

Main Article

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Readability and quality of online patient health information on parotidectomy

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Abstract

Objective. Complications of parotidectomy can have a massive impact on patients' quality of life. This study aimed to evaluate the readability and quality of online health information on parotidectomy.

Method. The search terms 'parotidectomy', 'parotid surgery', 'parotidectomy patient information' and 'parotid surgery patient information' were parsed through three popular search engines.

Results. The websites were analysed using readability scores of the Flesch Reading Ease test and the Gunning Fog Index. The DISCERN instrument was used to assess quality and reliability. The average Flesch Reading Ease score was 50.2 ± 9.0 , indicating that the materials were fairly difficult to read, the Gunning Fog Index score showed that the patient health information was suitable for an individual above 12th grade level, and the DISCERN score indicated that the online patient health information had fair quality. The Kruskal–Wallis test showed a significant difference in Flesch Reading Ease and DISCERN tool scores according to website category ($p < 0.05$).

Conclusion. Current online patient health information on parotidectomy is too difficult for the public to understand, and it exceeds the reading levels recommended by Health Education England and the American Medical Association.

Introduction

Parotidectomy is considered the definitive management for benign and malignant parotid gland tumours.¹ The facial nerve travels within the parotid gland; hence, identification and preservation of the nerve is crucial.² Complications and long-term outcomes of parotidectomy can significantly impact patients' quality of life and should be considered when consenting, as when parotidectomy is improperly performed, this could lead to litigation.

Literature available on the patient's perspective has shown that sensory impairment, facial nerve dysfunction, Frey's syndrome and cosmetic outcomes impact quality of life the most, leading to significant morbidity.^{3–6} Thus, the decision-making process and consent for parotidectomy need to be supportive, clear, accurate and well-informed.⁷

The internet, with its wealth of information, has undoubtedly been a source of information for patients. Statista Research Department has revealed that out of 2004 respondents, 73 per cent have used the internet to search a symptom or self-diagnose, and 38 per cent have looked up risks of procedures.⁸ Although there are potential benefits to obtaining health information from the internet, it has its limitations in terms of quality and accuracy of information. Furthermore, in the UK, the majority of adults have the health literacy expected of the average 11- to 14-year-old. Health Education England has recommended that reading materials should be aimed at the average 11-year-old individual.⁹ The American Medical Association proposes that patient materials should be written at a sixth grade level.¹⁰ Several studies on the readability and quality of online health information about otolaryngology-related procedures and conditions have reported that information online is too difficult for the general public to understand.^{11–15}

To our knowledge, only one published paper has investigated the readability of online health information on parotidectomy. Our study not only focuses on a wider number of resources but also includes a larger number of websites. This allows us to provide a better overview on the current literature available for patients in the UK. Parotidectomy is a common head and neck surgical procedure; thus, the onus lies on healthcare professionals to review online information and ensure patients are equipped to make a well-informed decision. This study aimed to evaluate the readability and quality of online health information on parotidectomy.

Methods

The search was performed on three search engines, Google, Yahoo and Bing, in November 2021. The search terms used were 'parotidectomy', 'parotid surgery',

‘parotidectomy patient information’ and ‘parotid surgery patient information’. The top 30 websites from each search term were reviewed according to the inclusion and exclusion criteria, as described below. Duplicates were removed.

Inclusion and exclusion criteria

All search results needed to include patient health information on parotidectomy. Exclusion criteria included inaccessible websites, blogs, forums, PowerPoint slides, scientific webpages, articles targeting medical professionals, information not written in English language and websites not related to parotidectomy.

Website classification

The websites were classified into government, private clinics, professional organisations, medical information and miscellaneous sources.

