

Evaluation of internet use for health information by parents of asthmatic children attending pediatric clinics in Riyadh, Saudi Arabia

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BACKGROUND AND OBJECTIVES: Internet use by patients raises awareness about their conditions, while its use by physicians assists their ability to make evidence-based decisions. This study aimed at assessing the extent, sources and effects of Internet use by parents of asthmatic children in Riyadh, Saudi Arabia.

DESIGN AND SETTING: A cross-sectional design to collect data from two pediatric pulmonology clinics (public, private) for asthma management in Riyadh, Saudi Arabia, during the period of January to May 2011.

SUBJECTS AND METHODS: A specially designed tool was used to collect data from a random sample of 500 parents of asthmatic children. This tool included questions on demographic data (parents, child) and internet use (sources, frequency, purposes).

RESULTS: Most children (77%) in our study sample were diagnosed with asthma before their third birthday, by a treating physician (78%). Among Internet user parents (n=400), 53% used it for 10 to <30 minutes or <10 minutes (22%). Reported reasons for internet use were reassurance, clarification, online consulting, and new management schemes. Reported limitations for Internet use for managing asthma included the nonavailability of Arabic information and highly technical information. Parents suggested the need for the availability of the following online services: consulting/chatting with treating physician, receiving updates on asthma, booking appointments, and being directed to specific websites on asthma. Multivariate analysis showed that the most important predictors for internet use were: "higher mother education" (OR=7.02), followed by "higher father education" (OR=3.04) and "non-health related mother occupation" (OR=2.6).

CONCLUSION: The application of the findings of this study may assist clinicians in the patient-centered shared management of asthmatic children.

Members of the public obtain information about their own or their children's conditions or diseases from different sources, including health professionals (such as treating physicians, physiotherapists, nurses, health educators, pharmacists, or lab technologists,) and media of different types (TV, radio, newspapers, magazines, etc.), but most recently they have come to obtain this information through the Internet. In fact, the context in which patients consume health information has changed dramatically with the diffusion of the Internet, advances in telemedicine, and changes in health coverage in the me-

dia.¹ The Internet has proven to be a powerful and very popular vehicle for distributing health information to millions of individuals; it is interactive, user controlled, and provides an effective means for communicating detailed information.²

A recent review³ showed that the majority of health-related Internet searches by the public are for information on specific medical conditions, both before and after the clinical encounter. In fact, patients have been reported to use Internet sources to seek information on many conditions or diseases they may be suffering from, including conditions related to general medical care and

family medicine,⁴ rheumatological conditions,⁵ more serious conditions such as lung cancer⁶ and prostate cancer,⁷ and even cardiac surgery for congenital heart disease.⁸

This rather new development, reported more frequently within the last 10 to 15 years, has resulted in new horizons for the patient–doctor relationship. In fact, a recent review of current issues in the patient–doctor relationship⁹ reported that they include asymmetry of power, perceived challenges to the physician's authority, and interpersonal, systemic, and societal challenges. Concerns also include whether patient access to large volumes of information will improve their health, whether the variable quality of the information will have a deleterious effect, what the effect on health disparities will be, and whether the patient–doctor relationship will improve as patients become equal partners or be damaged if physicians have difficulty adjusting to their new role.¹⁰ Physicians and the organizations that support them must fully understand their role in the e-health revolution. Both must advance their awareness of the “new consumers” and their needs and define specific action items that will help society realize the benefits of e-health.¹¹

It is anticipated that the use of the Internet by patients will raise health awareness about their conditions, while its use by physicians will assist their ability to make evidence-based decisions. In asthma management, for example, the challenge is to bridge the gap between excessive morbidity and the science that holds the promise of reducing it; in other words, to translate scientific advances into meaningful recommendations for clinical care and to promote adoption of recommendations.¹²

While there has been increasing use of the Internet in healthcare, minimal research has been conducted to examine what, if any, impact the availability and integrity of healthcare information on the Internet has on the patient–doctor relationship, especially among parents of children suffering from bronchial asthma. Accordingly, this study's objectives were to assess the extent, sources, and effects of Internet use by the parents of asthmatic children in public and private clinics in Riyadh to obtain information related to their children's condition; and to recommend appropriate Internet-based methods for raising awareness of asthma in the community.

