

Main Article

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Assessing the readability and quality of online information on Bell's palsy

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Abstract

Objective. This study aimed to evaluate the readability and quality of current online information on Bell's palsy.

Method. A Google search using the terms 'Bell's palsy' and 'facial palsy' was performed separately. The first three pages of results were analysed. Readability was assessed using Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning-Fog Index and the Simple Measure of Gobbledygook. Quality was assessed using the Discern tool. Spearman's correlation between quality and readability was calculated.

Results. A total of 31 websites met the inclusion criteria. The mean Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning Fox Index and the Simple Measure of Gobbledygook scores were 52.45 (95 per cent confidence interval = 47.01–57.86), 10.50 (95 per cent confidence interval = 9.42–11.58), 12.76 (95 per cent confidence interval = 11.68–13.85) and 9.36 (95 per cent confidence interval = 8.52–10.20), respectively. The average Discern score was 44 (95 per cent confidence interval = 40.88–47.12). A negligible correlation was noted between the Discern and Flesch Reading Ease Score ($r_s = -0.05$, $p = 0.80$).

Conclusion. Online information on Bell's palsy is generally of fair quality but is written above the recommended reading age guidance in the UK.

Introduction

Bell's palsy is an acute, unilateral facial nerve paresis or paralysis of unknown cause. It has an incidence of between 20 and 30 per 100,000 people per year in the UK, with an equal sex distribution and median age of onset of 40 years.¹ Although typically self-limited, the facial weakness that occurs in Bell's palsy may cause a range of complications, such as eye injuries and facial pain. Oral incompetence and psychological sequelae can lead to additional poor outcomes, which can have a marked impact upon quality of life. In addition, with rapid onset of symptoms in less than 72 hours, patients with Bell's palsy can often feel frightened and confused, particularly as they may initially fear that they are having a life-threatening stroke. Seeking medical help early is imperative to establish the correct diagnosis and start the appropriate treatment of Bell's palsy. This can help optimise outcomes and likelihood of recovery.²

The coronavirus disease 2019 (Covid-19) pandemic has significantly affected help-seeking behaviour and attitudes, with a greater reluctance among the public to seek medical help.³ Key reasons include, but are not limited to, fear of Covid-19 infection, particularly among high-risk and shielding groups; fear of overwhelming the National Health Service (NHS); and lack of awareness that medical help should still be sought in an emergency. Operational changes to healthcare service delivery during the pandemic, such as reduced number of face-to-face consultations, has created additional barriers to accessing services, with patients more likely to seek information online first. This can be problematic because lack of regulation, quality and readability of online healthcare information mean it can vary greatly.

To date, there has been no study that has examined the appropriateness of online information relating to Bell's palsy. The aim of this study was to evaluate the quality and readability of online patient education information on Bell's palsy.

Materials and methods

Internet search strategy

The search terms 'Bell's palsy' and 'facial palsy' were entered separately into Google® Chrome in January 2022. All cookies and browser history were deleted prior to the searches in order to minimise bias of results based on previous internet activity. The first 3 webpages of search results were analysed, resulting in 27 websites for each search term. We elected to search only Google as it currently holds 92 per cent of the UK search engine market share.⁴ Additionally, we only assessed the first 3 webpage results for each Google search as most internet users do not typically look beyond this.⁵ The workflow of our methodology is shown in [Figure 1](#).

