG reading level or the grade level the reader must have completed in order to understand the reading sample under testing. You could also skip steps 3 & 4 and use the SMOG Conversion Table I below.
SMOG for shorter texts (less than 30 but greater than 10 sentences)

1. Count the number of sentences in the text.
2. Count the number of polysyllabic words in the text.
3. Find the total number of sentences and the corresponding conversion number on the SMOG Conversion Table II.
4. Multiply the total number of polysyllabic words by the conversion number. Use this number as the word count to find the correct score/grade level from Table I.

Additional guidelines when you are doing a SMOG Readability Test:

- A sentence is any group of words that ends with a period, exclamation mark, or question mark.
- Hyphenated words count as one word.
- Proper nouns and numbers, whether written or in numerical form, are counted if they are polysyllabic.
- Read abbreviations as their non-abbreviated form to determine whether they should be counted.
- Any time you have a sentence with a colon or semicolon followed by a list, count each bullet of the list as a new sentence.

<table>
<thead>
<tr>
<th>Total Polysyllabic Word Counts</th>
<th>Grade Level (± 1.5 Grades)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2</td>
<td>4</td>
</tr>
<tr>
<td>3-6</td>
<td>5</td>
</tr>
<tr>
<td>7-12</td>
<td>6</td>
</tr>
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<td>21-30</td>
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<td>183-210</td>
<td>17</td>
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<tr>
<td>211-240</td>
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<table>
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<th>Number of sentences</th>
<th>Conversion number</th>
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</thead>
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</tr>
<tr>
<td>28</td>
<td>1.07</td>
</tr>
<tr>
<td>29</td>
<td>1.03</td>
</tr>
</tbody>
</table>

*Developed by: Harold C. McGraw, Office of Educational Research Baltimore County Schools, Towson, Maryland. (7)
**FRY Readability Graph / Test**

The FRY readability method of testing was designed by Edward Fry from Rutgers University Reading Center. This formula is also easy to perform and can be done manually in about 15 minutes. The FRY analyzes three 100-word passages from a document. Like the SMOG formula, it takes the number of sentences and number of syllables into account. However, these numbers are then plotted onto a graph rather than put into a conversion table. (8)

**FRY for texts of greater than 300 words**

1. Select 3 passages from the beginning, middle, and end of the text.

2. Count exactly 100 words for each passage, beginning at the start of a sentence. If the final word does not fall at the end of a sentence, estimate the length of words counted with a fraction of the whole sentence. For example, if the sentence was “the cat was black” and the 100th word landed on “was,” the fraction would be ¾ or 0.75.

3. Count the total number of syllables in each 100-word passage. This should be your total syllable count.

4. Find the average of the number of sentences from each passage. For example, if the three selected passages had 5.9, 4.8, and 6.1 sentences, the average number of sentences would be 5.6 (16.8 divided by 3).

5. Find the average number of syllables in each passage.

6. Use the FRY readability graph by finding the average number of syllables on the horizontal axis and the average number of sentences on the vertical axis. The intersection of these two points will fall in a section, indicating the grade level of the text.

**FRY for texts of less than 300 words**

1. Count the total number of sentences and total syllables from the passage.

2. Use the following formula to determine the average number of sentences per 100 words: 100 x number of sentences) ÷ number of words = average number of sentences per 100 words.

3. Use the following formula to determine the average number of syllables per 100 words: 100 x number of syllables) ÷ number of words = average number of syllables per 100 words.

4. Plot on the FRY Readability Graph as directed above.
Additional guidelines when doing a FRY Readability Graph

- A word is defined as a group of syllables with a space on either side.
- Do not count proper nouns or numbers.
- When selecting 100 word passages, do not choose bulleted text, unless the bullets are complete sentences.
- Do not count titles or subtitles.
- A hyphenated word counts as one word.
- An easy way to count syllables is to skip all one-syllable words as you have at least 100 syllables with 100 words. Put a hash mark above each syllable after the first syllable of the word. At the end, count all the hash marks and add 100.
- Pronouncing the words out loud helps to define the syllables.

*Fry, Edward. Elementary Reading Instruction. ©1977. The McGraw-Hill Companies. (8)*
The Flesch and Flesch-Kincaid tool has been around for over 50 years and uses the same framework as the SMOG and the FRY of examining the number of words, syllables, and sentences in a text. It is composed of two tests: the Flesch Reading Ease and the Flesch-Kincaid Grade Level. (9)

**The Flesch Reading Ease uses the following formula:**

\[
206.835 - (1.015 \times \text{average # of syllables per word}) - (84.6 \times \text{average # of words per sentence})
\]

The result will be a number from zero to 100. The higher the score, the easier the document is to read. A score of 60 or higher indicates the material is under an 8th grade reading level.