SUBJECTS AND METHODS

A cross-sectional approach was used for data collection from a random sample of 500 parents of asthmatic children undergoing treatment at two pediatric pulmonology clinics at King Khalid University Hospital (a

Table 1. Distribution of characteristics and clinical profile of asthmatic children (n=505).

Study variable	Number (%)
Gender (n=486)	
Male	292 (60.1)
Female	194(39.9)
Age (months) (n=466)	
<6	65 (13.9)
7-12	61 (13.1)
13-24	53 (11.4)
25-36	38 (8.2)
37-48	43 (9.2)
49-60	35 (7.5)
>60	171 (36.7)
First diagnosis of asthma (n=485)	
<1 year	264(54.4)
1 to < 3 years	113 (23.3)
3 to < 6 years	61(12.6)
6 to < 12 years	44 (9.1)
>12 years	3 (0.6)
How was diagnosis made? (n=489)	
Physician consultation	393 (81.4)
Nurse consultation	7 (1.4)
Suspected, went for check-up	79 (16.1)
One of the friends advised me	10 (2.0)
How did you locate your physician? (n=482)	
Referral	261 (54.1)
Through a friend	169 (6.1)
From internet	16 (3.3)
Newspaper advertisement	1 (0.2)
Health journals	1 (0.2)
Others	34 (7.1)
Where do you usually obtain medication for asthma? (n=460)	
Hospital	427 (92.8)
Pharmacy	30 (60.5)
Internet	3 (0.65)
How do you communicate with your doctor? (n=483)	
By telephone/SMS	36 (7.5)

Study variable	Number (%)
E-mail	3 (0.6)
Only when I visit the clinic	429 (88.8)
Other	15 (3.1)
How frequently do you communicate with the doctor? (n=488)	
Only when I need to booked an appointment	228 (46.7)
Weekly	4 (0.8)
Monthly	50 (10.2)
Quarterly	152 (31.1)
How frequently do you communicate with the doctor? (n=488)	
Yearly	10 (2.0)
Other	44 (9.0)
Source of information of your child's asthma presentation (n=505) ^a	
Family doctor	35 (6.9)
Pediatrician	189 (37.4)
Pediatric pulmonologist	342 (67.7)
Adult pulmonologist	8 (1.6)
Nurse	67 (13.3)
Pharmacist	3 (0.6)
Internet	61 (12.1)
Health education brochures/posters	55 (10.9)
Radio	4 (0.8)
TV Programs	33 (6.5)
Health Journal	20 (4.0)
Parents of asthmatic children	77 (15.2)
Sources of information of your child's asthma management (n=505) ^a	
Family doctor	28 (5.5)
Pediatrician	166 (32.9)
Pediatric pulmonologist	339 (67.1)
Adult pulmonologist	28 (5.5)
Nurse	69 (13.7)
Pharmacist	12 (2.4)
Internet	49 (9.7)
Health education brochures/posters	30 (5.9)
Radio	4 (0.8)
TV programs	22 (4.4)
Health journal	11 (2.2)

^aCategories are not mutually exclusive

government teaching tertiary-care setting) and Dallah Hospital (a major private hospital) in Riyadh, Saudi Arabia during the period January to May 2011. Parents (fathers or mothers) of asthmatic children seeking care at either center who consented to participate in the study were included.

A specially designed questionnaire was used for data collection. This tool included questions about demographic data (for both parents), including nationality, education, occupation, residence, allergy history, and allergy-management practices (as applicable); relevant child information, including age, gender, how the diagnosis was made, medications, communication with treating physician, and sources of information about asthma; and Internet use: location, duration, frequency, search engines used, purposes (eg, asthma presentation, complications, management), usefulness, and limitations. The collected data was reviewed for completeness and accuracy, then analyzed using SPSS version 18.0 (IBM Corp, Armonk, New York, United States). Data management included coding, cleaning, entry, analysis, and presentation. Suitable biostatistical techniques were applied in the analysis (frequency distributions; bivariate analysis using odds ratios, 95% confidence intervals, and *P* values; multivariate analysis using multiple logistic regression). Necessary ethical clearance was obtained from the King Saud University, College of Medicine Institutional Review Board.