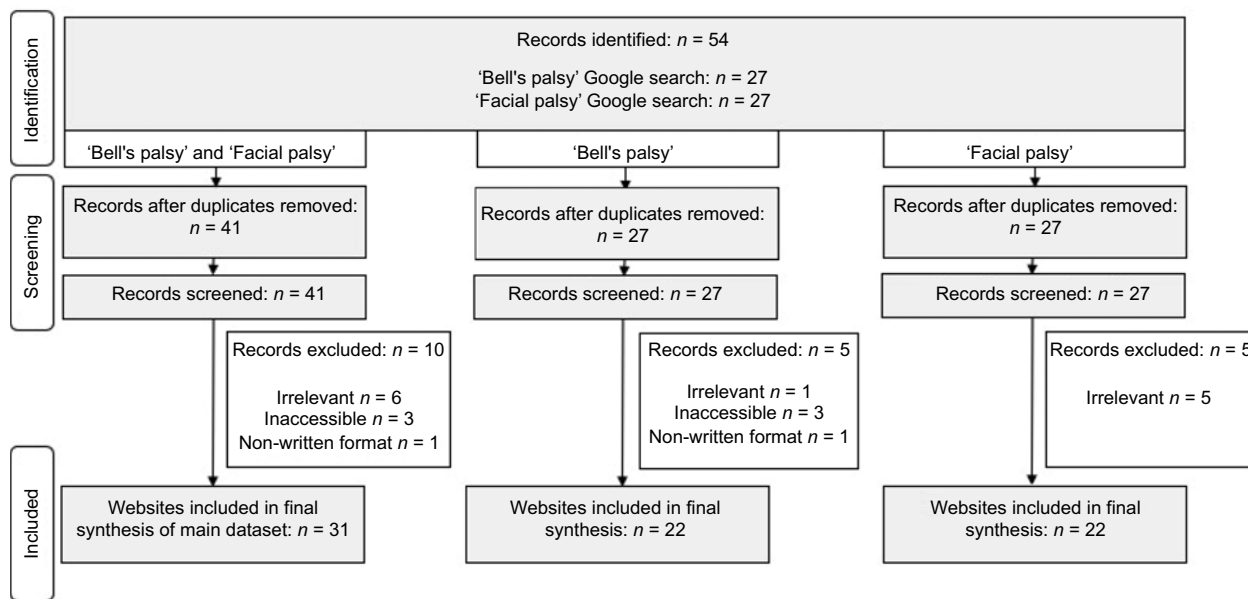


Figure 1. Flow diagram displaying the systematic search methodology. The searches were performed in January 2022.

All websites were objectively scored for readability and quality by the authors (HR and NF). Any inconsistency during website evaluation was resolved by utilising a third independent assessor who made the final decision.

Eligibility criteria

Websites were included if they were written in English, if information was presented in written format and was accessible without a subscription. Websites not relevant to ‘Bell’s palsy’ or ‘facial palsy’ were excluded, including those where information was presented in the format of a scientific paper. Duplicate websites were also excluded.

Readability assessment

Four validated tools were used to measure the readability of information on each website. These included: Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning Fox Index and the Simple Measure of Gobbledygook score (Table 1). Written patient information for each website was transferred into Microsoft Word® and analysed using an online tool.⁶

Flesch Reading Ease Score generates a score ranging from 0–100, with higher scoring content being easier to read.

Content with a score of 60–79 is classed as ‘average’, written at a suitable reading level for a 12 to 15-year-old, and a score of 80–100 is categorised as ‘easy to read’, deemed suitable for a 9 to 12-year-old. Content with a score of 0–60 is classed as ‘difficult’ to read.⁷

Flesch–Kincaid Grade Level, the Gunning Fox Index and the Simple Measure of Gobbledygook score estimate the US academic grade level (number of years of education) necessary to comprehend written information. Both the Gunning Fox Index and Simple Measure of Gobbledygook score assess the average sentence length and the number of ‘complex’ words, defined as those consisting of three or more syllables. A sample of 10 sentences from the beginning, middle and end of a body of text is used for both calculations.

Quality assessment

The quality of written information provided by each website was assessed using the Discern instrument (Table 2). First validated in 1999, it consists of 16 separate criteria that are rated through an ordinal Likert scale of 1 to 5.⁸ Section 1 (questions 1–8) assesses the reliability of a publication, whereas section 2 (questions 9–15) focuses on specific details about treatment choices. Section 3 (question 16) provides an overall rating of the literature quality. The total Discern score ranges from 16 to 80, with a higher score indicating better-quality information.

Table 1. Readability formulas and score interpretation

Test name	Formula	Result range	Result interpretation
Flesch Reading Ease Score	$= 206.835 - 1.015 \times \left(\frac{\text{words}}{\text{sentences}}\right) - 84.6 \times \left(\frac{\text{syllables}}{\text{words}}\right)$	0–100	0–30: very difficult; 30–50: difficult; 50–60: fairly difficult; 60–70: standard; 70–80: fairly easy; 80–90: easy; 90–100: very easy
Flesch–Kincaid Grade Level	$= 0.39 \times \left(\frac{\text{words}}{\text{sentences}}\right) + 11.8 \times \left(\frac{\text{syllables}}{\text{words}}\right) - 15.59$	0–12	US grade level of education required to understand a text on the first reading
Gunning Fox Index	$= 0.4 \times \left[\left(\frac{\text{total words}}{\text{total sentences}}\right) + 100 \left(\frac{\text{complex words}}{\text{total words}}\right) \right]$	0–20	6: 6th grade (US); 7: 7th grade; 8: 8th grade; 9–12: high school; 13–17: college; 17+: college graduate
Simple Measure of Gobbledygook score	$= 3 + \sqrt{\text{number of polysyllabic words}}$	4–18	Years of formal education required to understand a text

