

## Readability of Colorectal Cancer Online Information: A Brief Report

### Abstract

**Purpose:** Colorectal cancer (CRC) is the third leading cause of cancer-related death in the United States. A decline in deaths caused by CRC has been largely attributable to screening and prompt treatment. Motivation, shown to influence cancer-related screening and treatment decisions, can be shaped by information from the Internet. The extent to which this information is easily readable on cancer-related websites is not known. The purpose of this study was to assess the readability levels of CRC information on 100 websites. **Methods:** Using methods from a prior study, the keyword, “colorectal cancer,” was searched on a cleared Internet browser. Scores for each website ( $n = 100$ ) were generated using five commonly recommended readability tests. **Results:** All five tests demonstrated difficult readability for the majority of the websites. **Conclusions:** Online information related to CRC is difficult to read and highlights the need for developing cancer-related online material that is understandable to a wider audience.

**Keywords:** Colorectal cancer, online information, readability

### Introduction

In the United States, colorectal cancer (CRC) is the third leading cause of cancer-related death in women and men.<sup>[1]</sup> In 2018, it is expected that there will be 97,220 new cases of colon cancer and 43,030 new cases of rectal cancer, resulting in 50,630 deaths.<sup>[1]</sup> Early detection and treatment of CRC influence survival rates.<sup>[1]</sup> There has been a decline in deaths caused by CRC, which is largely attributable to screening and prompt treatment.<sup>[1]</sup> Motivation influences cancer screening and treatment decisions,<sup>[2]</sup> and both may be affected by the communications conveyed on the Internet.<sup>[3]</sup> The extent to which this information is readable and comprehensible can shape motivation and health-care decisions. A recent review of the literature suggests that effective health communication is multifaceted, and when health education efforts are ineffective, health can be impacted directly and/or indirectly.<sup>[4]</sup> Health education experts suggest that materials be written at the sixth-grade reading level for increased understandability,<sup>[5]</sup> but little is known about the extent to which this guidance is followed on websites related to cancer.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: [reprints@medknow.com](mailto:reprints@medknow.com)

The purpose of this study was to assess the readability levels of CRC information on 100 websites.

### Methods

Methods, based on a prior study,<sup>[6]</sup> entailed searching a cleared Internet browser with the keyword “colorectal cancer.” The URLs of the first 100 websites written in English were included to create the sample. We then used [readable.io](http://readable.io), a Medline-recommended service, to generate readability scores for each website.<sup>[7]</sup> The service provides scores for five commonly recommended readability tests: Flesch–Kincaid Grade Level, Gunning Fog Index, Coleman–Liau Index, the Simple Measure of Gobbledygook Grade Level, and Flesch–Kincaid Reading Ease (FRE). We then grouped the scores and classified the readability as “easy” (grade <6), “average” (Grade 6–10), or difficult (Grade >10).

### Results

All five tests revealed that the majority of websites had difficult readability [Table 1]. Based on the FRE, 89% of the websites were graded as difficult and the remaining 11% were graded as average. All five tests showed that <6% of sites had easy readability. Among the four tests that

**How to cite this article:** Basch CH, Ethan D, MacLean SA, Garcia P, Basch CE. Readability of colorectal cancer online information: A brief report. *Int J Prev Med* 2018;9:77.

Corey H. Basch,  
Danna Ethan<sup>1</sup>,  
Sarah A. MacLean<sup>2</sup>,  
Philip Garcia,  
Charles E. Basch<sup>3</sup>

Department of Public Health,  
William Paterson University,  
Wayne, <sup>1</sup>Department of Health  
Sciences, Lehman College,  
Bronx, <sup>2</sup>Icahn School of  
Medicine at Mount Sinai,  
<sup>3</sup>Department of Health and  
Behavior Studies, Teachers  
College, Columbia University,  
NY, USA

### Address for correspondence:

Dr. Danna Ethan,  
Lehman College, CUNY,  
250 Bedford Park Boulevard  
West, Gillet Hall, Rm. 431,  
Bronx,  
NY 10956, USA.  
E-mail: [danna.ethan@lehman.cuny.edu](mailto:danna.ethan@lehman.cuny.edu)

### Access this article online

**Website:**  
[www.ijpvmjournal.net/www.ijpvm.ir](http://www.ijpvmjournal.net/www.ijpvm.ir)

**DOI:**  
10.4103/ijpvm.IJPVM\_95\_18

### Quick Response Code:



**Table 1: Descriptive statistics on the readability tests of all sites (n=100)**

Test	Minimum	Maximum	n			Mean	SD
			Easy: Grade <6	Average: Grade 6-10	Difficult: Grade >10		
FKGL	5.0	16.0	1	48	51	10.4	2.1
GFS	2.6	18.1	5	19	76	11.3	2.9
CLI	3.0	19.3	1	18	81	11.6	2.2
SMOG	7.8	16.6	0	13	87	12.0	1.9
FRE*	16.8	78.7	0	11	89	47.5	11.0