RESULTS

Table 1 reflects the distribution of characteristics and clinical profile of the asthmatic children in the study sample (n=505). It shows that most asthmatic children (60%) in our sample were males. A little more than one-third (37%) of them were more than 5 years old. Most of the children (77%) were diagnosed with asthma before their third birthday by a treating physician (78%). The majority of children were seen on referral (54%). It was interesting to learn that most of the parents (85%) reported that they obtained asthma medications from the hospitals where their children were treated and that they only communicated with the treating physician when they visited the clinic (89%). Most parents mentioned that their main source of information about asthma presentation or management was the treating pediatric pulmonologist (67–68%) or the pediatrician (33–37%).

Table 2 shows parent characteristics (n=505). Most parents (90%-91%) were Saudi citizens residing in Riyadh (90%); 23% to 25% had secondary but no post-secondary education and 50% had a university education. Most fathers were in non-health related occupa-

tions, whether governmental (52%) or private (37%), with no history of allergy (65%). About two-thirds of mothers were housewives (64%), and about three-quarters had no history of allergy (75%). Among those reporting allergies (25% of mothers and 35% of fathers), most had been diagnosed as asthmatic (68–73%) for which they used either no treatment (34–44%) or salbutamol (39–42%).

Table 3 shows the distribution of asthma-management variables among people who had used the Internet to look up health information (henceforth, “Internet users”; n=400). More than half of the users reported using it for between 10 and 30 minutes (53%), while 22% had used it for less than 10 minutes. Surprisingly, most users (88%) used the Internet for asthma management without being advised to do so by a physician; Google (81%) was the search engine of choice, and general medical websites were the major source of information (88%). Reported reasons for using the Internet for medical information included reassurance (40%), need for clarification of information (38%), and less often, online consultation (19%) and new management techniques (16%). Around 79% of parents reported that the Internet provided solutions to asthma-related questions only sometimes. The most important limitations of Internet use for obtaining asthma-management information included non-availability of Arabic language information (57%) and the highly technical nature of the information (25%), which was not easily understandable. They suggested a need for availability of the following online services: consulting with a treating physician (47%), receiving updates on asthma treatment (38%), booking appointments (32%), chatting with the treating physician (26%); and being directed to specific websites on asthma (24%). When asked if they had attempted to use information from the Internet to discuss their child’s condition with the treating physician, most of them (80%) reported that this had never happened, but those who had (20%) felt that the discussion was generally welcomed by the physician concerned (83.5%).

Table 4 includes the results of bivariate analysis testing possible associations between selected study variables and Internet use for asthma information. Only father’s level of education (odds ratio=5.1; 95% confidence interval=2.5, 10.5) and mother’s level of education (OR=7.6; 95% CI=4.0, 14.5) were found to be predictors for Internet use for asthma information and management. The interaction of father’s education and mother’s education with Internet use, by stratifying mother’s education across two levels of father’s education (more and less education) showed a statisti-

Table 2. Characteristics of parents of asthmatic children (n=505).

