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# Evaluation of Consumer Health Information Websites Based on International Guidelines

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## Research Paper

### Title: Evaluation of Consumer Health Information Websites Based on International Guidelines

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## Abstract

**Background and Aim:** Since health information websites in the Internet is almost the first and the most used source of information for public. It is therefore necessary to comprehensively evaluate websites which provide health information for the public.

**Objective:** The research aimed to investigate the quality of Farsi health information websites comparing the international pairs provided with recognized quality standards including those from the Medical Library Association of America (MLA).

**Materials and Methods:** Checklists of the British Medical Association (BMA), MLA, Health On the Net Foundation Code (HONcode) principles, and Web Content Accessibility Guidelines (W3C) were use as the research tools. The sample of websites included the 10 top health websites in English rated by MLA and nine Iranian health information websites in Persian (Farsi).

**Results:** Iranian websites did not obtain desirable scores against the quality standards of health information websites (BMA, HONcode, W3C, and MLA) in terms of scope, accuracy, and quality, authorship and authority, attribution and justifiability, bias -free observation, good design, code of conduct/standards. An analytical comparison of health information websites

based on their ownership showed that the private sector organisation websites were better than the governmental Iranian websites in terms of observing the standards as well as comprehensiveness. Strengths of the Iranian websites included information privacy, transparency, consumer involvement, and ease of understanding. No considerable differences were observed between the private sector organisation and governmental websites on other criteria.

**Conclusions:** Results of this research highlighted the need to determine standards and improve the quality control of public health information websites in Iran, by an organization or institute such as the Iranian Medical Library Association. These findings will create the basis of recommendations for developing a comprehensive, consistent, reliable, up-to-date, and high-quality website, which can account for the needs of health consumers. Provision of such a website will contribute to improvements in understanding of diseases, effective self-care and self-management and appropriate lifestyle advice. In turn, this may help to reduce unnecessary referrals to health centers, hospitalization and unnecessary taking of medicine, leading to better health outcomes for the population.

**Keywords:** Consumer Health Information; Health Information Exchange; Health Information Management; Health Information Systems; Medical Informatics; Health Information Technology

## **Introduction**

The web is a key of health information resources for an increasing number of people [2-3]. When people refer to health information on the Internet, they expect to obtain information which is credible and reliable, not misleading or out-of-date. Many Researches has have that health information is one of the most popular search topics for users on the Internet and many people from around the world refer to the websites of medical centers on a daily basis to get health-related information [4]. The scope of health information available is extensive, ranging from medical or healthcare information needed by people for themselves or their family members to the evidence and information needed for making decisions about treatment options, signs and symptoms, prevention, diagnose and treatment, and access to healthcare systems [5]. The Internet is also seen as a new communication and interaction channel between doctors as well as between health staff and patients. This has changed the traditional relationship between doctors and patients, making it less autocratic with doctors as the main decision makers about care and treatment, to a more democratic and participatory state, in which both doctors and patients decide on the treatment collaboratively [6].

Looking across different societies, the Internet is not used equally to find obtain health information. According to recent studies, about %60 of adults in the USA surf the Internet only for obtaining health and medical information [7]. Meanwhile %80 of patients search for the information related to their own health state and treatment on the Internet before visiting their doctor and also consult with their doctors via email [8, 9]. Similar studies have also shown that about %90 of patients agree on obtaining correct medical information via the Internet and consider it effective and useful [8, 10]. Research evidence in Iran has demonstrated that %90 of patients tend to obtain information about their own or family's disease through the Internet and %82.38 are interested in going through their treatment process via telemedicine [11]. In a study conducted in teaching hospitals in Tabriz examining the importance of giving information to patients, doctors in five educational groups with the highest load of diseases in Iran completely agreed with giving treatment information to their patients and considered it a right for them. They believed that treatment information is a significant part of patient care, which is necessary and critical at all the stages of pre-diagnose, during diagnose, treatment, post-treatment, control, and disease management [12].

Nevertheless, this information must be correct, highly accurate, and most accessible to avoid people the mass of incorrect and misleading information available on the Internet which can endanger the health of users [13, 14]. A previous study evaluated websites affiliated to English National Health Service (NHS) which provides medical information and health services to the population [15].It included that an American site aimed to compare patients and publics internationally. Using a combination of recognized health information quality criteria the study aimed to assess the relevance and usefulness of the information provided. Based on the British Medical Association (BMA) guidance, UK Department of Health and NHS evaluation tools, "MedlinePlus" which is the website affiliated to America's Library of Congress was rated as the highest scoring website in terms of content compared with other websites; at the national level,

“NHS Choices” provided relevant and accurate health information. Results of this research also revealed that the content and design of local websites was of poorer quality than those of national (international) websites [15].

