

# Developing and Evaluating Parents' Satisfaction with a Website to Manage Pediatric Asthma

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## Abstract

**Background:** Providing information in an accessible form is important for managing chronic diseases.

**Objective:** To develop an interactive website regarding pediatric asthma and to evaluate the satisfaction with the website of parents of children with asthma.

**Methods:** In this cross-sectional study, the user interface of the website was developed by examining experts' perspective. Then, the users used the website during a three-month period and completed an electronic questionnaire.

**Results:** All parents reported that the entire website was informative. Of the participants, 98 percent reported that the medication section was the most useful, 93 percent considered the management and treatment section most useful, and 90 percent found the nutrition section most useful. The users had high satisfaction with the information content of the website.

**Conclusion:** By creating an interactive website, we provided an educational tool to help parents learn essential information about asthma treatment and prevention of disease progression. The users believed that the website could meet their information needs.

**Keywords:** pediatric asthma; information needs; internet; website

## Introduction

Asthma is one of the most common chronic diseases of childhood. Despite advances in its treatment, without proper treatment pediatric asthma may progress to adult asthma.<sup>1</sup> One of the factors that can lead to a delay in the diagnosis of childhood asthma or lack of appropriate treatment is lack of understanding of the signs and symptoms of the disease and the ways to prevent and control it.<sup>2</sup> Therefore, education of patients and their parents is essential to prevent and treat asthma in childhood.<sup>3,4</sup>

Different educational methods can be used to educate patients and parents. Educational interventions can provide information through mobile-based applications, pamphlets, books, training courses, and websites. However, these interventions are not all used to the same extent, and their levels of

acceptance vary. With the increasing use of the internet to obtain health information,<sup>5</sup> internet-based interventions have gained more popularity than other methods.<sup>6-9</sup> In this regard, Clark et al.<sup>10</sup> showed that websites are considered more interesting and practical than other educational interventions such as conferences, training sessions, and books. Other studies have shown that web-based interventions have a greater impact in increasing the knowledge and participation of patients and their families.<sup>11</sup>

Flexibility in communication improves the popularity of web-based interventions.<sup>12</sup> By employing a web-based intervention, one can send multimedia messages, adjust the messages according to the conditions and characteristics of users, and provide up-to-date information. Despite the availability of various information sources, some studies have shown that people prefer to obtain medical information from a physician because they have greater confidence in the information obtained in that way.<sup>13</sup>

However, several factors make parents less likely to see a physician, which can lead to inappropriate treatment of asthma in children. These children may suffer from the consequences of an untreated problem for a long period of time. Inappropriate treatment of asthma in children increases the probability of resistance to the treatment of asthma and the incidence of adult asthma.<sup>14</sup> Factors that lead people not to visit a physician include families' low income, poverty, and discontinuous insurance status.<sup>15</sup>

Therefore, because people can access the internet easily and can receive up-to-date and useful information at low cost, providing the required information on the internet can help parents to manage their children's disease. Furthermore, enabling patients or their families to communicate with a physician via the website can help people receive reliable information with the lowest cost. Therefore, creating a website to provide the information that parents need to know may be effective in the treatment and prevention of the disease. Studies have shown that web-based interventions provide useful and reliable information and can play a major role in educating patients, increasing self-management ability, and improving interaction with clinicians.<sup>16-20</sup>

However, studies have shown that some websites are difficult to read and that people without at least a high school degree cannot gain the required information.<sup>21, 22</sup> To meet the intended purpose, websites should be developed in such a way that people with any level of literacy can get the required information from reliable content.

Consequently, providing information in language that is comprehensible to people is very important. Because of the different abilities of individuals, websites in people's native languages and websites that provide simple and understandable information can have a greater impact. Considering the importance of the treatment of asthma in childhood and the role of parents in this regard, providing information in an understandable and accessible form is a vital issue. Therefore, in this study, an interactive, native-language website with understandable content for users was developed to be used as a tool for educating parents and helping them learn the necessary information regarding pediatric asthma treatment and prevention of disease progression. In addition, users' satisfaction was evaluated to assess the extent to which the developed website met the users' expectations.

