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Chapter 8

Internet Use in Physician Practice and Patient Interaction

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The Internet can be part of a technological bridge that can help both patients and physicians better manage health care processes and information (Rice & Katz, 2000) because more than half of Internet users in the United States seek health care information online. (While growth in such use is increasing worldwide, certainly there are wide disparities across and within nations and regions.) Although there has been good delineation of the types of activities for which health information seekers and physicians use the Internet, the interface of these two areas—how health information seekers and physicians bring information from the Internet to bear on one another—is less clear. Thus, this chapter looks at these relationships in greater detail, basing the analysis on a Robert Wood Johnson Foundation–sponsored survey of the topic. Much of the data from this study has already been reported by Murray, Lo, Pollack, Donelan, Catania, et al. (2003a), although neither in this framework or using these analyses.

Murray et al. (2003a) found that 85% of a national random sample of physicians report experiencing patients bringing Internet information to an office visit. If physicians felt that the quality of information the patient brings was accurate and relevant, they judged it to be beneficial. Inaccurate or irrelevant information was judged to harm health outcomes and the physician–patient relationship. The most consistent predictor of a perceived deterioration in the physician–patient relationship, the quality of health care, or in the health outcome, was physicians' feeling that pa-

tients were challenging their authority. A substantial minority of physicians (38%) believed that the patient bringing in information made the visit less time efficient, particularly if the patient wanted something inappropriate. Physicians also said that they, in part, agreed to clinically inappropriate requests of their patients based on the information from the Internet that the patients bring to them. This acquiescence may be due to fear of damaging the physician–patient relationship or because of the negative effect on time efficiency of not doing so (Murray et al., 2003a).

Our interest here is to analyze the data further, in the context of other reported research. This review is organized by research concerning use of the Internet by (a) physicians and (b) patients, and outcomes relevant to (c) physicians and (d) patients.

PHYSICIAN USE OF THE INTERNET

Physician E-Mail and Internet Searching

Physician use of the Internet is widespread; even as early as 2001, 90% of U.S. primary-care physicians and 55% of German ones had used the Internet (Risk & Dzenowagis, 2001). A 2001 Harris Interactive poll found that 59% of all U.S. physicians used the Internet daily (Harris Interactive, 2001a). Daily use varied by activity, led by searches for medical literature (42%), followed by seeking drug information (29%), patient education materials (20%), clinical trials information (19%), and continuing medical education (CME) courses (10%; Miller, Hillman, & Given, 2004). For e-mail, more than one third communicated with colleagues and more than half of those communications had to do with patient symptoms or treatment (Miller et al., 2004). A year later, 90% of doctors reported using the Internet to research clinical information, 74% to read medical journal articles, 63% to communicate with colleagues, 58% to complete continuing medical education (CME), 30% to access electronic medical records, and 25% to communicate with patients (Harris Interactive, 2003). An American Medical Association survey in late 2001 involving nearly 1,000 physicians found that 78% surfed the web, two thirds accessed the web daily, and 30% had a Web site (primarily to advertise their practice, or provide patient education; Greenspan, 2002).

Carney, Poor, Schifferdecker, Gephart, Brooks, and Nierenberg (2004) found that community-based clinical teachers and preceptors 60 years or older were four times more likely to use the Internet to assist in students' and residents' education, and at least twice as likely to use full-text Medline articles for patient care decisions than those under 60. Similarly, Houston, Sands, Nash, and Ford (2003) identified the average age of physicians who use the Internet daily for work as 49 years. So contrary to one's initial expectations, it may not be necessarily the case that the younger doctors are using the Internet most, at least in the United States. However, results from other studies disagree with this conclusion. Angelo and Citkowitz (2001) found that physicians under 55 years of age are more likely to participate in online physician discussion groups, although this is quite an old study in Internet terms because the data were collected in 1998. Miller et al. (2004) also found age inversely correlated with Internet reliance and use in practice (but with very small differences). And Potts and Wyatt (2002) found that more recently qualified doctors are more likely to see Internet information as reliable.

Non-U.S. surveys report physician age is correlated with Internet use. In Canada, younger physicians and specialists, not general practitioners, are more likely to be online; about 62% of those under age 44 report Internet access at work, compared to only 55% of those aged 55 to 64, and 42% of those 65-and-older (Martin, 2003). New Zealand family practitioners report similar results (Cullen, 2002). Regarding age, then, there is some evidence to reject the common assumption that younger doctors are more likely to use the Internet, but definitions of "older age" vary among sources. As well, over time, age effects could recede due to growing training efforts, popularization of e-health activities, and enhanced ease of use. On the other hand, there is reason to think that as new applications are created, other age gaps will emerge.

