

Use of the Internet by Sudanese doctors and medical students

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استخدام شبكة الإنترنت من قِبل الأطباء وطلاب الطب في السودان
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الخلاصة: استُخدم في هذه الدراسة استبيان لتقصّي أنماط استخدام الإنترنت لدى 102 من أطباء المستشفيات و123 من طلبة الطب في مدينة الخرطوم، بالسودان، وذلك في كانون الثاني/يناير 2005. ولوحظ أن الأطباء يستخدمون الإنترنت بنسبة أعلى (84.3%) بالمقارنة مع الطلاب (78.9%). وكان حوالي نصف الاستشاريين (55%) يستخدمون الإنترنت يومياً، بالمقارنة مع 18.2% فقط من الأطباء المبتدئين. وقد وصف العديد من الاستشاريين والأطباء المبتدئين قدراتهم بأنها منخفضة (60% و53.1% على الترتيب). وكان ثلث الطلاب (33.3%) يستخدمون الإنترنت لأغراض شخصية فقط وليس لأغراض تعليمية. وشملت العوائق أمام زيادة استخدام الإنترنت من قِبل الأطباء: ضيق الوقت (80.2%)، وضعف المهارات (54.6%)، وعدم التوصل إلى النصوص الكاملة للمقالات المنشورة في المجالات (53.4%)، وصعوبة التحقق من جودة المعلومات (47.6%)، وارتفاع التكاليف (41.8%). وواجه الطلاب عوائق مماثلة، ولكنهم أشاروا أيضاً إلى ضعف المعرفة باللغة الإنكليزية.

ABSTRACT Patterns of use of the Internet were investigated by a questionnaire survey of 102 hospital doctors and 123 medical students in Khartoum, Sudan, in January 2005. More doctors (84.3%) had used the Internet than had students (78.9%). Half of consultants (55.0%) used the Internet daily, compared with only 18.2% of junior doctors. Many consultants and junior doctors rated their abilities as poor (60.0% and 53.1%). One-third of students (33.3%) used the Internet only for personal and not for academic purposes. Barriers to greater use of the Internet by doctors included: time constraints (80.2%), poor skills (54.6%), no access to full texts of journal articles (53.4%), difficulty in verifying the quality of information (47.6%) and high costs (41.8%). Students faced similar barriers but also listed poor knowledge of the English language.

L'usage d'Internet chez les médecins et les étudiants en médecine soudanais

RÉSUMÉ Une enquête par questionnaire menée en janvier 2005 auprès de 102 médecins hospitaliers et de 123 étudiants en médecine de Khartoum, au Soudan, avait pour objectif d'évaluer leur profil d'utilisation d'Internet. Les médecins ont été plus nombreux (84,3 %) que les étudiants (78,9 %) à utiliser Internet. La moitié des chefs de clinique [consultants] (55,0 %) utilisaient Internet quotidiennement, contre seulement 18,2 % des internes [junior doctors]. Consultants et junior doctors ont été nombreux à juger médiocre leur capacité de navigation sur Internet (respectivement 60,0 % et 53,1 %). Un tiers des étudiants (33,3 %) a avoué n'utiliser Internet qu'à des fins personnelles, et non pas pour les besoins de leurs études. Parmi les obstacles à l'extension de l'usage d'Internet par les médecins figuraient les contraintes de temps (80,2 %), leurs compétences limitées en informatique (54,6 %), la non-gratuité de l'accès à l'intégralité de nombreux articles scientifiques en ligne (53,4 %), la difficulté à vérifier la validité des informations (47,6 %) et le coût élevé (41,8 %). Les étudiants étaient confrontés aux mêmes problèmes, auxquels s'ajoutait la méconnaissance de l'anglais.

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Introduction

Since the introduction of the Internet to public use, it has radically changed the way many people work and think [1]. The medical profession is no exception. One estimate has suggested that by the year 2010, 30% of a physician's time will be spent using modern information tools [2]. The Internet can meet the increasingly complex information needs of health professionals through access to databases, online meetings and journals [3]. It can facilitate care through remote patient monitoring and e-mail with colleagues and it can improve a doctor's problem-solving abilities by presenting pertinent data and information on demand.

