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**Title page**

## Quality of online information about migraine headache surgery

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## SUMMARY

Migraine headache is a debilitating disease that can lead to severe functional limitations and is the most common primary headache. In more than 30% of cases conservative therapies do not allow the control of symptoms or cause side effects. Peripheral nerve surgery should be considered in non-responsive chronic migraine or suspected peripheral origin. Nowadays Web has become one of the most important sources of knowledge for patients: the information available on the web is not subject to a control of the sources reliability but can influence the patient. The aim of the study is to evaluate the quality of information accessible on the Web about the surgical treatment of migraine headache.

"Headache OR migraine treatment", "headache OR migraine surgery" were the keywords used on two main search engines (Google and Yahoo). Among the first 50 websites, 26 were suitable and we divided them into five groups (practitioners, hospitals, healthcare portals, professional societies, encyclopedias). We applied the expanded EQIP (Ensuring Quality Information for Patients) scale: the EQIP scale consists of 36 questions with three sections (content, identification data and structure).

Although the overall average score was relatively high (22 out of 36), many lacks information were highlighted: overall, readability was not satisfactory in communicating information regarding migraine and its surgical treatment. Readability should be tested before medical online publication, in order to provide for its correct use by the patient and improving migraine knowledge.

**QUALITY OF ONLINE INFORMATION ABOUT MIGRAINE HEADACHE SURGERY**

**Introduction**

Migraine headache is a debilitating disease that can lead to severe functional limitations in both men and women aged 15 to 49 [1] and is the most common primary headache [2].

It causes the loss of about 250.000.000 days from work and school every year in Europe and USA. Furthermore, chronic daily headaches are associated with a higher incidence of comorbidities such as depressive disorders, anxiety states, sleep disorders, fibromyalgia [3]. Nicotine dependence and alcohol or drug abuse/ dependence are more common in people with migraine than without migraine. Migraine with aura is associated with a threefold increase in suicide attempts, regardless of the co-presence of psychiatric comorbidities [4]. Traditionally migraine has been considered as a consequence of a neurovascular disorder with involvement of the central nervous system, newly some data support the hypothesis of compression or irritation of peripheral sensory nerves within muscles, fascia, bone and vascular spaces of the head and neck [5-12]. The irritation of extracranial sensory nerves may appear spontaneously or may derive from several factors, such as traumatic and postoperative ones: these can cause an injury to the nerves or their surrounding tissue so as to create a trigger point for the migraine headache [1].

In addition, axonal and myelination process abnormalities have been proved by electron microscopic study of the nerves obtained during migraine surgeries [5].

A wide variety of drugs are used in the preventative pharmacological treatment of migraine: calcium-channel blockers as verapamil, beta blockers, tricyclic antidepressant like amitriptyline or nortriptyline, anticonvulsant as gabapentin and botulinum toxin type A [13].

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In more than 30% of cases these therapies do not allow the control of symptoms or cause side effects, limiting their use as a therapeutic solution for migraine headache [1].

It is widely showed in the literature that peripheral nerve surgery is effective and safe in cases of non-responsive chronic migraine or suspected peripheral origin with central conduction [14-27].

In particular, fascia, muscle or bone resection, vessel ablation or peripheral nerve section would be able to reduce the central transmission of the pain stimulus and therefore reduce the symptoms of migraine headache [14 - 16, 18, 19, 21-24].

According to European data from 2019, about 77% of population accesses the Internet daily and a further 7% uses it at least once a week. However, 84% consists of regular Internet users [28]. Regarding diseases with early onset, the patients of the "digital generation" (millennials) [29] are the ones who resort to this tool the most, although the data show a steady increase in its use in the older population [30].

It is increasingly clear that people are using the Internet as a source for information on health topics [31] and that the Web has become one of the most important sources of knowledge for patients [32].

Although the information available on the web is not subject to a control of the source's reliability [33], this information can influence the patient and his questions to the physician about the personal clinical condition and the therapeutic decisions related to it [31].

The aim of the study is to evaluate the quality of information accessible on the Web about the surgical treatment of migraine headache, through a validated method for the critical analysis of the quality of health information, the modified Ensuring Quality Information for Patients (EQIP) instrument [34-35].

**Materials and Methods**

We used Google and Yahoo as they are the most famous search engine worldwide. We ran the research using the keywords "headache OR migraine treatment", "headache OR migraine surgery". We included the first 50 websites, excluding irrelevant documents, scientific papers, videos, duplicates, and blogs.

We applied the expanded EQIP scale to evaluate the selected websites and we divided them into five groups (practitioners, hospitals, healthcare portals, professional societies, encyclopedias)

The EQIP scale consists of 36 questions with three sections: content (items 1-18), identification data (items 19-24) and structure (items 25-36) with YES and NO as a possible answer.