Influence of Physician Practice Characteristics

In terms of physicians' practice profile as related to patient perceptions and Internet use, very little data is available. Miller et al. (2004) reported that the strongest associations with increasing Internet use were with physician membership in group practice and the size of the practice. Some possible relationships can possibly be interpolated into some patient survey data. For instance, although there is no mention of how this health seeking is used in physician consultations, a Pew survey found that 66% of low-income California Internet users report that the Internet has improved the health information and services they receive (Fox, 2003). In contrast, 76% of higher income California Internet users report improved health services. But California may be an exception because the percentage of lower income Internet users who look for health information is equal to the percentage of higher income (84%)—this result is very atypical. Fox (2003) also introduced the intervening factor of health, as lower income Californians report being in much worse health than upper income Californians (27% of lower income respondents report excellent health vs. 48% for the higher income respondents, and 19% report a dis-

ability or chronic condition vs. 6%). So, it could be hypothesized that the poorer the practice profile, the more in need of health services the patients are, and thus the more the physician should be obtaining clinical information whether or not that information is gathered via the Internet.

Baker, Wagner, Singer, and Bundorf (2003) did not find a statistically significant relationship between living in a metropolitan area and Internet health seeking by patients. However, one study at the University of Iowa children's hospital (D'Alessandro, Kreiter, & Peterson, 2004) found that overall computer resources are used by only 17% of pediatricians to answer questions, whereas 28.6% use people resources and 44% use paper resources such as journals and textbooks. These non-urban doctors refer to paper resources more than twice as often as the Internet.

Kalsman and Acosta (2000) found that rural providers use the Internet with the same frequency as urban providers (85% of rural health providers had Internet access), and e-mail was the most frequently used Internet service (75% of respondents reported using the Internet either daily or one to four times a week). In a study of rural physicians in Australia, 84% had Internet access and 45.8% had videoconferencing access (White, Sheedy, & Lawrence, 2002). Of those with Internet access, 7.9% accessed it frequently for clinical purposes and 58.7% used it occasionally; pathology services and clinical information sheets were the higher uses reported (more than 50%). The authors concluded that rural physicians have embraced Internet technologies to a higher extent than their urban peers. This conclusion is supported by Jones and Lambros (2003), who saw at least equal Internet use and access among rural and urban physicians in Australia.

However, the findings of Angelo and Citkowitz (2001) may challenge these claims. In their study of physician online discussion groups, they concluded that urban physicians are more likely to take part. Nonetheless, as noted previously, their study was based on data collected in 1998. Moreover, it is not known to what extent various promotional efforts may be unique to the Australian context, especially given its particular geographic and infrastructural characteristics. Yet, overall it seems that rural providers are at least *as* versed in electronic communication as their urban colleagues.

Physician Referral of Patients to Web Sites

There is little information in the literature concerning physicians referring their patients to *specific* Web sites, although one source notes that a little more than half of physicians *occasionally* encourage Internet searches (Hollander & Lanier, 2001). A New Zealand study reports slightly higher results as 56% of responding physicians (67% of Internet users and 45% of non-users) recommend the Internet to their patients (although it is unclear how often; Cullen, 2002). Still, what is more interesting is the discrepancy between the low physician referral rate of specific Web sites and the high patient demand for specific referrals. All Internet users in a study of postsurgery patients felt that Internet sites developed by their own health care provider would provide greater benefit than general Internet use (Murero, D'Ancona, & Karamanoukian, 2001). Likewise, Salo, Perez, Lavery, Malankar, Borenstein, and Bernstein (2004) noted that 59% of hospital patients who use the Internet would like to have web links provided by their physician.

The benefits of physician referrals of specific Web sites are demonstrated by D'Alessandro et al. (2004). This survey had physicians write "information prescriptions" (IPs) for patients, or listings of approved and evaluated Web sites that provide specific, evidence-based information that patients can use to help manage their health problems. The intervention group used the Internet more for general and child health information, and 31% of the intervention parents used the IPs. Compared to the 69% who did not use the IPs, these patients were more likely to use the Internet for health information, to say they would use the IP again, and to recommend the IP to family or friends. Hence the literature bolsters the idea that patient demand for web-savvy doctors well exceeds the levels at which they are encountering them.

