Short Communication

Readability of online material related to skin cancer

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ABSTRACT

Objectives: The key to reducing mortality from skin cancer depends on early detection and treatment, which, in many cases, means a patient should be informed and possess the self-efficacy necessary to seek expert opinion. The purpose of this study was to determine the readability of skin cancer materials on the Internet using the commonly used readability tests.

Study design: This is a cross-sectional study.

Methods: A search was conducted using the key words 'skin cancer.' The first 15 pages of websites that contained English language articles on skin cancer comprised the sample for this study. All English language articles appearing on these websites were analyzed using the Readable.io service to automate popular readability scores. For each article, it was determined if it was generated from a .org, .com, .gov, .net, .edu or other source. Five readability tests were conducted on the materials to determine the ease with which one can read each article.

Results: Of the 102 websites sampled, none received an acceptable score on all five assessments. In fact, more than 90% of the websites sampled received an unacceptable score on any one of the five assessments, and more than 78% of the websites sampled received an unacceptable level on all five assessments. All five readability assessments demonstrated statistically significant results; each P-value obtained from the t-tests was substantially below 0.01 and, hence, below the $\alpha = 0.05$ threshold. These results indicate that it is unlikely that skin cancer websites are being written at the recommended level.

Of the websites sampled, roughly 42% were .com, and slightly more than 36% were .org. Statistical evidence indicated that neither .com nor .org websites are likely to be written at the acceptable level.

Conclusions: Both for-profit and non-profit agencies which aim to provide health information to consumers should be mindful of the readability levels of the materials they disperse.

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Introduction

Skin cancer is the most common cancer that affects men and women in the United States.[1] The American Cancer Society estimates that there are more than five million skin cancers diagnosed annually in the US.[1] With early detection and treatment, skin cancer prognosis is good. The key to reducing mortality from skin cancer depends on early detection and treatment,[1] which, in many cases, means a patient should be informed and possess the self-efficacy necessary to seek expert opinion. Now, more than ever, consumers are drawn to search the Internet for information for themselves and their loved ones.[2,3] Recent statistics suggest roughly 70% of Internet users search for health information online.[3]

It is, therefore, imperative that information related to skin cancer on the Internet be written in a way that is understandable. It is recommended that health materials be written at or below 6th grade level to increase the accessibility of information for those with difficulty reading.[4] Yet, studies suggest that materials are often presented at higher reading levels, which reduces their accessibility. Eltorai et al found that collectively, information from the American Association of Surgery of Trauma on their website was written at a 10th grade reading level.[5] Similarly, information on the top 10 websites related to lung cancer was written at an 11th grade reading level.[6] Prior studies have assessed for readability among such health-related materials as leaflets in medical products[7] and information on top medical-related causes of death in the US,[8] all of which indicate problematic readability for the intended populations.

The Centers for Disease Control and Prevention defines health literacy as 'the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions.'[9] The National Action Plan to improve Health Literacy has published guidelines on health literacy which involve readability levels of published health information. Studies indicate that those with low health literacy are at risk for worse health outcomes.[10]

Common readability tests are a recommended way to determine the level of readability of materials. Although different formulas and processes are used as a way to measure this construct, all tests provide indications of the ease with which one can read the material. For both the Flesch–Kincaid Grade Level (FKGL) and Flesch–Kincaid Reading Ease (FRE) tests, calculations are conducted using the average number of words in a sentence and the number of syllables in a word.[11] Using a norming group, the FKGL uses a rough estimate of the reading level by school grade that would be appropriate for reading the material, whereas the FRE uses a conversion table.[11] The Gunning Fox Index (GFI) also determines the reading level by school grade, but in this test, calculations are based on complex words that contain three or more syllables. The Coleman–Liau Grade Level (CLGL) test does not require counting syllables but instead uses word length in letters.[11] Finally, the Simple Measure of Gobbledygook (SMOG) Grade Level test uses a syllable-counting system with a subset of text at the beginning and end of the written sample.[12]

We did not identify any published studies about readability of skin cancer materials found on the Internet. The purpose of this study was, therefore, to determine the readability of skin cancer materials on the Internet using the aforementioned readability tests.

Methods

The methods for this study were based on a prior study in the published literature on the readability of materials related to colonoscopy preparation.[13] A search was conducted with a cleared browser using the Chrome search engine and inputting the key words 'skin cancer.' The first 15 pages of websites that contained English language articles on skin cancer comprised the sample for this study. First, URLs were vetted to determine if there was actual content on the page or if the URL was simply a splash page. All URLs that led exclusively to splash pages were excluded. All English language articles appearing on these websites were analyzed using the Readable.io service, which is a recommended service by MEDLINE[14] to automate popular readability scores. For each article, it was first determined if it was generated from a .org, .com, .gov, .net, .edu or other source. Then, the following readability tests were conducted on the materials to determine the ease with which one can read each article: FKGL, GFI, CLGL, SMOG) Grade Level, and FRE.

Data entry and analysis were conducted using Microsoft Excel. For the analysis, readability scores were calculated from a sample (n = 102) of skin cancer information websites using five different readability scores (FRE, FKGL, GFI, CLGL, and SMOG). Based on recommendations for readability,[15] the analysis assumes an acceptable readability level greater than

Table 1 – Distribution of readability scores by category.	
Readability scores	No. of websites (n = 102)
FRE	
Easy (80–100)	1
Average (60–79)	39
Difficult (0–59)	62
FKGL	
Up to grade 6	10
Grades 6–10	54
Beyond grade 10	38
GFI	
Up to grade 6	10
Grades 6–10	29
Beyond grade 10	63
CLGL	
Up to grade 6	1
Grades 6–10	48
Beyond grade 10	53
SMOG	
Up to grade 6	0
Grades 6–10	25
Beyond grade 10	77
CLGL, Coleman–Liau Grade Level; FRE, Flesch–Kincaid Reading Ease; FKGL, Flesch–Kincaid Grade Level; GFI, Gunning Fox Index; SMOG, Simple Measure of Gobbledygook.	