\*Scoring is as follows=Easy: Score 80–100; Average: Score 60–79; Difficult: Score 0–59. SD=Standard deviation, FRE=Flesch–Kincaid Reading Ease, FKGL=Flesch–Kincaid Grade Level, CLI=Coleman–Liau Index, SMOG=Simple Measure of Gobbledygook, GFS=Gunning Fog Score

**Table 2: Mean readability scores based on website and URL type**

Test	Group 1 (n=54)	Group 2 (n=46)	P*
FRE	47.7	47.1	0.789
FKGL	10.3	10.7	0.334
GFS	11.0	11.6	0.326
CLI	11.7	11.5	0.645
SMOG	11.9	12.2	0.408

\*Independent sample t-test. Group 1=.org, .gov, .edu, Group 2=.com, .net, other. FRE=Flesch–Kincaid Reading Ease, FKGL=Flesch–Kincaid Grade Level, CLI=Coleman–Liau Index, SMOG=Simple Measure of Gobbledygook, GFS=Gunning Fog Score

**Table 3: Counts of easy, average, and difficult scores**

Test	Group 1 (n=54)			Group 2 (n=46)			P*
	Easy	Average	Difficult	Easy	Average	Difficult	
FRE	0	6	48	0	5	41	0.999#
FKGL	1	30	23	0	18	28	0.108
GFS	2	12	40	3	7	36	0.606
CLI	0	9	45	1	9	36	0.604
SMOG	0	7	47	0	6	40	1.000#

\*Fisher’s exact test, # $\chi^2$ . FRE=Flesch–Kincaid Reading Ease, FKGL=Flesch–Kincaid Grade Level, CLI=Coleman–Liau Index, SMOG=Simple Measure of Gobbledygook, GFS=Gunning Fog Score

determined readability based on grade level, all found the average grade to be above the 10<sup>th</sup> grade, which indicates difficult readability. There were no significant differences found between websites with.org, gov, or.edu extensions (Group 1) and those with.com, net, or other extensions (Group 2). Independent sample t-tests [Table 2] and Fisher’s exact tests [Table 3] showed no significant differences in readability between the groups categorized based on their extension.

## Conclusions

The findings of this study indicate that, regardless of the URL type, online information related to CRC is difficult to read. Given that a facilitating factor for CRC screening is familiarity with CRC screening tests, increasing the ease with which materials can be read can lead to facilitating prevention efforts.<sup>[8]</sup> Study limitations include the cross-sectional design and restriction of material written in English. Nevertheless, this study supports the conclusion that cancer communications on the Internet are difficult to read<sup>[9]</sup> and highlights the need for developing health-related online material that is understandable to a wider audience.

Further studies could explore the extent to which readability of materials influences one’s motivations and actions.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

**Received:** 23 Feb 2018 **Accepted:** 10 Apr, 2018

**Published:** 17 Sep 18

## References

1. American Cancer Society. Key Statistics for Colorectal Cancer. Available from: <https://www.cancer.org/cancer/colon-rectal-cancer/about/key-statistics.html>. [Last accessed on 2018 Mar 30].
2. Basch CH, Basch CE, Wolf RL, Zybert P. Motivating factors associated with receipt of asymptomatic colonoscopy screening. *Int J Prev Med* 2015;6:20.
3. Eysenbach G. The impact of the internet on cancer outcomes. *CA Cancer J Clin* 2003;53:356-71.
4. Vahabi M. The impact of health communication on health-related decision making: A review of evidence. *Health Educ* 2007;107:27-41.

5. McKenzie JF, Neiger BL, Thackeray R. Planning, Implementing & Evaluating Health Promotion Programs: A Primer. New York: Pearson; 2016.
6. Basch CH, Ethan D, MacLean SA, Fera J, Garcia P, Basch CE. Readability of Prostate Cancer Information On-Line: A Cross-Sectional Study. American Journal of Men's Health. 2018. [Epub ahead of print].
7. National Institutes of Health. How to Write Easy-to\_Read Materials. Available from: <http://www.nlm.nih.gov/medlineplus/etr.html>. [Last accessed on 2018 Mar 30].
8. Brouse CH, Wolf RL, Basch CE. Facilitating factors for colorectal cancer screening. J Cancer Educ 2008;23:26-31.
9. Tian C, Champlin S, Mackert M, Lazard A, Agrawal D. Readability, suitability, and health content assessment of web-based patient education materials on colorectal cancer screening. Gastrointest Endosc 2014;80:284-90.

