

QUALITY OF WEBSITES IN SPANISH PUBLIC HOSPITALS

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ABSTRACT:

Objectives: to assess the quality of websites in Spanish public hospitals by means of a validated system, also including measures of readability and accessibility.

Methods: design and validation of a scale to assess the quality (citizen orientated) of the websites of hospitals. Evaluation of the quality of the of public hospital websites by means of the results of the above evaluation scale, analysis of the readability of their contents and the results of the accessibility test.

Results: the validated scale contains 73 elements or attributes. Analysis of the concordance of website evaluations shows average assessment values of between 0.80 and 0.81, which confirms a high degree of agreement amongst jurors. 20% of the attributes do not appear on any websites and 14% are present on all of them. The average mark of the hospitals is 43%. The marks given for readability of tests show that it is satisfactory for 64% hospitals. None of the websites visited fulfilled the requirements necessary to be considered as accessible.

Conclusions: The quality of the websites analyzed by means of this scale varies from 23% to 62%. Differences in the size or location of the hospitals do not explain this high level of variability. The results recommend to improve the readability of websites, and make them accessible to people with disabilities.

INTRODUCTION

The study 'use of the Internet in Spanish homes'¹[1] shows that Spanish internet users spend an average of nine hours per month surfing the net at home and that, in that time, they visit some 593 websites. Men (11.7 hours per month) spend more time surfing the Net than women (5.7 hours per month). These results underline the fact that internet users spend an average of 31 minutes per session and visit 33 websites each time. This same study emphasizes that somewhat over 50% of internet users visit the websites of Public Administration departments.

According to the data of the EGM²[2], the percentage of Spanish internet users who use the Internet at home is 62.3%. This is followed by 31.6% who use it at work and 13.3% in educational establishments. An increasing number of Spanish people are using the Internet and it is estimated that in the months of April and May 2004, there were 12 042 000 internet users (33.1% population). According to the EGM there is practically an equal number of men and women (56% male), although the majority (82.5%) are under the age of 45.

The study 'Navegantes en la Red'³[3] gives some data about their profile. A considerable majority (89.2%) are in or have finished secondary or higher education. 66% work and 26.9% study. The main reason for surfing the Net is personal (54.9%), considerably more than for professional reasons (35.9%) and academic reasons (8%).

Regarding the devices used for connecting to the Internet, the study 'TIC en los hogares españoles'⁴[4] points out that despite the growing use of laptop computers for this purpose, table – top computers (83.8%) continue more widely used, where the Internet is concerned. Mobile telephones or PDA's only represent 2.5%. The study also indicates that each Spanish household spends an average of around 23 euros per month on the above connections.

Once internet users have switched on the computer and are connected to the Internet, what are they looking for? The 'Encuesta sobre equipamiento y uso de tecnologías de información y comunicación en las viviendas'⁵[5] shows us that they mainly look for information about the following: goods and services (81.5%), websites of Civil Service departments (52%), of health (19.6%). The internet users are becoming accustomed to receiving information and services of all types through the Internet: leisure, tourism, financial matters, courses...etc. There is no doubt that the Internet has become an advantageous means of providing information and making oneself known to the world. At

the same time, it is an ideal platform for offering new services and, beyond all doubt, the ideal place for making any kind of services accessible.

In the field of health, the Internet can be used in a number of ways⁶[6]: to provide information about health and illness, health education, chats and debates (among patients or professional people or both) or to spread medical news. Another example is when a health centre uses a website to provide a large amount of information about the services it offers, the way in which they can be used, how to access them, working hours, etc. thereby drawing attention to itself. The website address http://jama.ama-assn.org/cgi/collection/patient_page of JAMA is an excellent example of how to organize verified information about health and present it to internauts. In <http://www.dipex.org> so called e-patients can share experiences, and obtain information about their illness or therapeutic methods. The address <http://www.usnews.com/usnews/health/hosptl/tophosp.htm> gathers information about hospitals in North America which have been classified, since 1991, according to a series of parameters which enable the rankings of the 'best hospitals' to be made available to internauts. In Spain, information about the 'top 20' hospitals has been available for the last five years, following a similar method, and can be found at the following address <http://www.iasist.com/iasist.html>

The Health on the Net Foundation (HON)⁷[7] states that 63% of patients have discussed with their doctor information about health which they found on the Net, 33.74% have had medical appointments on line and 43% have used the Internet to look for a second opinion on medical diagnosis. At the same time in the same study, it was found that 77% of doctors surveyed acknowledge that their patients discuss information about health found on the Internet with them, that 44% correspond with their patients by email and that 71% recommend websites to their patients as a valid source of medical information.