Readability assessment

Plain text from each website was transferred to Microsoft Word software. All formatting was removed. Readability was analysed with the Flesch Reading Ease test and the Gunning Fog Index. The scores were calculated using an online readability calculator from online-utility.org. Flesch Reading Ease scores range between 1 and 100, where higher scores correspond to text that is easier to read.¹⁶ The Gunning Fog Index directly approximates the years of formal education a person will need to understand the text on initial reading. An ideal score to aim at for the understanding of the general public will be 8.¹⁷ For instance, a Gunning Fog Index score of 8 requires the reader to be in eighth grade or above. Table 1 shows the formula used for calculating the scores. Table 2 shows the interpretation of Flesch Reading Ease scores.¹⁸

Quality assessment

The DISCERN instrument was used to objectively evaluate the quality of websites. The DISCERN instrument is a validated tool designed to help health consumers and information providers assess the quality of patient health information in terms of its treatment content. It can be used to assess certain features that enable a publication to be deemed useful for treatment decisions. It consists of 16 questions split into 3 major sections. The first section focuses on the reliability of the publication, the second section on the details of the information and the third section on the overall rating of the publication. It is based on a five-point continuous scale, with ratings of 1 = low rating and 5 = high rating. A total score out of a maximum of 80 points is calculated from the sum of the scores for the 16 individual questions.¹⁹ Two raters (JYT and YCT) independently assessed the DISCERN scores for all online patient health information. Discrepancies of more than four points

Table 2. Flesch Reading Ease score interpretation

Score	School level	Interpretation
100–90	5th grade	Very easy to read. Easily understood by average 11-year old student
90–80	6th grade	Easy to read. Conversational English for consumers
80–70	7th grade	Fairly easy to read
70–60	8th & 9th grades	Plain English. Easily understood by 13- to 15-year-old students
60–50	10–12th grade	Fairly difficult to read
50–30	College	Difficult to read
30–10	College graduate	Very difficult to read. Best understood by university graduates
10–0	Professional	Extremely difficult to read. Best understood by university graduates

were resolved by an independent third rater (DY), with discussions with the first two raters to reach a consensus. The scores were averaged to provide the final score for this study.

Data analysis

Means and standard deviations were calculated for continuous scores. The Kruskal–Wallis test was used to analyse average results according to the website categories. Spearman correlation analysis was used to evaluate the correlation between DISCERN score and total number of words in the online patient health information. A *p*-value of 0.05 was considered statistically significant.

Results

The searches performed yielded 360 results, of which 111 websites were removed because of duplication. Inclusion and exclusion criteria were then applied. There were 52 patient health information websites that met the inclusion criteria, and these were evaluated.

Of all the patient information websites, 51.9 per cent (*n* = 27) were from private clinics, 19.2 per cent (*n* = 10) were government websites, 13.5 per cent (*n* = 7) were from professional organisations, 13.5 per cent (*n* = 7) were medical information websites and 1.9 per cent (*n* = 1) were from miscellaneous sources (Fig. 1).

Readability

The mean Flesch Reading Ease score for the online patient health information was 50.2 ± 9.0, with a range of 30–63.3. Forty-six of 52 online patient health information websites had Flesch Reading Ease scores below 60, which indicates material that is fairly difficult to read. The evaluated patient health information can be comprehended by patients of 12th grade and above. Government websites, followed by medical information websites, have the highest Flesch Reading Ease scores, which fall under the classification that is fairly difficult to read. The other website categories were classified as difficult to read. Fig. 2 shows the average scores for Flesch Reading Ease scores according to website category. A Kruskal–Wallis test revealed that there was a significant difference in Flesch Reading Ease scores between website categories (*H*(4) = 9.95, *p* = 0.041).

Table 1. Tests and formulas used for calculation

Tests	Formula
Flesch Reading Ease	$206.835 - 1.015 \left(\frac{\text{total words}}{\text{total sentences}} \right) - 84.6 \left(\frac{\text{total syllables}}{\text{total words}} \right)$
Gunning Fog Index	$0.4 \left\{ \left(\frac{\text{words}}{\text{sentences}} \right) + 100 \left(\frac{\text{complex words}}{\text{words}} \right) \right\}$

