Turk Neurosurg, 2024

Original Investigation

DOI: 10.5137/1019-5149.JTN.42973-22.3

Received: 25.12.2022
Accepted: 26.06.2023

Published Online: 13.04.2024

Evaluating the Readability, Quality, and Reliability of Online Patient Education Materials on Spinal Cord Stimulation

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ABSTRACT

AIM: To obtain health-related information internet usage is rapidly increasing. However, there are concerns about the comprehensibility and reliability of internet-accessed health-related information. The aim of this research was to investigate the reliability, quality, and readability of patient education materials (PEMs) about spinal cord stimulation (SCS) on the internet.

MATERIAL and METHODS: A total of 114 websites suitable for the study were identified after a search on Google for the term "spinal cord stimulation." Gunning Fog (GFOG), Flesch–Kincaid Grade Level (FKGL), Flesch Reading Ease Score (FRES), and Simple Measure of Gobbledygook (SMOG) were used to determine the readability of sites. The credibility of the websites was assessed using the Journal of the American Medical Association (JAMA) score. Quality was assessed using the global quality score (GQS), the DISCERN score, and the Health on the Net Foundation code of conduct (HONcode).

RESULTS: Evaluating the text sections, the mean SMOG and FKGL were 10.92 ± 1.61 and 11.62 ± 2.11 years, respectively, and the mean FRES and GFOG were 45.32 ± 10.71 and 14.62 ± 2.24 (both very difficult), respectively. Of all the websites, 10.5% were found to be of high quality, 13.2% were found to be of high reliability, and only 6.1% had a HONcode. A significant difference was found between the typologies of the websites and the reliability and quality scores ($p<0.05$).

CONCLUSION: The internet-based PEMs about SCS were found to have a readability level that exceeded the Grade 6 level recommended by the National Health Institute. However, the materials demonstrated low reliability and poor quality. We think that websites related to SCS, which is a specific neuromodulation option among several interventional procedures for the management of chronic pain, should have some level of readability according to specific indexes and reliable content suitable for the public's educational level.

KEYWORDS: Spinal cord stimulation, Patient education, Online information, Chronic pain, Education level

ABBREVIATIONS: ARI: Automated readability index, **CL:** Coleman-Liau index, **HON:** Health on the Net Foundation, **HONcode:** Health on the Net Foundation code of conduct, **FRES:** Flesch Reading Ease Score, **GQS:** Global quality score, **SMOG:** Simple Measure of Gobbledygook, **SCS:** Spinal cord stimulation, **FKGL:** Flesch–Kincaid Grade Level, **GFOG:** Gunning Fog, **GQS:** Global quality score, **JAMA:** Journal of the American Medical Association, **LW:** Linsear Write, **USA:** United States of America, **QOL:** Quality of life, **PVD:** Peripheral vascular disease, **URL:** Uniform Resource Locator, **PEMs:** Patient education materials

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INTRODUCTION

Chronic pain, defined as pain that persists for more than six months, affects 100 million adults in the United States of America and negatively affects all dimensions of health-related quality of life (QOL), not to mention the aspect of high expenditures (16). Low back pain, an important cause of chronic pain, ranked first in the disability assessment and sixth in the overall burden assessment (26). There is vast research on the use of opioids and their good response to treating pain in many patients (23). Nevertheless, there are many side effects related to the use of opioids that affect public health negatively and may cause irreversible consequences. It is reported that mortality related to opioid use has increased by 200% in the last 20 years compared with previous years (26). It is clear that a longer-lasting solution with fewer side effects is needed for the treatment of chronic pain.

Spinal cord stimulation (SCS), one of the non-drug treatment modalities for chronic pain, is a neuromodulation therapy that has been used since the 1960s (16). In SCS, electrical stimulation is provided to the spinal cord, and the transmission of pain signals to the brain is interrupted (27,29). Although patients receive information about SCS from their pain specialists, there can be a misunderstanding of the procedure (10). Subsequently, patients want to complete this missing part using internet-based information. Patients reading about other patients' experiences can have a positive or negative influence on their decision (22). However, internet-based information may mislead patients by containing incorrect and incomplete information (10).

In the literature, a significant increase in the use of the internet as a source of information related to health is reported (13,24). In 2018, nine out of ten American adults used the World Wide Web, and 75% of them made medical searches with medical content. The National Institutes of Health, the American Medical Association, and the US Department of Health and Human Services have reported that patient education materials (PEMs) available on the internet should have a readability level that is no more difficult than that of a sixth grader or, preferably, easier (13). Information above the sixth grade level is considered difficult to understand and readable for the average person. Therefore, it is important that PEMs on websites be at a readability level suitable for the reader and be carefully evaluated before publishing. The uptake of information from the internet is increasing every day, and this brings up concerns about the exactness, worth, and eases of understanding the information. The readability and quality of information contained in online PEMs pertaining to numerous medical conditions have been addressed in the literature (5,15).

The SCS is an important therapy in the treatment of chronic pain. Even after a successful operation and discharge of the patient, there should be close follow-ups by the physician and medical technician to optimize the stimulation. To maintain a good compliance, it is important to understand this multifaceted therapy. In our study, we aimed to evaluate websites providing PEMs on SCS therapy, evaluating their readability, quality, and reliability. In addition, we also determined website typologies that provided highly reliable information about SCS.

MATERIAL and METHODS

This is a cross-sectional study. The term "spinal cord stimulation" was searched on Google (https://www.google.com) on June 6th, 2022, by two independent authors. A final decision by a third author is sought if there is no agreement among authors in the process of evaluating the websites. Google was used in our study due to its leading position as search engine with a market share of 86.19% according to the December 2021 data (19).

