



Assessing the standards of online oral hygiene instructions for patients with fixed orthodontic appliances

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The availability of “e-health,” defined as the application of emerging information and communications technology (ICT), especially the Internet, to advance or enable health and health care,¹ has grown exponentially over the last 2 decades. The results of the 2009 National Health Interview Survey on the penetration of health information technology in the United States revealed that 51% of adult users had sought health information on the Web within the past 12 months.² According to the Eurostat report on ICT usage in households and by people living in member states of the European Union, 54% of Internet users looked for health topics in the first quarter of 2011.³ In this context, an online survey of e-health seekers from 42 countries around the world rated the Internet as the second favorite source of health information, following consultation by health care professionals.⁴

Oral health consumers also increasingly tend to retrieve and share online available health care information. Research results indicate that 34.5% of patients attending university dental clinics went online in advance for themselves or on behalf of family or friends.⁵ Furthermore, 49.8% of the dental practitioners surveyed in Wales claimed that patients had asked them about oral health information retrieved from the Internet.⁶

Fixed orthodontic appliances hinder oral hygiene procedures, predisposing patients to the occurrence of hyperplastic gingivitis and enamel demineralization in the peribracket area (that is, white-spot lesions [WSL]).⁷ Whereas gingival enlargement and inflammation often are transient and resolve within weeks after appliance removal,⁸ WSL may result in irreversible side effects such as compromised dental esthetics and caries. In 1 study,

ABSTRACT

Background. The authors conducted this study to assess the quality of the information available on the Web about oral hygiene for patients with fixed orthodontic appliances.

Methods. The authors entered the search terms “cleaning braces,” “brushing braces,” and “oral hygiene and braces” into Google, Yahoo, and Bing search engines. They analyzed Web sites satisfying the inclusion criteria from the first 20 hits of each search for accessibility, usability, and reliability by using the LIDA instrument; for readability by using the Flesch Reading Ease (FRE) score; and for the completeness of oral hygiene instructions.

Results. Sixty-two Web sites met the inclusion criteria. The mean total LIDA score of 71.2 indicated the moderate quality of the design of the reviewed Web sites. The mean (standard deviation [SD]) values of LIDA scores for accessibility, usability, and reliability were 85.9 (7.0), 63.4 (16.1), and 48.0 (10.4), respectively. The mean (SD) FRE Score of 68.6 (9.7) applied to standard reading skills. The completeness of information (mean [SD] = 67.1 [27.8]) presented the highest variability.

Conclusions. Overall, the authors found that the standards of online oral hygiene materials for orthodontic patients with fixed appliances exhibited modest scores. Readability appeared to be appropriate for young adolescents, whereas the comprehensiveness of the displayed information was highly variable. Further improvement of the infrastructure of electronic health information (that is, e-health) in orthodontics is necessary to meet patients’ needs.

Practical Implications. Given the moderate quality of oral hygiene instruction available on the Web for patients with fixed appliances, orthodontic patients and caregivers should be cautious when browsing the Internet for relevant information. Dental professionals should refer patients to valid Web-based educational materials.

Key Words. Oral hygiene; orthodontic appliances; patient education; Internet.

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7 of 10 general dentists practicing in 3 regions of the United States reported that they had treated WSL during the last 12 months, whereas more than one-third of the practitioners viewed the appearance of severe post-orthodontic WSL as a pitfall to the perception of the treating orthodontist.⁹ The results of an epidemiologic study¹⁰ indicated that the role of general dentists in the development of WSL may be of great importance. General dentists were perceived to a large extent (48%) by themselves, orthodontists, patients, and parents as being responsible for preventing WSL.¹⁰ These authors¹⁰ observed that a percentage as high as 69% of dental practitioners appeared to be more strict in their judgment, recognizing the common responsibility with the previously mentioned groups in preventing WSL. Preventive measures such as prescribing topical fluoride products, encouraging patients to engage in appropriate oral hygiene, and providing dietary instructions are well acknowledged in the orthodontic literature.¹¹⁻¹³

Hypothetically, orthodontic patients may take the initiative to seek oral hygiene educational materials on the Web; however, investigators have expressed concerns about the overall quality, content, and presentation mode of the information distributed by oral health¹⁴⁻¹⁹ and orthodontics-related Web sites.^{20,21} General dentists and orthodontists may provide useful services to their patients by recommending reliable sources available on the Internet. Thus, we conducted this study to evaluate the qualitative standards of the available information on the Internet regarding oral hygiene maintenance during fixed orthodontic appliance therapy.