In a recent study carried out in Spain⁸[8], in which 302 doctors in hospitals in the northern and central parts of the country were surveyed, only 1.7% said they did not use the Internet. The rest surfed the Web for an average of 44 minutes per day. 37% of those surveyed had done an online course; 35% systematically consulted journals on the Net; 18% had contributed in some way to health websites; and most strikingly 12% claimed to have received emails from their patients regarding medical advice.

However, so much information raises doubts as to its effectiveness, reliability and also its validity. In 2002, Eysenbach et al⁹[9] carried out an exhaustive check of 79 studies assessing a total of 5941 particular health websites, and 1329 general websites. 55 of

these studies (70%) concluded by pointing out problems in the quality of the information. Other studies fall in with these results and point out the problems (doubts, lack of trust) that an erroneous piece of information can cause between an e-patient and their doctor¹⁰[10]. Others have emphasized the dangers that can result from poor information, for example, in the case of some illnesses¹¹[11], the use of medication¹²[12], or understanding the significance of information available in health centres¹³[13] (the so-called Report Cards).

It was with this in mind that, in 1997 Pealer et al¹⁴[14] carried out an initial assessment of the quality of health websites based on four criteria: content (current relevance, precision, references, legibility), author (credentials, objectivity), purpose (to inform or persuade) and layout (style, sources, graphics, stratification of the information). Evidence of these elements at the head, in the middle, and at the foot of the website, was verified. Two years later, Kim et al¹⁵[15], having searched for relevant information on the Net and carried out a detailed review of medical journals, identified 165 criteria for assessing information related to health which is found on websites. Afterwards they put the criteria into twelve categories, the most important of which being those related to the content of the websites, its design and appearance and information about the authors; these were followed by the degree of veracity and reliability of the information, the authority of the source, how easily it can be used and the accessibility and availability of the website. In 2004, Dominguez – Castro et al¹⁶[16] designed and validated a questionnaire for assessing the quality of websites which applied to centres dealing with health chemistry and health economy in various countries of the European Union, the USA and Canada. The writers classified these centres as high quality, medium quality (most centres fell into this group) or low quality.

An interesting assessment project of health websites is the one developed within the framework of the e-Europe Plan. This initiative was put forward by the European Commission in December 1999 in order to exploit the opportunities offered by the Internet. The fundamental objectives of the plan of action e-Europe 2002¹⁷[17] were the following: (a) A faster, cheaper and safer Internet; (b) investment in people and training and (c) to encourage use of the Internet. Within this last objective were two plans of action aimed at getting public services and health on–line.

The ‘health on–line’ did not only consist in developing infrastructures. It also set out to develop comparative assessment criteria of health websites and to provide European citizens with the necessary resources for assessing the quality of health websites. In order to fulfil this objective, the European Council, meeting in Faria (Portugal) in June 2000,

backed an initiative to develop a basic group of 'Quality criteria for websites related to health'¹⁸[18]. These criteria were divided into six groups: transparency and honesty, authority, privacy and protection of data, updating of information, explanations and accessibility.

Later developments in this project advocate: the introduction of codes of conduct (quality criteria established by consensus which will enable self-assessment in the future); etiquettes of quality which can be self applied (shown to certify the fulfilment of a code of quality drawn up by a third party); guides for verification by internauts (who can verify whether or not the code has been respected with the help of a tool for guidance); filtering tools (based on information which has been filtered and accredited). For this reason, it has been necessary to ensure that the websites are good quality, particularly those of the first type which offer information about health. This is the *raison d'être*, for example, of the Centre for the Quality of Information on the Internet in the United Kingdom (<http://www.hfht.org/chiq/>); or of similar initiatives in France or Germany¹⁹[19]; and of the codes of ethics which have been developed (<http://www.hon.ch/HONCode/conduct.html> ; <http://www.ihealthcoalition.org/ethics/ehcode.html> ; <http://www.mitrotek.org/home.nsf/HealthCare/HITI>). In Spain, the Web Médica Acreditada (WMA) of the Colegio de Médicos in Barcelona (<http://wma.comb.es>) has granted a stamp of quality to websites who request it and which fulfil certain recommendations²⁰[20].