We deleted the cookies and the computer's browser history. In a second step, we signed out from the Google account and switched to the browser's privacy format to ensure an unaffected search result.

Consistent with similar research, we collected the web addresses or links, also known as uniform resource locators (URLs), for the 200 most popular websites (2,4). The websites that ranked on the initial page of the search results were considered to be the most visited (12). Websites with non-English contents, as well as those that require registration or subscription, were excluded. Further, we eliminated websites without written content (e.g., single video or audio file as well as tables, figures, and list formats) and that contain journal articles.

Furthermore, the evaluation process excluded author details and citations to avoid false outcomes, as well as contact information such as addresses and phone numbers (35).

In the evaluation phase of the websites, we applied the so-called "three-click rule" if an evaluation criterion could not be found on the home page (8). According to this principle, website users should be able to get any information with three clicks of their mouse.

Website Typology

We divided the websites into six categories based on their typologies (34).

1. Professional websites: These are websites that are made by people or organizations with medical experience.
2. Commercial: Websites that promote health-related products for commercial gain.
3. Nonprofit, such as educational sites.
4. The health portals provide information related to health concerns.
5. News (online versions of magazines and newspapers).
6. Governmental (created by an agency that is officially affiliated with the government).

Reliability Analysis

The Journal of the American Medical Association (JAMA) uses four criteria to evaluate online information and resources, including disclosure, authorship, currency, and attribution (Table I), which help to evaluate the accuracy and reliability of information. Four points represent the highest reliability and quality (18). In our research, we classified websites as

Table I: Details on GQS, Discern-Criteria and JAMA Benchmark Criteria

GQS	**Score**
Poor quality, poor flow of the site, most information missing, not at all useful for patients	1
Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients	2
Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients	3
Good quality and generally good flow, most of the relevant information is listed, but some topics not covered, useful for patients	4
Excellent quality and excellent flow, very useful for patients	5
DISCERN Criteria	**Total Score (16-80 Points)**
1. Are the aims clear?	1-5 point
2. Does it achieve its aims?	1-5 point
3. Is it relevant?	1-5 point
4. Is it clear what sources of information were used	1-5 point
5. Is it clear when the information used or reported in the publication was produced?	1-5 point
6. Is it balanced and unbiased?	1-5 point
7. Does it provide details of additional sources of 1.45 support and information?	1-5 point
8. Does it refer to areas of uncertainty?	1-5 point
9. Does it describe how each treatment works?	1-5 point
10. Does it describe the benefits of each treatment?	1-5 point
11. Does it describe the risks of each treatment?	1-5 point
12. Does it describe what would happen if no treatment is used?	1-5 point
13. Does it describe how the treatment choices affect overall quality of life?	1-5 point
14. Is it clear that there may be more than one possible treatment choice?	1-5 point
15. Does it provide support for shared decision making?	1-5 point
16. Based on the answers to all of the above questions, rate the overall quality of the publication as a source of information about treatment choices.	1-5 point
JAMA Benchmark Criteria	**Total Score (0-4 Points)**
Authorship	1 point (Authors and contributors, their affiliations,and relevant credentials should be provided)
References/ Sources	1 point (Sources and references for all content should be listed)
Ownership	1 point (Sponsorship, conflicts of interest, funding, advertising, support, and video ownership should be fully disclosed)
Indication of date	1 point (Dates that on which the content was posted and updated should be indicated). JAMA is used to evaluate the accuracy and reliability of information)

JAMA: *Journal of American Medical Association,* ***GQS:*** *Global quality score.*

highly reliable if they scored 3 or more points on the JAMA benchmark and less reliable if they scored 2 or fewer points (28).

Quality Analysis

In order to assess the quality of websites, the DISCERN tool comprises a set of 16 questions that can be scored on a scale of 1–5 (33) The first eight questions evaluate the website's general content, and the next eight questions evaluate knowledge about the treatment (Table I). Two authors independently reviewed the websites using the DISCERN criteria. The final DISCERN score for each site was based on the average of the scores. The total DISCERN score can range from 16 to 80, with scores between 16 and 27 considered to be very poor, between 28 and 38 to be poor, between 39 and 50 to be fair, between 51 and 62 to be good, and between 63 and 80 to be excellent (7).

We evaluated websites using the global quality score (GQS), which uses a 5-point scale to rate the overall quality of the website (Table I). The evaluations express the quality of the data on the site and how useful it is for the patient. The rating ranges from one (poor quality) to five (excellent quality) (1).

The establishment of the Health on the Net Foundation (HON) in 1995 aimed to establish a standard for the quality of health-related information available on the internet. Its mission is to promote trustworthy and helpful health information online (6). To receive the HON code of conduct (HONcode) certification for a website, the following disclosures should be made (32):

- Content's date and source
- Competencies of the authors
- Privacy policy
- (Potentially) the doctor–patient connection
- The website's financing and advertising policies
- Contact information should be disclosed.

In our study, we investigated whether there was a HONcode stamp on the main page or related URL.

Readability

We used the following scores to evaluate the readability of the websites: Simple Measure of Gobbledygook (SMOG), Flesch-Kincaid grade level (FKGL), Gunning FOG (GFOG), Coleman-Liau Index (CL), automated readability index (ARI), Flesch reading ease score (FRES), and Linsear Write (LW) readability formulas obtained from "www.readibility-score.com" (5,18). The average reading level was examined using language and concepts that are easily understood by sixth-graders, according to the recommendations of the American Medical Association and the National Institutes of Health.

Analysis of Visibility and Popularity

The level of visibility and popularity of an area is measured by Alexa (https://www.alexa.com/), a well-known traffic engine (31). The popularity and visibility of a website are assessed by analyzing the frequency of clicks and visits received within the past three months and comparing this data to similar data from other websites. A website's score goes up when it gets more clicks, which means that it is more popular than other websites.

