Use of the Internet as a Medical Resource by Rural Physicians

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Background: **Internet has become an integral tool for modern physicians, and those not ready to embrace this new technology will be missing a valuable resource. This pilot study reviews rural physicians' usage patterns of the Internet as a medical resource and examines the barriers that might preclude rural providers from using this technology.**

Methods: **We undertook a questionnaire survey of rural providers in Wyoming, Montana, and Idaho. Information was elicited about the physicians' Internet access, frequency of Internet use, the different Internet categories used, and the barriers they encountered to using the Internet. A background MEDLINE search was performed using the MeSH headings "Internet," "medical informatics," "and rural health."**

Results: **Eighty-five percent of providers had Internet access, and 75% of respondents reported using the Internet either daily or one to four times a week. E-mail was the most frequently used category. The next most frequent categories were on-line literature search, professional organizations, special interest Web sites, clinical reference Web sites, on-line journals, and patient education. Lack of time and having no computer were the most important barriers cited.**

Conclusions: **Although the findings of this survey suggest that, compared with broader physician populations, rural physicians are using the Internet with the same frequency, their scope of use might be much more limited. Barriers to using the Internet are difficult to determine, but lack of time, hardware, and a sense of need appear to be important factors. (J Am Board Fam Pract 2000;13:349–52.)**

We have become an Internet society. To explain what the Internet has done since being accessible to the public domain is extremely difficult. Its growth and depth are almost incomprehensible. An estimated 90 million people in the United States and Canada use the Internet on a regular basis, and it is estimated that by the end of the decade more homes will have computers than cable television.[1] From on-line literature searches to on-line office billing, the Internet has become an integral tool for modern physicians. Those that are not ready to embrace this new technology will be missing a valuable resource.

Accessing new medical information has always been an important but challenging process for the rural physician. To prevent professional isolation, it is essential for physicians to interact with colleagues and consultants.[2] Historically, texts, journals, and local continuing medical education programs have been primary sources of reference. More recently, teleconferences, and telephone networks have increased communications.[3] Geographic distance and busy practices remain as barriers, however.[2] Through e-mail, chat rooms, and thousands of Web sites, the Internet has opened a multitude of channels that allow rural providers to keep in touch with not only the regional medical community but also the world.

There are few published studies that have described physicians' use of the Internet. A recent search of MEDLINE and the Internet found no studies that examined Internet use by rural physicians specifically. Limited surveys were found that reported national physician use trends.[4–6] These surveys, discussed in detail below, found between 75% and 85% of physicians used the Internet on a daily or weekly basis. This pilot study reviewed rural physicians' use patterns of the Internet as a medical resource. In addition, this study examines the barriers that might preclude rural providers from using this technology. We hypothesized that rural providers were less likely than nonrural providers to use the Internet because of such barriers

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as access, time, and the lack of knowledge of what is available on-line.

Methods

A background search of MEDLINE (1966 to 1999) used the MeSH terms "Internet," "rural health," and "medical informatics." We found no articles pertaining to rural physicians' use of the Internet. An Internet search was then performed, which located a database of Internet surveys.[5,6] Again, these did not pertain to rural physicians, but contained studies of larger physician populations. We developed a questionnaire that included queries regarding basic demographic and practice data, including sex, age (categorized by decades), and specialty. Physicians were asked whether they had easy access to the Internet and the location of their computer (ie, home, office, or both). Frequency of use was divided into three categories: daily, one to four times per week, or less than once per week. These categories were arbitrarily selected because we assumed that those who chose either daily or one to four times per week were regular users. A five-point Likert scale was used to score the frequency with which regular users accessed different Internet categories: e-mail, clinical reference Web sites, on-line journals, on-line literature searches, patient education, professional organizations, and special interest Web sites. Those who either did not have Internet access or used the Internet less than once per week were considered to be low-frequency users and were questioned about barriers. They were given five options to rank: no access, no computer, no time, no need, no useful information, and too difficult. In addition, physicians were questioned whether they had ever had any training in using the Internet.

The population sampled included all family physicians, pediatricians, obstetricians, and internal medicine physicians from Wyoming, Idaho, and Montana who worked in population areas of less than 25,000. A comprehensive list of names and addresses was provided by American Medical Info.* An initial mailing was sent to all providers, followed by a second mailing 5 weeks later to nonrespondants. No telephone follow-up was undertaken. Response data were then entered into a database and sorted by the primary author. Chi-square analysis was used to compare demographic categories and frequency of use.

*American Medical Info, a division of Info USA, Dept 202, PO Box 3366, Omaha, NE 68176-0202.

Table 1. Demographic Information.

Characteristics	Number	Percent
Sex		
Male	208	83
Female	42	17
Age (years)		
30–39	37	15
40–49	114	46
50–59	70	28
>60	25	10
Specialty		
Emergency medicine	2	1
Family practice	138	55
General practice	17	7
Internal medicine	36	14
Obstetrics-gynecology	26	10
Pediatrics	23	9
Unspecified	8	3

Results

Four hundred eighty-one questionnaires were mailed, and 250 were returned for a total response rate of 57%. Forty questionnaires came back as undeliverable. No questionnaire was excluded. Incomplete questionnaires were tabulated with the information given. Demographic information is listed in Table 1. Of the responding physicians, 85% reported that they had access to the Internet. These respondents reported their computer was located at home (36%), the office (11%), or both (52%). Three reported that their computer was at another location (ie, hospital).

