Evaluation of Web Sites for Quality and Contents of Asthma Patient Education

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ABSTRACT

The patients and health care professionals worldwide depend largely on the internet for health care information due to its easy ubiquitous accessibility and economy, unlike the print media. The clinicians, health care professionals and asthma patients depend on the internet resources. The authentication of information on the web is an unmet demand. There is a growing need to provide quality information to the patients who desire education in the internet. As there is no system of validation of quality of information on internet, there can be a possibility of misleading or biased information on the internet. The present study aimed to evaluate the quality and content of information of websites providing patient education of asthma. Google search engine were used to identify 192 websites providing education on asthma, among which 42 were analyzed by Health on the Net Foundation Code of Conduct (HON code); Core Educational Concepts and Health Summit Working Group (HSWG) guidelines. On the basis of core educational concepts and HSWG criteria, websites were graded as excellent, good and average. Among the 42 websites, the HON code compliance was found to be very low (19%). A majority of the sites were compliant to basic HSWG criteria while lacking in few key elements. The HSWG scores were affected by development factors, and higher among those developed from public organizations of developed countries with non commercial interest. HSWG criteria and information on missing core educational concepts of HON code must be incorporated for an enhanced quality of information for asthma patient education.

Key words: Asthma, content validity, patient education, quality of internet information

INTRODUCTION

Asthma is a chronic disease characterized by recurrent attacks of breathlessness and wheezing, which vary in severity and frequency from person to person. During an asthma attack, the lining of bronchial tubes swell, causing the airways to narrow and reduce the flow of air in and out of the lungs. Strongest risk factors for developing asthma are exposure to indoor allergens, such as mites in bedding, carpets and stuffed furniture, pollution and pet dander, as well as outdoor allergens such as pollen and moulds, tobacco smoke and chemical irritants in the work place.[1]

The World Health Organization (WHO) has projected the increasing trends of asthma, especially in the populations of developing countries. Asthma is not just a public health problem for high-income countries; it occurs in all countries regardless of the level of development. Most of the asthma -related deaths occur in low and lower middle income countries.[1] Asthma is the most common chronic disease in children, currently affecting an estimated 6.8 million under the age of 18, of which 4.1 million suffered

an attack in 2006.[2] The increase in the prevalence of asthma in children has also led to an increased public attention for the disease. The general goals of asthma therapy are maintaining normal activity levels, maintaining nearly "normal" pulmonary function, prevent chronic and troublesome symptoms and recurrent exacerbations of asthma, avoid adverse effects from asthma medications and to meet patient's and family's expectations of care.

Patient education is the process by which health care professionals and others impart information to patients that will alter their health behaviors or improve their health status.[3] Education providers may include: physicians, pharmacists, nurses, psychologists, advocacy groups, special interest groups and pharmaceutical companies. The basic aim of the asthma patient education is to make the patient understand what asthma means on a personal level and to acquire information and skills needed to prevent and control asthma. Asthma patient education programs have been shown to significantly improve the control of the disease and enhance the quality of life, which can certainly be achieved through a global approach to the individual patient. It is widely believed that a patient who is educated about his or her health-related problem will have improved health outcomes.

Internet is an effective medium for asthma education.[4] Millions of people worldwide currently have access to the internet. Approximately 3% of all the available web pages are health-related[5] and has great potential to improve health outcome through patient education.[6,7] It has been estimated that 55% of those with Internet access have used the web to obtain health-related or medical information and search engines represent the principal method by which people seek Internet-based information.[8] Studies suggest that more than 95% of consumers use a search engine rather than going directly to a website when confronted with specific health related questions.[9] It is very much difficult to ascertain, which of the resources are accurate or appropriate for users.[10] Studies have shown that the patients searching for disease related information find the information they obtained on the Internet as understandable and trustworthy. Because of the potential of harm from misleading and inaccurate health information,[11-13] many organizations and individuals now agreed on key principles for evaluating health-related websites,[14] to develop a set of helpful key evaluation criteria for quality of these resources.[15,16] The Health on the Net Foundation Code of Conduct (HON code) is perhaps an oldest and best known quality label[17,18] for medical and health websites and help to standardize the reliability of medical and health-related information available on the World Wide Web. Health summit working group (HSWG) provides explicit criteria for evaluation of health-related websites[14,18,19] and has been utilized as rating tool.[20] However, web-based information is seldom the subject of systematic investigation[21] for its accuracy and appropriateness for users.[10,21] Quality control tests and content validity assessment are means by which the patient education credibility and accountability can be established.[22] Hence, the present study was conducted to evaluate the quality of web-based asthma patient education material for HON code compliance, asthma core education concepts and the HSWG criteria.