However, one of the limitations of this study was that it only investigated websites written in English and focused on UK audience. The study concluded that information about health services, and treatments should be tailored to the local community so that people would know what information was directly relevant to them. In Iran, there has not previously been a comprehensive study or evaluation published which looks at the quality of the health websites designed for the public and patients. The only research that can be represented as the background for the evaluation of health websites for health consumers in Iran is an article in which the websites of Iranian universities of medical sciences are examined to find whether or not they provide health information to patients or not. The results of this descriptive cross-sectional study, carried out in 2010, showed that only a limited number of university websites were presenting health information in a simple (lay) language, which can be useful to patients and the public. The quality of the information presented was also low [16].

However, an increasing need to have a comprehensive, reliable, and verified (web-based) information source which could simplify and popularize medical science, bridge the gap between specialists (health service providers) and health consumers knowledge, and disseminate reliable health information to the consumers of health information. [17, 18] Therefore, it is necessary to comprehensively evaluate Iranian websites which provide health information for the public so that the quality and reliability of their information would be assessed based on the conventional standards. This would help to determine whether there is a reliable health information source for the public, patients, and health service providers or there is a need for creating a comprehensive website to respond this public demand. Novelty of this study is due to recruiting all of important world evaluation tools in assessment as a toolkit. Therefore, all of functions and specificities of websites will be evaluated in a comprehensive view.

Accordingly, the first objective of this original research was to study the state of Persian (Farsi) health information websites for health consumers in Iran and compare them with websites which subscribe to recognized quality standards including those from the Medical Library Association of America (MLA). Furthermore, the second objective of this study was to specify how many of the Iranian websites are governmental or owned by private sector organizations and whether their ownership influences their quality. This will show the current situation of Farsi health information for public's, their competency and weakness comparing to standards. Hence a roadmap for a comprehensive and responsive website of health information for public will be designed based upon.

## **Materials and Methods**

A descriptive cross-sectional study was designed. Research tools for investigating the websites were checklists of the British Medical Association (BMA), MLA, Health On the Net Foundation Code (HONcode) principles, and Web Content Accessibility Guidelines (W3C) (see Multimedia

Appendix 1.). The sample of websites included the 10 top health websites in English rated by MLA (see Multimedia Appendix 2.) and nine Iranian health information websites in Persian (Farsi), (see Multimedia Appendix 3.).

The Google search engine was used to identify and select Iranian health information websites. Health information websites for patients and the public were found by using related key words such as patient information website, websites of information needs of patients, health information on the Internet, and information about diseases on the Internet. The first 20 pages of results were reviewed to select the most appropriate websites for comparison. Websites were included if they have presented health information for the public and patients, were up-to-date, and corresponded with the broad definition of a website. A three scale scoring was defined for each criterion. If the website met all the related criterion would have scored three, if it was partially match score two, and in the case of failure to comply the criteria score one. Then, all the websites (Iranian and international) were compared, evaluated and scored, based on these criteria. For the analytical comparison of Iranian and international websites, a comparative table was extracted from the hash table of the evaluation criteria of the four research tools (BMA, HONcode, W3C, and MLA). Since the criteria in all of the tools were not exactly same and uniform in the four evaluation tools, the criteria with same definitions were entered as it was in the original tool but those with different definition or those who were only in one or two tools, uniquely, were entered with an additional description to show the original tool (Table 5). Then, the websites were evaluated based on the criteria and only those websites that had completely observed the whole criteria (i.e. they had score 3 from the evaluation tools included in Multimedia Appendixes 4-11) were entered into the hash table. To compare private sector organisation and governmental websites (launched by Ministry of Health and Medical Education) in Iran and the international websites, a hash table of the research criteria was presented (Table 6). In order to include all the criteria in the hash table, the criteria with the same definition in the four research tools were put in the table without any changes and the criteria with different definitions were identified by adding the name of the respective tools in front of their names.