The quality of websites is also measured by the degree of comprehension of the information given (legibility). By legibility we mean the ease with which a text can be read and understood²¹[21]. There are tools which measure this formal linguistic legibility in an objective way based on: length of words and sentences, grammatical constructions, etc. These techniques have developed noticeably²²[22] as in the case of the Flesch formula (the most widely used), the Fry scale, the Flesch – Kincaid scale or the SMOG formula. Various projects have applied them to information contained in websites^{23 24 25 26} [23] [24] [25] [26], to documents of informed consent^{27 28}[27] [28], information about health education for patients^{29 30 31}[29] [30] [31] or to leaflets about medication³²[32]. These indices have also been used in Spain to measure the legibility of documents of informed consent^{33 34}[33] [34], leaflets about health education^{35 36}[35] [36] and also websites²²[22].

The Flesch formula is based on the premise that the longer the words and sentences are in a text, the more difficult they are to understand. Since 1997 a computerized version has been available in the Microsoft Word programme, enabling it to be used more easily together with other useful measurements for the analysis of readability like the complexity of sentences or vocabulary. One precaution which must be

taken when using these measurements is that the results obtained by them are originally designed for the language in which that measurement was developed. In the case of the Flesch formula, it is English, and so it is necessary to take into account differences between the English and Spanish languages, and use, in our case, the adaptations of the Flesch formula to the Spanish language^{37 38 39}[37] [38] [39].

Another important aspect regarding the quality of a website is its accessibility since it directly affects, amongst other things, the number of people who can have access to the information, the ability to catch the internet user's eye as they go from website to website looking for information, or the time needed to find what they are looking for.

The accessibility of websites on the Internet can be defined as the combination of technologies and norms for implementing and designing them, which facilitate the use of the Internet for the largest possible number of people, including those with disabilities. In this last case, various types of disabilities which can hinder or prevent the person from having access to the information and making effective use of the website, have been identified. These not only include visual, auditory and ones related to movement, but also learning disabilities (this includes many older people who are technologically illiterate), and 'technological handicap' due to a lack of adequate technical means to gain access to all areas of the website (equipment which is not up-to-date regarding the latest hardware/software technologies or lines with slow access).

The governments of the various countries, aware of the importance of this fact, have put forward legislative initiatives regarding this matter. In the USA, for example, since 7th August 2001, all information produced by or for the Government in electronic format has had to fulfil norms of accessibility⁴⁰[40]. On our side of the Atlantic, the European Commission adopted, on 25th September 2001, a communiqué in order to increase the accessibility of European websites with the aim of improving access to the Net for people with disabilities and the growing number of elderly people.

The resolution of the European Council of 25th March 2002⁴¹[41], encourages member States to take the measures needed to enable public websites at all levels of government to be accessible. In Spain, the law 34/2002 of 11th July⁴²[42], in a fifth additional regulation, states that Civil Service Departments will take the necessary measures to ensure that the information available on their websites is accessible to people with disabilities and to the elderly, by 31st December 2005, as well as encouraging manufacturers of equipment and software to adopt norms regarding accessibility.

With the aim of making the above easier to achieve, the WAI (Web Accessibility Initiative), which belongs to the W3C (World Wide Web Consortium), developed a group of

guidelines or basic rules for accessibility⁴³[43], which in fact constitutes a norm for the creation of accessible websites that is recognised worldwide. The test of web accessibility⁴⁴[44] (TWA) is a web tool based on the internationally accepted criteria for analysing and informing us of the level of web accessibility. When it is applied, it enables us to determine, in a simple way, whether or not the design of the websites fulfils the accessibility norms, and, as a result, allows people with disabilities to have correct access to the information and effective communication with the website.

The importance of new information and communication technology makes it necessary to widen the concept of accessibility in hospitals to include the Internet. It is no longer a question of simply answering the telephone in time, or of there being no delays or architectural barriers. The Net, along with all it offers and could offer, calls for this channel of information to be developed (giving information about how to get there, hours, list of services, attending to patients, sending analytical results to mobile telephones, making appointments via the Internet, consultation with other specialists thousands of kilometres away, the possibility of professionals having access to hand of the medical history of their patients, a second medical opinion from anywhere in the world, integrated Web centres dealing with illnesses such as diabetes or AIDS, enabling children in hospitals to continue their education in their normal educational establishments via the Internet, communicating with relatives who are in hospital, etc.)

