Developing and validating a nursing website evaluation questionnaire

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Aim. The aim of this paper is to report on the development and validation of an evaluation questionnaire for nursing websites.

Background. Increasing numbers of the general public and health care professionals are using the Internet to access health and health care-related information. The quality of such websites, therefore, needs to be evaluated.

Methods. A total of 24 websites in the United States and Taiwan, including websites in 13 leading schools and 11 hospitals, were selected as test websites. A total of 120 participants with Master’s degrees in either nursing or mechanical engineering were invited to examine the 24 websites using a nursing website evaluation questionnaire. A 32-item questionnaire was developed, covering overall impression, download and switch speed, accessibility and convenience, web page content, service function and compatibility with common browsers. Participants were requested to connect to the specific websites and browse the contents before filling in the questionnaire. The results were arranged into 12 different sequences and prepared on a CD using Macromedia Dreamweaver. Data were analysed using Cronbach’s α, Guttman split-half reliability and factor analysis.

Findings. Internal consistency was good, with a Cronbach’s α of 0.93 in Part I and a KR-20 (Kuder Richardson) of 0.85 in Part II. Four factors given in Part I were identified as content truth, accessibility and convenience, speed and connection, and overall impression.

Conclusion. The nursing website evaluation questionnaire had good construct validity and internal consistency.

Keywords: nursing, nursing website, evaluation questionnaire

Introduction

The Internet is growing rapidly. A study in 2003 estimated the number of Internet users worldwide to be 419,054,724 (Nielsen/Net Ratings 2003). The significance of such a huge number is the dramatic increase in the speed and frequency with which Internet data are exchanged. More and more people, including both the general public and health care professionals, are using the Internet to search for information related to health care in lieu of traditional methods of obtaining health-related information from professionals. Baker et al. (2003), in a nationwide survey in the United States in 2001, found that 40% of respondents with access to the Internet used to look for advice or information about
health or health care. It is expected that these figures will increase exponentially, making the use of the Internet to search for health information an issue of major importance.

Background

Professional staff use the Internet as a reference tool for their clinical work, as a means for exchanging information, and as a source of updating their professional knowledge. The general public can obtain health information and diversified professional opinions to assist in decision-making and to gain emotional support, and to obtain better health care (Jadad & Gagliardi 1998, Kiley 2000). Thus, ideally, patients will become well informed about their own health problems (Clark 2000). With respect to the general public, the change in behaviour that has emerged as a result of acquiring and disseminating such health information can balance the unequal relationship connected with traditional medical information-giving and treatment.

However, this situation is a two-edged sword that has seen several problems emerging. Timmons (2001) and Kiley (2000) have indicated that the credibility of website information, website appropriateness and misleading website information are currently the most important issues to consider. Anyone, regardless of whether they are accredited professionals, can post health-related information on the Internet, or even intentionally ignore the accuracy of the information they post, which may lead to distortions and misrepresentations. Therefore, differences in the contents of website information are very large and confusing to the general public. Impicciatore et al. (1997) have suggested that there is an urgent need to check public-oriented health information on the Internet for accuracy, completeness and consistency. Jadad and Gagliardi (1998) point out that determining the accuracy of the information could be more challenging than the search for the information itself. How to determine whether information from a health website is good or bad information has become a critical issue (Wyatt 1997).

Nursing websites are an important source of health information. However, not many studies have yet been carried out to evaluate these. With regard to methodology for evaluating websites, Wyatt (1997) mentions two major factors that must be considered: careful selection by the testers, and carrying out an effective and reliable evaluation. Testers must consider whether or not they have the appropriate participants, and whether or not their selection procedure might lead to bias. The evaluation method must be shown to be fully trustworthy before any conclusion can be drawn from the evaluation. However, there are in fact few ready-made reliable evaluation tools (Beck 1997, Kim et al. 1999). As well as the quality of information on a website, the style of information transmission is also very important, and both of these should be taken into consideration.

Referring to the e-Book by Lynch and Horton (1997), we identified 14 evaluation items to check when evaluating website content: first impression, speed, compatibility with all browsers, accessibility, absence of HTML errors, readily accessible to search engines, visibility, usability, trustworthiness, security, currency and authority, objectivity, accuracy, and coverage.