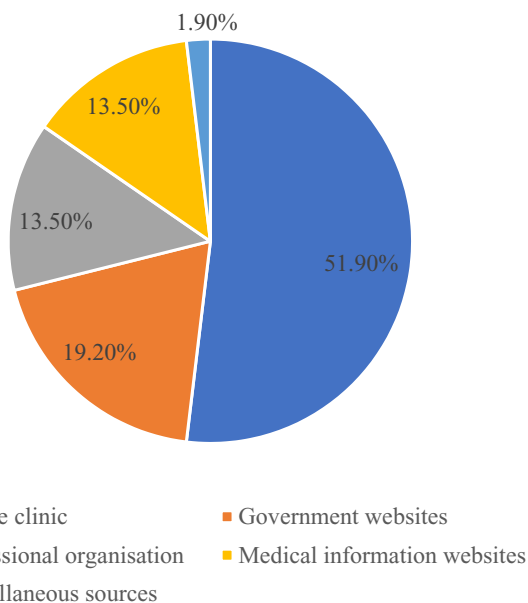


Figure 1. Percentages of websites in each category.

The mean Gunning Fog Index score was 12.5 ± 1.9 . The reading grade ranged from eighth grade to senior college level. The ideal score is 8; one online patient health information source had the closest score, of 8.78. Patient health information from government websites had the lowest average grade level, followed closely by medical information websites. Fig. 3 shows the average reading grade levels based on Gunning Fog Index scores according to website category. A Kruskal–Wallis test revealed that there was no significant difference in Gunning Fog Index scores between website categories ($H(4) = 8.75, p = 0.068$).

Discern scores

The average DISCERN score was 43.7 ± 1.3 . The scores ranged from 19 to 71. Fig. 4 shows the average DISCERN score for each question. Table 3 shows the individual questions used for scoring, with the respective average \pm standard deviation values.¹⁹ Table 4 shows the corresponding quality level of the total DISCERN score. The question targeting relevance of patient health information was consistently highly scored, whereas the question on whether information is provided regarding a non-treatment route had the lowest score. Fig. 5 shows average DISCERN scores according to website category. The highest scoring for reliability and quality was from the

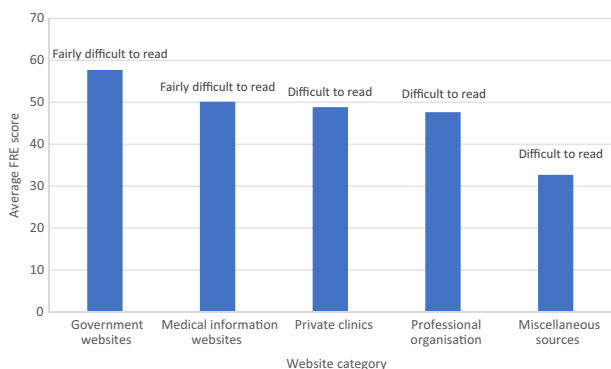


Figure 2. Average Flesch Reading Ease (FRE) scores according to website category.

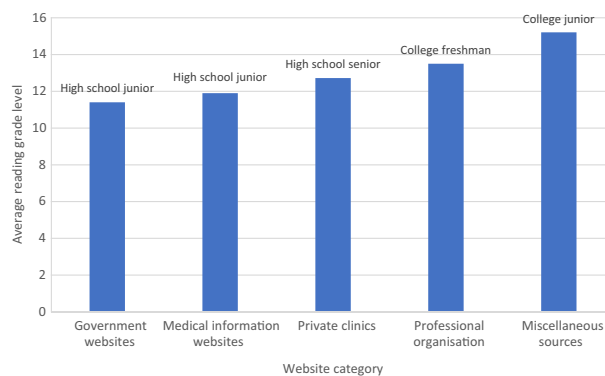


Figure 3. Average reading grade levels based on Gunning Fog Index scores according to website category.