At the same time the Internet poses several challenges to the medical profession. Doctors are increasingly faced with identifying, evaluating and applying a large quantity of medical information of indeterminate quality [4]. Many doctors still prefer the traditional sources of information such as textbooks and paper journals, and they are slow to adopt the Internet.

For medical students, the Internet offers a great potential to meet their academic needs and to promote learning [5]. It can provide curricular support to students for whom access to a library is difficult or time-consuming. The Internet also offers a great opportunity for interactive learning and provides a fast and efficient means of accessing online journals, conferences and seminars [6].

The use of the Internet by doctors in Sudan is increasing slowly and lags substantially behind use of the printed media. Understanding the use of the Internet and barriers to its use by our doctors and medical students is an essential step to providing the evidence on which to base further actions to expand and improve its usage. The present study in Khartoum aimed to investigate the patterns of use of the Internet

among a group of Sudanese doctors and students in terms of frequency and purpose of use, services accessed and self-rating of skills of use.

Methods

The study was carried out among the doctors of the Police Central Hospital and the students of the medical school of the University of Elribat in Khartoum, Sudan, in January 2005. The hospital comprises 400 beds and all major and most minor medical specialties. It is the training centre of the medical school of University of Elribat. The University was established in 2000 and adopts a 5-year curriculum. It has a traditional library with mainly paper-based and a few electronic resources.

A self-administered questionnaire was designed to be distributed to all the doctors and students who were present in the hospital and university campus on 3 consecutive days in January 2005. The information collected from the participants included: personal and professional characteristics; ownership of a personal computer and, if so, whether the computer was connected to an Internet server; their views on the Internet as an aid to professional or academic development; whether they had received any training on computer or Internet use; where the Internet was accessed (home, office, etc.); frequency of using the Internet; purpose of using the Internet (professional or personal); and services accessed (e.g. e-mail, databases). It also covered: the problems faced with using the Internet and self-perceived abilities of using the Internet (fair, poor). A fair ability was having a general working knowledge to accurately access the required service within a suitable time. A poor ability indicated facing difficulties accessing the required service or needing the help of another person.

We also assessed how respondents evaluated the quality of information derived from the Internet. Respondents chose from a list including: checking the research methodology of the scientific material; seeking confirmation from another source; and checking the reputability of the journal or the source of the information. The qualified doctors in the survey were asked about their reaction to health information derived by patients from the Internet. Those who had never used the Internet were asked about the reasons why they did not use it or tried to learn to use it.

In order to validate the questionnaire it was pre-tested among a group of 25 doctors and 20 students, and then revised to enhance its clarity and comprehensibility. Attached to the questionnaires was a brief description of the nature and aims of the study. Consent was obtained from every participant on the understanding that their participation was voluntary, the collected data were to be used for research purposes only and that the questionnaires were anonymous.

The data were analysed using *SPSS*, version 10, using the Student *t*-test where applicable. The level of significance was $P < 0.05$.

Results

Doctors

The response rate from the doctors was 102/138 (73.9%); 52 respondents (51%) were women and 50 (49%) were men. The mean age was 38 years (range 25–58 years). Three-quarters of the respondents (76.4%) were junior doctors (house officers, residents and registrars); the rest (23.6%) were consultants in different specialties. More than half of the respondents (63, 61.7%) owned their own computers and half of them were connected to an Internet server.

A total of 86 respondents (84.3%) reported using the Internet, 20 consultants and 66 junior doctors (male: female ratio 16:4 for consultants and 27:39 for junior doctors). Of the Internet users, 53 stated that they had some training on its use and the rest had learned it by themselves or used it with a help of a colleague or a secretary. Table 1 shows the pattern of Internet use, where accessed and self-ratings of abilities of use. Consultants were more frequent users, using the Internet for both professional and personal purposes, and more of them accessed it at home, compared to the junior doctors. Both groups were similar in types of services used and in self-rating of their abilities in using the Internet.

