

# Evaluating The Readability of Online Educational Materials Targeted to Radiology Patients

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## Introduction

- Health literacy is particularly important in radiology, due to limited direct patient care compared to other specialties.
- The average reading level for an American is at 7-8th grade.
- RadiologyInfo was a national attempt to provide accurate and accessible information for patients, yet studies completed in 2014 and 2019 showed content was written with advanced language, measured at the 10th-14th grade level.
- The editors of RadiologyInfo released a statement in 2020 addressing the higher readability and their attempts at improving comprehension.

## Objectives

- Our primary goal is to re-evaluate the readability of online radiological information accessible to patients from recognized educational resource websites, academic institutions, and large private practice groups.
- If common patient resources/reports can be matched to the comprehension level of the patient, better patient autonomy and outcomes can be achieved.

## Study Methods

- Three websites from each source of information provider (institutional resource, academic health institution, and private practice group) were selected for analysis.
- RadiologyInfo, ChoosingWisely, and ImageGently are three common/popular informational websites, created and vetted by the American College of Radiology (ACR) and Radiological Society of North America (RSNA).
- The top three academic institutions, Stanford University, University of Pennsylvania, and Washington University at St. Louis were selected based on the extent of their research grant funding, from the published 2017 rankings released by the Blue Ridge Institute for Medical Research.
- Radiology Associates of North Texas (RANT), Radia, and Advanced Radiology Services, were the three largest private practice groups listed on Radiology Business.
- We sampled their patient information landing page text with the Readability Test Tool, Test by Direct Input feature from Webfx.com to measure their readability metrics and compared readability scores (Flesch-Kincaid reading ease, Flesch-Kincaid grade level, and automated readability index) and text statistics.
- Texts originating from titles, subtitles, and hyperlinks were excluded from the study.