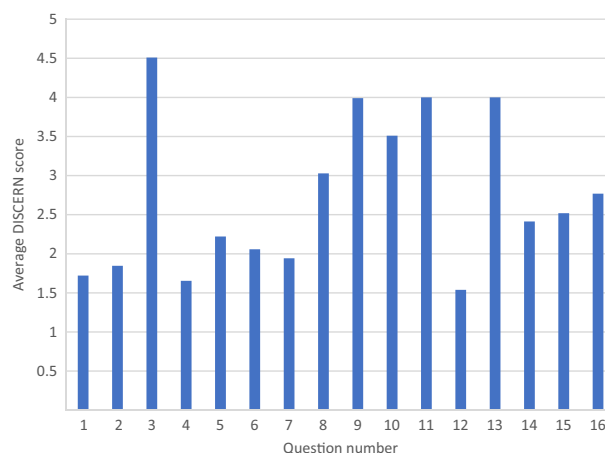


Figure 4. Average DISCERN scores for each question.

miscellaneous source of Wikipedia. Patient health information from private clinics had the lowest DISCERN score. A Kruskal–Wallis test revealed that there was significant difference in DISCERN scores between website categories ($H(4) = 14.02, p = 0.007$). Spearman’s rank correlation co-efficient showed a moderate and statistically significant correlation between DISCERN score and the total number of words in the patient health information ($r = 0.43, p = 0.001$).

Discussion

On a global level, 278 million internet searches are conducted in a day, and approximately 12.5 million of these searches are on health-related issues.²⁰ Fifty per cent of parents used internet resources to find medical information prior to their child’s surgery.²¹ Online health information seeking was inversely associated with age.²² Information technologies have a role in disseminating health and medical information, thereby improving knowledge transfer from healthcare professionals to the general public and reducing the gap of power and communication.²³ However, this largely unregulated source of information can lead to conflicting or confusing information. Poor readability and understanding of information can have a negative effect on medical adherence.^{24,25}

Several studies on the readability and quality of online health information about otolaryngology-related procedures and conditions have reported that the information online is too difficult for the general public to understand.^{11–15} One

Table 3. Questions used in DISCERN scoring

Question	Score (mean ± SD)
1. Are the aims clear?	1.72 ± 0.06
2. Does it achieve its aims?	1.85 ± 0.09
3. Is it relevant?	4.49 ± 0.31
4. Is it clear what sources of information were used to compile the publication (other than the author or producer)?	1.66 ± 0.07
5. Is it clear when the information used or reported in the publication was produced?	2.21 ± 0.15
6. Is it balanced and unbiased?	2.06 ± 0.57
7. Does it provide details of additional sources of support and information?	1.96 ± 0.28
8. Does it refer to areas of uncertainty?	3.03 ± 0.34
9. Does it describe how each treatment works?	3.97 ± 0.15
10. Does it describe the benefits of each treatment?	3.50 ± 0.14
11. Does it describe the risks of each treatment?	3.99 ± 0.18
12. Does it describe what would happen if no treatment is used?	1.54 ± 0.17
13. Does it describe how the treatment choices affect overall quality of life?	3.98 ± 0.34
14. Is it clear that there may be more than one possible treatment choice?	2.42 ± 0.21
15. Does it provide support for shared decision-making?	2.51 ± 0.42
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	2.78 ± 0.15

SD = standard deviation

Table 4. Corresponding quality level of total DISCERN score

DISCERN score	Quality level
64–80	Excellent
52–63	Good
41–51	Fair
30–40	Poor
16–29	Very poor

study to our knowledge, by Grose *et al.*, has analysed the quality and readability of online patient education materials regarding parotidectomy.²⁶ That study evaluated 35 patient health information materials from the first 10 pages on Google. Readability was analysed using Flesch–Kincaid grade level and Flesch Reading Ease score, and quality was analysed using the DISCERN tool. The results showed that online patient information materials may not be comprehensible to the average individual.²⁶

Our study results are consistent with the findings of Grose *et al.*²⁶ In our Flesch Reading Ease readability assessment of online patient health information on parotidectomy, the average grade level of the 52 websites was 10th to 12th grade. The mean Flesch Reading Ease score for the online patient health information was 50.2 ± 9.0, with a range of 30–63.3. In fact, only 7 of 52 patient health information websites had Flesch Reading Ease scores above the standard criterion of 60, where they can be comprehended by patients who completed