When Internet users were asked how they evaluated the scientific information derived from the databases they mentioned the following methods: looking to the research methodology (41 responses, 47.7%); seeking a confirmation from another source (39 response, 45.3%); and checking if the article was published in a reputable journal (28 responses, 32.6%). Many of them (47, 54.7%) stated that their use of Internet had played a role in their professional development. Barriers to greater use of the Internet mentioned by doctors included: time constraints (69, 80.2%), poor skills (47, 54.7%), having no access to full texts of journal articles (46, 53.5%), difficulties in verifying the quality of the searched information (41, 47.7%) and the high cost of connection to the Internet (36, 41.9%).

Of the 102 participants, 18 (17.6%) mentioned that patients at some time had brought health-related information from the Internet to the consultations. They stated that most of the time they took this information into account and might subject it to further verification.

The 16 (15.1%) respondents who had never used the Internet mentioned the fol-

Table 1 Patterns of use of the Internet by consultants and junior doctors in Sudan in 2005

Variable	Consultants (n = 20)		Junior doctors (n = 66)		P-value
	No.	%	No.	%	
<i>Frequency of use</i>					
Daily	11	55.0	12	18.2	< 0.05
Weekly	7	35.0	17	25.8	
Rarely	2	10.0	37	56.1	
<i>Purpose of use</i>					
Personal	3	15.0	18	27.3	NS
Professional and academic	8	40.0	23	34.8	
Both	11	55.0	25	37.9	
<i>Services used</i>					
E-mail	18	90.0	58	87.9	NS
Databases	16	80.0	39	59.1	
Downloading information	13	65.0	35	53.0	
Movie, sports	9	45.0	41	62.1	
<i>Where accessed</i>					
At work	3	15.0	4	6.1	< 0.05
At home	16	80.0	10	15.2	
At cyber café	1	5.0	52	78.8	
<i>Self-rated ability</i>					
Adequate	8	40.0	31	47.0	NS
Poor	12	60.0	35	53.0	

NS = not significant.

n = total number of respondents.

lowing reasons: being too old to learn modern technology, lack of skills, not believing in its relevance to medical practice, time constraints and not having a personal computer connected to the Internet.

Students

The response rate from the students was 156/224 (69.6%); there were 70 (44.9%) males and 86 (55.1%) females. The mean age of the respondents was 22 years (range 17–24 years). A total of 61 students (39.1%) owned a personal computer at home, but only 23 of them (14.7%) were connected to an Internet server.

A high proportion of respondents (123, 78.9%) said that they had used the Internet. Table 2 highlights the patterns of Internet use. The majority of these devoted little time for Internet use, used it for both personal and academic matters (e.g. sports, movies, and games), mostly used the e-mail, accessed it at Internet cafés and rated themselves as poorly skilled in using it. Only 38 of the Internet users (30.9%) stated that they had some training (by an expert) on Internet use. The rest relied on self-training or their colleagues. Concerning the impact of the Internet on their studies, 43 respondents (35.0%) mentioned that

Table 2 Patterns of use of the Internet by 123 medical students in Sudan in 2005

Variable	No.	%
<i>Frequency of use</i>		
Rarely	36	29.3
Weekly	64	52.0
Daily	23	18.7
<i>Purpose of use</i>		
Personal	41	33.3
Academic	36	29.3
Both	46	37.4
<i>Services used</i>		
E-mail	102	82.9
Databases	68	55.3
Downloading information	57	46.3
Movie, sports, games	81	65.9
<i>Where accessed</i>		
At home	23	18.7
At cyber café	121	98.4
<i>Self-rated ability</i>		
Adequate	44	35.8
Poor	79	64.2

it substantially helped them. The barriers to better use of the Internet mentioned by students included: poor skills, high costs per hour in the Internet cafés, failure to find the required information, poor knowledge of the English language and time constraints.