Grandinetti (2000) proposed a simple evaluation standard. The information provided on a website was considered to be trustworthy if it explicitly described the author’s name, affiliation, source, ownership and date of posting on the website. Cravener (2000) indicated that the frequency of updates, accuracy and credentials should be evaluated in order to determine the quality of the website. Although these questions may be clearly answered, Grandinetti (2000) still took a conservative view, emphasizing that while the information source was essential to the accuracy and authority of the health information, it alone was not a sufficient guarantee. Jadad and Gagliardi (1998) used medical databases, website search engines, and literature directories to find 47 website evaluation tools. Among these tools, 13 provided an evaluation standard and five also provided an operation guide. However, these tools did not describe their construct validity and internal consistency.

The study

Aim

The aim of this study was to develop a comprehensive and reliable evaluation questionnaire for nursing websites, and to test the validity and reliability of this evaluation questionnaire.

Design

This study used an explorative investigation design. After preliminary compilation and analysis of the questionnaire, examiners were invited to evaluate the selected sample websites by using this questionnaire.

Websites

United States of America

We selected the leading six nursing school websites in the United States (Best Graduate Schools 2002). The US News listed the top five ranked hospital websites, and the rest of the
hospitals were listed in alphabetical sequence without the entire ranking being listed (Comarow 2001). Therefore, we selected magnet hospitals, which are listed as providing an excellent nursing service. In the list of 35 hospitals, four were selected randomly.

Taiwan
At the time of the study, there were no data on objective ratings of Taiwan nursing websites. To select websites and hospitals for the study, we analysed seven major hospital and nursing websites in Taiwan, including the organizational profile, nursing health education information, search function, inquiry function, related links, on-the-job education and hospital publications. Two hospital nursing websites that contained more than five of the foregoing functions were selected. For the schools, the six primary functions of the nursing school websites in the country were analysed. These functions included brief introductions to departments and schools, brief introductions to teachers, announcements, related information, search functions and teaching materials of lectures. Seven school nursing websites having six or more functions were subsequently selected.

Summary of websites
In summary, six schools and nine hospitals were selected for the American nursing websites and seven schools and two hospitals were selected for the nursing websites in Taiwan, giving a total of 24 websites were selected as the test samples for this study.

Website examiners
We invited a convenience sample of 60 Master’s degree nurses and 60 mechanical engineering graduate students to act as website examiners by completing the questionnaire.

Research tools
Health website evaluation webpage production procedure
The website evaluation sequence for each of the 120 examiners was different. Also, because the evaluation process might be tiring, each examiner was asked to evaluate only 12 websites. Therefore, the information on the 24 websites was randomly arranged in advance in 12 different sequence combinations. The information on the 12 websites was copied to a CD. After the examiners inserted this into their CD drive, the web pages would automatically open, and they could then evaluate the websites according to the instructions.

The evaluated data were all website contents. The examiners were requested to connect to the specific websites and browse the contents before filling in the questionnaires. Instructions for the evaluation were included on the CD. In order to allow examiners to evaluate the websites one at a time, the webpage was designed to show the information of one website at a time. After finishing with one website, the examiners could move on to the next one, as explained on the CD.

Sample webpage production
The Macromedia Dreamweaver program was used to produce the sample webpage. This was divided into three major sections: (1) system operation description and cautions; (2) domain name of evaluated websites and link websites; and (3) listed information table of all evaluated websites.

Developing the nursing website evaluation questionnaire
Fourteen evaluation factors were analysed, according to the factors proposed by Lynch and Horton (1997) and Richard (2001). We further modified these factors into six major categories, in which the first part included categories 1–4 with the scale 1–5, and the second part included categories 5 and 6 with yes/no selection items (Table 1).

The first category was the overall impression of the website. This refers to having a clear and definite subject, a distinct and reasonable arrangement of ideas, and being effective visually. The second was download and switch speed, referring to how long it took for the website to open and how fast one could move between sites. The third was accessibility and convenience, which has to do with the correlation between the domain name and content, linking of the website with common search engines, whether icons had alternate text descriptions, speed and convenient opening of graphics, suitability of the pages for easy browsing, availability of valid links to related sites, appropriateness of these links, and provision of the means for browser interaction. The fourth was web page content, referring to the provision of correct and complete information, whether the content was valuable for reference, and whether the information provided was objective.

The fifth and sixth categories, in Part II of the questionnaire, were yes/no questions. They dealt with the services provided by the website, such as discussion forums and search tools within the site, along with compatibility with common browsers.