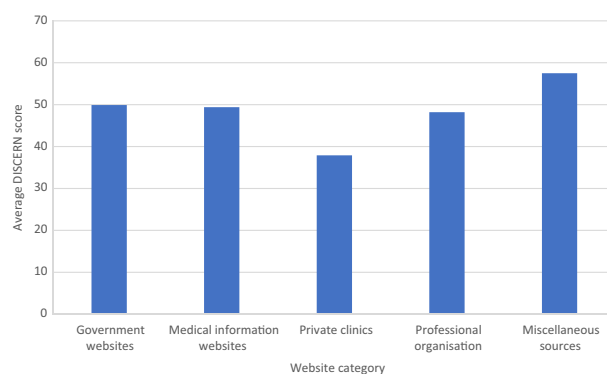


Figure 5. Average DISCERN scores according to website category.

10th grade and above. The mean Gunning Fog Index score was 12.5 ± 1.9. The reading grade ranges between eighth grade and senior college level. Government websites exhibited better readability scores, and there was a statistically significant difference in Flesch Reading Ease scores ($p < 0.05$). On average, compared to the 11-year-old criterion put forward by Health Education England and the sixth grade level criterion recommended by the American Medical Association,^{9,10} none of the online patient health information had a score below an eighth grade level.

We also included patient health information from ENT UK on parotid surgery in our study. Its readability score was 60.99 on the Flesch Reading Ease score, which showed information that was readable by an eighth grade student. The DISCERN score was an average of 37.5 according to independent author ratings; this is because of the lack of clarity on pre-operative preparation, post-operative care, when to seek help and where to do so.

The average grade level of popular magazines including *National Geographic*, *People Magazine*, *Time Magazine*, *Sports Illustrated* and *Reader's Digest* was 9.5.²⁷

One study analysing the readability of patient health information for urological treatments demonstrated that although online patient health information may be easily readable by well-educated adults, a significant proportion of the UK adult population still struggle with comprehension.²⁸ This is in line with the National Literacy Trust finding that one in six adults in England has very poor literacy skills.²⁹

In our quality assessment, the mean DISCERN score showed that the websites had fair quality. There was a statistically significant difference ($p < 0.05$) in DISCERN scores according to website category. The DISCERN tool indicated that the online patient health information consistently scored highly in terms of relevance, how each treatment works, treatment risks and the impact of treatment choices on quality of life. Websites failed to consistently describe the outcomes if no treatment is used. General Medical Council (GMC) guidelines state that clinicians need to provide patients with information on the potential benefits, risks of harm, and uncertainties about and likelihood of success for each option, including the option to take no action.^{7,30}

Many websites also consistently failed to appropriately state their aims and sources of information. Clear aims at the beginning of a publication are important, as this helps readers to judge at the outset if the material is likely to contain the information they want. The same applies to demonstrating what the material does not cover, as patients need a comprehensive understanding of the procedure before they are able to make

an informed decision about treatment. Sources of information are crucial for patients to have the option to check or seek further information.¹⁹ Previous studies have similarly described a lack of appropriate citation of information, and dates of when the information was used or updated.³¹

There is a proportionately larger number of websites from private clinics, suggesting that these organisations could be employing digital marketing strategies to target consumer viewership. Naturally, this should place the emphasis on private surgeons to proactively create online information that is of better readability and quality for their potential patients.

The combination of these findings suggests that current online patient health information on parotidectomy is too difficult for the general public to understand, retain and weigh up a decision. We suggest that patients aim for government websites, such as those produced by the National Health Service Trusts, as this information has better ratings in terms of both readability and quality. At present, there is no clear guidance or standardisation for structuring patient health information; however, the literature suggests that the information should be simple enough to pitch at a level equivalent to a sixth grader or an 11-year-old.^{9,10} From our experience of reading through the various websites, we believe that good patient health information should have the following features: avoidance of jargon, specific subheadings, reason for surgery, post-operation care, information given in small chunks, and graphic or photographic description. Analysing the readability formulas, and decreasing the number of words per sentence and the number of syllables are important steps in achieving better readability.