## Results

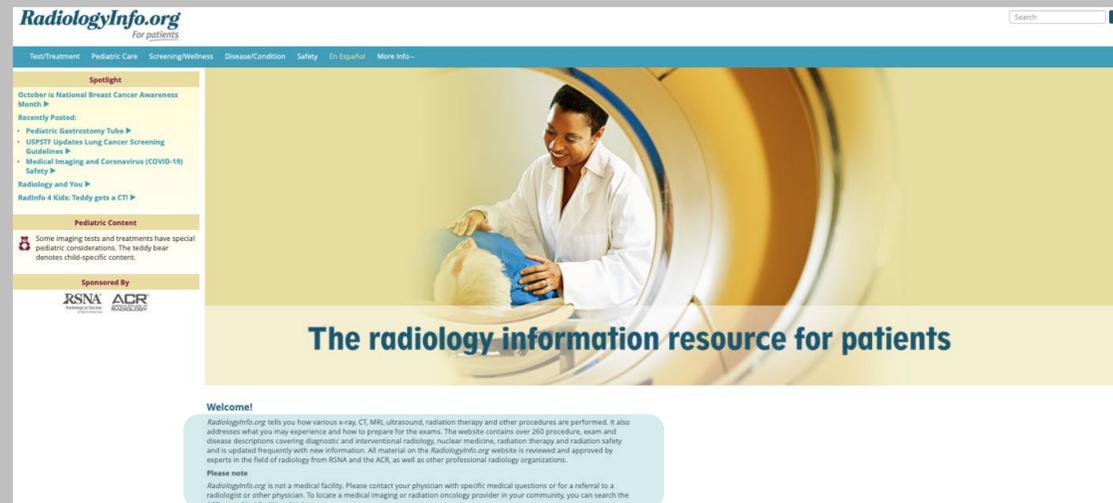


Figure 1. Example of Patient Landing Page

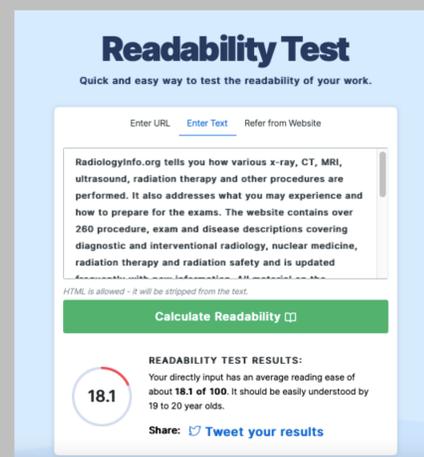


Figure 2. Score evaluation of landing page text

Educational Institution Websites	Flesch-Kincaid Reading Ease	Flesch-Kincaid Grade Level	Automated Readability Index
RadiologyInfo	18.10	14.20	11.40
ImageGently	40.10	11.20	11.30
ChoosingWisely	9.40	19.70	21.30
Average	22.53	15.03	14.67
<b>Academic Institutions</b>			
Stanford	3.60	20.00	22.10
U Penn	21.30	15.20	15.20
U Washington SL	20.00	15.90	16.30
Average	14.97	17.03	17.87
<b>Private Practice Groups</b>			
RANT	40.20	12.40	12.40
Radia	51.10	11.60	11.20
Advanced Rad	16.30	16.20	15.80
Average	35.87	13.40	13.13

Table 1. Comparison of reading scores across websites

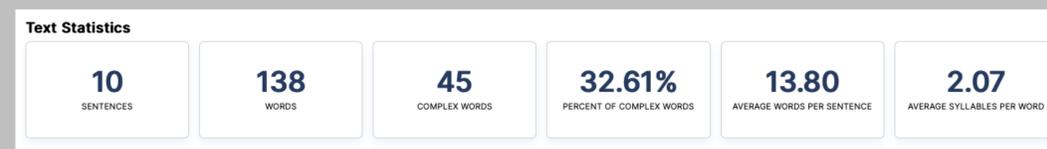


Figure 3. Text statistics of a landing page

Educational Institution Websites	No. sentences	No. words	No. complex words	% complex words	Avg words per sentence (WPS)	Avg syllables per word (SPW)
RadiologyInfo	10.00	138.00	45.00	32.61%	13.80	2.07
ImageGently	6.00	186.00	59.00	31.72%	31.00	1.96
ChoosingWisely	4.00	154.00	35.00	22.73%	38.50	1.73
Average	6.67	159.33	46.33	29.02%	27.77	1.92
<b>Academic Institutions</b>						
Stanford	11.00	323.00	94.00	29.10%	29.36	2.05
U Penn	14.00	276.00	84.00	30.43%	19.71	1.96
U Washington SL	14.00	304.00	91.00	29.93%	21.71	1.95
Average	13.00	301.00	89.67	29.82%	23.59	1.99
<b>Private Practice Groups</b>						
RANT	5.00	96.00	21.00	21.88%	19.20	1.74
Radia	37.00	816.00	131.00	16.05%	22.05	1.58
Advanced Rad	22.00	462.00	144.00	31.17%	21.00	2.00
Average	21.33	458.00	98.67	23.03%	20.75	1.77

Table 2. Summary of text evaluated across websites

## Results

- The average Flesch-Kincaid grade level of each category was found to be institutional website: 15th, academic institution: 17th, and private practice group: 13th, with Stanford's content being regarded with the highest grade level (20th) and ImageGently's content the lowest grade level (11th).
- The averages of the Flesch-Kincaid reading ease were institutional website: 22.5, academic institution: 15, and private practice group: 36, with Stanford having the lowest reading ease (3.6) and Radia having the highest (51.1).
- Each webpage had a variable amount of text content, with Radia providing the most information on each imaging modality and RadiologyInfo providing the least text on their patient information landing page.
- The institutional websites had an average of 159 words, of which 29% words were considered complex. There was an average of about 28 words in each sentence.
- Academic institutions had an average of 301 words, of which 30% were considered complex words. There was an average of 24 words in a sentence.
- Private practice groups had an average of 458 words, of which 23% were considered complex words. There was an average of about 21 words in a sentence.

## Conclusion

- Although Radia did have the most content on their pages, this is due to having multiple pages rather than a single landing page for patients. The number of complex words (16%) is still comparatively less than other private practice groups (23%), academic health institutions (30%), and national websites (29%).
- The data show content presented from these nine radiology information providers across all three categories is significantly above the reading ability of the average American patient.
- This puts patients at a significant disadvantage in being able to understand the specifics of their medical experience but more importantly limits their ability to make informed medical decisions and receive care specifically tailored to their needs.

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