This cross-sectional study was conducted by a descriptive approach in two phases in Kerman, the largest city in southeastern Iran, in 2015–2016.

### **Phase 1: Website Development**

To develop the website, we first identified the required main topics in an information needs assessment study of parents of children with asthma (a previous phase of the same project).<sup>23</sup>

In this phase, the topics proposed by parents were discussed in a focus group consisting of one pediatric allergy and asthma specialist and two medical informaticians and an expert on health information technology. To guide the focus group discussion, a form consisting of the topics proposed by

parents was given to the experts. The topics were discussed one by one, and after the discussion of each topic, the experts reached a consensus about whether the topic should be included in the website. After identifying the topics that should be included, the website content for each topic was written by a pediatric allergy and asthma specialist. Then, 10 physicians (four general practitioners and six asthma and allergy specialists) were read the content and expressed their opinions about the content of the website. The prepared content and the physicians' opinions were discussed in a focus group with the same experts who participated in the first focus group. Based on the comments of the focus group, the final version of the website content was prepared. The first draft of the website prototype was discussed in the focus group, and then the website was designed with Joomla. The website was developed according to American Medical Association (AMA) guidelines for medical and health information sites on the internet. The AMA guidelines comprise four fundamental principles for content, advertising and sponsorship, privacy and confidentiality, and e-commerce.<sup>24</sup>

After the website was prepared, it was evaluated by the same focus group to identify and address problems and weaknesses. The website was introduced to 15 parents of children with asthma to identify problems, and then the required changes were made. In this phase, the participants were asked to give their opinion regarding information retrieval and the understandability of the information provided through the website.

The website was designed to facilitate interaction between parents by allowing them to communicate with each other via the website. Moreover, through the website, they can interact with a pediatric allergy and asthma specialist to ask questions.

## **Phase 2: Evaluation of Website Users' Satisfaction**

### *Data Collection Method*

In this phase, the website was introduced to parents of children with asthma who were referred to physicians' offices. One of the researchers asked parents to visit and use the website during a three-month period.

The study population was all parents of children with asthma who visited the offices of pediatric allergy and asthma specialists for the treatment of their children. In this phase, 124 parents were recruited to participate. These parents were randomly identified in the previous phase of the same project.<sup>25</sup> Moreover, one of the researchers visited the offices and selected more participants. Parents who had the ability to use computers and cell phones and to access the internet were included in the study.

During the three-month period, SMS reminders were sent weekly to prompt the included parents to visit the website. The participants' contact information and consent were obtained in the previous study.<sup>26</sup>

### *Measurement Tool Validity and Reliability*

To measure user satisfaction, a semistructured questionnaire was designed and distributed through the website to visitors. The questionnaire consisted of four sections. The first section was related to demographic information of participants (eight questions). The second section included 10 closed questions (with answers of yes, no, and partly) regarding their opinions about the website and the usefulness and ease of use of the website. In this section of the questionnaire, participants answered questions about the data quality and appearance of the website and also about the ease of access to the physician and other parents (with answers of very low, low, partly, high, and very high). The third section of the questionnaire consisted of four open-ended questions in relation to the sections of the website that they were satisfied with, sections that need revision and improvement, suggestions for improving the website, and the number of times that parents visited the website during the three-month period. In the

fourth section of the questionnaire, participants were asked to evaluate the website with a score from 1 (very poor) to 5 (very good).

The validity of the questionnaire was confirmed by four medical informaticians and a pediatric allergy and asthma specialist. The reliability of the questionnaire was assessed using the test-retest method ( $r = 0.87$ ). Fifteen parents were asked to complete the questionnaire after visiting the website. Then, after 20 days, they were asked to complete the questionnaire again.