Seventy-five percent of respondents reported using the Internet either daily or one to four times a week. When frequency of use was compared by sex, age, or specialty, there were no significant differences among groups. There was a trend toward increased use among pediatricians (Table 2). E-mail was the most commonly used category, with 71% respondents reporting frequent or very frequent use. The next most frequently used categories were on-line literature searches, professional organizations, special interest Web sites, clinical reference Web sites, on-line journals, and patient education (Table 3).

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Table 2. Percentage of Physicians Who Used the Internet Regularly, by Specialty.

Specialty	Percent
Emergency medicine	100
Family practice	71
General practice	67
Internal medicine	72
Obstetrics-gynecology	80
Pediatrics	95
Unspecified	50
Total	75

Note: Regular use defined by respnse of daily or 1–4 times per week.

Seventy-six percent of the 89 eligible respondents ranked at least one reason for not using the Internet. Only 7% ranked all the options listed. Lack of time was clearly the most important reason, cited by 44% respondents, and 25% cited no computer as the second most important reason (Table 4). Only 19% of the eligible respondents reported having had training in using on-line resources.

Discussion

The lack of published data in this area made it difficult to formulate an initial hypothesis regarding the frequency of use in this rural provider population. One can theorize that practicing in a rural area would create more barriers to using the Internet, such as: access, time constraints, and the lack of knowledge as to what is available on-line. Conversely, practicing in a rural area might motivate the physicians to use any accessible means for

Table 3. Frequency of Use of Various Internet Medical Resources.

Internet Category	Frequent or Very Frequent	
	No. (%)	Mean*
E-mail	113 (71)	3.99
Clinical reference Web sites	25 (15)	2.37
On-line journals	21 (13)	2.29
On-line literature search	41 (25)	2.71
Patient education	20 (12)	2.31
Professional organizations	39 (24)	2.75
Special interest Web sites	28 (17)	2.40

*Mean of responses scored on Likert scale: 1 = never, 2 = infrequent, 3 = occasional, 4 = frequent, 5 = very frequent.

Table 4. Barriers to Using the Internet.

Barrier	Most Important Barrier No. (%)
No access	5 (7)
No computer	17 (25)
No need	10 (15)
No time	30 (44)
No useful information	0 (0)
Too difficult	6 (9)

information. The primary hypothesis of our study was based on the theory of increased barriers and less use. A recent survey of 10,000 physicians by the Healtheon Corporation reported that 85% of US physicians used the Internet.[6] A similar survey by PSL Consulting found that almost 75% of physicians in the United States, Canada, and the United Kingdom use the Internet on a daily or weekly basis.[5] Our survey findings suggest that rural physicians are using the Internet at a frequency similar to that used by broader physician populations.

E-mail was clearly the most commonly used Internet service. This finding has also been supported by others.[5,6] The Healtheon survey found that 63% of physicians used e-mail on a daily basis. PSL Consulting and the American Medical Association survey, however, found very high rates of access in other categories, such as medical journals (95%), and professional association Web sites (59% to 86%).[4,5] Our survey findings did not suggest that rural physicians are using these other resources to this degree. One reason might be that rural physicians are less aware of these on-line resources, but this barrier was not specifically addressed to the regular users during the survey. When asked, infrequent users cited the lack of useful resources as the least common reason for nonuse. This statistic was limited by the very few respondents.

Our results would support our initial hypothesis that such barriers as time and lack of access keep rural physicians from using the Internet. Excluding time, our findings suggest that a sense of need or a foreseen benefit might be important issues for some rural physicians. Having a computer might also be important. Interestingly, Healtheon's survey found that 49% of the physicians said time was a barrier, whereas 20% were dissatisfied with the lack of content.[6]

There were some limitations to this survey. Barriers to using the Internet were difficult to eluci-

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date. A rank order method used to score this portion of the survey proved to be prohibitive. Many participants responded to one or two choices, but few ranked all choices. In addition, by listing time as a barrier (which any busy physician will mark), the possible true barriers might not have been made clear. Sampling bias is another limitation in that relatively few providers responded, and those nonresponders could have changed the outcomes significantly. A telephone follow-up, which was not conducted, might have improved the response rate. We selected rural areas arbitrarily by populations of 25,000 or less to provide the desired sampling size. This definition could have included some larger communities with relatively easier Internet access owing to their proximity to larger metropolitan areas. Lastly, the sample accuracy was dependent on the unvalidated accuracy of data provided by the commercial database company.

Overall, the survey results give little information regarding true barriers, although this pilot study opens opportunities for future research. More information could be obtained by sampling a broader physician population, using a simpler questionnaire, and improving follow-up. It is our hope that this research not only stimulates further investigation, but also encourages rural physicians, educators, and organizations to use and develop the Internet as a major communication tool.

Conclusions

The Internet has become a useful source of information to physicians. With the increasing availability of full-text articles, the need for a medical library is fading. Our survey findings suggest that rural physicians are using the Internet with the same frequency as a broader population of physicians; however, the rural physicians' scope of use might be much more limited. Barriers to using the Internet are difficult to determine, but lack of time, hardware, and a sense of need appear to be important factors.

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