Characteristic	Father No (%)	Mother No (%)
Nationality (F [n= 493]; M [n= 483])		
Saudi	447 (90.7)	433 (89.6)
Non Saudi	46 (9.3)	50 (10.4)
Education (Fn = 490; Mn = 472)		
Does not read/write	7 (1.4)	14 (3.0)
Reads/writes	11 (2.2)	11 (2.3)
Primary education	22 (4.5)	29 (6.1)
Preparatory education	46 (9.4)	52 (11.0)
Secondary education	115 (23.5)	119 (25.2)
University education	246 (50.2)	235 (49.8)
Postgraduate degree	43 (8.3)	12 (2.5)
Occupation (F [n= 486]; M [n=470])		
Health related	36 (7.4)	31 (6.6)
Non-health related Governmental	252 (51.9)	101 (21.5)
Non-health private	180 (37.0)	29 (6.2)
Housewife	Not applicable	302 (64.3)
Other	18 (3.7)	7 (1.5)
Residence (F [n=469])		
Riyadh	422 (90)	
Near to Industrial area	10 (2.1)	
Other	37 (7.9)	
History of allergy (F [n=450; M [n=464])		
Yes	158 (35.1)	117 (25.2)
No	292 (64.9)	347 (74.8)
If yes, type of allergy (F [n=146]; M [n=112])		
Asthma	106 (72.6)	76 (67.8)
Other	40 (27.4)	36 (32.2)
Drug treatment (F [n=151]; M [n=107])		
None	67 (44.4)	36 (33.6)
Salbutamol (rescue medicine)	59 (39.1)	45 (42.1)
Inhaled Corticosteroid	15 (9.9)	12 (11.2)
Other	10 (6.6)	14 (13.1)

F= sample size of fathers; M= sample size of mothers, but for the same sample of children (n=505).

cally significant association (OR=10.44; 95% CI=4.86, 22.4) of mother’s education (at the level of more father education) and Internet use for asthma information when compared with the non-significant association (OR=1.37; 95% CI=0.39, 4.9) of mother’s education (at the level of less father’s education) and Internet use. (**Table 5**). The multivariate analysis showed the variables nationality of mother (“a non-Saudi mother,” OR=4.80; 95% CI=1.1, 21.3) and occupation of mother (“non-health related” OR=2.6; 95% CI=1.9, 3.3) were the independent predictors for Internet use for asthma information and management, as seen in **Table 5**.

DISCUSSION

Healthcare delivery is being transformed by advances in e-health and by the newly empowered, computer-literate public, which is ready to become an equal partner in its own health. Such changes can bring about

Table 3. Distribution of asthma management variables among Internet users (n=400).

Variable	No (%)
Time spent on internet for information about asthma (n=325)	
<10 min	69 (21.2)
10 to <30 min	170 (52.3)
30 to <60	49 (15.1)
>1 hour	37 (11.4)
Internet use, upon physician advice (n=278)	
Yes	32 (11.5)
No	246 (88.5)
Type of search engine (n=400)	
Microsoft	2 (0.5)
Yahoo	22 (5.5)
Google	324 (81.0)
No response	52 (13.0)
Websites for information related to asthma (n=295)	
Medical base	17 (5.8)
General medical website	259 (87.8)
Specialized medical Journal	11 (3.7)
Other	8 (2.7)
Using Internet for medical purpose (n = 400)	
Need for clarification	154 (38.5)
New management schemes	64 (16.0)
Reassurance	159 (39.8)
Online consulting	76 (19.0)
Internet offered solutions to asthma related questions? (n=344)	
Never	38 (11.0)
Sometimes	271 (78.8)
Always	35 (10.2)
Limitations faced while retrieving information related to asthma (n=400)	
Technical information (not easily understandable)	102 (25.5)
Non-Arabic information	229 (57.2)
Unavailable medicine in Saudi Arabia	14 (3.5)
Others	55 (13.8)
Suggested Internet uses for learning about asthma (n=400)*	
Online consulting with treating physician	188 (47 %)
Online drug purchasing	17 (4.2)
Online booking of appointments	127 (31.8)
Online chatting with my doctor	106 (26.5)
Obtaining updates of asthma	152 (38.0)
Being directed to specific websites on asthma	99 (24.8)
Using information from Internet for discussing child's condition with child's doctor (n=359)	
Yes, and he welcomed	60 (16.7)
Yes, and did not welcome	12 (3.3)
Never happened	287 (80.0)

positive results, like improved clinical decision making, increased efficiency, and strengthened communication between physicians and patients.¹¹ Parents of chronically sick children, such as asthmatic children are no exception. Nevertheless, most parents in our study sample (68%) indicated that information about childhood asthma was obtained from the treating pediatric

pulmonologist, which is congruent with the results of a study at the University of Iowa's multidisciplinary thoracic clinic, where 139 patients reported that the most common source of information about their condition was their referring physician (47%) or subspecialist physician (82%).⁶ Similarly, data from the US Health Information National Trends Survey¹ indicated that 62.4% of more than 6000 adult patients expressed a high level of trust in their physicians, despite newly available alternative information channels.