## **Results**

### **International Health Information Websites (in English)**

Out of the 10 websites recommended by the American Medical Library Association (MLA) as accurate consumer health websites (see Multimedia Appendix 2), six were comprehensive and contained public health information websites (Table 1) and four were specialized health information websites for particular health conditions such as patients with cancer or AIDS or specific groups like children and teenagers (Table 2). According to the evaluation of international websites based on BMA, HONcode, W3C, and MLA criteria (Multimedia Appendix 4-7), among the public health information websites, the “MedlinePlus” and the “CDC” ranked the best and weakest (with the highest and lowest scores, respectively). “Kidshealth” and “HIV InSite” received the highest and lowest scores, respectively, among the specialized health

information websites. Compared with other international health information websites, “MedlinePlus” and “Kidshealth” obtained the highest score in the four research tools and the highest score in the evaluation criteria by HONcode and MLA. In both websites, important and necessary criteria such as attribution and justifiability were well observed and their content were easy, understandable, comprehensive (scope criteria), and interactive (the interaction possibility of users with the content such as existence of interactive tools for calculating height and weight, measuring health literacy, educational games, and so on). In general, the findings showed that, according to the obtained scores, all the international websites were in a desirable state in terms of observing the standards of evaluation tools (Table 1, Table 2).

**Table 1.** Scores of the international public health information websites using the standard evaluation criteria of BMA, HONcode, W3C, and MLA

Websites Title	Research tools			
	(BMA) Of the total score (39)	(HONcode) Of the total score (24)	(W3C) Of the total score (12)	(MLA) Of the total score (12)
<b>1 Centers for Disease Control and Prevention (CDC)</b>	32	23	10	10
<b>2 Familydoctor</b>	34	24	9	11
<b>3 Healthfinder</b>	35	24	10	12
<b>4 Mayo Clinic</b>	35	24	10	11
<b>5 MedlinePlus</b>	38	24	11	12
<b>6 NetWellness</b>	31	19	11	9

**Table 2.** Scores of the international specialized health information websites using the standard evaluation criteria of BMA, HONcode, W3C, and MLA

Websites Title	Research tools			
	(BMA) Of the total score (39)	(HONcode) Of the total score (24)	(W3C) Of the total score (12)	(MLA) Of the total score (12)
<b>1 Cancer</b>	31	22	10	10
<b>2 HIV InSite</b>	34	23	9	10
<b>3 Kidshealth</b>	38	24	10	12
<b>4 NIH SeniorHealth</b>	37	24	10	11

### **Iranian Health Information websites (in Persian)**

Out of nine Iranian websites which met the inclusion criteria (see Multimedia Appendix 3), five cases contained public health information websites (Table 3) and four were specialized health information websites for particular health conditions including cardiovascular diseases, breast cancer, AIDS, nutrition, orthopedics, food and medicine, and one contained films (Table 4). Evaluation of the Iranian websites based on the evaluation criteria of BMA, HONcode, W3C,

and MLA (see Multimedia Appendix 8-11) showed that, from among public health information websites, “7Sib” obtained the highest score in all the four research tools and “Avaye Salamat” and “IranHealers” got the lowest scores. Findings also showed that “Iranorthoped”, with the highest score in the checklists of BMA and HONcode, is the most highly rated Iranian specialized website. “IranHIV” also obtained the lowest scores compared with the other specialized health information websites. According to the total scores obtained by the websites, all the Iranian websites were low quality in terms of observing the standards of evaluation tools and none of them could obtain the highest score (3) in any category (Table 3, Table 4).

**Table 3.** Scores of the Iranian public health information websites using the standard evaluation criteria of BMA, HONcode, W3C, and MLA

Websites Title	Research tools			
	(BMA) Of the total score (39)	(HONcode) Of the total score (24)	(W3C) Of the total score (12)	(MLA) Of the total score (12)
1 Avaye Salamat	24	14	9	9
2 BioTeb	28	17	8	6
3 Rastineh	27	17	9	7
4 IranHealers	28	14	8	6
5 7Sib	30	17	9	10

**Table 4.** Scores of the Iranian specialized health information websites using the standard evaluation criteria of BMA, HONcode, W3C, and MLA

Websites Title	Research tools			
	(BMA) Of the total score (39)	(HONcode) Of the total score (24)	(W3C) Of the total score (12)	(MLA) Of the total score (12)
1 IranHIV	26	11	8	6
2 Nut.Behdasht	29	17	9	11
3 Iranorthoped	33	22	9	9
4 Fdo.Mui	23	15	7	8

### Comparing Iranian and International Health Information Websites

Findings of the research showed that some of the evaluation criteria had not been necessarily considered on all the websites. Nevertheless, the number of the criteria which were not considered on the Iranian websites was more than that of the international websites (Table 5).

Strengths of the Iranian websites included transparency, privacy, consumer involvement, and comprehensibility. International websites observed important evaluation criteria such as authorship and authority, attribution, justifiability, scope, and having a ‘recently updated’ date more than the Iranian websites. For example, the international websites had better performance than the Iranian ones concerning the indication of updating intervals and the last updating date.