In this so-called 'age of communication' the information which citizens have about public services and its greater accessibility via the Net, are aspects on which Governments are gradually focusing their attention. In the case of hospitals, a positive development in the websites of health centres can be noticed. It seems there is constant investment in time and money to enable information about hospitals to reach citizens. This information not only includes that related to the services offered by or activities of each centre, but also the possibility of using the hospital websites to offer health education to those who visit them, and to draw people's attention to them. In a study comparing 84 American and European hospital websites⁴⁵[45] it was found that websites of Spanish hospitals were good on information given about their structural organization (resources, number and qualifications of professional staff, services, etc) and about their activities (number of operations, waiting time for information, etc.) The American hospitals had much more information about accessibility (surgery times or information) and about the effectiveness of operations which they carried out (mortality, etc.)

The image of hospitals as seen by the public is of concern to professionals, boards of directors and the Department of Health since confidence in the Public Health Service

could be affected and in the future, have negative repercussions regarding the fulfilment of therapeutic obligations, surgery attendance, or cause patients to go to other centres which instil more confidence.

The image of a hospital is not only influenced by the information it wants to give about itself⁴⁶[46]. It is obvious that this image is the result of a broad interaction of the behaviour of out-patients, in-patients, boards of directors, professionals, trade unions, suppliers, etc⁴⁷[47]. It is necessary to distinguish between: functional image (the relation between the services offered and the hospital's ability to fulfil them), organizational image (the concern about carrying out a service without making mistakes, or the desire to relieve suffering), and the intentional image (the one the hospital itself intends to present)⁴⁸[48]. In that sense, hospital websites are becoming more and more important when it comes to boosting the intentional image of the centre and, as a result, improving the Corporate (or global) image it presents to the general public.

This study has two objectives. Firstly, to design and validate a scale for assessing the quality of a health centre website (in terms of the degree of citizen orientation), and secondly to analyze the degree of citizen orientation (including measures of legibility and accessibility) of the Spanish public hospital websites.

MATERIAL AND METHODS

A descriptive study of the level of quality of the websites of public hospitals in which the first stage is to create and validate a scale for assessing the suitability of their contents.

In designing the assessment scale for the Websites (The e-Information Quality Scale of Health Centres) the following were taken into account: (1) significant elements of the websites which had been identified in a previous study to find out what makes internauts give more credibility to a particular website; (2) attributes of website quality from a selection of Spanish (Top 20 and catalogue of hospitals) and American (Best hospitals) hospitals.

Assessment of the quality of the websites included the following parameters: (1) results of the assessment scale; (2) results of the legibility analysis of the contents; and (3) results of the accessibility test⁴⁴[44].

Elements that increase the credibility of a website

225 'simulated' internauts (acting as any internaut, but at the request of the research team) surfed a series of health websites with the aim of indicating the elements that, in their opinion, helped to increase the credibility of those websites. In particular, 73 elements referring to language, format and information were identified and included in the scale. What was most valued regarding language was the use of some technical terms whilst at the same time being clear and not overloaded with technical jargon. Regarding format, most importance was given to the ease and speed of surfing, as well as how the links worked. In the case of information, its being complete and relevant was appreciated. In determining the credibility of a website most important was the degree to which information was updated and supported by organizations or people who were competent in that area.

Attributes of the websites of the best hospitals

The websites of 32 Spanish and American hospitals were visited in order to identify outstanding, novel or characteristic elements which indicated that it was a website directed at citizens or patients.

The Spanish hospitals were selected from the 'Hospitales TOP 20 2003'⁴⁹[49] programme. In this edition 139 hospitals had taken part voluntarily. These are classified into hospitals of the Sistema Nacional de Salud (SNS) and private hospitals. The SNS hospitals are in turn categorized into five levels according to criteria related to size, educational role, technological equipment and complexity of patients. Having rejected those centres which lacked a website and those which participated in the study, two of the first four hospitals in each group were selected at random (table 1).