Content Analysis

We evaluated the websites according to their typology to see if they included some topics related to SCS (indication, contraindication, procedure, complication, recovery, risk, and removal).

Statistical Analysis

We used the SPSS Windows 25.0 (SPSS Inc., Chicago, IL) program for statistical analysis. Data with continuous values were given as the mean ± SD. Both numerical values (n) and percentages (%) were utilized to present the frequency data. For statistical analysis, data with continuous values were analyzed with Kolmogorov–Smirnov and Shapiro–Wilk normality tests. The Mann–Whitney U or Kruskal Wallis tests were used according to the number of groups in the comparison of continuous values. Chi-square or Fisher's exact tests were used for comparison of the frequency data. A p value of <0.05 was considered statistically significant.

RESULTS

A total of 114 websites were compared, and according to their typology, commercial (56.1%) and professional organization (11.4%) websites were the most common (Figures 1 and 2).

Comparing the typologies of the first 10 Google search results to those of the remaining results revealed no statistically significant differences (p=0.353). Between the first 10 results and the remaining search results according to their popularity indices, a significant relationship was found in Web rank values (p=0.001), while no significant relationship was found in Alexa values (p=0.524).

There was no statistically significant difference between the readability values of the top 10 websites and the readability values of the remaining websites (FRES, GFOG, GFOG, CL, and SMOG; p>0.050).

There was no significant correlation between the JAMA reliability (p=0.252), the DISCERN quality scores (p=0.176), and the contents (p>0.050) of the Top 10 websites and the remaining 104 websites. However, the GQS scores and the presence of HONcode elements exhibited a statistically significant difference between the top 10 websites and the remaining search results (p=0.041) (Table I).

These 114 websites had an average JAMA score of 1.52 ± 0.88, a DISCERN score of 28.03 ± 18, a GQS score of 1.69 ± 1.07, and an Alexa score of 122887.92 ± 168053.93. The websites included in the study with these results have been assessed to be less reliable and of very poor quality.

In the analysis of the texts of 114 evaluated websites, the mean FRES average and the mean GFOG were 45.32 ± 10.71 and 14.62 ± 2.24 (both very difficult), respectively. The mean FKGL and SMOG were determined to be 11.62 ± 2.11 and

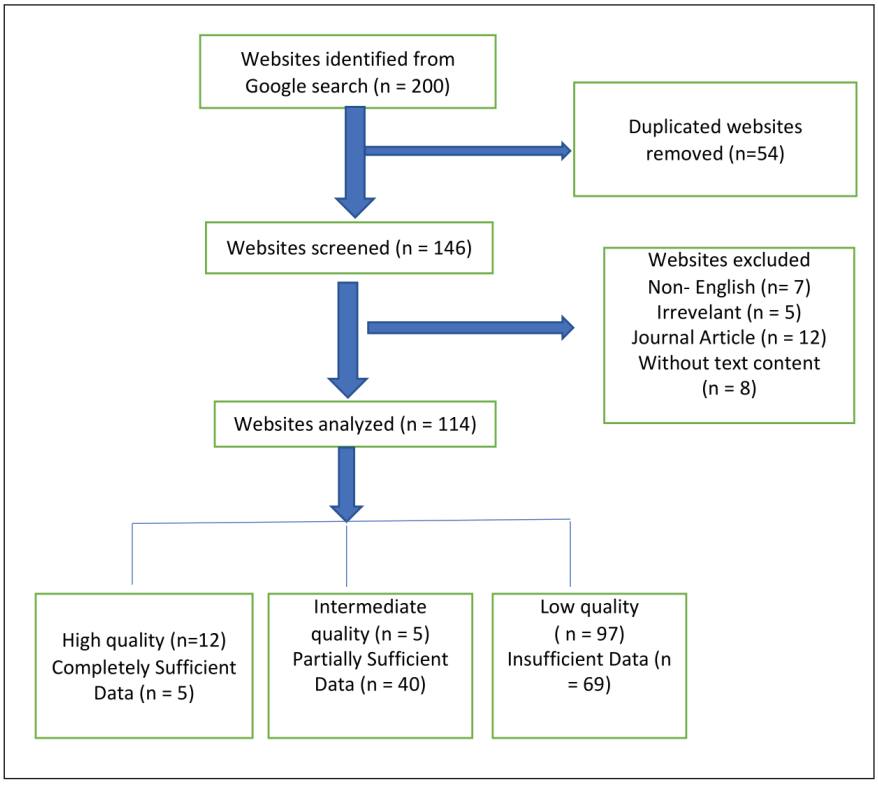

Figure 1: Flowchart "study design".