MATERIALS AND METHODS

The list of websites to be surveyed was obtained from 12 international search engines (AltaVista, AOL search, Ask.com, CompuServe, FAST Search-alltheweb.com, LookSmart, Lycos, MSN Web Search, Netscape Netcentre, Open Directory Project, WiseNut, Yahoo!) using Copernic agent basic version 6.12.12. Further, 12 Indian search engines (123India, 123Khoj, AltavistaIndia, India a2z, IndiaBook, LocateIndia, MSNIndia, SearchIndia, Yahoo India) and the most popular search engine Google were used for data collection. Meta-search method and the use of Google as data source was chosen to enlist the diverse variety of health-related and non–health-related sites. The search for websites was undertaken using the keywords "asthma patient education" or "asthma patient information". The first 50 sites from each of these search engines were retrieved. This was based on the fact that 62% of the typical search engine users click on a search result within the first page of results and 90% of search engine users click on a result within the first three pages of search results.

A total of 192 websites were enlisted from the above search strategy. Those sites that are unreachable, duplicate, highly technical (e.g. journals, conference proceeding and continuing medical education (CME) material), other than English language, search engine listings and library sites (total 150) were excluded from study before evaluation. The remaining 42 sites were further classified on their economic status, sponsorship, organization and site specificity.

Health on the Net Foundation Code of Conduct (HON code) compliance was chosen as the parameter for evaluating the quality of websites. The selected sites were evaluated for the HON code compliance by self-checker facility provided by HON website (http://www.hon.ch) and rated as a dichotomous indicator variable (1/0).

The content validity for asthma patient counseling in

the internet was evaluated using the "Core Educational Concepts" criteria. Eleven core educational concepts specific for asthma patient education were developed and the websites were evaluated for compliance.

The quality of all the websites providing patient information for asthma were evaluated based on the extent of their adherence to Health Summit Working Group (HSWG) criteria. Similar dichotomous ratings were allotted for evaluating the extent of compliance of each of the core patient education concepts and for each of the seven categories of HSWG criteria. On the basis of the sum of scores obtained from "Asthma core educational concepts" and HSWG criteria, websites were graded as excellent (24-27), good (19-23) and average (14-18).

The descriptive statistics and all calculations were performed with SPSS Version 13 for Windows. Relationship between the total score of HSWG criteria with the variables were compared by one -way analysis of variance test and their statistical significance were determined using a critical value of less than 0.05.

RESULTS

A total of 192 sites were screened, of which 42 sites met the inclusion criteria. The remaining sites, not meeting the inclusion criteria, were excluded from the study. Among these, 40 sites belonged to developed countries and only 2 sites originated from developing countries. A total of 20 sites were private funded, 22 sites were publicly funded and 18 sites belonged to medical school and hospitals, while 24 sites were non–health-care based; also 20 sites were found to be from commercial institutions while 22 were non-commercial sites. Classification on the basis of disease content of websites, 12 sites were found to be asthma specific, while 30 sites were nonspecific and included other chronic diseases. In terms of geographical origin of the websites, 37 sites were found to be American, 2 sites were from Asia and Europe, while 1 site belonged to Australia.

Evaluating the compliance to the Health on the Net Foundation Code of Conduct (HON code) showed that out of 42 websites only 8 (19.04%) websites adhered to the HON code quality criteria.

Eleven core educational concepts were developed and the websites were evaluated for the compliance. The distribution of "Core Education Concept" scores of asthma patient education in 42 websites are described in Table 1. A majority of the websites [n = 41 (97.6%)] provided information on the disease and [n = 40 (95.2%)]

triggers for asthma, while only 5 (12%) of the sites provided advise on the travel of asthma patients.

