The Internet and the diabetic foot: quality of online information in French language

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Received 6 September 2006; accepted 10 December 2006
Available online 07 March 2007

Abstract

The Internet has become a major source of health information for consumers. Nevertheless the quality of medical information varies widely and is generally poor.

Aim. – This study aimed to evaluate the quality of information delivered on French-speaking Internet about the diabetic foot.

Methods. – Websites were selected using three popular search engines and introducing “foot + diabetes” and “foot + diabetic” as keywords. Two diabetologists independently evaluated the quality of information using a specially created scoring grid (range 0–52) based on acknowledged and published criteria with items relevant to general characteristics of the site and to information content. One hundred and twenty websites were selected but only 27 were included for analysis.

Results. – Agreement between the two raters was close for global score and site content but lower for site characteristics. Averaged global score ranged from 8 to 44. Only five sites were assessed as very advisable with a score higher than 39; in contrast 18 sites were judged as not advisable at all (score lower than 26).

Conclusion. – This study, the first to be devoted to information about the diabetic foot on the Internet, clearly shows the variability and the general poor quality of information delivered by the great majority of French-speaking websites. Regulation organisms are urgently needed for checking and labelling public oriented health information in order to make the Internet a performing tool for patient information.

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Résumé

Internet et pied diabétique : qualité des informations sur les sites francophones.

Internet est devenu une source majeure d’accès du public aux informations médicales. Cependant, la qualité des informations délivrées sur le web est très inégale, souvent critiquable et pouvant parfois se révéler dangereuse.

Objectif. – La présente étude s’est attachée à évaluer la qualité des sites donnant des informations destinées au public sur le pied diabétique.

Méthodes. – Les sites ont été sélectionnés à partir de trois moteurs de recherche généraliste en introduisant comme mots clés les termes « pied + diabète » et « pied + diabétique » ; les sites ont été évalués par deux médecins indépendants au moyen d’une grille de cotation allant de 0 à 52 points, fondée sur des critères reconnus et publiés, et comportant deux sortes d’items, l’une se rapportant aux caractéristiques générales du site et l’autre au contenu de l’information. Des 120 sites sélectionnés, seuls 27 sites ont été inclus dans l’analyse.

Résultats. – La concordance entre les deux juges était étroite pour le score global et celui se rapportant au contenu du site, moins forte en ce qui concernait ses caractéristiques. Le score global moyen pour les deux juges allait de 8 à 44 témoignant de la variabilité dans la qualité de l’information. Seuls cinq sites ont été qualifiés de hautement recommandable avec un score global supérieur à 39 alors que 18 étaient déconseillés.

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doi:10.1016/j.diabet.2006.12.003
Conclusion. – Cette première étude des sources web francophones qui portent sur le pied diabétique confirme la pauvreté et la médiocrité de la qualité des informations données par l’immense majorité des sites. En raison des éventuels effets délétères que pourrait entraîner une mauvaise information, la mise en place d’organismes de régulation (sociétés savantes, association de patients, organismes de tutelle) semble essentielle pour faire d’Internet un outil performant au service de la santé.

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Keywords: Internet; Information; Quality; Diabetes; Diabetic foot

Mots clés : Internet ; Information ; Qualité ; Diabète ; Pied diabétique

1. Introduction

Nowadays, the World Wide Web (WWW or “the web”) has become one of the most popular sources of health care information for consumers. In 1999, it was estimated that more than 100,000 websites offer health-related information [1] and this number is growing steadily. Two recent surveys reported that 80% of online American adults (≈100 million people) have already searched for medical information on the web [2,3]. In France, this percentage was estimated as high as 35% translating to about 14 million French adults “cyberchondriacs” [2]. Two-thirds of Internet users looked for information about a specific disease [2]. Moreover, more than 70% of health seekers reported that information they find on the web influences a therapeutic decision [4]. Easy access to medical information on the web could develop patient self-empowerment and convenient self-management of his/her own health [5]. Nevertheless, this critically depends on the accuracy, reliability and readability of information delivered on the web; indeed, several studies have shown a great variability in the quality of the web-based health information for various specific diseases [6–14]. Education of patients and caregivers is essential in chronic diseases, especially in diabetes for preventing complications. As foot problems are among the most serious and costly but preventable complications in individuals with diabetes [15], we conducted a study aiming to assess the quality of web-based information on the diabetic foot.