Two criteria of bias and code of conduct/standards were considered the most important evaluation criteria; in this regard, Iranian websites were of a similar standard to the international websites, and no website could obtain the maximum mark for code of conduct/standards (Table 5).

Neither Iranian nor international health information for public websites met the W3C standards for web designing (robust) and accessibility (Table 5). Among international websites, only 4 (%40) mentioned that they "can produce braille output for disabled", a quality criteria regarding "speech recognition software" and "screen readers" from the W3C standards.

**Table 5.** Comparison of Iranian and international websites based on the standards of BMA, HONcode, W3C, and MLA

Criteria	Iranian websites	International websites
	Frequency (percent)	Frequency (percent)
Authorship and Authority	2(22.2)	9(90)
Transparency	6(66.6)	10(100)
Attribution	2(16.7)	7(70)
Justifiability	0(0)	9(90)
Date	0(0)	3(30)
Understandable	7(77.7)	10(100)
Perceivable (W3C)	0(0)	2(20)
Audience	4(44.4)	8(80)
Scope	5(55.5)	10(100)
Complementarity	5(55.5)	10(100)
Consumer involvement	6(66.6)	10(100)
Interactive features	1(8.3)	3(30)
Privacy	9(100)	10(100)
Advertising policy	2(16.7)	8(80)
Financial disclosure	0(0)	9(90)
Bias	6(66.6)	10(100)
Sponsoring	4(44.4)	10(100)
Design (BMA)	3(33.3)	8(80)
Operable (W3C)	1(11.1)	9(90)
Robust (W3C)	0(0)	0(0)
Navigability	5(55.5)	10(100)
Accessibility	0(0)	0(0)
Code of conduct/standards	0(0)	7(70)

### Comparing Iranian Governmental and Private Sector Organization Health Information Websites

Six out of the nine Iranian websites were supervised by private sector organisations and the others were government-owned (i.e. Ministry of Health and Medical Education) (see Multimedia Appendix 3). Comparison of these websites in terms of obtaining the total score of

evaluation (i.e. 3) from the standards (BMA, HONcode, W3C, and MLA) showed that the websites owned by private sector organisations ranked higher than the governmental ones in terms of scope, complementarity, consumer involvement, and appropriate navigation. However, the criteria of acknowledging sponsorship, transparency and bias could be seen more often in the governmental websites. Concerning the other criteria, there was no considerable difference between private sector organisation and governmental websites (Table 6).

**Table 6.** Comparing scores of Iranian governmental and private sector organization websites using the evaluation criteria of BMA, HONcode, W3C, and MLA

Criteria website	Governmental websites	Private sector organization websites
	Frequency (percent)	Frequency (percent)
Authorship and Authority	1(33.3)	1(16.6)
Transparency	3(60)	3(50)
Attribution	1(20)	1(14.3)
Justifiability	0(0)	0(0)
Date	0(0)	0(0)
Understandable	2(66.6)	5(83.3)
Perceivable (W3C)	0(0)	0(0)
Audience	1(20)	3(42.9)
Scope	0(0)	5(83.3)
Complementarity	0(0)	5(83.3)
Consumer involvement	1(33.3)	5(83.3)
Interactive features	0(0)	1(14.3)
Privacy	3(100)	6(100)
Advertising policy	0(0)	2(33.3)
Financial disclosure	0(0)	0(0)
Bias	3(100)	3(50)
Sponsoring	3(100)	1(16.6)
Design (BMA)	0(0)	3(50)
Operable (W3C)	0(0)	1(16.6)
Robust (W3C)	0(0)	0(0)
Navigability	0(0)	5(83.3)
Accessibility	0(0)	0(0)
Code of conduct/standards	0(0)	0(0)

## Discussion

The main objective of this study was to scrutinize Iranian (Persian/Farsi) health information websites compared with international (English) health information websites selected by Medical Library Association (MLA) of America in terms of observing the qualitative standards of BMA, HONcode, W3C, and MLA evaluation tools. The results showed that Iranian health information websites were weaker in terms of observing important evaluation criteria such as authority and

authorship, attribution, justifiability, bias, quality of websites designing, code of conduct/standards, and so on than the English international websites. Strengths of the Iranian websites included the criteria of privacy, transparency, consumer involvement, and clarity of understanding for patients. While the content, content reliability, responsiveness of website and website design are highly significant criteria for the acceptance of a website by patients [19]. An earlier study of Iranian (Persian/ Farsi) medical and health websites using “Silberg” criteria checklist also showed that none of the websites completely observed all the principles in “Silberg” criteria checklist, only %50 of these websites were reliable and had provided the references and sources for all the content published on the website [20]. Study of the Iranian Universities’ websites also indicated that only %10 of university websites presented health information in a simple language that could be useful for patients and the public, but content was very weak in comprehensiveness [16].