In addition to this, given the limitations of the DISCERN questionnaire, which does not include specific questions about the presentation of information including graphics such as pictures or videos, we were unable to analyse the effects of media content on the readability of patient health information. However, studies have found that by including relevant pictures closely linked to written text, we are able to improve attention to and comprehension of patient health information, as well as increasing the likelihood of adherence to health instructions, especially in patients with low literacy skills, who are likely to benefit from this.³² Another study suggested that the inclusion of pictures or videos in patient health information not only improved the attractiveness of the website but also facilitated the recall of information, especially in the older population.³³ A combination of spoken and written or visual information is deemed most effective as a means of conveying information.²⁴

When consenting patients, it is important to consider the Montgomery ruling, which outlines the principles of doctors, who have a duty to ensure that patients are aware of the 'material risks' associated with the procedure and that the information given to a patient is adequate, as judged from the perspective of a reasonable person in the patient's position.³⁴

The GMC decision-making and consent document outlines that when obtaining consent for a procedure, the clinician should discuss important information such as diagnosis and prognosis, uncertainties surrounding the diagnosis and prognosis, options for further investigation, options for treating or managing the condition, options for conservative and active treatment, the nature of each option, what would be involved and the desired outcome and the potential benefits, risk of harm, and uncertainties about and the likelihood of success for each option.⁷

While the GMC guidelines do not set out the minimum grade of the practitioner when obtaining consent, they do

recommend that clinicians who have been tasked in consenting are suitably trained and competent, have sufficient knowledge of the intervention and its associated benefits and harms, as well as alternative options for treatment and care, have the skills to have a dialogue with the patient that is in line with the guidance, feel competent to carry out the delegated task, and understand and agree that they will refer to an appropriate colleague for further information, advice or support if necessary.⁷

- The internet is a largely unregulated source of potentially conflicting or confusing information
- Parotidectomy complications and long-term outcomes can significantly impact patients' quality of life; the Montgomery ruling should be considered, to avoid litigation
- Current online patient health information on parotidectomy is too difficult for the general public to understand; website quality was classed as fair, with several shortcomings
- Websites failed to appropriately state aims, information sources and outcomes of no treatment
- Combined spoken and written or visual information are deemed most effective for conveying information
- Surgeons should guide patients to a few high-quality websites and discuss the information tailored to their priorities, to ensure an informed decision on treatment

A study by McMullan demonstrated the role of the internet in enabling patients to move from being the passive recipient to the active consumer of health information. The author concludes that clinicians not only acknowledge patients' search for knowledge, but also play an important role in guiding them to reliable and accurate health websites.³⁵ Given that consenting is a dynamic process, with each patient's condition being different, the GMC recommends taking a proportionate approach when consenting patients, taking into account the nature and severity of the patient's condition, the complexity of the decision, the impact of the potential outcome on the patient's individual circumstances, information available to the patient, potential options for treatment and management, and the nature of the consultation.³⁶

There are several limitations in our study. As we only picked the top 30 websites from each search engine, we may not have encountered high-quality online information. Readability tools assign a grade level based on semantic and syntactic difficulty. They do not consider pictures, health literacy, education level or cultural sensitivity.³⁷ Readability formulas also ignore the complexity of vocabulary. For example, the word 'haematoma' can be more difficult compared with 'educational', although 'educational' has more syllables. Because of the limitations of the DISCERN instrument, scientific websites were excluded. Despite being classified as an objective tool written from the perspective of a health consumer, there is subjective variability in user-dependent analysis. This was minimised by two reviewers working independently, whereby differences were resolved by a third reviewer, involving extensive discussion with the first two reviewers.

Conclusion

In our critical analysis of the readability of online patient health information on parotidectomy, we conclude that websites are too difficult for the general public to understand. The quality of websites was classed as fair, with several shortcomings that need to be improved. This warrants the need for improvements of website readability and quality in order to benefit the patient. Surgeons should be the preponderant source of clinical information, at the same time respecting

and acknowledging patients' right to autonomy. They should guide patients to a few high-quality websites and discuss the information tailored to their priorities in order to equip them with sufficient knowledge to make an informed decision on their treatment.

Competing interests. None declared.

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