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ORIGINAL ARTICLE

Web-based information on intraoperative neuromonitoring in thyroid surgery

Cesare Carlo Ferrari, Sebastiano Spampatti, Andrea Leotta, Stefano Rausei, Francesca Rovera, Luigi Boni, Davide Inversini, Giulio Carcano, Gianlorenzo Dionigi, Renzo Dionigi

Department of Surgical Sciences and Human Morphology, Endocrine Surgery Research Center, University of Insubria, Varese, Italy

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ABSTRACT

Background: This is a preliminary analysis of intraoperative neuromonitoring (IONM)-related websites available to the general public with respect to thyroid surgery.
Methods: Four key terms and/or phrases (neuromonitoring AND thyroid AND neck surgery, intraoperative neuromonitoring, intraoperative electrophysiological monitoring, IONM) were entered separately into the search engines Google.com, Yahoo.com and Bing.com. The first 50 results obtained for each search procedure were evaluated. Websites were evaluated for content quality using the validated DISCERN rating instrument. Readability was graded by the Flesch Reading Ease Score and the Flesch–Kincaid Grade Level.
Results: The results were related to scientific publications in most cases (64%). A large percentage (59%) of the servers are located in the USA. The main language used is English (91%); only 19% of the websites are multilingual or in other languages. 58% of the sites were rated as excellent to good and 42% as fair to poor. The median Flesch Reading Ease Score was 49.6; the median Flesch–Kincaid Grade Level was 13.85.
Conclusions: World Wide Web information about IONM in thyroid surgery is too specific and difficult and poorly accessible to the general public.

1. Introduction

It is estimated that internet now has two billion users. [1] Internet is used increasingly as a tool for disseminating health information. [2] Patients and their families explore internet for valuable information about health conditions, treatment options, procedures and technology. [2–5] Patients who are informed about their own health have been shown to be better equipped to interact with the health care system. [4,5]

Intraoperative neuromonitoring (IONM) has been proposed as an adjunct to standard visual identification of the laryngeal nerves and for an real-time assessment of recurrent laryngeal nerve (RLN) during thyroidectomy. [6] Interest in this technique has grown in recent years. Horne et al. in 2007 reported that 45% of otolaryngologists in the USA use RLN monitoring. [7] Sturgeon et al. in 2009 reported that 37% of general surgeons in the USA use nerve monitoring. [8] In northern Europe, about 80% of thyroidectomies are performed with IONM. [9] Attitudes changed with the introduction of a non-invasive monitoring device (endotracheal tube-based formats), [6] the publication of prospective trials, [10,11] guidelines defining standards of IONM, [12,13] user-friendly systems, [6,13,14] training courses, [14] some medico-legal issues, [15] research, [16] societies' recommendations, [17] and commercial effort. [18–20]

This paper presents a preliminary analysis of IONM-related websites available to the general public. The purpose of this preliminary survey was to evaluate these websites for accuracy and completeness of IONM internet data provided.

2. Methods and materials

In December 2012, the following key terms and/or phrases were entered separately into the search engines most commonly used, that is, Google.com, Yahoo.com and Bing.com: *neuromonitoring AND thyroid AND neck surgery, intraoperative neuromonitoring, intraoperative electrophysiological monitoring, IONM*.

Google is a multinational internet and software corporation invested in internet search, cloud computing, and advertising technologies. [21] Google has been estimated to run over one million servers in data centers around the world, and to process over one billion search requests every day. [21] Yahoo is a community-driven question-and-answer site and knowledge market that allows users to both submit questions to be answered and answer questions asked by other users. [22] Yahoo is available in 12 languages. Yahoo is the second most popular site in the USA. [22] Bing (formerly Live Search, Windows Live Search, and MSN Search) is a web search engine that consists of a search engine, index, and web crawler. Bing-powered search accounts for over 30% of USA searches and is available in more than 20 languages. [23]

The first 50 results obtained (omitting duplicates) for each search procedure were evaluated and grouped in categories according to the

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kind of content, language, access restrictions, server localization, date of last update and quality index, sponsorship, authorship, oversight, and intended audience. Sites were categorized as institutional/governmental or commercial. These data were collected and analyzed by 3 surgeons. Websites were evaluated for content quality using the DISCERN rating instrument: this is a validated tool for judging the quality of information on treatments to appraise a health website. [24] Readability was graded by two measures: the Flesch Reading Ease Score and the Flesch–Kincaid Grade Level. [25] The Flesch and Flesch–Kincaid readability tests are designed to indicate comprehension difficulty when reading a passage of contemporary English. Although they use the same core measures (word length and sentence length), they have different weighing factors, so the results of the two tests correlate approximately inversely: a text with a comparatively high score on the Reading Ease test should have a lower score on the Grade Level test. [25] The Flesch Reading Ease readability score formula rates text on a 100-point scale based on the average number of syllables per word and words per sentence. The higher the Flesch Reading Ease score, the easier it is to understand the document.

3. Results

102,000 results were retrieved with Google.com, 309,000 with Bing.com and 203,000 with Yahoo.com. One hundred and fifty links were analyzed and, hence, 150 websites were explored. The results were related to scientific publications in most cases (64%). In 31% the web pages showed only previews with access restrictions for full content. A large percentage (59%) of the servers are located in the USA. The main language used is English (91%); only 19% of the websites are multilingual or in other languages. 58% of the sites were rated as excellent to good and 42% as fair to poor. Commercial sites scored significantly lower ($P < 0.05$) than institutional sites. There was no relation between the rating score and the position of a website on the search engine ranking. The median Flesch Reading Ease Score was 49.6 and the median Flesch-Kincaid Grade Level was 13.85.