Concerning the obtained scores against the research tools, “Medline Plus” and “Kidshealth” received the highest scores in the four research tools among the international websites.

But, among the Iranian websites, only one website (7Sib) scored relatively high in all of the four research tools. None of the Iranian websites received a complete score in any of the research tools. Our finding is similar to the Brewster and Sen’s (2010) results. They also found that quality of content of “MedlinePlus” as an international website received the highest score and placed ahead of the national websites of England and NHS [15].

It also was revealed that the “Medline Plus” and “Kidshealth” received complete scores in “MLA” and “HONcode” evaluation tools. Al Huziah et al. (2009) also evaluated 122 Arabic websites in terms of observing HONcode criteria and found that Arabic health websites met %70 of HONcode criteria [21].

In general, Iranian websites did not obtain desirable scores against the quality standards of health information websites (BMA, HONcode, W3C, and MLA) in terms of scope, accuracy, and quality. An analytical comparison of health information websites based on their ownership showed that the private sector organisation websites were better than the governmental Iranian websites in terms of observing the standards as well as comprehensiveness. In contrast, evaluation of British health information websites demonstrated that the governmental website of “NHS Choices” had scored the highest among all of the local and national websites of National Health Service of England [15]. It is clear that a wider subject scope in websites leads to more access and retrieval of information. When the content is not reliable and accurate enough this technology create an opportunity to distribution of a mass amount of unreliable and low-quality information. Therefore it is very important to control the quality of health information websites and develop a quality website for public and patient.

It can be inferred that the most visible problem of Iranian websites is for lack of organisational authentication for quality control and also lack of awareness and knowledge of website developers about principles, codes of standard and designing features and evaluation criteria of health information websites.

## **Conclusions**

Access to accurate and comprehensive information is an integral part of healthcare. The fast and uncontrolled growth of health information on the web may seriously harm the health of community. Public health information websites available in developed countries are evaluated by credible relevant organizations and their content are frequently updated. This may not be the case in other countries such as Iran where absence of an organization responsible for the quality control of the technical and content of health websites is a clear crystal defect. Iranian public health information websites are not evaluated and controlled neither in terms of content nor against technical criteria. Consequently, their quality is not reliable. It may be concluded that there is not an available reliable and high-quality resource in the Persian/ Farsi language for answering the needs of health information consumers. The results of this study showed that the content of Iranian health websites was not high-quality and credible.

In conclusion, the study suggests creating a comprehensive, consistent, reliable, up-to-date, and high-quality website, which can account for the needs of health consumers. Provision of such a website will contribute to improvements in understanding of diseases, effective self-care and self-management and appropriate lifestyle advice. In turn, this may help to reduce unnecessary referrals to health centers, hospitalization and unnecessary taking of medicine, leading to better health outcomes for the population.

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## **Conflicts of Interest**

We declare that there is no conflict of interest with other parties in pursuing and conducting the research and reporting the results of study.

## **Multimedia Appendix**

### **Multimedia Appendix 1**

Research tools

### **Multimedia Appendix 2**

10 top health websites introduced by Medical Library Association of America

### **Multimedia Appendix 3**

9 Iranian health information websites

### **Multimedia Appendix 4**

BMA criteria for assessing the quality 10 top health websites introduced by Medical Library Association of America

### **Multimedia Appendix 5**

HON Code criteria for assessing the quality 10 top health websites introduced by Medical Library Association of America

**Multimedia Appendix 6**

MLA criteria for assessing the quality 10 top health websites introduced by Medical Library Association of America

**Multimedia Appendix 7**

W3C criteria for assessing the quality 10 top health websites introduced by Medical Library Association of America

**Multimedia Appendix 8**

BMA criteria for assessing 9 Iranian health information websites criteria for assessing the quality

**Multimedia Appendix 9**

HON Code criteria for assessing 9 Iranian health information websites criteria for assessing the quality

**Multimedia Appendix 10**

MLA criteria for assessing 9 Iranian health information websites criteria for assessing the quality

**Multimedia Appendix 11**

W3C criteria for assessing 9 Iranian health information websites criteria for assessing the quality

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