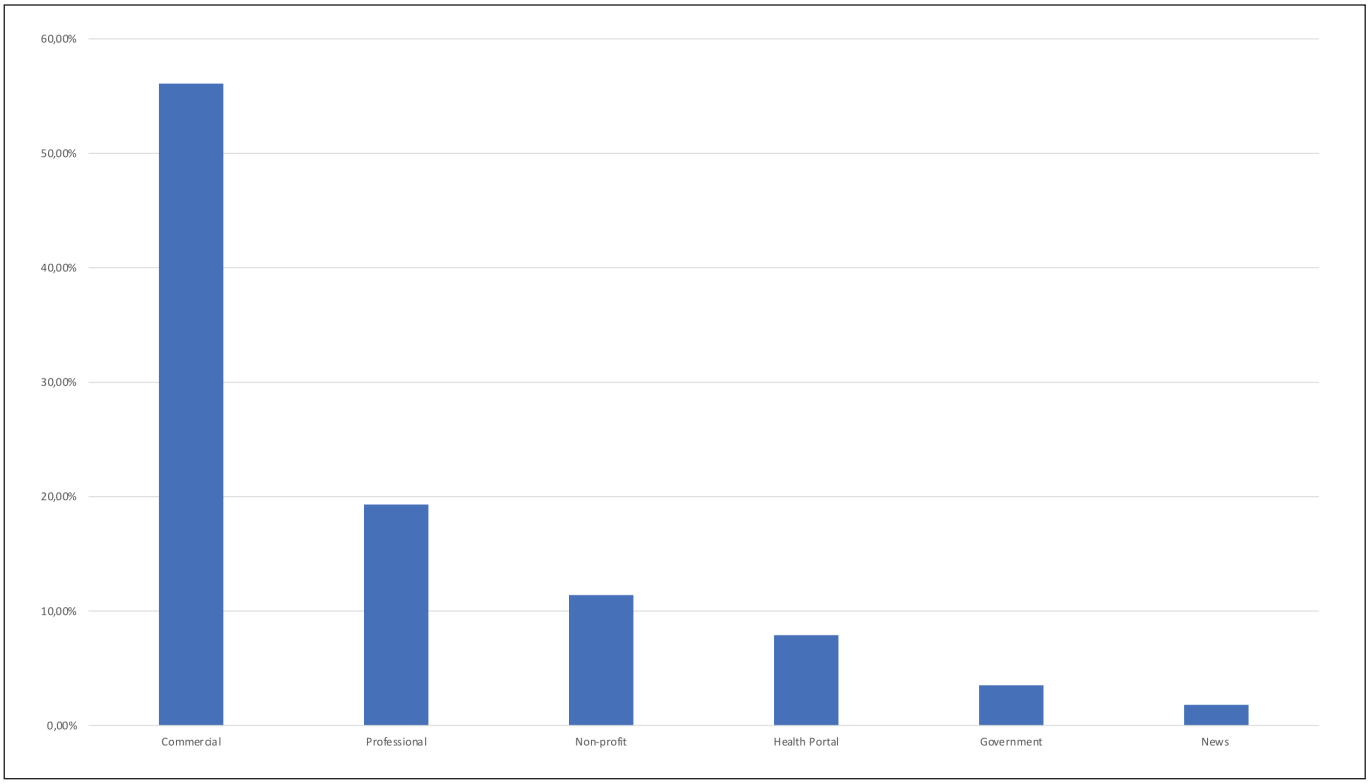

Figure 2: Websites according to typology.

10.92 ± 1.61 years of education, respectively, while the CL index, ARI index, and LW index were 12.03 ± 1.68, 11.84 ± 2.46, and 12.82 ± 2.87 years of education, respectively.

When the typologies of the sites and all readability indices were compared, a significant relationship was only found in the LW readability formula (p=0.036). No significant relationship was found in other formulas (p>0.05). A statistically significant difference (p<0.001) was observed between the average readability index of 114 websites and the reading level of sixth-graders (Table II). When comparing the readability of the websites based on their typologies, no significant difference was observed (p>0.05).

Based on the content analysis results, there was no significant difference (p>0.05) between the top 10 websites and the remaining ones. Likewise, there was no statistically significant difference between the content of all 114 websites according to typology (p>0.05) (Figure 3).

The 114 websites had significant differences (p<0.001) in their typologies, JAMA credibility scores, and DISCERN values. For commercial websites, these ratings were seen to be lower. Only 13.2% of the websites received a JAMA score of three or above and were considered highly reliable. For the 114 websites, a significant relationship was also found between the GQS values (p<0.001) and HONcode entities (p=0.002) according to their typologies. According to GQS values, only 12 (10.5%) sites were identified as high quality. Only 7 (6.1%) of all sites had a HONcode presence. The highest HONcode presence was found in health portals with a score of 3 (Figures 4 and 5).

In the correlation analysis, there was no positive correlation between the mean readability scores based on the readability formulas and JAMA reliability scores, DISCERN quality scores, or GQS values (Table III). There was a positive correlation between JAMA scores and DISCERN scores (r=0.918, p<0.001), GQS values (r=0.926, p<0.001), and HONcode values (r=0.428, p<0.001).

DISCUSSION

The objective of this study was to evaluate the reliability, quality, and readability of internet-based PEM regarding SCS. We sought to identify the types of websites that offer highly reliable and readable information. We intended to compare the top 10 websites included on the first page of the study findings with other websites in terms of reliability, quality, and readability. Finally, we evaluated the relationship between website readability and their level of quality and reliability.

SCS is a highly specific procedure. Patients may not be sufficiently informed about the procedure itself or the associated risks it involves. Although patients receive information about the SCS from their pain physicians, there are studies reporting that informed consent is not sufficient, and patients use the internet for more or more detailed information (10). In the era of digitalization, the internet has evolved into a resource that is not only useful for patients but