To evaluate content validity, six scholars, either with PhD degrees in information-related fields or working as supervisors at information centres, were invited to examine the
The questionnaire was divided into two major parts, with six categories and 32 questions in total. The first part contained 17 questions using 5-point Likert scale responses, while the second part had 15 yes/no questions.

Data collection

Questions on the health website evaluation questionnaire were arranged in the same sequence as the nursing websites on the CD, and different-coloured paper was used to identify different sites so as to reduce potential errors (such as giving answers in the wrong place).

We sent out 120 CDs and 1440 questionnaires, and received 107 CDs with 1284 questionnaires back. There were 141 questionnaires which showed that the examiners had spent fewer than 5 minutes in the websites; therefore we assumed that these 141 questionnaires were not valid and discarded them. Thus, valid questionnaires numbered 1143 in total.

Data analysis

SPSS for Windows 11.0 was used to perform statistical analyses. Descriptive data were calculated in terms of percentage, mean, standard deviation and frequency, and factor analysis was used to test the validity of the evaluation scale. Cronbach’s $\alpha$ and the Guttman split-half reliability were used to examine internal consistency.

Findings

The mean age of the examiners was 33.4 years, with a standard deviation of 9.0 years. There were 60 females and 47 males. Their average experience in using the internet was 5.7 years (standard deviation 2.1 years). Websites were reviewed for an average of 21.7 minutes each (standard deviation 22.6 minutes). Times ranged from 5.0 to 210.0 minutes. Eight examiners were found to have spent an extended time at certain sites. Median time was 15.0 minutes (Table 2).

With respect to the internal consistency of Part I of the questionnaire, the Guttman split-half value was 0.85, and the Cronbach’s $\alpha$ was 0.93. For Part II, the Kuder Richardson-20 was 0.70. Internal consistency for both parts was good.

The top three items in Part I ranked by mean score were ‘correlation between web name and content’, ‘clear topic’ and ‘clear and reasonable arrangement of ideas’. The last three were ‘provision of methods for reader interaction’, ‘illustrations having accompanying text to assist in description’ and ‘convenience in opening graphics’ (Table 3).
Gender students in a university department of mechanical engineering.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Background A (n = 59) (55.1%)</th>
<th>Background B (n = 48) (44.9%)</th>
<th>Σ Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1 (2.1%)</td>
<td>46 (97.9%)</td>
<td>47</td>
<td>43.9</td>
</tr>
<tr>
<td>Female</td>
<td>58 (96.7%)</td>
<td>2 (3.3%)</td>
<td>60</td>
<td>56.1</td>
</tr>
<tr>
<td>Age</td>
<td>Mean (sd)</td>
<td>Mean (sd)</td>
<td>Mean (sd)</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td>39.5 (7.4)</td>
<td>26.1 (3.4)</td>
<td>33.4 (9.0)</td>
<td>31.4</td>
</tr>
<tr>
<td>Average years using the Internet</td>
<td>6.0 (2.4)</td>
<td>5.4 (1.6)</td>
<td>5.7 (2.2)</td>
<td>6.0</td>
</tr>
<tr>
<td>Minutes reviewing each website</td>
<td>25.5 (24.1)</td>
<td>16.6 (19.2)</td>
<td>21.7 (22.6)</td>
<td>15.0</td>
</tr>
</tbody>
</table>

A = Nurses had a Master’s degree from a medical centre; B = Doctoral or Master’s degree students in a university department of mechanical engineering.

Table 3 Rank of items in Part I

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation between website name and content</td>
<td>3.69</td>
</tr>
<tr>
<td>Clear topic</td>
<td>3.66</td>
</tr>
<tr>
<td>Clear and reasonable arrangement of ideas</td>
<td>3.65</td>
</tr>
<tr>
<td>Back and forth speed between web pages</td>
<td>3.63</td>
</tr>
<tr>
<td>Time spent waiting for website to open</td>
<td>3.59</td>
</tr>
<tr>
<td>Correct information is provided</td>
<td>3.58</td>
</tr>
<tr>
<td>Website is linked to other sites via common search engines</td>
<td>3.57</td>
</tr>
<tr>
<td>Content is valuable for reference</td>
<td>3.56</td>
</tr>
<tr>
<td>Data are objective</td>
<td>3.56</td>
</tr>
<tr>
<td>Information provided is complete</td>
<td>3.55</td>
</tr>
<tr>
<td>Linked websites provide useful information</td>
<td>3.54</td>
</tr>
<tr>
<td>Visual effect</td>
<td>3.53</td>
</tr>
<tr>
<td>Suitability of web pages for easy browsing</td>
<td>3.52</td>
</tr>
<tr>
<td>Effectively linked with other websites</td>
<td>3.50</td>
</tr>
<tr>
<td>Convenience in opening graphics</td>
<td>3.43</td>
</tr>
<tr>
<td>Illustrations have accompanying text to assist description</td>
<td>3.28</td>
</tr>
<tr>
<td>Provision of methods for reader interaction</td>
<td>3.27</td>
</tr>
</tbody>
</table>