E-Mailing and Discussing Internet Information With Patients

Nearly 90% of New Zealand physicians report that at least some patients bring Internet information to their visits, though 93% of those physicians reported that fewer than 10% of their patients did so (Cullen, 2002). Five percent of American Society of Clinical Oncologists were mailed a survey about Internet health information use and evaluation, with nearly 50% responding (Helft, Hlubocky, & Daugherty, 2003). They estimated that about 30% of their patients used the Internet for cancer information, and discussing such information added about 10 minutes to each patient encounter. The oncologists indicated that this information could make patients more hopeful and knowledgeable, but also more confused and anxious, and they reported both positive and negative effects of Internet use by their patients. Only 9% of the physicians felt threatened when patients brought Internet information to discuss. A defensive reaction from physicians to patients who bring Internet information to the visit can degrade the trust and communication between the physician and the patient. Rather, physicians should be more open to acting as a fa-

cilitator for patients' seeking and acquiring online medical information (Jacob, 2002).

The British Medical Association is still hesitant about physicians' using e-mail to provide services to patients, largely due to the lack of a personal contact that helps provide diagnosis clues, providing service to patients outside a doctor's licensing location, and the lack of confidentiality. However, the American Medical Association is more supportive, providing guidelines that say e-mail "can aid the health care delivery process by allowing written follow-up instructions, test results and dissemination of educational materials for patients, as well as a means for patients to easily reach their physician on routine health matters" ("UK Doctors Still 'Out of Office' to Patients Online," 2003).

But physicians themselves may be a barrier to online health care information access by patients. One study found that 43% of physicians do not think patients are knowledgeable enough to understand much of what is in Medline (Hollander & Lanier, 2001). Aside from qualms about patient knowledge, physicians' negative attitude may also stem from overall physician dissatisfaction with the quality of web-based information (Hollander & Lanier, 2001; Murray et al., 2003a; Potts & Wyatt, 2002). Indeed, although 75% of physicians believe electronic journals will make information easier to find, 26% also believe that electronic publication will lead to lower quality publications in medical literature (Wright, Tseng, & Kolodner, 2001). Concerning nonacademic Internet sources, Potts and Wyatt (2002) found that 48% of web-using physicians reported information to be "sometimes reliable," whereas only 20% believed it to be "usually reliable," and 29% saw it as "usually unreliable." This generally negative view is echoed by a small-scale survey that found 79% of physicians caution their patients against health content on the Internet (Hollander & Lanier, 2001).

PATIENT USE OF THE INTERNET

Characteristics of Patients Who E-Mail Their Physicians or Seek Online Health Information

Socioeconomic and health variables clearly are associated with people's access of online health care information. Online health information seekers are significantly more likely to be younger and have higher incomes and education. For instance, Cotton and Gupta (2004) found that the mean age of seekers versus nonseekers was 40 versus 52 years, and that 48% of seekers report having at least a bachelor's degree versus 18% for nonseekers. Even as use of the Internet for health information seeking has

expanded, disparities along socioeconomic lines continue, and, thus, this may constitute yet another area in which a "digital divide" operates (Rice & Katz, 2003).

Patients' Perceptions of Reliability, Credibility and Usability of Online Health Information

Physicians seem to have some justification to be concerned about the reliability of online health information. Most patients who used the Internet rated the quality of that information as roughly the same as other information sources (including physicians as an information source). In an interesting juxtaposition, Diaz, Griffith, Ng, Reinert, Friedmann, and Moulton (2002) found that 60% of health seekers consider the quality of the information they found online as the same or better than that they obtain from their provider. Moreover, 62% rated the Internet quality as "excellent" or "very good," 32% "good," only 6% "fair," and none "poor." Fifty-nine percent of those using online health information did not discuss this information with their doctor. But those who did discuss this information with their doctors rated the quality of information higher. In another study, health seekers equivalently rated the quality of Internet information as good (70%) or excellent (25%), and the quality of other resources as good (66%) or excellent (28%; Peterson & Fretz, 2003). Further, Harris Interactive (2002a) reported that 82% of online health seekers consider the information is of good quality, 93% consider it is trustworthy, and 85% consider it is easy to understand. Patients decidedly rate the quality of Internet information as much higher than do physicians, and a significant 38% of Internet health seekers judge the information on their own without consulting a doctor (Harris Interactive, 2002b).