Table 2. Discern scoring system

Question number	What is being investigated?	Question rating				
		No	Partially			Yes
Section 1						
1	Are the aims clear?	1	2	3	4	5
2	Does it achieve its aims?	1	2	3	4	5
3	Is it relevant?	1	2	3	4	5
4	Is it clear what sources of information were used to compile the publication (other than the author or producer)?	1	2	3	4	5
5	Is it clear when the information used or reported in the publication was produced?	1	2	3	4	5
6	Is it balanced and unbiased?	1	2	3	4	5
7	Does it provide details of additional sources of support and information?	1	2	3	4	5
8	Does it refer to areas of uncertainty?	1	2	3	4	5
Section 2						
9	Does it describe how each treatment works?	1	2	3	4	5
10	Does it describe the benefits of each treatment?	1	2	3	4	5
11	Does it describe the risks of each treatment?	1	2	3	4	5
12	Does it describe what would happen if no treatment is used?	1	2	3	4	5
13	Does it describe how the treatment choices affect overall quality of life?	1	2	3	4	5
14	Is it clear that there may be more than one possible treatment choice?	1	2	3	4	5
15	Does it provide support for shared decision making?	1	2	3	4	5
Section 3						
16	Based on the answers to all of these questions, rate the overall quality of the publication as a source of information about treatment choices	1	2	3	4	5

Scores are categorised as follows: very poor (16–29), poor (30–40), fair (41–51), good (52–63) and excellent (64–80).

Statistical analysis

All statistical analyses were performed using the data analysis tool on Microsoft Excel® spreadsheet software 2019 for Mac. This included calculating mean readability and quality scores, 95 per cent confidence interval ranges and Spearman's correlation. Statistical significance was set at $p < 0.05$.

Results

A total of 54 websites were screened against the exclusion criteria, resulting in 31 unique websites forming the main dataset (Figure 1). The following exclusion criteria applied: duplicate website ($n = 13$), scientific or journal article ($n = 4$), subscription-based website ($n = 3$) and websites that did not contain information relevant to the 'Bell's palsy' or 'facial palsy' ($n = 3$). All three of these were medical clinic information pages.

Readability assessment

When assessing the main dataset, mean scores and 95 per cent confidence intervals for Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning Fox Index and the Simple Measure of Gobbledygook score were 52.45 (47.01–57.86), 10.50 (9.42–11.58), 12.76 (11.68–13.85) and 9.36 (8.52–10.20), respectively (Table 3). A mean Flesch Reading Ease Score of 52.45 indicates that content was 'fairly difficult'

to read. Flesch–Kincaid Grade Level, the Gunning Fox Index and Simple Measure of Gobbledygook scores equate to an average required reading age of 15–16, 17–18 and 15–16 years old, respectively.

On sub-analysis of the search term 'Bell's palsy', the mean scores and 95 per cent confidence intervals for Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning Fox Index and Simple Measure of Gobbledygook score were 55.90 (50.40–61.40), 9.85 (8.68–11.01), 12.20 (10.97–13.43) and 8.91 (7.98–9.85), respectively (Table 3). A mean Flesch Reading Ease Score of 55.90 indicates that the content was 'fairly difficult' to read. The scores for Flesch–Kincaid Grade Level, the Gunning Fox Index and Simple Measure of Gobbledygook score are equivalent to a reading age of 15–16, 17–18 and 14–15 years old, respectively.

On sub-analysis of the search term 'facial palsy', the mean scores and 95 per cent confidence intervals for Flesch Reading Ease Score, Flesch–Kincaid Grade Level, the Gunning Fox Index and Simple Measure of Gobbledygook score were 48.15 (41.64–54.66), 11.27 (9.97–12.58), 13.50 (12.20–14.81) and 9.96 (8.95–10.98), respectively (Table 3). A mean Flesch Reading Ease Score of 48.15 indicates that the content was 'difficult to read'. The scores for Flesch–Kincaid Grade Level, the Gunning Fox Index and Simple Measure of Gobbledygook score are equivalent to the reading age of 16–17, more than 18 and 15–16 years old, respectively.