The "Content data" section is about the first definition of the topics, a description of the medical procedure sequence, a description of the solutions for any complications, the qualitative and quantitative benefits and risks. "Qualitative" includes the type of benefits and risks associated with the procedures; "Quantitative" includes statistical values about the benefits and risks of the procedures.

The "Identification data" section considers the presence of the production and revision date of the document, a Logo and evidence-based data.

The "Structure data" is the last section and it analyzes if the information is clearly expressed and without complex words, with short sentences, if the tone is respectful, and if the images or graphic well support the content.

The largest score is 36, 1 point for each answer.

20 is equivalent to the 75th percentile and established a high score website; less than 20 points defined a low score website.

**Results**

We found 26 suitable websites applying the inclusion and exclusion criteria before using Google and Yahoo.

Then 5 groups were created: there were 3 practitioners' websites (11.5%), 6 Hospital websites (23.1%); 7 Healthcare portals (26.9%), 9 professional society websites (34.6%) and 1 Encyclopedia (3.8%).

After that, we applied the expanded EQIP tool to assess the eligible websites, based on quality and quantitative factors.

The mean score of the selected websites was 22 points and we considered as a high score an overall of 20 or more: 20 websites (76.9%) had a high score and only 6 (23.1%) presented a low score; that means that the quality of the information is overall satisfactory.

Tab.1 describes the results in detail. All the websites well defined the subjects that will be covered and the description of the medical problem, but there was a poor description about the alternative treatments, the quantitative risks and side effects, and no websites covered all relevant issues or reported the names of people or agencies that produced or financed the documents.

Five out of 7 (71.4%) of the low score websites belonged to Health care portals websites and they had the lowest mean score: 18 points.

The hospital websites scored an average of 21.7 points and 83.3% of them were above 20 points but the best of them scores 23 out of 36 points.

The professional society websites were the largest group in the sample; they had a mean score of 23.3 points and each of them was a high score website.

There were only 3 practitioners' websites, but they collected the highest average score (27.7 points); in this group we found the highest score (two websites scored 28 points) and it seemed the best at defining and at describing a solution to the medical problem.

More precisely, analyzing Content data we saw a lack in description of the procedure sequence (only 11 websites had it, 42.31%), description of how potential complication will be dealt with (missing in 69.23%), description of the alert signs that patients may detect (missing in 42.31%), information about cost and insurance (missing in 70.08%).

About Identification data appeared that only 5 websites reported a bibliography regarding their affirmations (19.23%) and the author's or the funder's name rarely appeared (missing respectively in 84.62% and 92.31%).

Finally, evaluating Structure data, although the communication was clear and understandable to a non-field audience, there was no balance between risks and benefits for what concern the given information (only 11 websites had it, 42.31%) and only 9 websites (34.62%) had relevant or clear figures and graphics.

**Discussion**

Migraine is still a poorly understood, underdiagnosed and undertreated condition [36]. Because of its impact on the patient's life, headache disorders should be considered a public health priority.

It is increasingly clear that people are using the Internet as a useful tool for information on health topics [31] and that the Web has become one of the most important sources of knowledge for patients [32], especially for patients with chronic diseases and lifelong therapies [37].

Although the information available on the web is not subject to a control of the source's reliability [33], this information can influence the patient and his questions to the physician about the personal clinical condition and the therapeutic decisions related to it [31]. Moreover, the difficulty that people can meet in easily understanding a website text at first reading, may compromise patient comprehension of health information. The readability of the website is defined as the ease with which a reader can understand a text and depends both on the content (choice of words, syntax ..) and on the form (font type and size, line spacing ..). Many Websites are still lacking in some critical points, such as in the low readability: raising the readability level of these information can make the difference between a successful or failed communication.

Our study explored 5 groups of enrollable websites (Practitioners websites, Hospital websites, Healthcare portals, Professional Society websites and Encyclopedia) by using the expanded EQIP scale.

Although the overall average score was relatively high (22 out of 36), many lacks information were highlighted especially in the "Health care portals" group.

All the websites well defined the subjects that will be covered and the description of the medical problem, but there was a poor description about the alternative treatments and the quantitative risks and side effects: 96.15% of the documents didn't cover all relevant issues

on the topic, no website stated if and how patients were involved/consulted in its production, none included a consent form, contrary to recommendations. Moreover, none reported the names of people or agencies that produced or financed the documents. We also noted that only 2 sites (7.7%) mention the possibility of treatment failure, indicating the probability of percentage success.

Overall, readability was not satisfactory in communicating information about migraine and its treatment, especially the surgical one. The worst scores were obtained from the sites of public institutions, while the specialists' web sites and private groups obtained the best overall scores. These data can be explained by the fact that surgical treatment of headache is still not very widespread and there are few surgical teams that perform such procedures in hospitals; on the contrary, being a niche surgery, for now it is mostly treated by a few independent specialists.