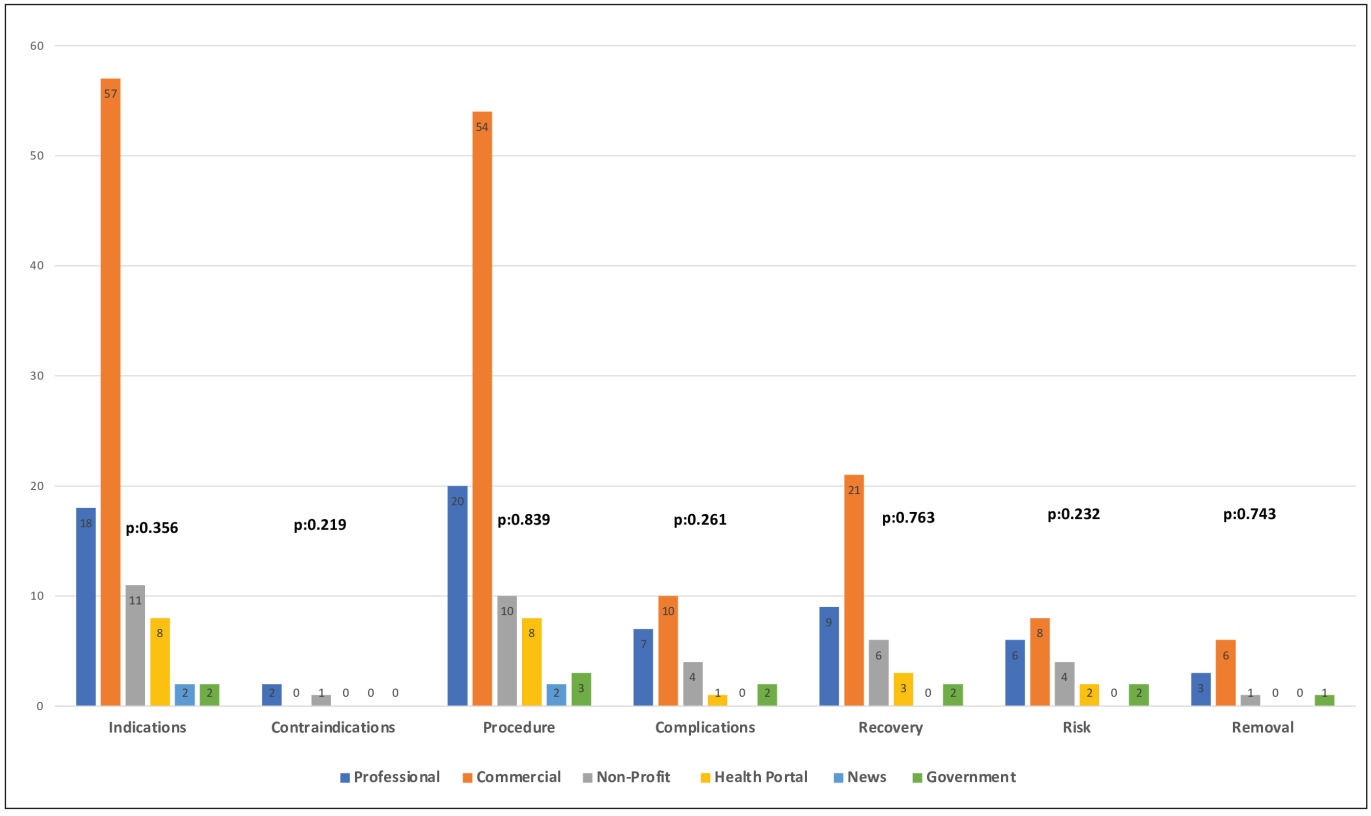

Figure 3: Content analysis according to typology.

Table II: All Group of Websites' Mean Results and Statistical Comparison of Text Content to 6th Grade Reading Level

		Top 10 (n=10)	Others (n=104)	Total (n=114)	Comparison of the first 10 websites and remaining 104 websites according to parameters (p)	Comparison of the 114 websites' according to 6th grade reading level (p)
Readability Indexes		**Mean** ± SD	**Mean** ± SD	**Mean** ± SD		
FRES		46.78 ± 11.26	45.18 ± 10.7	45.32 ±10.71	0.645	**<0.001**
GFOG		14.39 ± 2.20	14.64 ± 2.26	14.62 ± 2.24	0.944	**<0.001**
FKGL		11.26 ± 2.25	11.65 ± 2.1	11.62 ± 2.11	0.865	**<0.001**
The CL Index		12.1 ± 2.07	12.03 ± 1.65	12.03 ± 1.68	0.778	**<0.001**
The SMOG Index		10.63 ± 1.6	10.95 ± 1.61	10.92 ± 1.61	0.802	**<0.001**
ARI		11.65 ± 2.7	11.86 ± 2.45	11.84 ± 2.46	0.960	**<0.001**
LW Formula		12.35 ± 3.24	12.87 ± 2.85	12.82 ± 2.87	0.802	**<0.001**
Grade Level		11.80 ± 2.25	11.91 ± 2.08	11.90 ± 2.09	0.943	**<0.001**
Popularity Index						
Alexa Rank		53804 ± 58270.57	166065.37 ± 202324.47	122887.92 ± 168053.93	0.524	
Webrank		6.87 ± 0.34	4.63 ± 1.63	5.33 ± 1.72	**0.001**	
JAMA Mean ± SD		1.90 ± 1.28	1.49 ± 0.83	1.52 ± 0.88	0.252	
DISCERN Mean ± SD		35 ± 22.09	27.36 ± 17.54	28.03 ± 0.88	0.176	
GQS Mean ± SD		2.3 ± 1.33	1.63 ± 1.03	1.69 ± 1.07	**0.041**	
JAMA		**n (%)**	**n (%)**	**n (%)**		
Insufficient Data		4 (40)	65 (62.5)	69 (60.5)	**0.031**	
Partially Sufficient Data		4 (40)	36 (34.6)	40 (35.1)		
Completely Sufficient Data		2 (20)	3 (2.9)	5 (4.4)		
DISCERN		**n (%)**	**n (%)**	**n (%)**		
Very Poor		4 (40)	65 (62.5)	69 (60.5)		
Poor		3 (30)	18 (17.3)	21 (18.4)	0.572	
Fair		1 (10)	9 (8.7)	10 (8.8)		
Good		1 (10)	9 (8.7)	10 (8.8)		
Excellent		1 (10)	3 (2.9)	4 (3.5)		
HONcode n (%)	+	3 (30)	4 (3.8)	7 (6.1)	**0.014**	
	-	7 (70)	100 (96.2)	107 (93.9)		
GQS		**n (%)**	**n (%)**	**n (%)**		
Low Quality		7 (70)	90 (86.5)	97 (85.1)	0.365	
Medium Quality		1 (10)	4 (3.8)	5 (4.4)		
High Quality		2 (20)	10 (9.6)	12 (10.5)		
Typology		**n (%)**	**n (%)**	**n (%)**		
Professional		3 (30)	19 (18.3)	22 (19.3)		
Commercial		3 (30)	61 (58.7)	64 (56.1)		
Non-profit		1 (10)	12 (11.5)	13 (11.4)	0.353	
Health portal		2 (20)	7 (6.7)	9 (7.9)		
News		0 (0)	2 (1.9)	2 (1.8)		
Government		1 (10)	3 (2.9)	4 (3.5)		