Table 4 Rank of items in Part II

<table>
<thead>
<tr>
<th>Item</th>
<th>Yes (%)</th>
<th>No (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website is compatible with Internet Explorer</td>
<td>89.2</td>
<td>10.8</td>
</tr>
<tr>
<td>Website is compatible with Netscape</td>
<td>83.6</td>
<td>16.4</td>
</tr>
<tr>
<td>Each page provides a link back to previous levels of the site or to the front page</td>
<td>79.2</td>
<td>20.8</td>
</tr>
<tr>
<td>Neutral and unbiased health information is provided</td>
<td>79.0</td>
<td>21.0</td>
</tr>
<tr>
<td>There is a service mailbox</td>
<td>75.8</td>
<td>24.2</td>
</tr>
<tr>
<td>Professional background of the website administrator is related to website content</td>
<td>70.8</td>
<td>29.2</td>
</tr>
<tr>
<td>There is a data search function</td>
<td>67.4</td>
<td>32.6</td>
</tr>
<tr>
<td>Source of published data are provided</td>
<td>53.1</td>
<td>46.9</td>
</tr>
<tr>
<td>Content is updated regularly with the current date given</td>
<td>52.2</td>
<td>47.8</td>
</tr>
<tr>
<td>Readers can leave messages</td>
<td>48.0</td>
<td>52.0</td>
</tr>
<tr>
<td>Best browser version for the website is indicated</td>
<td>45.1</td>
<td>54.9</td>
</tr>
<tr>
<td>There is a discussion area</td>
<td>43.0</td>
<td>57.0</td>
</tr>
<tr>
<td>Frequently asked questions by the reader and their related answers are shown</td>
<td>42.3</td>
<td>57.7</td>
</tr>
<tr>
<td>The author’s name is given</td>
<td>40.9</td>
<td>59.1</td>
</tr>
<tr>
<td>The professional background of the website administrator is described</td>
<td>27.9</td>
<td>72.1</td>
</tr>
</tbody>
</table>

Four items were grouped under Factor I: ‘content is valuable for reference’, ‘complete information is provided’, ‘data are objective’ and ‘provide correct information’. This factor was called ‘content truth’. Factor II included ‘illustrations have accompanying text to assist description’, ‘effectively links to other websites’, ‘the linked websites provide useful information’, ‘graphics can be opened easily’, ‘methods are provided for reader interaction’ and ‘web pages are suitable for easy browsing’. These elements were grouped as ‘accessibility and convenience’. Factor III consisted of ‘back and forth speed between web pages’, ‘time spent waiting for the website to open’, ‘website is linked to other sites via

compatible with Netscape’ and ‘each page provides a link back to previous levels of the site or to the front page’. The last three were ‘the professional background of the website administrator is described’, ‘the author’s name is given’ and ‘frequently asked questions by the reader and their related answers are shown’ (see Table 4).

Factor analysis was performed for Part I using both principal component analysis and varimax rotation. Four factors in total were extracted, which kept the common factor eigenvalue at approximately 1 through the screen plot diagram. A loading factor of 0.40 was used as the cut-off point. Factors I–IV accounted for 46.40%, 8.64%, 6.02% and 5.57% of the total variance, respectively, on the website evaluation questionnaire (Table 5).
common search engines’ and ‘correlation between website name and its content’. These factors were grouped as ‘speed and connection’. Factor IV included ‘clear topic’, ‘clear and reasonable arrangement of ideas’ and ‘visual effect’. These factors were grouped as ‘overall impression’ (Table 6). Cronbach’s α values for the four factors were 0·90, 0·83, 0·82 and 0·81, respectively.