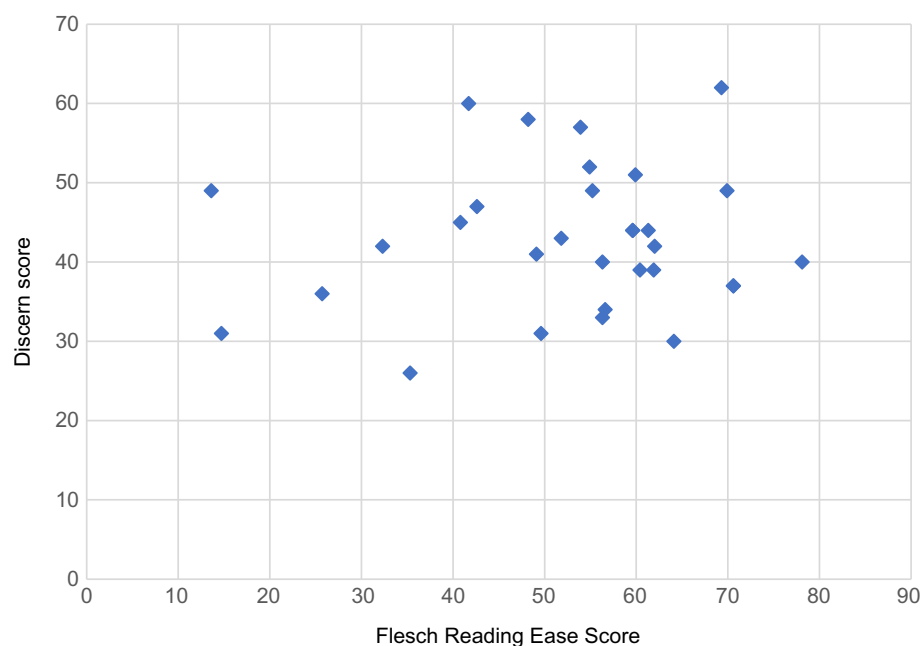
Quality assessment

Three resources had to be excluded from Discern calculations in the 'facial palsy' dataset because of a lack of information

Table 3. Summary of readability and quality data for 'Bell's palsy' and 'Facial palsy' search terms

Test name	Main dataset search term analysis Bell's palsy & facial palsy*	Search term-specific subgroup analysis		
		Bell's palsy [†]	Facial palsy [‡]	P-value
Flesch Reading Ease Score (mean (95 per cent CI))	52.45 (47.04–57.86)	55.90 (50.40–61.40)	48.15 (41.64 – 54.66)	0.089
Flesch–Kincaid Grade Level (mean (95 per cent CI))	10.50 (9.42–11.58)	9.85 (8.68–11.01)	11.27 (9.97–12.58)	0.126
Gunning Fog Index (mean (95 per cent CI))	12.76 (11.68–13.85)	12.20 (10.97–13.43)	13.50 (12.20–14.81)	0.172
Simple Measure of Gobbledygook (mean (95 per cent CI))	9.35 (8.52–10.20)	8.91 (7.98–9.85)	9.96 (8.95–10.98)	0.154
Discern score (mean (95 per cent CI))	44.00** (40.88–47.12)	45.82 (42.33–49.30)	44.89** (41.02–48.76)	0.435

* $n = 31$; [†] $n = 22$; [‡] $n = 22$; **3 search results not containing information related to treatment options removed from Discern calculations. $p < 0.05$ for significance. CI = confidence interval

**Figure 2.** Scatter plot comparing ease of readability (Flesch Reading Ease Score) and (Discern) quality scores.

regarding treatment ($n = 19$). The mean Discern score for the combined dataset was 44.00 (40.88–47.12), denoting that information was of 'fair quality'. Discern scores and 95 per cent confidence intervals for the search terms 'Bell's palsy' and 'facial palsy' were 45.82 (42.33–49.30) and 44.89 (41.02–48.76), respectively. This equates to 'fair quality' for both search terms.

Correlation between Flesch Reading Ease Score and Discern

There was a negligible correlation between Flesch Reading Ease Score and Discern scores from the main dataset ($r_s = -0.05$, $p = 0.80$; Figure 2).