Of the 33 (21.2%) who had never used the Internet, two-thirds of them were first-year students. The reasons for never-use included: lack of interest, inability to use it, unaware of its uses and lack of suitable time.

Discussion

The response rate of participants in our study is similar to other similar studies [4, 7]. Despite the relatively high proportion of Sudanese doctors who used of the Internet in 2005, they lag behind their colleagues

worldwide in their frequency and skills of using the Internet. In a survey in 1995, more than 80% of German doctors used the Internet more than 1 hour per day [8]. Some studies indicated that half of doctors report a general comfort in using the Internet in contrast to a markedly lower figure in our study [9]. A Tanzanian study indicated that 76% of the investigated doctors had no computer at home, and only 50% felt that they understood the basic terminology and concepts of computing (let alone the Internet) [10]. Our study clearly indicated that the possession of a computer connected to the Internet is not necessarily associated with efficient and frequent use of the Internet, as this depends on many factors that may not be related to the use of Internet *per se*, but rather to the use of technology in general [11].

For the medical students the response rate was comparable to similar international studies done in the last 4 years [12–15]. The percentage of students using the Internet (irrespective of frequency of use) is comparable to other studies which showed an average proportion of 80% [13, 14]. But there was a greater difference in the frequency and skills of use of the Internet. Our students tended to use the Internet infrequently. For example, in 2002 half of students in Saudi Arabia used the Internet at least 1 hour per day compared to less than one-fifth of our study sample in 2005 [16]. This might be related to the low ownership of a personal computer among our students (39.1%), which is markedly lower than other studies where, for example, more than 70% of American students in 2000 and Danish students in 2004 had their own computer [16].

In contrast to some international studies [8, 9] we found that the rate, frequency and skills of using the Internet were much higher among the consultants than the younger junior doctors. The consultants usually had

ready access to Internet at work and home, and in addition their teaching duties compel them to use the Internet more frequently. Therefore it is unwise to assume that older aged doctors (or individuals) do not use modern technologies including the Internet by virtue of their age only. In one study it was found that doctors aged 60 years and older were 4 times more likely to use the Internet than younger ones [17]. Access and ease of usage are the most important determinants of adoption of computer and Internet use and not age [18].

There are many barriers to getting the most out of Internet use. Some users feel drowned in an ocean of medical information. Thus they are confronted with too much information to scan, and too little specified information to respond to a defined question. This is further complicated by the users' lack of skills of verifying the quality of information available on the Internet (a considerable portion of it is inaccurate and misleading). Many doctors lack the knowledge of the basic technological aspects of the Internet. They, for example, confuse a database such as *PubMed* or *MedEscape* with a search engine such as *Yahoo* [3,19]. This computer "illiteracy" might limit greater use of the Internet as a source of information [20]. Finding time to use the Internet is a real problem for some doctors, especially those with multiple responsibilities, such as practice, teaching, research and administration. Such busy doctors might seek the help of a secretary or a colleague to do a certain tasks on the Internet. Some doctors are reluctant to change their working pattern, or their information-seeking behaviour (especially those preferring printed sources) [21].

The poor skills of our students in using the Internet adversely affect their getting the most out of it. The situation is similar

to Nigerian students, where 80% reported lacking the proper skills [14]. Medical students need to acquire computer and Internet skills at the beginning of their medical studies. Some studies indicated that medical students who have not acquired the skills of information technology by the 3rd year are unlikely to do so in the final hospital-based years [22]. But the real problem is the slowness and reluctance of medical educators to incorporate the skills of computer literacy into the curriculum, stating reasons such as the density of the curriculum, lack of staff, scarcity of space and lack of belief in the importance of modern information technology.