The second part of the questionnaire evaluated website function and compatibility with various browsers. Questions dealt with reader questions and answers, the professional background of the website administrator and the search function. Browsers evaluated for compatibility were Internet Explorer and Netscape. The structure of the questionnaire is illustrated in Figure 1.
Discussion

Reliability coefficients indicated that the questionnaire had good reliability. The factors we extracted were simpler than the items in the original questionnaire, and could serve as a reference for future website evaluation questionnaire designs. The items included within each factor could function as operational guides for said factor. The total cumulative variance explained by the four factors was 66.6%; thus we concluded that the questionnaire had good construct validity.

Eysenbach et al. (2002) reviewed website evaluation tools in Hungarian, Japanese, Spanish, German and Italian, and concluded that the index developed by Willems and Bouvy (2001), which used a five-point Likert scale, should be used to assess the completeness of website content.

Part I of our nursing website evaluation questionnaire applied five-point Likert scale to evaluate four factors of content truth, accessibility and convenience, speed and connection, and overall impression. These factors were consistent with the requirements of good websites as suggested at the website ‘ASKanything.com’. Nursing websites are different in nature from other medical or commercial health-related sites. The Health on the Net Foundation (1997) defines eight criteria for evaluating nursing websites: (1) authority; (2) complementarity; (3) confidentiality; (4) attribution; (5) justifiability; (6) transparency of authorship; (7) transparency of sponsorship; and (8) honesty in advertising and editorial policy. Our questionnaire seems to measure the first six of these principles.

Website evaluation tools developed in studies in other countries have tended to put emphasis only on the correctness or completeness of the content (Doupi & van der Lei 1999, Fitzmaurice & Adams 2000, Latthe et al. 2000). However, accessibility, convenience and functionality are, for the most part, not clearly described. Our questionnaire incorporated not only the accessibility and convenience in Part I, but also the functionality in Part II. While various studies have suggested methods for examining website evaluation scales, discussion about examination of their construct validity is lacking. We looked at it in a preliminary fashion, but would suggest that it should be explored in greater depth in the future.

The last three items in both Parts I and II could function as suggestions for designers of nursing websites. According to our findings, people expect to be able to interact with websites. Clarity would be enhanced if illustrations were accompanied by assisting descriptions. Time spent waiting for graphics to open might cause readers to lose interest and browse to other websites. Mention of authors’ and managers’ names, along with their professional backgrounds, was found to be a key sign of trustworthiness for users.

The nursing and mechanical engineering examiners in this study were either graduates or graduate students in Taiwan. They had studied English since middle school, giving them at least 10 years of English education and implying that they could understand the contents of websites from the United States. Thus, the data in this study were assumed to be valid.

The examiners logged on to the internet using the same type of servers used by the Ministry of Education in Taiwan, which are quite fast. However, the internet route and regional LANs may cause differences in the speed with which web pages open, depending upon whether one is in Taiwan or in the United States. This is a limitation of the study.

Conclusion

The nursing website evaluation questionnaire was developed to measure six components of a website: content validity, accessibility and convenience, speed and connection, overall

What is already know about this topic

• Increasingly, both the general public and health care professionals are using the Internet to search for information related to health care, in lieu of traditional methods of obtaining health-related information from professionals.
• Professional staff use the Internet as a reference tool for their clinical work as a means for exchanging information and as a source of updating their professional knowledge.
• There are 47 website evaluation tools without descriptions of validity and reliability.

What this paper adds

• The questionnaire with construct validity and internal consistency could be valuable to both the general public and professional health care workers as a tool for evaluating the usability, content and validity of the information found in nursing websites.
• Six principles of evaluating nursing website proposed by the Health on the Net Foundation could be measured by our questionnaire.
• Authors’ and managers’ names, along with their professional backgrounds were essential for the readers’ trustworthiness.
impression, website function and compatibility with various browsers. It had good internal consistency, as shown by its Cronbach $\alpha$ value of 0.93. The construct validity was supported by factor analysis. This questionnaire could be valuable to both the general public and professional health care workers as a tool for evaluating the usability, content and overall validity of the information found in nursing websites.

**Author contributions**

Study conception and design/Data collection/Data analysis/Drafting of manuscript/Statistical Expertise/Obtaining funding/Supervision – SLT; Critical revisions/Admin – SKC.

**References**