There is an additional irony of patient Internet use, which may trouble physicians. Although Internet users report overall high satisfaction with the Internet as a health resource (Williams, Nicholas, Huntington, & McLean, 2002), they also bemoan the search process as complex and unsuccessful (Gordon, Capell, & Madhok, 2002; Salo et al., 2004). Only one study by Harris Interactive (2002a) finds Americans believing that Internet health information is easy to find (72% of online health seekers). Rather, in a study of Internet health information searching involving postsurgery patients, 83% had difficulties completely understanding the information, and a third felt the retrieved information was overwhelming (Murero et al., 2001). The most common problems mentioned were: no new information, information too general, confusing interface/organization, and too much information to process (Williams et al., 2002). Yet, as Murero et al. (2001) further pointed out, 94% felt the information helped them cope with stress and anxiety about the surgery. Likewise, in

MEDLINEplus searches, the mean patient satisfaction rating was 6.1 on a scale of 1 to 10 and only 55% reported success (29% were unsuccessful); yet 74% of patients overwhelmingly indicated they would use the search engine again (Zeng, Kogan, Plovnick, Crowell, Lacroix, & Greenes, 2004). Similarly, of respondents in the Williams et al. (2002) experiment, only 30% said they found the information they were looking for (33% said maybe), 37% still said they would use the information. Again, in a U.K. study of rheumatology patients using the Internet, 83% found Internet information useful, whereas only 54% found any information not previously known (Gordon et al., 2002). So, several surveys conclude that the percentage of patients reporting they would use the retrieved information was higher than the percentage of patients reporting success in information retrieval.

Patients' Discussing Online Information With Physicians

Most Internet health seekers act independently (a mere 3% say they look up information only when told to do so by their doctor). Yet, there are contradictory reports as to how their Internet activity affects doctor–patient communication (Harris Interactive, 2002b). To begin, contrary to negative predictions, few health seekers are approaching their physicians specifically because of information they found on the Internet. Only 14% made an appointment to see their doctor as a direct result of Internet information (Harris Interactive, 2002a). Additionally, only one in five health seekers mentions information to their doctor at all (Tu & Hargraves, 2003). Diaz et al. (2002) put this in the negative, saying 59% *do not* discuss this information with their doctor. Tu and Hargraves (2003) further found that of those individuals who sought health information (Internet or otherwise) *and* saw their doctors, only 24% mentioned the information during a visit. The patient's tendency to mention information to their physicians was associated with the level of the patient's education, the number of chronic conditions, gender, race, and age. Overall, less than 40% of health seekers seem to bring up Internet information in doctors visits. Note that these reports are from the patient's viewpoint. Murray et al.'s (2003b) companion study surveyed a nationally representative sample of 3,209 patients. Nearly a third had looked for online health information in the past year, and 8% had taken that information to their physician. Nearly three quarters of those who did wanted the physician's opinion about the information. If the patients perceived that their physician had adequate communication skills, and did not appear to be challenged by the information, the patients felt that the effect was positive.

PHYSICIAN OUTCOMES

Providing Service

Many surveys report that physician Internet use significantly affects patient care decisions. Harris Interactive (2003) found that of doctors who regularly visit at least one health-related Web site, 96% report that it has had some impact on knowledge of new treatments (35% major impact, 61% minor impact), 76% note that it has had an impact on patient interaction (12% major impact, 64% minor impact) and 70% report that it has had at least a minor impact on the types of diagnoses made. Internet information brought in by patients sometimes influences treatment plans for 45.4% of physicians (Hollander & Lanier, 2001).

Similarly, the increased efficiency in physician time and operations with e-mail communication to patients is reflected in numerous articles and surveys (Mechanic, 2001). Kittler, Wald, Volk, Pizziferri, Jagannath, et al. (2004) found that in 63% of cases such communication did not increase the overall clinic workload, and generally it improved workflow and made it easier for patients to contact the practice. Half of those surveyed reported receiving between one to five e-mail requests per day for medication requests and refills, as well as for appointment requests, referral requests, and general electronic messaging. Likewise, Couchman, Forjuoh, and Rascoe (2001) demonstrated that patients would like e-mail for prescription refills, non-urgent consultations, and receiving test results. Furthermore, Sittig (2003) showed the desire of patients to go beyond administrative requests in their e-mail, as 75% of patient e-mail to physicians included requests for medication or treatment information or actions, or specific diseases or symptoms.