In addition, given that some autonomous regions did not take part in the 'Top programme' and to broaden the review carried out on hospital websites, two hospitals from each of the following autonomous regions were included (table 1): Andalusia, the Basque Country, Catalonia and Madrid, as well as one hospital each from Galicia, Castilla–Leon and Castilla–La Mancha.

American hospitals were selected from those on the honours list of 'Best Hospitals 2004'⁵⁰[50]. The top ten (out of the 14 on the list) were chosen.

[Insert table 1 about here]

Readability

In order to determine the readability of the hospital websites, equivalent texts were selected from each of them (to enable comparison to be made between the centres on

similar matters) taken from the forms regarding admissions, location of the centre or welcome page. These texts, about 200 words in length, were analyzed together with others taken from different pages (for example: hospital history, information about SAIP, or about blood/organ donation...) if the information was available, in order to assess the readability of a larger number of items for internauts (the number of words in the texts analyzed ranged from 111 to 1706). The documents, in htm or html format, were made into Word documents (.doc). Analysis of the text was carried out making use of what is offered in the Microsoft Word for Windows programme (Tools/Options/spelling and grammar/statistics on readability/style of writing: selecting Exhaustive Verification). In the spelling and grammar tools menu when the spell-check is completed, statistics regarding the readability of the document are automatically obtained. These include Flesch indices and those regarding the complexity of sentences as well as vocabulary.

- Flesch readability index: relates the difficulty of the text to the length of the words and sentences. The Flesch formula is:

$$206.835 - (1.015 \times \text{ASL}) - (84.63 \times \text{ASW})$$

ASL is average sentence length (the number of words divided by the number of sentences) and ASW is the average number of syllables per word (the number of syllables divided by the number of words). Texts in English are given a score of between 0 (minimum readability) and 100 (maximum readability). For Spanish texts (Spanish sentences and words are generally longer than English ones), the readability is considered to be sufficient if they achieve a score of/above 10³⁸. [38]

- Sentence complexity index. Sentences which are too long or which have a very complicated structure are considered to be difficult to understand. The greater the number of subordinate clauses and the smaller the number of simple sentences a text has, imply that it is more difficult to read. This index uses a scale of between 0 (minimum complexity, and so maximum readability) and 100 (maximum complexity and so minimum readability).

- Complexity of vocabulary: words which are too long or rarely used can make reading difficult. Microsoft Word compares words with a dictionary of most common vocabulary. Any word which doesn't appear there is considered very complex. Scoring is between 0 (very easy) and 100 (very difficult).

The Integrated readability index (LEGIN) put forward by Simón, Barrio and Concheiro³⁸[38] matches previous indices and obtains values of between 0 (very difficult) and 200 (very easy).

$$\text{LEGIN: } 100 + \text{Flesch Index} - \text{Sentence complexity index}$$

According to these people, texts in Spanish can be considered readable if they achieve a score of more than 10 in the Flesch index, less than 40 in the sentence complexity index and more than 70 in the Integrated readability index.

Fernández Huertas adaptation of the Flesch formula to Spanish has also been used³⁹[39]. The readability formula in this case is:

$$206.84 - 0.60A - 1.02S$$

A is the average number of syllables in groups of 100 words analyzed and S is the average number of sentences in each group of 100 words. The recount of syllables and sentences is done automatically by means of Word (readability statistics). The results are compared with the table drawn up by Flesch.

Accessibility Test

A study was made of the websites of each of the hospitals using the web accessibility test (WAT.exe version 1.2)⁴⁴[44]. This is a tool for analysing and obtaining information about the level of accessibility. In our study a level 1 analysis of the websites of all the hospitals was made including the content of homepage and all links to pages at the same site.

The web accessibility test is based on the guidelines and basic rules laid down in the WAI (Web Accessibility Initiative)⁵¹[51] for the execution of the analysis. Each one of these guidelines is divided into one of several points of verification, which describe special situations in the web design. These points of verification contain a numerical code which identifies them and the description of the problem of accessibility as well as possible solutions.

The information supplied is organized on 3 levels according to its impact on web accessibility.

Priority 1: the website must satisfy these verification points.

Priority 2: the website should observe these verification points.

Priority 3: on developing the website, these verification points can be satisfied.