The pattern of compliance to the HSWG criteria is described in Table 2. A majority of the websites [n = 36 (85.7%)] were compliant to the disclosure criteria, where the purpose and profiling of the sites were disclosed. The websites were evaluated on the basis of their adherence to HSWG criteria and selected core educational concepts.

The possible determinants of the mean HSWG scores are described in Table 3. The average credibility score was 3.36 ± 1.1 (mean ± SD) of a maximum score of 5 and 67% of sites had secured favorable credibility scores. The mean score for content validity was 3.07 ± 1.5 (mean ± SD) of a maximum score of 5 and 61% of the sites had secured favorable content validity scores. The mean disclosure score was 1.74 ± 0.7 (mean ± SD) of a maximum score of 2 and 87% of the sites had disclosed their identity and interest. The average score for linking capability was 2.74 ±

Table 1: Pattern of core education concepts included in the asthma patient education websites

Core educational concepts of asthma patient education	No. websites (%)
Disease	41 (97.6)
Diet	11 (26.2)
Alternative asthma therapy	8 (19.1)
Drug information	36 (85.7)
Triggers	40 (95.2)
Asthma control	32 (76.2)
Special patient group information	26 (62.0)
Lifestyle modifications	27 (64.3)
Diagnosis	28 (66.7)
Smoking advices	29 (69.1)
Travel and asthma	5 (12.0)

Table 2: Extent of compliance to various HSWG criteria of asthma patient education websites

Criteria	No. sites compliant (%)	Criteria	No. sites compliant (%)
Credibility		Links	
Source	41 (97.6)	Selection	32 (76.2)
Context	40 (95.2)	Architecture	30 (71.4)
Currency	13 (31.0)	Content	31 (73.8)
Relevance	37 (88.1)	Back linkages	22 (52.4)
Editorial review process	10 (23.8)		
Contents		Design	
Accuracy	33 (78.6)	Accessibility	39 (92.9)
Hierarchy of evidence	31 (73.8)	Logical organization (Navigability)	36 (85.7)
Original source stated	23 (54.7)	Internal search engine	37 (88.1)
Disclaimer	28 (66.7)		
Omissions noted	14 (33.3)	Interactivity	
Disclosure		Mechanism for feedback	38 (90.5)
Purpose of the site	37 (88.1)	Chat room	03 (07.1)
Profiling	36 (85.7)	Tailoring	00 (00.0)

1.5 (mean ± SD) of a maximum of 4 and 69% of the sites had the capacity to link to other websites. The average score for the quality of web design was 2.67 ± 0.7 (mean ± SD) of a maximum score of 3 and 89% of the sites had patient friendly design. The average interactivity scores was 0.80 ± 0.4 (mean ± SD) and 32% of the websites had facility for interaction. There was a statistically significant difference ($P = 0.01$) of "mean link scores" between private and public websites. However, no significant difference were noted ($P > 0.05$) in other HSWG criteria scores between the private and public sites. There was a significant difference of the "mean link scores" between commercial and non-commercial sites. Non-commercial sites exhibited greater (2.0 ± 0.0) "disclosure mean value" scores as compared with commercial organizations (1.4 ± 0.9). A significant difference was observed ($P = 0.04$) in the mean criteria scores between various continents. The sites in Asia had

a higher "mean link score" compared to other continents, whereas Australian websites had the least link to other sites.

On the basis of HSWG scores, 11 (26.19%) websites were graded excellent, 24 (57.14%) good and 7 (16.67%) average. Twelve websites were therefore shortlisted based on the quality criteria [Table 4] as they comply with all or most of the quality standards.