Physicians are generally neutral about their patients' overall experiences with Internet health material; 1% rated patients' experiences as excellent, 28% good, 62% neutral, and 9% poor (Potts & Wyatt, 2002). Yet 40% of physicians in that study reported that their patients received actual physical benefits from Internet use, whereas only 8% reported any harmful effects. Specifically, 27% did not report any benefits for their patients whereas 51% reported two or more benefits. Fifty percent did not report any problems for their patients whereas 29% reported two or more problems.

Discussions With Patients

Despite physicians' concern over web quality, and lack of confidence in their patients' ability to accurately judge and use such information, and reluctance to "prescribe" Internet searches, the literature overwhelmingly

describes the favorable impact of patient-found Internet information on doctor–patient communication (Hollander & Lanier, 2001; Kittler et al., 2004; Murray et al., 2003a). Hollander and Lanier (2001) found that 69% of physicians believe that patients who secure information independently communicate better with health care providers, and 40% note that they are more compliant. In another study, 30% of online health seekers report that health information from the Internet had a major impact on discussions with their doctor (Harris Interactive, 2002a). In an Australian survey, 60% of patients said that Internet information led to more discussions with physicians, whereas only 1% reported it led to less; 34% felt that Internet information improved their relationship with their physician, and only 3% felt it worsened their relationship (Brotherton, Clarke, & Quine, 2002).

Not all studies report physician discussion about or use of patient-provided online information, however. In one survey, 51.5% of health professionals say they do not have the time to answer Internet-generated patient questions (Hollander & Lanier, 2001). And Cullen (2002) found that although 70% of New Zealand physicians say they take the information into account, only 38% of physician Internet users and 32% of non-Internet users indicated that they would actually read the information and discuss it at the patient's next visit.

There may be a slight discrepancy between the smaller figures of Internet information brought to visits (Tu & Hargraves, 2003) and the larger figures of the positive impact of Internet information in visits (Harris Interactive, 2002a, 2002b). But, this is not surprising, as physicians tend to underestimate the amount of Internet health seeking done by their patients. For example, in a U.K. survey, physicians report that only 1% to 2% of their patients had used the Internet for health information in the last month (Potts & Wyatt, 2002). What is, perhaps, likely is that patients are engaging in Internet health seeking and self-education without specifically stating such to their physicians.

PATIENT OUTCOMES

Use of Online Health Information

In 2001, a third of American health seekers said that Internet health information had a major impact on how they understood their health problems (Harris Interactive, 2002b). Among those without listed chronic conditions, 67% said that use of the Internet improved their understanding of health care issues (Baker et al., 2003). And one Australian study of oncology patients found that Internet information allowed 46%

of the respondents to better cope with their illness, versus only 1% saying it hurt their ability to cope (Brotherton et al., 2002). Online communication between physicians and patients demonstrates additional positive benefits for patient care. It seems to enhance health care in nearly three out of four; 63% of doctors who communicate online with patients note a minor impact on delivering better care, and an additional 10% note a major impact (Harris Interactive, 2003). Likewise, 48% of staff members in surveyed clinics (using a patient–physician e-mail program) believed that it improved the quality of care for the patient (Kittler et al., 2004). Seen from the doctors' point of view, online communication is having a sizable impact on patient satisfaction; 67% of doctors who see an impact consider it to be minor impact, and 19% see it as major (Harris Interactive, 2003).

A study by the Boston Consulting Group found that those who used the web for health-related purposes more frequently were two to three times more likely to take action that affected their own diagnosis and treatment, such as asking their physicians more detailed questions, suggesting a diagnosis to their physicians, and requesting specific treatments (Pastore, 2001). A survey of more than 12,000 online consumers by Gomez Advisors (Pastore, 2000a) reported that 77% had searched for online health information, and that desired features of health sites included being able to e-mail their own doctor, obtain lab results online, and manage health insurance eligibility and reimbursements.