FRES: *Flesch reading ease score,* ***FKGL:*** *Flesch-Kincaid grade level,* ***SMOG:*** *Simple Measure of Gobbledygook,* ***GFOG:*** *Gunning FOG-Index,* ***CL:*** *Coleman-Liau Index,* ***ARI:*** *Automated readability Index and* ***LW:*** *Linsear Write,* ***JAMA:*** *Journal of American Medical Association Benchmark Criteria,* ***HONcode:*** *The Health on the Net Foundation Code of Conduct (HONcode),* ***GQS:*** *Global Quality Score, Bold character; statistically different (p<0.05)*

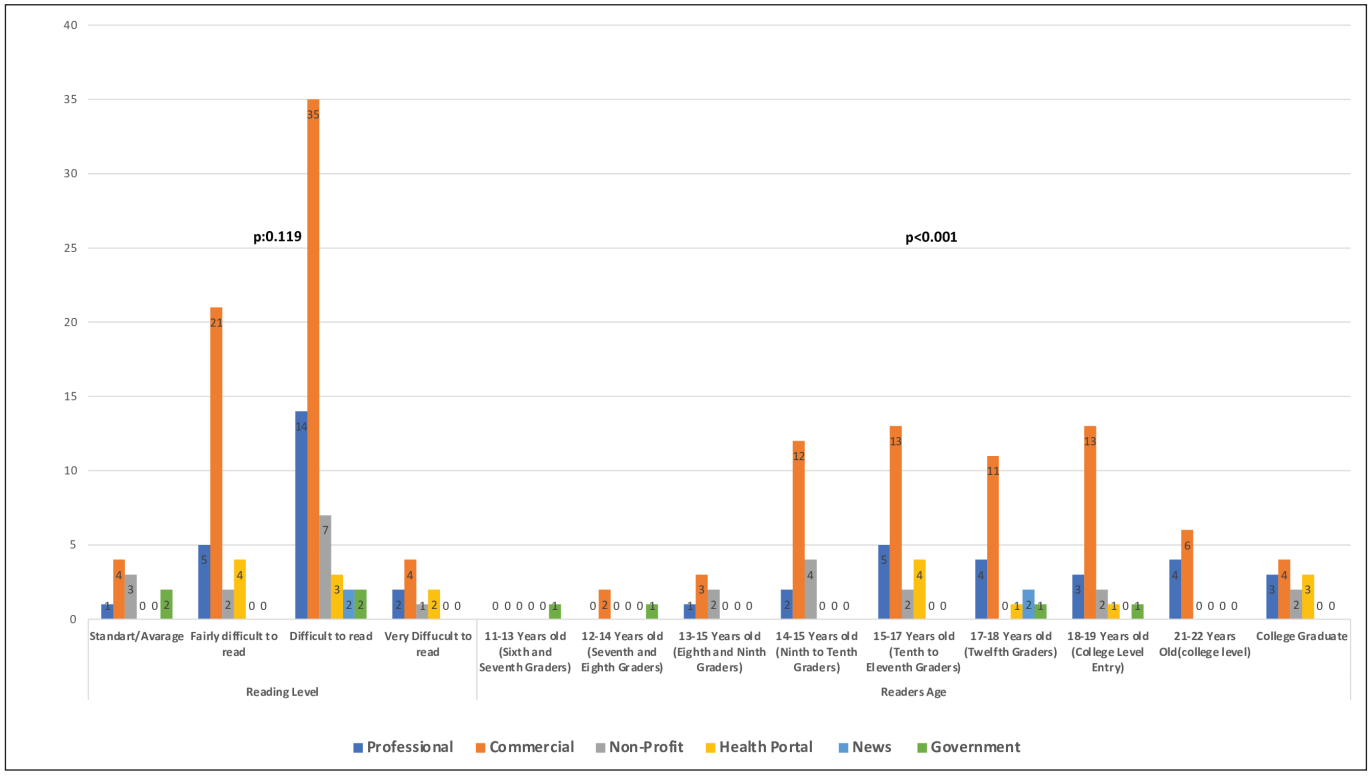

Figure 4: Comparison of the reading levels according to the typologies of the websites.