Therefore, in order of importance, first come those in the Priority 1 category, then Priority 2 and finally Priority 3. The only condition for passing the accessibility test is the absence of problems at the Priority 1 level, both those of the kind automatically detected by the system (automatic) and those which require manual verification (manual). Within websites which are accessible, 3 levels of accessibility can be distinguished according to their degree of suitability.

Level A. all verification points of Priority 1 are satisfied.

Level AA: all verification points of Priority 1 and Priority 2 are satisfied.

Level AAA: all verification points of Priority 1, 2 and 3 are satisfied.

Hospitals assessed

The websites of the hospitals which in May 2004 were included in the catalogue of hospitals which were the object of study (table 2) were visited. The number of beds in 13 centres varied between 106 and 1389 with an average of 448 beds. The number of annual admissions varied between 24 506 and 407 552, the average being 134 514 admissions.

[Insert table 2 about here]

Procedure

Once the first version of the scale had been prepared, in order to determine the validity of its content, it was checked by three professional people, independently of one another. Its coherence was analyzed and those attributes which were not very clear were modified. Next, again independently, three researchers visited the websites of each of the hospitals in the study. They applied the e-Information Quality Scale of Health Centres and gave each of the elements in the survey a score of 1 (present) or 2 (not present). Later, these evaluations were subjected to concordance analysis (kappa index) to find out the levels of agreement. At the time of evaluation, the first week of October 2004, none of the researchers were able to gain access to the websites of hospitals 5 and 9, and so they were not assessed. Then, the readability and accessibility tests were carried out on each of the hospital websites.

RESULTS

The definitive e-Information Quality Scale of Health Centres (annexe I) contains 73 elements which make a website more credible. The last 7 attributes have only been evaluated in those cases where the websites visited give information about topics related to health or illnesses. The concordance analysis of these evaluations (table 3) shows average values of between 0.80 and 0.81, which confirms the high degree of agreement among assessors.

[Insert table 3 about here]

The results from applying the scale to the hospital websites included in the study (table 4) show large variations in the frequency with which the elements or attributes appear in each hospital (23 – 62%), and each element or attribute appears in the 11 hospitals assesses. The average score of the hospitals was around 43%. Almost 20% of attributes do not appear in any of the websites visited while only 14% attributes included on the scale exist in all the hospitals. Access to information in the official languages of

autonomous regions (where appropriate) is only evident in 18% of cases. Information regarding updating of websites is not available.

[Insert table 4 about here]

Readability

The scores obtained in each of the indices of readability for comparable texts in the hospital websites are shown in table 5a.

[Insert table 5a about here]

The scores obtained using the Flesch readability index show that six hospitals scored more than 10, which means their websites are readable in Spanish. The average score of all the hospitals was higher than this figure too (11.55), but four of them (36.4%) did not go above zero (minimum readability) and another did not achieve a score of 10. Attention is drawn to the enormous variation in the scores using this index, the variation coefficient being 0.98. The average score using the Sentence complexity index was 31.45, which situates it within the category of adequate readability for this index (<40). Only three hospitals (27.3%) scored over 40, which means, the text analyzed did not fulfil the requirements to be considered adequately readable.

The three hospitals which had a low readability score in the previous index were the same that were below the levels considered as adequate (>70) in the Integrated readability index. This index incorporates the two previous ones but reduces considerably the wide variation which they showed.

The Flesch index adapted by Fernández Huerta showed a variation coefficient of 0.23. The average score was 59.11, bordering on the 60 point mark, implying standard readability. In this case, five hospitals scored below this level (45.5%): two of them were in the a slightly difficult category and the other were classified as difficult.

Finally, the Complexity of vocabulary was great with an average score of 71.27 which is approaching levels considered to be of maximum complexity (100). If we exclude the websites of two of the hospitals, the rest (81.8%) scored 70 or more.

Table 5b shows the scores in each of the indices of readability obtained through the analysis of the collection of texts from the the Health Centre websites. In these additional analyses we can see that, when the documents analyzed are considered as a whole, the global evaluation of the readability of the websites remains similar as far as table 5a is concerned. However, the Flesch index indicates greater complexity in the texts in two cases (from 33 to 18 and from 20 to 9 points); the Sentence complexity index gets worse in one hospital (from 12 to 34 points) and improves in another (from 30 to 18 points). The Integrated readability index tends to give greater complexity in the case of one of the

websites (from 94 to 73); the Fernández Huertas adaptation of the Flesch formula to Spanish indicates greater complexity in the case of another website (from 72.14 to 58.76 points); and the Complexity of the vocabulary on one of the websites increases even more (from 30 to 54 points).