2. Methods

2.1. Selecting the sites (Fig. 1)

The WWW was searched using three search engines, Google, Yahoo! and Voila. These search engines were selected because they are the most popular in France, accounting for more than 80% of queries [16]. To identify potential relevant sites, “pied + diabète” (“foot [and] diabetes”) and “pied + diabétique” (“foot [and] diabetic”) were entered as search terms: these keywords were chosen after asking diabetic patients in our department about the terms they entered for such a search. The links on the first electronic page for each search were retained, as do most of web users [16]. So, the first 20 websites were examined for each of the three search engines.

![Fig. 1. Flowchart of the inclusion.](image-url)
2.2. Assessing the sites

Quality of information was assessed using a standardised form consisting of two sections (Tables 1 and 2). The first part addressed the characteristics of the site using a nine item scale, in accordance with published recommendations [13,17–20]: each site was rated as to its ownership, involvement of an editorial board, kind of financial source and scientific references; also we took account of presence of updating, pertinent hyperlinks, possibility of e-mail contact, website navigability and aesthetics.

The second part looked at the content using a 20 item rating scale about pathophysiology and screening of the diabetic foot, patients counselling and potential consequences of negligence. The quality of information content was judged from published clinical practice guidelines [21–24].

Most items were rated on a three point scale: 0 if the information was absent, wrong or harmful, 1 if it was incomplete and 2 if it was right. For dichotomic items, score was 0 (absence) or 1 (presence). Global score ranged from 0 to 52 (0–14 for the site characteristics and 0–38 for content).

Two physicians, a specialist in diabetology (J.L.R.) and a GP (P.L.), completed the form for each site, independently.

### 2.3. Statistical analysis

Inter-rater agreement was assessed using three methods: the kappa measure, determination of intraclass correlation coefficient (ICC [1,1]) based on Anova [25] and Lin concordance coefficient which allows a 95% confidence interval to be determined, contrary to the ICC [26]. Moreover, Pearson’s r correlation coefficient was computed for the global score of each site between the two raters. Statistical analysis was carried out using SAS statistical package.

### 3. Results

#### 3.1. Selected sites

Using the three search engines and the two keywords, more than 100,000 diabetic foot related-websites were identified. As only the first 20 sites on the first websites were retained, we examined 120 potentially relevant websites. Ninety-three (77.5%) were excluded because 48 were completely irrelevant, four were not available and in 39 the content was identical to another website; so, only 27 sites (22.5%) were included in the study (Fig. 1): 14 were identified by Google, nine by Yahoo! and four by Voilà. Sixteen sites were found using “Pied + diabète” and 11 using “Pied + diabétique” as keywords. Ninety percent of the sites clearly specified the authors of the web content and e-mail for contacting author was given in 90% of cases; in 65% of the sites, an editorial board and/or a webmaster was present. Only 12 sites (44%) mentioned the source of information they provided.

Eight websites were created by pharmaceutical companies, six by health professional individuals and nine by medical organisation; two were established by a patient and two by a hospital department.

The vast majority of sites originated from France; only three were from other French-speaking countries (two from Belgium and one from Canada).
Correlation coefficient between the two judges was 0.97 for both the global score and the quantity of information and 0.76 for the characteristics of the sites ($P < 0.01$) (Fig. 2A–C).

Fig. 3 shows individual site global score according to the two judges: mean global score (± S.D.) was $24.0 \pm 10.2$ for rater #1 and $24.8 \pm 11.3$ for rater #2 with a mean difference of $0.8 \pm 3.0$ between the two raters.