In conclusion, in our opinion physicians, both general practitioners and specialists, remain the principal source of comprehensible information. Medical information to be published on online portals should be carefully planned, setting up which information to give and how to make it readable. Plain language should be used and short sentences with simple words should be preferred; furthermore, effective communication should be supported by graphic material (tables, drawings, diagrams). So, readability should be assessed before online publication, to support its correct use by the patient and improving migraine knowledge.

CONFLICT OF INTEREST STATEMENT

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**Tab.1**: EQIP tool results applied to the 26 eligible websites about Headache and surgical treatment research on Google® and Yahoo®.

| Question | Yes (%) | No (%) |
|---|---|---|
| **Content data** | | |
| 1. Initial definition of which subjects will be covered | 26 (100 %) | 0 (0%) |
| 2. Coverage of the above-defined subjects | 26 (100 %) | 0 (0%) |
| 3. Description of the medical problem | 26 (100 %) | 0 (0%) |
| 4. Definition of the purpose of the medical intervention | 26 (100 %) | 0 (0%) |
| 5. Description of treatment alternatives (including no treatment) | 21 (80.77 %) | 5 (18.23 %) |
| 6. Description of the sequence of the medical procedure | 11 (42.31 %) | 15 (57.69 %) |
| 7. Description of qualitative benefits | 25 (96.15 %) | 1 (3.85 %) |
| 8. Description of quantitative benefits | 17 (65.38 %) | 9 (34.62 %) |
| 9. Description of qualitative risks and side-effects | 15 (57.69 %) | 11 (42.31 %) |
| 10. Description of quantitative risks and side-effects | 4 (15.38 %) | 22 (84.62 %) |
| 11. Addressing quality of life issues | 25 (96.15 %) | 1 (3.85 %) |
| 12. Description of how potential complications will be dealt with | 8 (30.77 %) | 18 (69.23 %) |
| 13. Description of precautions that the patient may take | 12 (46.15 %) | 14 (53.85 %) |
| 14. Mention of alert signs that the patient may detect | 15 (57.69 %) | 11 (42.31 %) |
| 15. Addressing medical intervention cost and insurance issues | 7 (26.92 %) | 19 (70.08 %) |
| 16. Specific contact details for hospital services | 23 (88.46 %) | 3 (11.54 %) |
| 17. Specific details of other sources of reliable information/support | 12 (46.15 %) | 14 (53.85 %) |
| 18. The document covers all relevant issues on the topic | 1 (3.85 %) | 25 (96.15 %) |

**Tab.1**: EQIP tool results applied to the 26 eligible websites about Headache and surgical treatment research on Google® and Yahoo®.

| Identification data | | |
|---|---|---|
| 19. Date of issue or revision | 26 (100 %) | 0 (0%) |
| 20. Logo of the issuing body | 25 (96.15 %) | 1 (3.85 %) |
| 21. Name of persons or entities that produced the document | 4 (15.38 %) | 22 (84.62 %) |
| 22. Name of persons or entities that financed the document | 2 (7.69 %) | 24 (92.31 %) |
| 23. Short bibliography of evidence-based data used in the document | 5 (19.23 %) | 21 (80.77 %) |
| 24. The document states if and how patients were involved/consulted in its production | 0 (0%) | 26 (100 %) |
| **Structure data** | | |
| 25. Use of everyday language, explains complex words or jargon | 26 (100 %) | 0 (0%) |
| 26. Use of generic names for all medications or products | 26 (100 %) | 0 (0%) |
| 27. Use of short sentences | 26 (100 %) | 0 (0%) |
| 28. The document personally addresses the reader | 26 (100 %) | 0 (0%) |
| 29. The tone is respectful | 26 (100 %) | 0 (0%) |
| 30. Information is clear | 26 (100 %) | 0 (0%) |
| 31. Information is balanced between risks and benefits | 11 (42.31 %) | 15 (57.69 %) |
| 32. Information is presented in a logical order | 26 (100 %) | 0 (0%) |
| 33. The design and layout are satisfactory | 18 (69.23 %) | 8 (30.77 %) |
| 34. Figures or graphs are clear and relevant | 9 (34.62 %) | 17 (65.38 %) |
| 35. The document has a named space for the reader's notes | 3 (11.54 %) | 23 (88.46 %) |
| 36. The document includes a consent form, contrary to recommendations | 0 (0 %) | 26 (100 %) |

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TABLE LEGEND.

Tab. 1: EQIP tool results applied to the 26 eligible websites about Headache and surgical treatment research on Google® and Yahoo!®.