The data were then entered into SPSS version 20 and analyzed with descriptive statistics (frequency and percentage).

### *Ethical Consideration*

The study was approved by the ethical research committee of Kerman University of Medical Sciences. The participants also participated with informed consent in the study and were assured of the confidentiality of their information. One of the researchers first explained the study objective to the parents, and then their consent was implied in their agreement to participate in the study.

## **Results**

### *Phase 1: Website Development*

The website has five main menus. The first menu is a home page that includes general information about the website. The user satisfaction questionnaire was also put on this page. The second menu includes asthma facts. This menu has 12 submenus and includes the following topics: general information about pediatric asthma, signs and symptoms, risk factors, causes of asthma attacks, suspected asthma attack, management and treatment of asthma, medication, methods of using the inhaler, child nutrition, child and school environment, the role of exercise, and prevention of asthma. The third menu provides information on the offices and clinics of asthma and allergy specialists in Iran, including names, phone numbers, and addresses of the offices. The interactive functionality is provided in the fourth menu. With this functionality, parents can ask questions and get answers from a pediatric allergy and asthma specialist. The questions are answered within 24 hours. Moreover, they can interact with other parents visiting the website. Parents can communicate with each other and engage in discussion and dialogue. The fifth menu includes the contact information of the website owner (see Figure 1).

### *Phase 2: Evaluation of Website Users' Satisfaction*

In the development phase, the problems and shortcomings of the website identified by experts and users were resolved. The researchers then introduced the website to 124 parents of children with asthma whose contact information was collected during the needs assessment study.<sup>27</sup> These parents were contacted through phone calls and messages.

In addition, one of the authors visited asthma and allergy clinics and introduced the website to randomly selected parents. Parents were encouraged to visit the website and use its functionalities.

During the three-month period, a total of 1,010 visitors visited the website, and 150 of these visitors completed the questionnaire. The participants ( $n = 150$ ) were 25 to 48 years old (mean = 33 years, standard deviation = 4.108 years); 90 parents (60 percent) were mothers, and 107 parents (71 percent) had an academic degree. Other background characteristics are presented in Table 1.

All respondents were informed about the site by the researcher. The frequency of visits to the website during the study period was four to eight times, based on self-reporting by the participants. In response to the question that asked participants to identify sections that are useful, all respondents

reported that in general, the entire website is informative and useful. In total, 98 percent of users reported that the medication section was more useful than the other sections, 93 percent found the management and treatment section more useful, and 90 percent said that the nutrition section was more useful than the other sections. Regarding the ease of use, 83.3 percent of the respondents reported that the website is “quite easy” to use.

The users' satisfaction with the website is shown in Figure 2. In general, 139 respondents (92.7 percent) reported their overall satisfaction as “very high.” The information content of the website had the highest user satisfaction. The lowest levels of satisfaction were reported regarding the interaction with other parents. All respondents ( $n = 150$ ) believed that the website should be introduced to other parents. The mean score that parents gave to the website, based on a scale from 1 (very poor) to 5 (very good), was 4.93 (standard deviation = 0.262).

## Discussion

We developed an educational website for parents of children with asthma. Development of the website was complemented with changes suggested by experts and members of the target group. The results showed that users were satisfied with the information content of the website, and they noted that such information has a very important role in managing their child's condition. In this regard, Wiecha and et al.<sup>28</sup> showed that, in their study, most users were satisfied with the website information. They asked participants to give a rating from 0 to 10 to the developed website, and with an average score of 9.2, users confirmed the usefulness of the information.<sup>29</sup> The results of the present study are consistent with the results of the study by Wiecha et al. The existence of the necessary elements to provide guidance to patients with asthma to improve their health situation could have led to an increase in the use of the virtual environment. The rich information content of a website can increase website user satisfaction and provide an opportunity to access needed information.<sup>30</sup>