Kappa coefficient varied widely from 0.18 to 1 according to the items. Generally, agreement was closer for judging site content (kappa: 0.35–1.0) compared to site characteristics (kappa: 0.18–0.77). So, according to Landis and Koch [27], agreement about site content was very good or fair for 59% of items (kappa $\geq 0.61$), moderate for 37% (0.61 < kappa $\geq 0.41$) and poor for 5% (kappa < 0.41); for site characteristics, these percentages were 22, 44 and 33%, respectively. ICC values were 0.981, 0.900 and 0.854 for global score, site content and characteristics, respectively; for Lin concordance coefficient, corresponding values were 0.94 [95%CI: 0.88–0.97], 0.95 [0.90–0.98] and 0.72 [0.48–0.86]. So, the agreement was judged very good allowing to combine the assessment of the two raters and use the mean value (averaged global score) in the main analysis.

### 3.3. Ranking—the sites

Fig. 4 shows the sites mapping of the two raters: for the first, six sites (sites 1–4, 6 and 7) were judged satisfactory as they are in the upper right quadrant and seven completely unsatisfactory in lower left quadrant (sites 17, 19, 20, 22–24 and 26); for the second rater, seven sites were satisfactory (sites 1–5, 7 and 8) and nine unsatisfactory (13, 14, 18, 20–24 and 26).

Sites were ranked according to the averaged global score: a site was considered as very advisable if the score was between 39 and 52 (first quartile of maximum global score), advisable with reservation for a score between 26 and 38 (second quartile), not advisable between 13 and 26 (third quartile) and harmful if lower than 13 (fourth quartile). Averaged global score varied widely (range: 8–44, mean S.D.: 24.4 ± 10.6). Only five sites (18.5%) were classified as very advisable; by contrast, 66.7% were considered not advisable or harmful (Fig. 5), mostly due to lack of patients counselling: considering this point, all “harmful” sites were silent on the necessity of a regular self-examining the feet and wearing adequate footwear were also frequently omitted. Among the ‘top five’, two sites originated outside France (one from Belgium and the other from Canada); three were created by a health professional association, the two others by health professional individuals. All the pharmaceutical company-linked sites were judged as not advisable or harmful.

### 4. Discussion

This study clearly shows the poor quality of information in French language delivered about the diabetic foot by the WWW: so, only 13.5% of the sites we analysed were judged as advisable for the patients. These results are in accordance with most of previous studies on other chronic diseases [13].

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**Table 2**

<table>
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<tr>
<th>Number</th>
<th>Site identity</th>
<th>Site address (URL)</th>
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<tr>
<td>15</td>
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<td><a href="http://www.chaps-jussieu.fr/po/po/diabet/POLY.Chp.6.4.html">http://www.chaps-jussieu.fr/po/po/diabet/POLY.Chp.6.4.html</a></td>
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<tr>
<td>23</td>
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<td><a href="http://www.ch-vexin.fr/articles_diab%e9tologie.html">http://www.ch-vexin.fr/articles_diab%e9tologie.html</a></td>
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<tr>
<td>17</td>
<td>Diabeted</td>
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<tr>
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<td>Dumont</td>
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</tr>
<tr>
<td>26</td>
<td>Dromadaire</td>
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<tr>
<td>19</td>
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<td>7</td>
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</tr>
<tr>
<td>24</td>
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<td>27</td>
<td>Vulgaris médical</td>
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</tr>
</tbody>
</table>

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**Figure 3**

Individual site global score according to the two judges: mean global score (± S.D.) was 24.0 ± 10.2 for rater #1 and 24.8 ± 11.3 for rater #2 with a mean difference of 0.8 ± 3.0 between the two raters.