In conclusion, the main deficiencies among our sample were the skills and the computer and language literacy to get the optimum benefit from Internet services. Junior doctors and students reported difficulty in accessing the Internet due to its high cost. The availability of Internet services can be enhanced by providing funding assistance to universities and students to purchase computers and Internet facilities. For doctors, finding a suitable time to use the Internet and assuring the accuracy of the Internet information were real challenges. Understanding more about the information-seeking behaviour of doctors is crucial to encourage greater use the Internet. Doctors need adequate training in the skills of using the Internet through programmes tailored to the specific needs of the different sectors of the medical community. Doctors in rural and remote areas might suffer from the "digital divide" and sustained efforts are needed to modify their information-seeking behaviours and to achieve equity in using the Internet. Incorporation of adequate teaching of medical informatics in the curriculum is an important step to promote the interest and skills of medical students.

References

1. Glowniak J. History, structure and function of the Internet. *Seminars in nuclear medicine*, 1998, 28:135–44.
2. Duffy M. The Internet as a research and dissemination resource. *Health promotion international*, 2000, 15:349–53.
3. McConnell J. Getting more out of the worldwide web. *Lancet*, 1998, 351(Suppl. 1):3–4.
4. Rzymiski P, Wilczak M. Ocena wykorzystania internetu jako źródła informacji fachowej przez ginekologów i położników [Evaluation of professional Internet resources' use by gynaecologists and obstetricians]. *Ginekologia polska*, 2001, 72:750–4.
5. Peterson MW et al. Medical students' use of information resources: is the digital age dawning? *Academic medicine*, 2004, 79:89–92.
6. Mutairi SM. Tracing medical information over the Internet. *Saudi medical journal*, 2000, 21:421–3.
7. Nylenna M, Hjortdahl P, Aasland C. Internett-bruk blant norske leger. [The use of Internet among Norwegian physicians]. *Tidsskrift for den Norske lægeforening*, 1999, 119:4342–4.
8. Obst F. Use of Internet resources by German medical professionals. *Bulletin of the Medical Library Association*, 1998, 86:528–33.
9. Hart-Hester S, Olutade J, Arthur CR. Utilization of computer technology by family medicine community preceptors in Mississippi. *Journal of the Mississippi State Medical Association*, 2002, 43:273–6.
10. Samuel M et al. Assessing computer skills in Tanzanian medical students : an elective experience. *BMC public health*, 2004, 4:37–45.
11. Amin Z. Theory and practice in continuing medical education. *Annals of the Academy of Medicine, Singapore*, 2000, 29:498–502.
12. Ajuwon GA. Computer and internet use by the first year clinical and nursing students in a Nigerian teaching hospital. *BMC medical informatics and decision making*, 2003, 3:10–20.
13. Mansoor I. Computer skills among medical learners: a survey at King Abdul Aziz University, Jeddah. *Journal of Ayub Medical College, Abbottabad*, 2002, 14:13–5.
14. Odusanya OO, Bamgbala O. Computing and information technology skills of final year medical and dental students at the College of Medicine University of Lagos. *Nigeria medical journal*, 2002, 9:189–93.
15. Nurjahan MI et al. Utilization of information technology in medical education: a questionnaire survey of students in a Malaysian institution. *Medical journal of Malaysia*, 2002, 57(Suppl.):58–66.
16. Virtanen JI, Nieminen P. Information and communication technology among undergraduate dental students in Finland. *European journal of dental education*, 2002, 6:147–52.
17. Carney PA et al. Computer use among community-based primary care physician preceptors. *Academic medicine*, 2004, 79:580–90.
18. Clayton PD, Pulver GE, Hill LL. Physician use of computers: is age or value the predominant factor? *Proceedings of the Annual Symposium on Computer Application in Medical Care*, 1993, 4:301–5.
20. Cullen K. In search of evidence: family practitioners' use of the Internet for clinical information. *Journal of the Medical Library Association*, 2002, 90:370–9.

21. Kelly K. Electronic resources: use and user behaviour. *Bulletin of the Medical Library Association*, 1999, 87:228–30.
22. Osman LM, Muir AL. Computer skills and attitudes to computer-aided learning among medical students. *Medical education*, 1994, 28(5):381–5.

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