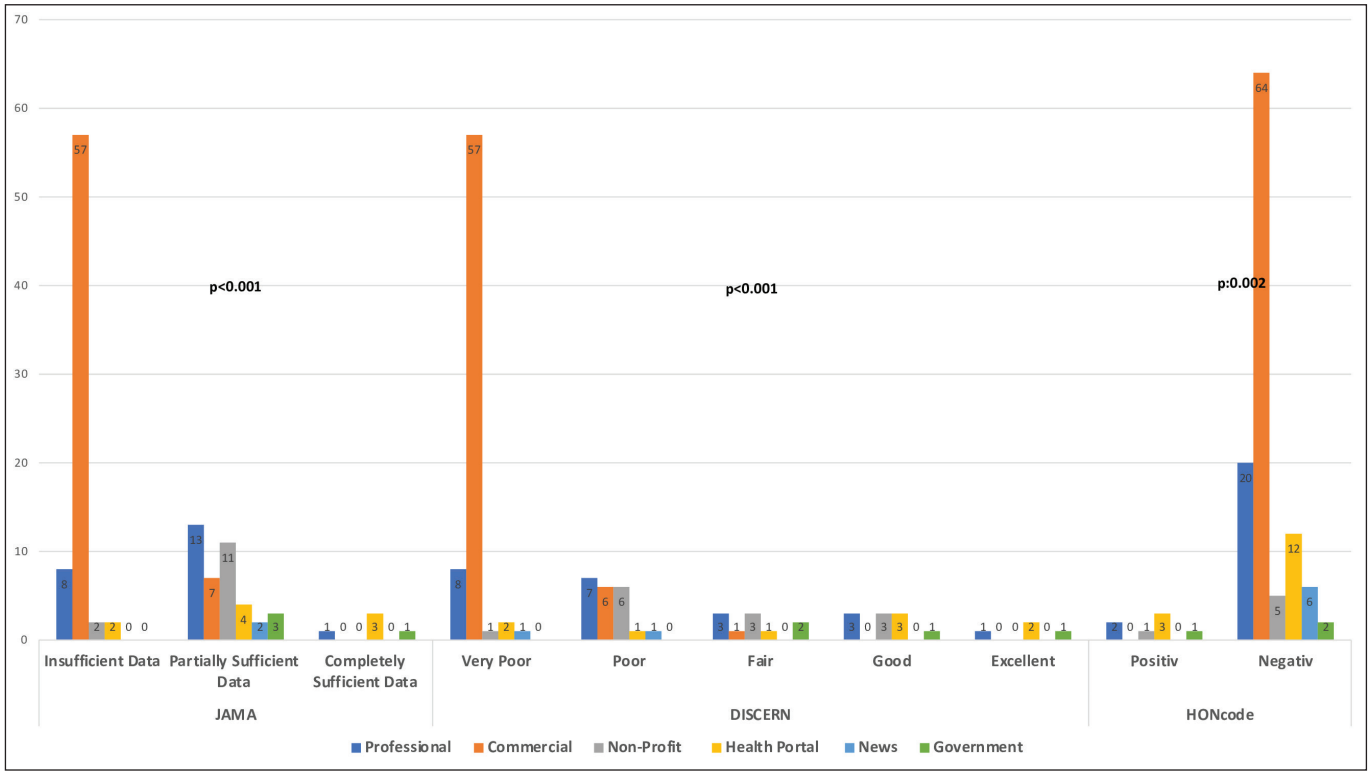

Figure 5: Comparison of JAMA, DISCERN scores, and HONcode presence according to the typologies of the websites.

Table III: Correlation Relationships Between Rank and Readability Formulas, JAMA, DISCERN Scores, HONcode Presences

	Alexa Rank		Web Rank		JAMA		DISCERN		GQS		HONcode	
	r	p	r	p	r	p	r	p	r	p	r	p
Mean FRES	-0.354	0.236	0.051	0.851	-0.005	0.957	0.034	0.721	0.013	0.888	0.120	0.204
Mean GFOG	0.254	0.402	-0.011	0.969	0.024	0.804	0.014	0.881	-0.014	0.982	-0.082	0.384
Mean FKGL	0.270	0.373	-0.027	0.920	0.010	0.915	-0.032	0.738	-0.031	0.742	0.112	0.235
Mean CL Index	0.508	0.076	-0.023	0.933	0.084	0.373	-0.112	0.235	0.088	0.354	-0.114	0.226
Mean SMOG index	0.219	0.473	-0.028	0.919	0.041	0.664	-0.002	0.982	0.010	0.915	0.089	0.388
Mean ARI	0.345	0.249	0.019	0.945	-0.030	0.749	-0.071	0.450	-0.075	0.429	-0.105	0.267
Mean LW Formula	0.068	0.825	0.028	0.917	-0.004	0.964	-0.034	0.722	-0.057	0.545	-0.079	0.403
Grade Level	0.212	0.486	0.015	0.956	-0.006	0.951	-0.042	0.656	-0.045	0.636	-0.111	0.240
JAMA	-0.444	0.129	0.369	0.159	-	-	**0.918**	**<0.001**	**0.926**	**<0.001**	**0.428**	**<0.001**
DISCERN	-0.376	0.206	0.284	0.207	**0.918**	**<0.001**	-	-	**0.939**	**<0.001**	**0.403**	**<0.001**
GQS	-0.414	0.160	0.331	0.211	**0.926**	**<0.001**	**0.939**	**<0.001**	-	-	**0.415**	**<0.001**
HONcode	-0.291	0.335	0.402	0.123	**0.428**	**<0.001**	**0.403**	**<0.001**	**0.415**	**<0.001**	-	-

FRES: *Flesch reading ease score,* ***FKGL:*** *Flesch-Kincaid grade level,* ***SMOG:*** *Simple Measure of Gobbledygook,* ***GFOG:*** *Gunning FOG-Index,* ***CL:*** *Coleman-Liau Index,* ***ARI:*** *automated readability Index and* ***LW:*** *Linsear Write,* ***JAMA:*** *Journal of American Medical Association Benchmark Criteria,* ***HONcode:*** *The Health on the Net Foundation Code of Conduct (HONcode),* ***GQS:*** *Global Quality Score, Bold character; statistically different (p<0.05).*

also for healthcare providers. Health literacy is defined as "the level of obtaining, processing, and understanding basic health information that individuals need to make decisions about their health" (17).