Discussion

Patients are increasingly seeking health-related information online. This is the first study, to our knowledge, to have systematically evaluated the readability and quality of online information relating to Bell's palsy. We found that information is generally of fair quality but difficult to read.

Bell's palsy is a disabling condition that can have a profound impact on patient quality of life. With a rapid onset of symptoms, individuals may seek urgent information online, particularly as symptoms may mimic a stroke. In addition, although prognosis on the whole is favourable, sequelae can include

aesthetic, functional and psychosocial disturbances. This includes: unrecovered paresis, contracture of facial muscles, and difficulty eating and drinking. Access to high-quality information online can play an instrumental role in empowering patients to actively participate in their care and recovery.⁹

This study found that websites on Bell's palsy were generally 'fairly difficult' to read, with an expected reading age of a 15 to 18-year-old. This exceeds the UK recommendation of 9 to 11 years old.¹⁰ Similarly, in the USA, the National Institutes of Health recommends that the readability of patient education materials should be written at a level no greater than 6th grade, equivalent to 11 to 12 years old. Although the readability scores for 'Bell's palsy' were slightly more favourable than those for 'facial palsy', none of the websites analysed in this study achieved these recommendations. This is significant because readability is a key component of health literacy. There is growing evidence to demonstrate that individuals with poor literacy are likely to have worse knowledge of their medical condition and treatment compliance.¹¹

Thus, content with a high readability score as demonstrated by our study may discriminate against individuals who are likely to have lower average levels of health literacy, such as those from lower socioeconomic backgrounds.¹² In addition, in the current climate relating to Covid-19, patients are more likely to search for healthcare information online.¹³ The result of this is a likely widening of health inequalities with poorer health outcomes.

The general content for Bell's palsy was found to be of 'fair quality', indicating that there were potentially important but not serious shortcomings. Although the highest quality resources were from the National Institute for Health and Care Excellence Clinical Knowledge Summaries and Patient UK, there is scope to improve the quality of information provided by other webpages to ensure that patients are better informed about the multidisciplinary approach required for the management of Bell's palsy.^{14,15}

Our readability and quality scores for online healthcare information are similar to those in the existing scientific literature for otolaryngology. For example, analysis of online information relating to the search term 'tinnitus' was found to be of 'fair quality' but had poor readability.¹⁶ Similarly, online information relating to 'chronic rhinosinusitis' was found to be of high-quality but poor readability.¹⁷

- Bell's palsy is an acute, unilateral facial nerve weakness of rapid onset and unknown cause
- It is important to quickly seek medical attention after the onset of symptoms to avoid misdiagnosis or delayed diagnosis
- This study aimed to assess the readability and quality of online information on Bell's palsy
- Online information on Bell's palsy is generally of fair quality but written above the recommended reading age guidance in the UK
- There was a negligible correlation between the readability and quality of online information on Bell's palsy

We found a negligible correlation between Flesch Reading Ease Score and Discern scores for online information relating to Bell's Palsy. This demonstrates that further work is needed as information should be easily readable and high-quality to aid patients in medical decision-making. It should also be accessible to all patients, including those with lower health literacy rates, complex care needs and older adult patients. Of the combined 31 websites analysed in this dataset, only one was deemed to be of both 'good quality' and 'easy' readability.¹⁵

Limitations

This study has several limitations. First, the search strategy only reviewed websites from the first three search pages on Google. It is possible that patients may use different search engines such as Bing® and Yahoo® to access healthcare information and explore beyond the third search page. This could result in other online patient education materials being identified that may have different readability and quality outcomes than those included in this study. Second, websites were only assessed if they were written in English, limiting the applicability of results to those who understand the language. Third, readability tools do not account for the presentation and layout of information on a given website, including use of illustrations or videos. These are important factors that contribute to clarity and comprehension. Fourth, although the Discern instrument evaluates a wide variety of factors that contribute towards information quality, it requires a degree of subjective assessment and does not consider the accuracy of information. Finally, the internet is a dynamic

platform whereby information and resources are constantly changing, and thus our search results may differ at different moments in time.

Conclusion

This is the first study to have evaluated the readability and quality of online information relating to Bell's palsy. Freely available information online is difficult to read and exceeds the UK recommended reading level for health information. Quality of information, although varying by source, is generally fair. Healthcare professionals should re-assess the current offering and develop or direct patients to high-quality websites that are easily comprehensible. This will better facilitate patient education and shared decision-making.

Competing interests. None declared

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