Most of the parents in our study sample (79%) reported using the Internet to gain information on their children's condition. This level is higher than that seen in similar studies in Glasgow, on 140 rheumatology patients (43% Internet users);⁵ in Texas, on 160 families of children requiring cardiac surgery (58% Internet users);⁸ nationwide in the United States, by the US National Health Information Trends Survey of 6369 adults (63% Internet users);¹ and in Detroit, on 1289 patients (65% Internet users).⁴ One obvious explanation is that all four mentioned studies were performed 5 to 9 years before ours, when global Internet access and use were generally less prevalent than nowadays, when almost everybody, especially in urban areas, has access to and uses the Internet for several purposes.

The most important predictors for Internet use in our study sample were "higher mother education" (OR=7), "higher father education" (OR=3), the combination of both these higher-education variables (OR=10.44), and "non-health related mother occupation" (OR=2.6). Schwartz et al 2006⁴ also reported that education and income of parents were significantly associated with Internet use in their Detroit MetroNet study. Indeed, education is always key to non-traditional channels for seeking professional advice, the classical channel being the treating physician.⁴ Parents are increasingly likely, after a diagnosis of their child with asthma, to seek additional information about the disease, its presentations, complications, and modern management strategies—especially highly educated parents. This has been indicated by parents in the current study and other studies.⁴⁻⁶

In our study, parents reported the following reasons for Internet use for asthma information: reassurance and clarification (38–40%) and online consultation or obtaining information on new management schemes (16–19%). These reasons seem different from those in the Detroit study,⁴ where patients mentioned the following reasons: obtaining information on specific medications (53%), prevention (34%), and alternative therapies (25%). On the other hand, rheumatology patients in the Glasgow study⁵ reported looking for relevant informa-

Table 4. Association Between Selected Variables and Internet Use for Child's Asthma (bivariate analysis).

Study variable	Use of Internet		OR (95% CI)	P
	Yes (%)	No (%)		
Nationality of father				
Saudi	348 (77.9)	99 (22.1)	1.0	.021
Non-Saudi	43 (93.5)	3 (6.5)	4.1 (1.2,13.5)	
Education of father				
More education	370 (82.2)	80(17.8)	5.1 (2.5,10.5)	<.0001
Less education	19 (47.5)	21(52.5)	1.0	
Occupation of father				
Health related	30 (83.3)	6(16.7)	1.28 (0.5,3.5)	.74
Non-health related	358 (79.6)	92(20.4)	1.0	
History of allergy (father)				
Yes	129 (81.6)	29 (18.4)	1.1 (0.67,1.9)	.73
No	246 (79.9)	62 (21.1)	1.0	
If yes, type of allergy				
Asthma	84 (79.2)	22 (20.8)	0.81 (0.28,2.24)	.89
Other	33 (82.5)	7 (17.5)	1.0	
Nationality of mother				
Saudi	338 (78.1)	95 (21.9)	1.0	.013
Non-Saudi	47 (94)	3 (6)	4.4 (1.3,14.3)	
Education of mother				
Less Education	22 (40.7)	32(59.3)	1.0	<.0001
More Education	351 (84)	67(16)	7.6 (4.0,14.5)	
Occupation of mother				
Health related	28 (90.3)	3 (9.7)	3.4 (0.96,12.4)	.06
Non-health related	116 (89.2)	14(10.8)	3.0 (1.6,5.9)	.003
Housewife and other	226 (73.1)	83(26.9)	1.0	--
History of allergy (mother)				
Yes	91 (77.8)	26 (22.2)	0.84 (0.5,1.4)	.58
No	280 (80.7)	67 (19.3)	1.0	

tion (83%), drug treatments (54%), alternative therapies (31%), and patient organizations (11%). A recent literature review³ summarizes all of the above by mentioning that the Internet is used by the patient before the clinical encounter to seek information to manage the patient's own healthcare independently and/or decide whether they need professional help; after the clinical encounter, however, it is done for reassurance because of dissatisfaction with the information provided by the health professional during the encounter.