According to the US Department of Education, National Institute for Literacy, approximately 32 million American adults cannot read, and 68 million Americans have literacy skills that fall below the fifth-grade level (9). Considering that millions of health-related searches are made on Google all over the world and nearly four out of five American internet users access health-related information on the web, the importance of creating a site with appropriate readability emerges (11,17).

Our analysis revealed no discernible differences between the first 10 websites and the remaining websites when comparing their typologies. The websites of commercial and professional organizations were the most frequently mentioned in all search results. Significant differences were observed between the reliability scores of websites and their typologies. The significant difference we found was related to the JAMA scores of the websites, with health portal-based websites having high scores compared with commercial-based websites, which have low scores. The top 10 websites had no discernible difference in reliability compared with the rest of the websites. A significant relationship was found according to the DISCERN values and GQS criteria according to website typologies. This means health portal-based and government websites offer higher-quality content. The DISCERN values revealed no significant difference between the top 10 websites and other websites.

Our study found a significant difference in GQS values between the top 10 websites and remaining websites. Specifically, we found that 20% of the top 10 websites were of high quality, whereas only 9.6% of the other 94 websites were of low quality. A significant relationship was found between HONcode entities according to typologies. Accordingly, it was found that health portal-based websites offer quality content with a higher percentage of HONcode. A significant relationship was found between the top 10 websites and the rest of the websites when it came to HONcode presence. Accordingly, while the presence of HONcode was detected in 30% of the top 10 websites, it was found in 3.8% of the remaining websites. Except for the LW readability formula, we did not identify any statistically significant differences between the readability indicators of all sites based on their type. The readability scores of the top 10 websites and the others did not significantly differ from one another.

Commercial and professional institutions in our study created most of the websites. In the literature, there are similar results showing that the number of commercial websites is higher (3,21). On the other hand, Arif et al. showed that websites created by professional organizations are more common (2). In our study, we evaluated hospital websites that offered doctor appointment options or shared phone numbers for advertising purposes as commercial. Perhaps this has led to

a higher number of websites with commercial content. We encountered many websites emphasizing the commercial aspect of the procedure in the content related to SCS. We think that patients should be more careful about this issue, and non-commercial websites should involve healthcare professionals.

In the present study, the presence of HONcode was observed in 6.1% of the websites (n=7). In similar studies in the literature, the presence of HONcode was detected at 10% or 12.8% (25,30). For this reason, our study is slightly lower than the values in the literature. It is known that commercial sites are more interested in issues with financial profit. This can probably explain their low HONcode rate, which is a set of standards for ethical and dependable medical and health information on the internet (30). In addition, in the present study, websites with HONcode were found to have high DISCERN and GQS scores. We can conclude that healthcare practitioners should advise their patients to choose HONcode-compliant websites when looking for information regarding SCS.

The websites in this study received a "poor" mean DISCERN score of 28.03 ± 18, which was determined by the researchers. Similar results on health information in COVID-19, which is a current issue, were published by Halboub et al.; the DISCERN score was found to be 31.5 ± 12.55 and "poor" as well (14). There are studies in the literature reporting higher DISCERN scores. The use of academic websites or journals was associated with high DISCERN and JAMA ratings, as well as outcomes with difficult readability (20).

Patients are known to prefer comprehensible sources with fewer medical terms when looking for health-related information online. Academic resources, on the other hand, can be defined as the resources used by healthcare. Therefore, we excluded scientific journals from our study.

There was no statistically significant difference when comparing website typologies and readability. However, our results indicate that the average readability scores of the websites studied exceeded the National Institutes of Health recommendation for a 6th-grade reading level. This result is consistent with previous literature on the same topic (20). In a similar study related to patients' information about COVID-19, the authors reported moderate to low readability scores (18), which makes it clear that more individuals can be effectively informed with easier readability levels. In relation to this, information can be presented more effectively by using the suggested level of readability.

In the content analysis, it was determined that there were 98 (86%) websites with indication-based content, followed by 97 (85.1%) websites with procedure-based information. The least number are videos with explanation content, only found on 11 (9.6%) websites. Between website typologies and subjects, there was no statistically significant difference. Considering that there are more commercial websites, it is not surprising that there are more websites that address indication and implantation topics but fewer websites with explanation procedure content.

The present study has its limitations. We exclusively searched for English-language websites and used Google.com as our search engine. We detected websites using the United States data network, which is a single country.

Although there is no consensus on which index is the best for evaluating the readability of internet-based PEMs, the indices we used in our study are among the most common ones.

CONCLUSION

The internet-based PEM related to SCS was found to have a readability level that exceeded the National Health Institute's recommended Grade 6 level. Our analysis revealed that the reliability and quality of the website content were generally low and poor, respectively. Health portal-based websites were found to provide more reliable and higher-quality information, whereas commercial websites performed poorly in comparison to these values. The JAMA, DISCERN, GQS, and HONcode correlations revealed that reliable websites also offer high quality content. For a better understanding of the therapy and procedure, we recommend that websites offering health-related information be of a reading level appropriate for the average educational level of each nation.

Therefore, websites should be checked using relevant readability indices.

AUTHORSHIP CONTRIBUTION

Study conception and design: MEG, GKM, EO
Data collection: MEG, EO
Analysis and interpretation of results: GKM, EO, VH
Draft manuscript preparation: MEG, GKM, EO
Critical revision of the article: GKM, VH
All authors (MEG, GKM, EO, VH) reviewed the results and approved the final version of the manuscript.

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