4. Discussion

Health information on the internet ranges from personal accounts of illnesses and patient discussion groups to peer-reviewed journal articles and clinical decision support tools, treatment options, procedures and technology. [1,2] To date, no study has evaluated websites related to IONM in thyroid surgery. We reviewed website advice on IONM in thyroid surgery. According to this preliminary survey, World Wide Web information about IONM in thyroid surgery is mostly too specific and difficult and poorly accessible to the general public.

Readability is the ease in which text can be read and understood. For most standard documents, the desired Flesch Reading Ease Score is about 60–70. For the content reviewed here, the median values were 49 and 13 for the two evaluation scores. Moreover, only 19% of the websites are multilingual, in most cases they are addressed to scientific publications (64%), the intended audience are health professions, and 31% of the web pages showed only previews with access restrictions for full content.

Commercial sites may be divided into business to business, or business to consumer (surgeon or patient) portals. [25] Sites of this last type are designed to bring interesting and updated information by offering news, reference material and links to related sites where even more information can be found. An information site may also include features of the “brochure” or “mini-catalog” site. If there is adequate information on the website, it can be useful for information, answering routine questions or mailing brochures and product literature.

In the present study, commercial sites scored significantly lower than institutional ones.

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References

1. Ali AH. The power of social media in developing nations: new tools for closing the global digital divide and beyond. *Harvard Hum Rights J* 2011;**24**(1):185–219.
2. Eysenbach G, Köhler C. How do consumers search for and appraise health information on the world wide web? Qualitative study using focus groups, usability tests, and in-depth interviews. *BMJ* 2002;**324**:573–7.
3. Meric F, Bernstam EV, Mirza NQ, et al. Breast cancer on the world wide web: cross sectional survey of quality of information and popularity of websites. *BMJ* 2002;**324**:577–81.
4. Yeo H, Roman S, Air M, et al. Filling a void: thyroid cancer surgery information on the internet. *World J Surg* 2007;**31**(6):1185–91; discussion: 1192–3.
5. Air M, Roman SA, Yeo H, et al. Outdated and incomplete: a review of thyroid cancer on the World Wide Web. *Thyroid* 2007;**17**(3):259–65.
6. Lamadé W, Meyding-Lamadé U, Hund E, Senninger N, Herfarth C. [Transtracheal monitoring of the recurrent laryngeal nerve. Prototype of a new tube]. *Chirurg* 1997;**68**(2):193–5.
7. Horne SK, Gal TJ, Brennan JA. Prevalence and patterns of intraoperative nerve monitoring for thyroidectomy. *Otolaryngol Head Neck Surg* 2007;**136**(6):952–6.
8. Sturgeon C, Sturgeon T, Angelos P. Neuromonitoring in thyroid surgery: attitudes, usage patterns, and predictors of use among endocrine surgeons. *World J Surg* 2009;**33**(3):417–25.
9. Dralle H, Sekulla C, Lorenz K, Nguyen Thanh P, Schneider R, Machens A. Loss of the nerve monitoring signal during bilateral thyroid surgery. *Br J Surg* 2012;**99**(8):1089–95.
10. Thomusch O, Sekulla C, Walls G, Machens A, Dralle H. Intraoperative neuromonitoring of surgery for benign goitre. *Am J Surg* 2002;**183**(6):673–8.
11. Barczyński M, Konturek A, Cichón S. Randomized clinical trial of visualization versus neuromonitoring of recurrent laryngeal nerves during thyroidectomy. *Br J Surg* 2009;**96**(3):240–6.
12. Chiang FY, Lee KW, Chen HC, et al. Standardization of intraoperative neuromonitoring of recurrent laryngeal nerve in thyroid operation. *World J Surg* 2010;**34**(2):223–9.
13. Randolph GW, Dralle H, Abdullah H, et al.; with the International Intraoperative Monitoring Study Group. Electrophysiologic recurrent laryngeal nerve monitoring during thyroid and parathyroid surgery: International standards guideline statement. *Laryngoscope* 2011;**121**(S1):S1–16.
14. Dionigi G, Bacuzzi A, Barczynski M, et al. Implementation of systematic neuromonitoring training for thyroid surgery. *Updates Surg* 2011;**63**(3):201–7.
15. Angelos P. Recurrent laryngeal nerve monitoring: state of the art, ethical and legal issues. *Surg Clin North Am* 2009;**89**(5):1157–69.
16. Serpell JW, Yeung MJ, Grodski S. The motor fibers of the recurrent laryngeal nerve are located in the anterior extralaryngeal branch. *Ann Surg* 2009;**249**(4):648–52.
17. http://www.awmf.org/uploads/tx_szleitlinien/003-002l_02.pdf
18. http://www.medtronic.com/for-healthcare-professionals/products-therapies/ear-nose-throat/therapies/head-and-neck-surgery/index.htm
19. http://www.medical-langer.de/en/applications/thyroid-surgery/
20. http://www.inomed.com/taetigkeitsbereiche/neuromonitoring/
21. http://en.wikipedia.org/wiki/Google
22. http://en.wikipedia.org/wiki/Yahoo!_Answers
23. http://en.wikipedia.org/wiki/Bing
24. http://www.discern.org.uk/discern.pdf
25. http://www.readabilityformulas.com/flesch-reading-ease-readability-formula.php