DISCUSSION

The internet has been acknowledged as an important tool of mass communication in the field of health care, which has the potential to be used to dispense global, cost-effective multimedia patient education material. The use of internet is particularly useful in the case of chronic conditions such as asthma, as it has been shown that when

Table 3: Factors affecting HSWG criteria

Category	HSWG criteria (Mean ± SD)						P value
	Credibility	Contents	Disclosure	Links	Design	Interactivity	
Continents							0.04*
Asia	3.5 ± 0.7	3.5 ± 0.1	2.0 ± 0.0	4.0 ± 0.0	3.0 ± 0.0	1.0 ± 0.0	
America	3.2 ± 1.2	2.9 ± 1.5	1.7 ± 0.7	2.8 ± 1.4	2.6 ± 0.6	0.97 ± 0.4	
Europe	4.0 ± 1.4	4.5 ± 0.7	2.0 ± 0.0	1.0 ± 1.4	3.0 ± 0.0	1.0 ± 0.0	
Australia	5.0 ± 0.0	5.0 ± 0.0	2.0 ± 0.0	0.0 ± 0.0	3.0 ± 0.0	1.0 ± 0.0	
Economic status of country							0.700
Developed	3.3 ± 1.25	3.0 ± 1.5	1.7 ± 0.68	2.7 ± 1.52	2.7 ± 0.6	0.98 ± 0.42	
Developing/Underdeveloped	3.0 ± 0.0	4.5 ± 0.7	2.0 ± 0.0	3.5 ± 0.71	3.0 ± 0.0	1.0 ± 0.0	
Organization							0.01*
Private	2.9 ± 1.05	2.8 ± 1.4	1.6 ± 0.8	3.4 ± 0.7	2.6 ± 0.8	1.0 ± 0.5	
Public	3.6 ± 1.3	3.4 ± 1.6	1.8 ± 0.5	2.2 ± 1.8	2.7 ± 0.5	0.95 ± 0.4	
Patronage							0.573
Medical Schools/ Hospitals	3.3 ± 1.2	3.5 ± 1.2	1.9 ± 0.5	2.4 ± 1.7	2.7 ± 0.6	1.0 ± 0.4	
Non-healthcare Organization	3.3 ± 1.2	2.8 ± 1.6	1.6 ± 0.8	2.9 ± 1.3	2.7 ± 0.6	0.9 ± 0.4	
Basis of Interest							<0.05*
Commercial	3.1 ± 1.2	2.7 ± 1.6	1.4 ± 0.9	2.9 ± 1.4	2.5 ± 0.8	0.9 ± 0.5	
Non-commercial	3.4 ± 1.3	3.4 ± 1.3	2.0 ± 0.0	2.6 ± 1.6	2.8 ± 0.4	1.05 ± 0.2	
Disease specificity to asthma							>0.05
Specific	3.3 ± 1.4	2.4 ± 1.7	1.6 ± 0.8	3.0 ± 1.1	2.7 ± 0.6	0.8 ± 0.6	
Non-specific	3.3 ± 1.1	3.3 ± 1.4	1.8 ± 0.6	2.6 ± 1.6	2.6 ± 0.6	1.0 ± 0.3	
Total	3.4 ± 1.1	3.1 ± 1.50	1.7 ± 0.66	2.7 ± 1.5	2.7 ± 0.6	1.0 ± 0.4	

P < 0.05, significant difference of mean criteria scores between various characteristics of websites.

Table 4: Best websites on the basis of their evaluation scores

Serial number per quality ranking	Web address	Total core educational concepts score (Max 11)	Total HSWG criteria score (Max 22)
1	www.allergycapital.com.au	9	16
2	www.newtoasthma.com	7	18
3	www.drbarryzimmerman.com	7	19
4	www.aafa.org	10	16
5	www.nhlbi.nih.gov	9	18
6	www.asthma.org.uk	9	18
7	www.anesthesia-az.com	7	17
8	www.stmarysmaine.com	10	16
9	www.intermountainhealthcare.org	9	17
10	www.priorityhealth.com	8	16
11	www.firstconsult.com	8	16

it comes to patients searching for information online, the number of patients with these conditions outnumbers those with no chronic conditions. Patients with severe persistent asthma may require particularly intensive patient education and referral to appropriate sources of support, and therefore internet can serve as a treatment guide for them. The unhindered ability of the patient to access the information available online raises the question of appraisal of information available. It is essential to check the quality of public-oriented health care information on the internet for accuracy, completeness and consistency. Developed countries such as the United States had 37 sites devoted to patient counseling and a majority of them were compliant to many of the quality criteria. Asian countries had very few sites devoted for patient counseling in asthma. A multi linguistic website called the UK site translated asthma-counseling points into multiple languages and was found to be unique with more patient-friendly features.