[Insert table 5b about here]

Accessibility

In table 6, the problems of accessibility detected in each of the hospital websites analyzed are summarized, specifying in each case the priority level they belong to. In each of the problem columns, the first number refers to those which have been detected automatically by the system and the second one those which have to be verified manually.

[Insert table 6 about here]

None of the websites visited fulfil the necessary requirements to be considered accessible. That is to say, they have priority 1, 2 or 3 problems, whether detected automatically by the system or requiring manual verification. The accessibility problem most frequently detected in the hospital websites was that each graphic element (images, symbols, activities, buttons, etc.) was not accompanied by an equivalent text describing it. Other problems detected were that none of the information given through the use of colour was not available in black and white (for example, by means of the context or indicators) or that the webpages could no longer be used if the scripts, applets and other programming tools were switched off or did not offer back-up. In addition, documents were not organized in such a way that they could be read without a style sheet, or the way they were presented could cause the screen to flicker, which could cause a user suffering from photosensitive epilepsy to have a fit.

DISCUSSION

The analysis of the hospital websites has been carried out combining information about the degree to which certain attributes regarding quality, readability and accessibility are present. From this it has been understood that information on the Internet must fulfil these criteria in order to be citizen orientated.

The scale, developed through work with internauts and after checking the websites of the most prestigious hospitals, shows an adequate level of consistency amongst observers and sufficient validity regarding its content for its use to be widespread. Furthermore, if we compare it with that developed in other studies (although with different objectives) we can see a number of points in common.

In this way, Kim et al¹⁵[15] identified 165 criteria for appraising health-related websites which are divided into 12 specific categories. Some of these coincide with the elements of quality identified in our study. For example the one which concerns naming the writers or sponsors relates to our criteria of including the name and logo of the hospital. Also the updating of information (date of the last updating and that this had been carried out no more than 2 months before). The ease of use category could be linked to accessibility and the time needed to load the website. The quality of the links would be connected to the fact of their functioning and enabling access to specific files. Finally, the fact of the existence of contact addresses or feedback mechanisms is related to both giving a portal address, telephone or base and number and e-mail address, and the existence of opinion forms for information, suggestions or complaints or information about how to contact other surgeries or Accident and Emergency.

In the Pealer et al study¹⁴[14] three elements were identified in each web document: heading, main part and foot of page. It is considered that the author (name and logo of the hospital at the head of the page) must appear in the heading. The e-mail address of the hospital should appear at the foot of the document as well as the dates when it was set up and last updated, which coincide with elements 13 and 14 on our scale. According to Pealer et al, the contents of these websites should be assessed for readability, amongst other points, something which we have carried out in our study. Finally, the presentation of the websites is to be assessed by analysing letter-types (size, colour, etc.) as well as the presence of graphs (evidence of images which improve the design of the website).

In the questionnaire developed by Domínguez - Castro et al¹⁶[16] concerning the quality of websites in pharmaeconomics and health economics centres, similar elements can be found in 10 of its 26 questions. A few examples are: author or authors identified in the website (name and logo of the hospital); contact with those in charge of the centre (contact details including portal address, telephone and/or fax number, e-mail); bibliographical references to articles quoted from (information about health or illnesses supported by a bibliography), or the inclusion of publications by researches at the centre (publications by the hospital itself). Information about research projects carried out at the centre, as well as whether or not the date of updating the document is stated, and if this has been carried out in the last 2 months, is equivalent to attributes or elements 50, 14 and 15 on our scale. The existence of links which have been updated also corresponds to elements 63 and 64 of our scale. Other similarities can be found in information about courses and their contents (courses, congresses or conferences appearing in the

hospital's agenda), and the existence of an internal searcher for information (website searcher).

As far as the results of the study are concerned, it has to be emphasized that hospitals websites need to become more citizen/patient orientated in order to improve the quality of the information they provide, as well as to promote their corporate image. In accordance with the data on the scale used in this study, the websites which were visited did not fulfil even half of the defined attributes of quality. Almost 20% of identified attributes were not found at any of the websites visited. Some of these attributes would seem particularly desirable: website searcher, date of last updating, that it had been updated in the previous two months. Other attributes absent were: information regarding external medical appointments (times, telephone numbers), absence of a complete directory for each service, listing the names and responsibilities of all the professional people working in that area. Finally, none of the hospitals had a section for national and international medical developments, not did they offer the possibility of having a tour of the hospital in virtual reality. In addition, none of the websites had a stamp of quality or guarantee of accessibility.