The results of this study showed that most website users were satisfied with the website's features and could easily use it. In the study by Wiecha et al.,<sup>31</sup> the users of the developed website also reported strong satisfaction with the ease of use of the website, with a score of 8.4 points out of 10. A user-friendly system plays an important role in individuals' satisfaction.<sup>32, 33</sup> Individuals and users must be able to easily use all capabilities of the website.<sup>34</sup>

The results of this study showed that 75.3 percent of parents were satisfied with the appearance of the website. In this regard, studies have shown that the appearance of a website is a key factor in attracting users.<sup>35-37</sup> The more users are satisfied, the more likely they are to revisit a website. If the site is not suitable, users may be reluctant to visit the website even though it has useful information.

The website is one of the initial steps in the implementation of e-government and information technology development, which can facilitate online services and access to information for the management of chronic diseases.<sup>38</sup> Conversely, inadequate communication is a hidden reason for unexpected behaviors by patients with chronic diseases, which often lead to inadequate treatment of the patient in addition to annoyance and anxiety.

The results showed that the majority of parents were satisfied with their interaction with a physician via the website. The reason for this satisfaction was that they could ask questions of the physician and receive free counseling without wasting time. The ability to interact with the physician could cause users to place more trust in the provided information.

Despite the results that showed that the users were satisfied with their interaction with the physician, their level of interaction with other parents was low and not very satisfactory. This may be due to the short duration of the study. People were asked to use the website and interact with each other and

with the physician during the three-month period. This period may not have provided a sufficient opportunity for parents to communicate with each other and read each other's perspectives.

Because of the nature of the disease, sometimes patients with asthma or similar diseases should avoid traffic in polluted environments, and this prevents them from visiting health centers. Therefore, the existence of a computer-based intervention that establishes a relationship between the patient and the care center can meet the information needs of patients and provide social and psychological support. In addition, a website that provides teleconsultation can be used to manage patients' medications and prescribed diet and can reduce the time and cost of in-person visits. Also, the engagement of patients in their care via a web-based network can create an incentive to promote patients' cooperation.<sup>39</sup>

In our study, all website sections were informative and useful. Among the sections of the website, the pharmaceutical, management and treatment, and nutrition sections were more useful than other sections. In recent years, health systems have created different ranges of healthcare for consumers. Subsequently, self-management of healthcare has increased among patients, who are looking for new ways to obtain information, understand their rights and accountability, and make health decisions for themselves and others.<sup>40</sup>

The management of chronic diseases such as asthma requires action by the patient or family and long-term, continual follow-up. For example, the patient has an important role in following the recommendation to avoid allergens such as cigarette smoke.<sup>41</sup> Another important point about patients with asthma is the need for timely use of prescription drugs. Lack of on-time use of these drugs will lead to side effects and increased treatment cost. Web-based interventions that provide on-time reminders and promote patient participation in health activities have been very helpful in this regard.<sup>42</sup>

## **Strengths and Limitations of the Study**

One of the strengths of this study is that we recruited actual users in addition to experts and asthma specialists to develop the website. Moreover, the website content is written in easily understandable language so that users are more likely to be able to read and use it. In addition, to enhance the quality of the website, we applied the AMA guidelines for the development of health websites. The weakness of this study is that we could not provide tailored information based on the patient's condition to parents. This tailored information could allow parents to obtain the required information more quickly.

## **Conclusion**

In this study, by creating an interactive website, we provided an educational tool for parents and help them learn the necessary points about pediatric asthma treatment and prevention of disease progression. The users believed that the website was effective and could meet the information needs of parents of children with asthma.