Fostering Physician–Patient Discussion in General and About Web Sites

Americans are optimistic about the effect of Internet on the doctor–patient relationship: 40% think it will improve it whereas only 5% think it harms it (Harris Interactive, 2002a). Relationships between health practitioners and patients appear to be improved by e-mail communication, by increasing rapport and keeping communication lines open (Bysinger, 1997; Patt, Houstan, Jenckes, Sands, & Ford, 2003). Liederman and Morefield (2003) surveyed the staff and patients of a primary care clinic in California, who had a patient–practitioner web-messaging system made available to them. Of the patients who used the system and replied to the survey, 75% felt it improved access to their health care provider and 85% were satisfied with the system. However, this satisfaction was significantly associated with promptness of reply, with 83% patients expecting a reply to their e-mail within 48 hours. Health care providers were also generally satisfied with the system and preferred it to the telephone for non-urgent queries, although face-to-face contact was preferred for medical examinations and urgent illness.

If doctors are not confident in patients' ability to accurately use the Internet to look up health information, then talking over the information with the patients (to correct any misunderstandings) should result in increased approval for patient Internet health seeking as it affects their health care. This view is echoed from the patient's perspective. Diaz et al. (2002) discovered that respondents who shared Internet information with their providers rated its quality higher than those who did not (although this finding might also be a function of the quality of the information in the first place). From the physician's perspective, as well, 93% say they want their patients to discuss Internet information with them, and 62% even say it is a good idea for the physicians to explore the Internet in order to familiarize themselves with the information patients find (Hollander & Lanier, 2001). Interaction between physicians and their patients about Internet health sites is associated with greater site credibility. According to a LaurusHealth.com survey (Pastore, 2000b), the most credible health Web sites are those recommended by users' physicians (67%) or a local hospital (56%), whereas the least credible are those sponsored by a company that sells products or surveys on that site (9%); even those recommended by friends were not very credible (32%).

Effects on Physician–Patient Relationship

Concerns about Internet health information leading patients to challenge physicians appear to have little foundation. The research literature overwhelmingly indicates that the increase in patient health-seeking behavior does not necessarily lead to patients desiring to replace or challenge their physician. Neither does it appear that Internet health information will replace reliance on physicians. Only 11% of health seekers use the Internet instead of speaking with their physician (Diaz et al., 2002). Nearly a third (31%) of U.K. rheumatology patients using the Internet report that Internet information searches are easier than asking questions of their physician (Gordon et al., 2002). Yet generally speaking, Internet information does not appear to decrease doctor's visits. A survey of nearly 5,000 households in early 2002 (Baker et al., 2003) found that about 40% of those with Internet access had sought online health information, and 6% used e-mail to contact a physician or health care professional. Very few reported any effect on measurable health care use, physician visits, or telephone contacts with physicians, though about a third indicated that their use affected a decision about health or their health care, and 5% reported ordering prescriptions or pharmaceutical products online. However, the Boston Consulting Group found that those who used the web for health-related purposes more frequently, were two to three times more likely to take action that affected their own diagnosis and

treatment (Pastore, 2001). This proactive behavior includes asking their physicians more detailed questions, suggesting a diagnosis to their physicians, and requesting specific treatments.

Clearly, patients still rely on their physicians to a large degree (Brotherton et al., 2002). 60% of independent health seekers only rely on Internet information when their doctors tell them to (Harris Interactive, 2002b). Likewise, of American adults who discussed Internet information with their doctor, only 14% asked the doctor for prescription medication and only 9% started an alternative treatment (Harris Interactive, 2002a). In another survey, 41% of Internet health seekers use the Internet only as a second opinion (Diaz et al., 2002). Although Sciamanna, Clark, Diaz, and Newton (2003) discovered that non-Internet users consider the Internet as a substitute for insufficient doctor communication, when they do have access, participants found the Internet less useful than expected and treated it more as a second opinion/source. Patients would much rather discuss Internet information with their doctors than use it to replace them, and those patients who do discuss information with their doctors are more positive about its quality and health benefits.

METHODOLOGY

A random sample of 2,000 physicians providing at least 20 hours a week of direct patient care, stratified by medical specialty, was selected from the Medical Marketing Service, Inc.'s national list of physicians, derived from the American Medical Association's database of more than 650,000 physicians.

The survey (Murray et al., 2003a) was developed through literature reviews, focus-group discussions, and pilot administration. It included three parts. The first asked general questions about views toward online health information as well as direct-to-consumer advertising (DTCA). The second section included either specific questions about the last time a patient brought Internet health information to an appointment, or specific questions about the last time a patient brought in DTCA information. The third section asked demographic, patient, practice and workload questions, which were later extended with specialty, year of graduation, region, office or hospital based, and training. Each version of the survey was sent to a random half of the sample.