**The Flesch-Kincaid Grade Level uses the following formula:**

\[
(0.39 \times \text{average sentence length}) + (11.8 \times \text{average number of syllables per word}) - 15.59
\]

The result will be the grade level the patient must be reading at or above to understand.

The Flesch-Kincaid Tool is a feature found in Microsoft Word. To access this feature, follow the steps below. The reading level only goes up to grade 12.

1. Go to the Tools Menu.
2. Click on Options.
3. Click on Spelling and Grammar
4. Place a checkmark on “show readability statistics”
5. Click OK
6. Go to the Tools Menu again
7. Click on the Spelling and Grammar
8. The readability statistics will show at the end of the spell and grammar checks.
9. This feature will stay on until it is turned off.

Be very careful when using the computer to assess readability. The computer typically gives a score of 2-3 grade levels below what a document calculated by hand would have scored. To improve the accuracy of the computer, ensure the document has the appropriate sample size of at least 30 sentences or 300-500 words and that all headings, lists with bullets, sentence fragments, abbreviations, etc. have been deleted from the text. Also remember to cut and paste the selected text into a new document and rename it before running a computer analysis of it. (10)
**Recommended Computer Software Readability Programs**

Micro Power & Light Company has a software package called Readability and Readability Plus that contains nine readability formulas. The formulas include those described in this document with the exception of the SAM. It can be used for any written document. The software can be purchased for Windows or Macintosh and costs $119.95 for a single copy. Visit [http://www.micropowerandlight.com/rdplus.html](http://www.micropowerandlight.com/rdplus.html) for more information. (11)

A new software program on the market that is designed specifically for improving readability for health care providers is the Health Literacy Advisor. This program scans user documents for their readability and creates detailed reports. It also offers alternative words for more than 9,000 medical terms. The Health Literacy Advisor costs $1,295.00 for each computer, up to 5 computers, on an annual basis. For more information, visit the website at [http://www.healthliteracyinnovations.com](http://www.healthliteracyinnovations.com). (12)

**Suitability Assessment of Materials (SAM)**

SAM was designed in 1993 by Doak, Doak, and Miller. It is a short and systematic way to evaluate the suitability of health care instructions for a given patient population. The SAM assessment tool can be used for written instructions, illustrations, and instructions via video/audiotape. The tool has been researched and validated by many health care providers from different cultures. SAM identifies the areas of text that decrease suitability so these can be altered to ensure reader comprehension. SAM takes about 30-45 minutes to complete but it varies depending on length of instructions and familiarity with use of the test. (13)

**How to Perform a SAM**

1. Read the SAM instrument and evaluation criteria.

2. Read the text that needs to be evaluated and write a brief summary about its purpose and key point(s).

3. For short instructions (one page or pamphlet), use the entire sample. For longer samples, pick several samples with topics central to the purpose. If the text is over 50 pages, increase the sample size to 6 pages.
4. Evaluate and rate each sample section using the 22 SAM categories on the SAM scoring sheet. The categories are shown in the diagram to the right. Each section is rated as either superior (2 points), adequate (1 point), or unsuitable (0 points). Any category that is not applicable, write N/A beside it on the scoring sheet.

5. Calculate the total suitability score by adding together all points. The maximum number of points is 44 or 100%. If any categories were marked N/A, subtract 2 points for each N/A from the total maximum points (44). For example, if the final score was 30 and there was one N/A, the calculated score would be 30/42 or 71%.

<table>
<thead>
<tr>
<th>Interpretation of Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 – 100</td>
</tr>
<tr>
<td>40-69</td>
</tr>
<tr>
<td>0-39</td>
</tr>
</tbody>
</table>

6. Interpret the score and assess the impact of any deficiencies. Depending on the area and the extent of deficiency in an area, choose appropriate revisions. Any factor that was scored as unsuitable is significant and should be addressed. If there are significant deficiencies in the areas of readability level or cultural appropriateness, they must be revised regardless of overall rating. These are the two most important areas to ensure that written instructions will be understood and accepted. (13)

The scoring sheet and a more extensive breakdown of the SAM evaluation criteria can be found at [http://www.hsph.harvard.edu/healthliteracy/doak4.pdf](http://www.hsph.harvard.edu/healthliteracy/doak4.pdf)

**Readability Formulas in Other Languages**

Many of the readability formulas for English text have been modified to calculate readability for other languages. For example, the Flesch-Kincaid has been adapted to calculate readability for languages such as Spanish, Dutch, and French. The Spanish adaptation is called the Fernandez Huerta formula, the Dutch adaptation is the Douma formula, and the French adaptation is the Kandel & Moles formula.