**Figure 4**

Sites mapping of the two raters: for the first, six sites (sites 1–4, 6 and 7) were judged satisfactory as they are in the upper right quadrant and seven completely unsatisfactory in lower left quadrant (sites 17, 19, 20, 22–24 and 26); for the second rater, seven sites were satisfactory (sites 1–5, 7 and 8) and nine unsatisfactory (13, 14, 18, 20–24 and 26).
The wide variability of health information on the Internet has also been shown for diabetes [11,28,29] but we were aware of only one recent study specially devoted to information on the diabetic foot in Scotland [30]: according to the authors, high quality of Internet-based information on foot care was available to patients in the UK but information was not easily accessible; however, it is worth noting that only five sites out of 23 had easily accessible relevant information and were scored, ranging from 5.5 to 14.5 for a maximum score of 23. Reports on the quality of health-related information on the French-speaking websites are scarce [31,32]. Difficulty for having access to relevant data is evidenced by the high proportion of sites we excluded because of irrelevance or redundancy. On the other hand, it is reassuring that two institutional sites from official associations (French-Speaking Association for the Study of Diabetes and Metabolic Diseases [ALFEDIAM] and Canadian Association for Wound Care [CAWC]) are ranked in the three first places together with a personal site created by a diabetologist deeply involved in diabetic foot management.

Nevertheless, our study has several limitations. First, to identify potentially relevant websites, we used only non-specialised search engines and introduced very simple keywords. We cannot rule out the possibility that a more complex search strategy could have given more relevant results. But, a naturalistic observation of search and retrieval process showed that people having already searched for health information on the web do not use medical portals or sites of medical societies, nor use Boolean operators or phrases to search the web [33]. So, results of our study are merely a reflection of what a ‘typical’ web user may obtain when searching web information on the diabetic foot. The way of assessing the websites is a second limitation of the study. First, as we were not able to blind website name for technical and time reasons, it is possible that personal biases could have affected the scores, as suggested by Seidman et al. [11]. Nevertheless, there were no conflicts of interest between the raters and authors or owners of the analysed sites; furthermore, the GP rater was not familiar with the diabetology world: from this point of view, it is worth noting that agreement between the “naïve” rater and the diabetologist was close. On the other hand, for judging the sites we used an original grid not previously validated and therefore open to criticism. Nevertheless, as emphasised by Jadad and Gagliardi [34,35], no gold standard exists for rating health information on the web and none of the developed instruments is really validated. As previously stated, the grid we developed was based on key criteria generally acknowledged for basic information [36] and took great account in evidence-based documents for assessing quality of medical content. The closer inter-rater agreement for site content is probably due to the part of subjectivity in assessing some site characteristics like aesthetics, navigability or relevance of hyperlinks. In addition to this methodological problem, the analysis of the sites by two physicians experienced in diabetic foot problems and used to surfing the Internet may also introduce a bias; a more realistic approach would consist in evaluating the sites by the patients themselves in a real-life situation but this approach is time-
consuming and was not feasible. Finally, the Internet is permanently moving and changing all the time: it is therefore possible that our results are no longer valid; however, we have to admit that no improvement in the quality of web-based health information was observed along the time.

Patient-oriented health information on the WWW appears as problematic due to its Janus-like aspects with a single head but two faces looking in opposite directions: freedom to publish provides a unique opportunity for gaining free, easy and rapid access to a big volume of potentially high quality data but the
lack of control often leads to information of low quality. This problem is specific for health websites but in this context, poor quality of information may be harmful. So, it is necessary to develop quality assurance tools for helping patients to find high quality evidence-based health information so that they can be actively involved in decisions related to their own health [37]. Several approaches have been developed like codes of conduct, quality labels, user guides, filters or third party certifications [38]. In this context, it is worth noting that the Commission of the European Communities has established quality and accessibility criteria for health-related websites and launched an action plan for a European e-health area aiming to empower health consumers [39].

From our study, it is clear that there is an urgent need to check patient-oriented healthcare information on Internet: in our opinion, this work must be done in cooperation with scientific societies, patients association and health authorities.

References


[38] Wilson P. How to find the good and avoid the bad or ugly: short guide to tools for rating quality of health information on the Internet. BMJ 2002;324:598–602.