Health on the Net Foundation, founded in 1995 had issued a code of conduct (HON code) for medical and health websites to address reliability and usefulness of medical information on the Internet. HON code is not designed to rate the veracity of the information provided by a website. Rather, the code only states that the site holds to the standards, so that readers can know the source and purpose of the medical information presented.[17,18] Therefore, to check for the quality of the material present on the Internet, HON code compliance was assessed for the websites under review. As observed in the study, the number of websites that complied with this code was found to be very few [n = 8 (19%)]. A study by Thakurdesai *et al.* (2004), also showed that of total 53 sites on diabetes mellitus patient education on the internet, only 15 sites were HON code compliant.[22]

Core educational concepts help evaluate the content validity and were established to incorporate the patient information requirements specific to the disease of asthma. While larger percentage of websites described the basic information about asthma such as the disease overview, drug information and triggers, very few addressed expected questions in patient education such as diet, alternative asthma therapy and travel and asthma. Thakurdesai *et al.* (2004) demonstrated the variability in quality of diabetes patient education websites with respect to core educational concepts and HSWG criteria.[22]

For evaluation of the health-related websites, many authors agree upon few key criteria. The most frequently are those dealing with content; design and esthetics of site; disclosure of authors, sponsors or developers; currency of information (includes frequency of update, freshness,

maintenance of site); authority of source; ease of use; and accessibility and availability.[23] To cover all these, Health Summit Working Group (HSWG) criteria was chosen. HSWG has developed an Internet Information Quality Tool (IQ) to assist site visitors in evaluating the quality of what is presented and also to help developers make hyperlink decisions.[24] Evaluation of HSWG criteria compliance showed that a majority of the websites are good in credibility criteria such as source, context and relevance but having poor currency and editorial review process. Evaluated websites were good at accuracy, display of disclaimer and hierarchy of evidence; fair with respect to original source statement but poor for omissions noted category of content criteria. Most of the sites were good with respect to disclosure criteria and were technically advanced with respect to design and links but fair with respect to back linkages. This is of significance because many users locate material by following links from other websites. The evaluated sites showed poor interactivity component especially in patient education perspective such as chat and discussion groups, mechanism of feedback, tailoring of content and customized alerts.

The present study was one of the first attempts to evaluate the quality of asthma patient education information. Yet the investigators were unable to retrieve all the available resources either due to inaccessibility or due to lack of maintenance of the websites. The investigators accessed websites that were enlisted in prominent search engines such as Google; however, institutional and intranet linked-sites were inaccessible. Among a total of 192 websites that provide patient information on asthma, a limited number of sites were evaluated due to the following reasons: websites that were unreachable, duplicate, highly technical (e.g. journals containing subscribed material, conference proceeding and continuing medical education (CME) material), other than English language, search engine listings and library sites (total 150) were excluded from study. The study revealed higher compliance of most sites to few of the quality criteria. Other criteria such as interactivity like chat rooms and feedback mechanism can be encouraged while developing new patient counseling websites.

CONCLUSION

Asthma is the disease condition affecting the rich and poor alike throughout the world. A patient is unlikely to have the knowledge about this disease. It is currently the fashion among public to visit internet café to meet their medical information requirements. Although large volume of information is available on the internet, unfortunately, all

information are not regulated. The sponsored information is likely to be biased and business oriented. It is required that the content of such information is collectively and critically evaluated. The present study evaluated the compliance of asthma education websites based on HON code, Core education concept and HSWG criteria. It was observed that 20% of the sites were compliant to HON code, while most sites adhered to the core education concept and all sites were compliant to the basic HSWG criteria. The HON code and HSWG criteria were able to decipher the quality of content of asthma information on the internet. Among the shortlisted 12 sites for asthma, the counseling information on the quality criteria was found to be satisfactory. On the basis of this study, it is now possible to evaluate and recommend the inclusion of quality information that is specific to meet the needs of asthma patients in education websites.

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