METHODS

Search method. We performed a systematic Internet search in August 2014, alternatively using the top 3 engines—Google (www.google.com), Yahoo (www.yahoo.com), and Bing (www.bing.com)—and the search terms “cleaning braces,” “brushing braces,” and “oral hygiene and braces.” We saved and pooled the first 20 search hits from each search combination for data analysis. We excluded any Web sites that had an access fee or a login requirement, were promotional product sites, involved discussion groups, provided video feeds, and were not written in the English language. For all eligible sites, we collected details regarding the author’s name and profession, publication date, origin, and media type.

Standard evaluation. Accessibility, usability, and reliability. We carried out qualitative analysis of Web sites by using the Minervation validation instrument for health care Web sites (that is, the LIDA tool, Version 1.2, Minervation), a free online semiautomated tool designed to validate the structure of health care Web sites in terms of accessibility, usability, and reliability. LIDA software enables users to calculate the percentile scores for each category that indicate high (> 90%), moderate (50-90%), and low (< 50%) quality, and the average value of

the accessibility, usability, and reliability scores, all of which result in the total LIDA score. The accessibility score is generated automatically by typing the URL of the Web site in the address box available on the link (<http://lida.minervation.com>). We processed 4-point scale responses (never, seldom, often, and always) to 9 questions to determine usability and reliability ratings (Table 1).

Readability. Using the Flesch Reading Ease (FRE) score, we evaluated the ease of understanding or comprehending a Web site’s text on the basis of the style of writing. The FRE score integrates average sentence length (ASL) and average number of syllables per word (ASW) into the following equation: $FRE\ score = 206.835 - (1.015 \times ASL) - (84.6 \times ASW)$. The FRE score is a number ranging from 0 to 100 that is categorized accordingly: very confusing (0-29), difficult (30-49), fairly difficult (50-59), standard (60-69), fairly easy (70-79), easy (80-89), and very easy (90-100). We extracted a sample text of 200 to 500 words and pasted the sample into the Text Readability Consensus Calculator (<http://www.readabilityformulas.com/free-readability-formula-tests.php>), a free readability measurement instrument available on the Web.

Completeness of information. Two of the authors (W.A.V., C.L.) examined simultaneously whether Web sites presented dietary advice and information on toothbrushing and dental care accessories. If their assessments did not match, they discussed the discrepancy until they reached consensus. In particular, they checked and scored information about toothbrushing on the grounds of the description of the technique, the suggested frequency per day, and the recommended concentration of fluoride toothpaste. In addition to assessing content for recommendations of toothbrushing with a fluoride toothpaste, the same 2 authors screened the Web sites for information on the use of interdental brushes, additional interdental accessories, and fluoride products. We added 1 point for each parameter if we noted that relevant information had been cited. Ideally, a Web site could reach a maximum score of 7 points if it included comprehensive instructions on all areas of interest. We converted completeness ratings into percentiles to enable homogenous presentation of outcomes.

RESULTS

Search results. The original search yielded 27,887,000 hits (Table 2). By collecting the first 20 Web sites identified by each search, we evaluated 180 search results for eligibility. After excluding 65 duplicates, 19 video feeds, 3 advertisements, 8 discussion groups, and 23 irrelevant

ABBREVIATION KEY. ASL: Average sentence length. ASW: Average number of syllables per word. FRE: Flesch Reading Ease. ICT: Information and communications technology. WSL: White-spot lesions.

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