None of the hospitals offered the possibility of making complaints through the Internet or by e-mail, not was it possible to make a prior appointment through the Internet or by e-mail. They did not give information about quality assessments that they could have carried out (although it did seem that some of them had done this), or make public any commitments regarding quality they had with the patients (for example making the 'letter to the Patient' public).

Other elements absent from more than half of the public hospital websites analyzed and which should be present are: use of regional languages, the possibility of patients being able to read the hospital report for the previous year; the recommendations and norms which patients have to follow when they are admitted to hospital, while they are inpatients or when they are discharged (hospitalisation guide), as well as information about activities related to teaching and research which are carried out in the hospital. Finally, if the centre has a library, it is a good idea if information is given about the services it offers and opening hours, as well as a list of publications.

On the contrary, 14% of the quality attributes were evident in all the hospitals. For example the name of the hospital at the head of the page, and contact details (postal address, telephone and/or fax number) amongst the others the rest were related to specific characteristics of the websites such as the use of a typology of letters or fonts (type, size, colour and contrast with the background) which make reading easier, the links

functioning correctly, or the fact that the page could be downloaded in less than 10 seconds. The only piece of medical information which was found in all of the hospital's websites was their list of services.

The difference in the quality of the information provided by the hospitals on the Internet is considerable. The range of marks on the scale used varied from the best mark obtained by a hospital which satisfied 62% of attributes of a good website directed at the patient/citizen, to the worst mark which was obtained by a hospital which only had 23% of these attributes (even though there was evidence the website was in the process of being updated).

Once the hospitals had been classified according to their score on the scale, a study was made of the three best and the three worst hospitals. There were no noticeable differences regarding size or location which could explain these results. It probably depends more on the willingness of the management team of each centre to project an image and spread information about the patient services, or the presence of a professional with experience in new technology and with a certain ability to insist, or perhaps also the presence of a support team skilled in developing websites.

Regarding website readability, the results of our study make it clear that 7 of the 11 hospital websites visited achieved scores indicating satisfactory readability. The other 4 need to make their websites easier to understand following the norms already described³⁶⁵²[36][52]. In addition, they need to try to simplify the vocabulary used in texts. This datum contrasts with the Blanco and Gutiérrez study²²[22] concerning the number of health websites (cancer, diabetes, etc.) which have a score of more than 70 points. Moreover, the average for the websites analyzed is slightly better (65 points). Clearly the objective of the hospitals should be to enable a person with a basic level of education to understand the information provided.

As far as accessibility is concerned, which will be a compulsory requirement for civil service departments from the end of 2005⁴²[42], none of the hospital websites visited fulfil the accessibility requirements. This problem can be easily overcome since all that is required is a website developer who designs it following the basic guidelines for making it accessible to people with disabilities.

The main limitation of this study lies in the dynamics of the Internet. Not only were two hospitals in the process of setting up their website, but it is also possible that some attributes were modified while the results were being compiled. Another limitation which must be taken into account is the temporary validity of the attributes on the scale used. What may be considered as a desired quality item on a website today, in a very few

months' time may no longer be so, depending on advances in the development of these communication tools. A third limitation is that the readability analysis was based on presentation documents from each centre which were supported to represent the communication style.

This study, like others about the Internet, also has the limitation of novelty and, it is there that its interest probably lies. Developing tools or evaluating website contents are complex tasks, since the information has to reach a very wide public. However, it seems that the attributes assessed and the readability and accessibility analyses carried out respond to the recommendations of a group of experts and the preferences of Spanish internet users.

The results of our work show the potential usefulness of this study for putting into practice communication strategies with the general public, to inform people of the services offered in a hospital, or meet the visibly growing demand for accessibility via the Internet (bringing the centres closer to people and patients). In addition, it helps us to reflect on the content and structure of these information websites not only to meet European directives and our own legislation, but also to ensure their information is comprehensible and relevant as well as meeting prescribed standards of credibility and quality.

[Insert annex 1 about here]

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