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## Notes

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Figure 1

Screenshot of Website Home Page



Figure 2

## Parents' Satisfaction with the Website

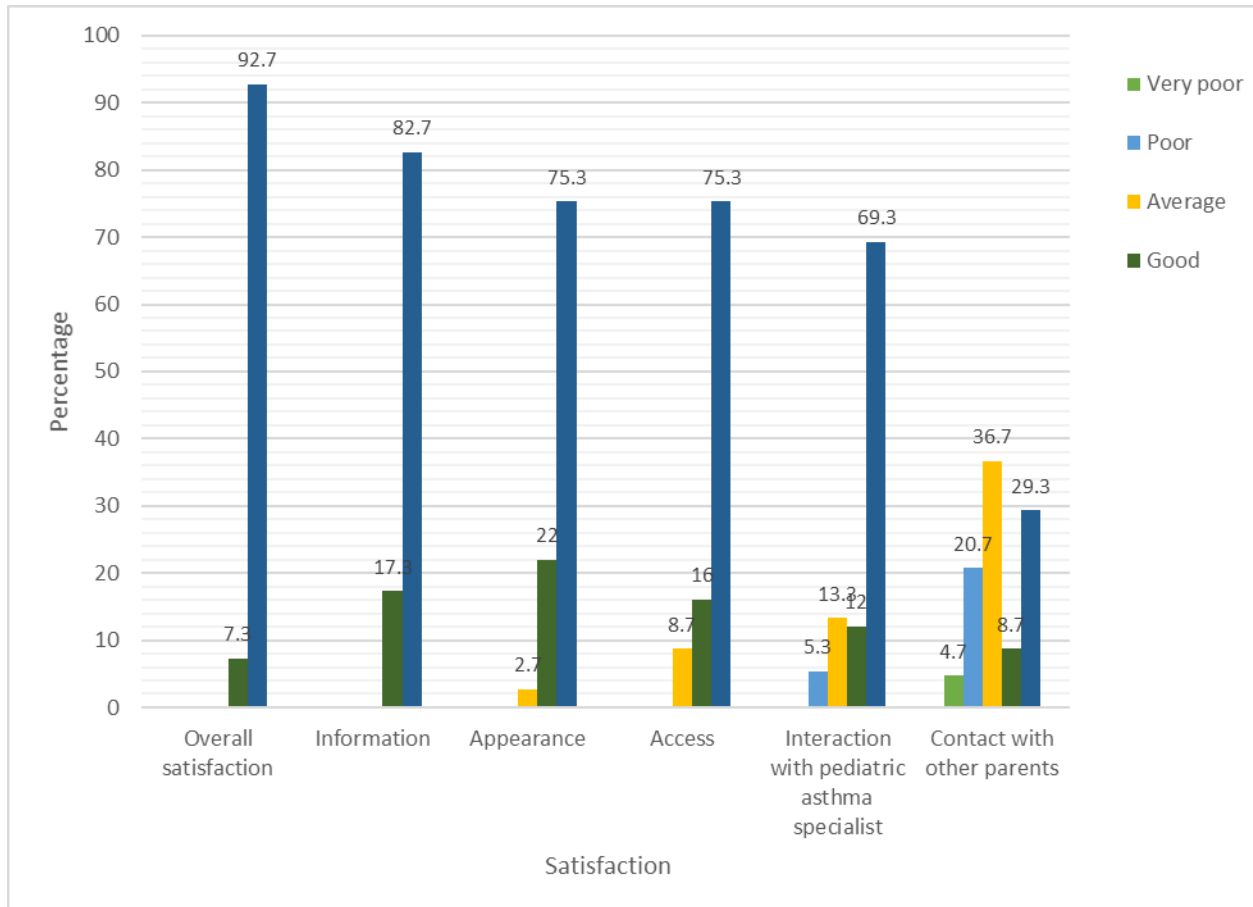


Table 1

## Characteristics of the Parents

<b>Characteristics</b>	<b>Number (Percent)</b>
Parent	
Mother	90 (60)
Father	60 (40)
Residence	
Kerman city	87 (58)
Other cities and villages	63 (42)
Educational level	
High-school diploma or lower	43 (28.6)
Academic degree	107 (71.4)
Job	
Employee	54 (36)
Housewife	54 (36)
Self-employment	42 (28)