The parents in our sample also reported that the Internet sometimes provided solutions to their children's asthma-related questions (79%). This finding is similar to the reports of 83% of rheumatology patients in the Glasgow study⁵ and 95% of families of children with congenital heart disease in Texas,⁸ who found Internet information useful for understanding their own (in Glasgow) or their children's (in Texas) conditions.

Parents identified two limitations related to Internet use for purposes of managing their children's asthma: the non-availability of information in Arabic (57%) and

Table 5. Predictors of Internet use for asthma information and management (multivariate analysis).

Study Variable	Adjusted OR (95% CI)
Educational status of father (more education)	3.04 (1.25, 7.4)
Educational status of mother (more education)	7.02 (3.3, 14.8)
Occupation of mother (non-health related)	2.6 (1.9, 3.31)

the highly technical nature of the information, which is not easily understandable by the lay person (25%). In fact, most international societies, including the American Thoracic Society, American College of Chest Physicians, and the European Respiratory Society, have a wealth of information readily available in many languages, but not in Arabic. These include asthma action plans, frequently asked questions (FAQs), asthma presentations, modern management methods, among other things. However, the Saudi Thoracic Society has a

special Arabic website called “Breathe,” which presents information about asthma management but does not seem to be well disseminated. Our experience is that the site is not well known to many asthma patients or parents of asthmatic children.¹³

Parents in our sample suggested the need for availability of several online resources that would be of benefit for them as parents of asthmatic children, including asthma-information updates (38%) and being directed to specific websites on asthma (24%). Interestingly, 63% of physicians in the Detroit study⁴ indicated that they had suggested specific websites to their patients. Furthermore, a recent study¹⁴ investigated the impact of an interactive patient website designed to give asthma patients individual feedback about their condition and to suggest tailored questions for patients to ask their physician. Many patients using this website had a positive shift in their attitudes regarding interactions with their physicians, besides the fact that this usage prompted them to become more actively involved in asthma care.

When the parents in our study were asked if they had attempted to use information from the Internet to discuss their child’s condition with the treating physician, they reported that in such cases (accounting for 20% of all respondents) this was generally welcomed by the physician (83.5% of these respondents). A national US telephone survey of 3209 participants¹⁰ indicated that most people who took similar information to the physician (71%) wanted the physician’s opinion on the information rather than a specific intervention. The effect of meeting the physician armed with information was likely to be positive as long as the physician had ad-

equated communication skills and did not appear to be threatened by the patient bringing in the information. A recent review³ indicates that health professionals are responding to the more “Internet-informed” patient in one of three ways: feeling threatened by the information the patient brings and responding defensively by asserting their expert opinion, (“health professional-centered relationship”), collaborating with the patient in obtaining and analyzing information (“patient-centered relationship”) or guiding patients to reliable health-information websites (“Internet prescription”), as in the example described above.¹⁴ We believe that for parents of asthmatic children in Saudi Arabia, a mixture of the second and third scenarios, in the presence of easily accessible, user-friendly Arabic websites, would definitely strengthen communication between treating pediatricians and parents of asthmatic children. It would also improve clinical decision making and shared management, leading to better outcomes for children’s asthma management, as reported in other studies.¹⁴⁻¹⁶

The results of this study can be applied to parents of pediatric patients receiving asthma management at academic institutions and private hospital clinics, but cannot be generalized to other healthcare-delivery setups in Saudi Arabia. Further research is needed on larger, more diverse samples, including different healthcare agencies and community sectors, to yield more representative and generalizable results.

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