Since most readability formulas are calculated based on the number of sentences and the number of syllables, languages like Japanese can also be calculated in a similar fashion. The Japanese language is based on four types of characters. Japanese readability formulas calculate the average number of characters per sentence, the frequencies of runs (maximal strings) for each character, the
average number of characters for each type of run, and the *tooten* (comma) to *kuten* (period) ratio. So readability is assessed in a similar fashion for all languages.

The Accessibility Institute at the University of Texas at Austin is currently developing a computer based multi-language readability tool called TxReadability. The goal of the project is to help determine if text or web pages are written at the best level for the reader population. As the world becomes more internationally intertwined, more multi-language readability tools will become available. (14)

**Factors Beyond the Readability Formulas**

The readability formulas are only part of the picture of whether or not a document is easy to read. There are a number of other factors that need to be considered when deciding what health materials to use for a particular audience. Following is a brief overview of these factors. More detailed information will be in Modules 8 & 9 on designing materials.

**Audience**

Reading materials and illustrations need to be targeted to the audience that will be using them. Once the targeted population has been determined, the specific needs and interests of that population need to be researched and taken into account when selecting or designing reading materials. Information should be sensitive to race, gender, age and cultural background of the intended audience, and bias-free language should be used. Lastly, make sure the information is what the specific reading population wants and needs to know.

**Content** (15)(16)

- All written information should have a clear purpose that is easily recognizable within the title or first paragraph. The target group should also be recognized and defined early in the text.
- The information should be accurate, up-to-date, current, and include all essential information. It is also important that the information does not contradict itself throughout the text.
- Any new words or concepts should be clearly defined and explained. Analogies and examples often help to simplify complex information. When using examples, concrete cases should be used instead of abstractions. Language helps the reader to create visual images, which helps the information be remembered, so strong, descriptive words should be used.
- Consistent terminology and the active voice should be used throughout the text. Medical jargon, technical words, slang and any abbreviations or acronyms should be avoided unless absolutely necessary or explained.
Finally, a friendly, conversational tone is maintained throughout the text and the text is engaging and interacts with the reader.

**Organization and Structure**

Organization and structure of the text is essential to maintaining interest and transitioning smoothly from one topic to the next. Key areas need to be emphasized by bolding or underlining the information. Information should be sequenced and presented in a logical manner. For example, post-operative information should not be discussed before pre-operative or operative information. Connective terms like “however” are used to clarify relationships. Lengthy subjects should be broken down into smaller sections. Each paragraph should present a single message and be labeled with a subheading. Bullets or numbers can also be used to break down lengthy topics. However, lists should be limited to six points or less to ensure reader interest is sustained. The goal of organizing the material is to guide the reader smoothly through the text in a step-by-step manner that is logical to the reader. (15)(16)

**Style and Design**

The style and design of the text will be what initially catches the reader’s eye and gets them intrigued about the material. Keep the following tips in mind when selecting or designing easy to read health materials. (15)(16)

- The material looks uncluttered with ample white space, generous margins, and short line length of 2-5 inches. There should be balanced white space between text and illustrations.
- Upper and lower case letters with a font size of 12-14 point for the text (serif faced preferred) are used. The font size of headings and important points should be larger or bolded to draw the reader’s eye to that area.
- Visual features like pictures, charts, and sidebars to attract attention and aid in learning and retention are apparent. Color is also eye catching and should be utilized in moderation.
- Each illustration is representative of the reader population and reflects an accurate representation of the content being presented in the text. All illustrations should convey a single idea and be properly labeled.
- Make certain that the material looks easy to read. If the text appears clustered and menacing, the reader is less likely to begin reading the material at all.

Need help determining if your document is readable? Click here to download a copy of the OSU / AHEC Clear Health Communication Program’s **Plain Language Checklist**
References

1. National Center for Education Statistics


   http://www1.va.gov/visns/visn02/vet/ed/articles/readability.doc


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AHEC Clear Health Communication Program