The questionnaire was mailed in the United States in November of 2000, with a $35 check as incentive, followed up with three mailed reminders and a telephone call. Of the original 2,000 physicians sent the survey, 38 were ineligible because they were deceased, retired, or no

longer in practice; and 1,050 physicians completed the questionnaire (response rate 53%). This study reports on the 515 physicians who had received the survey version with Internet questions in the second section. As the sample very closely reflected the characteristics of the physicians in the Medical Marketing Service database, data were not weighted for the present study. For more detail, see Harris Interactive (2001b) and Murray et al. (2003a).

ANALYSIS FRAMEWORK

Some of the measures reported by Murray et al. (2003a) are reconceptualized and in some cases recomputed for parsimony and improved reliability. The measures address individual characteristics, Internet use and perceptions, and outcomes, for physicians and patients. Physician and patient characteristics can be used to explain physician and patient Internet use, and those in turn can be used to explain physician and patient outcomes. Table 8.1 provides the descriptive statistics for the variables and scales used in the analyses, organized by the six concepts. Table 8.2 summarizes the final multiple regressions for usage and outcomes, also organized by the six concepts.

RESULTS

Descriptive Results

Physician E-Health Outlook and Practice Characteristics. Respondents were slightly positive about the recent increase in health information available to the public, felt that health-related information available to the public from ads, articles, Web sites and family/friends is somewhat accurate, slightly agreed that a range of negative effects are associated with health-related information on the Internet, and sometimes encourage their patients to look for information about their own medical conditions or treatments.

Concerning their practice, about half earned at least $250,000 per year, three quarters engage in joint decision making with their patients, nearly all work out of their office, and three quarters were male. The physicians saw, on average, 84 patients per week (spending 30 minutes with each), and devoted about 12 hours per week to other tasks relating to patient care and 5.9 hours on practice finances. Almost a quarter of

TABLE 8.1
Descriptive Statistics for Measures and Scales (With Reliabilities) Used in Analyses

Physician Characteristics		*Min*	*Max*	*Mean*	*S.D.*	*N*
increase health inf good/bad? 1vgood 5vbad		1	5	2.30	.91	1041
accuracy ads arts webs friends/family? 1VA 4NotAtAll; α = .55		1	4	2.44	.39	1047
mean 9 items health info effects 1SA 4SD high = worse; α = .68		1	4	2.24	.42	1029
encourage patients look for inf? 1often 4never		1	4	1.96	.82	1047
age		28	90	49.23	11.05	998
role play in Pt's decisions?	Physician 15.1%	Pt and family together 11.6%				1040
	Together 73.3%					
% Pts talked internet?	81–100% 61–80%	41–60% 7.6%	21–40% 30.8%	1–20% 59.1%		861
	.2% 2.3%					
1999 income med practice	< $100K 18.7%	–$150K 31.1%	–$200K 20.4%	–$250K 13.2%	> $250K 16.7%	957
office or hospital based?	Office 89.2%	Hospital 10.8%				1050
gender	Male 78.4%	Female 10.8%				1036

Patient Characteristics	*Min*	*Max*	*Mean*	*S.D.*	*N*
enough time spend w/patients? 1often 4never	1	4	1.65	.72	1044
how many patients see typical wk?	1	300	83.75	46.42	1018
min./patient typical week	3	300	30.62	23.69	1001
hours per week with Patients?	1	148	33.48	15.84	1016
hours/week related to other tasks related to care?	0	90	12.16	9.72	985
hours per week on finances?	0	55	5.90	5.69	954
mean medicaid minority < $20K; α = .75	0	100	23.37	18.83	994

(Continued)

TABLE 8.1
(Continued)

Physician Internet Use	*Min*	*Max*	*Mean*	*S.D.*	*N*
use Internet for practice? 1Y 2N	1	2	1.39	.49	1043
use Internet for clinical information? 1Often 4Never	1	4	3.12	1.1	636
communicate with patients by e-mail? 1Often 4Never	1	4	3.45	.84	637
refer patients to Web sites? 1Often 4Never	1	4	2.88	.86	866
Patient Internet Use					
how relevant to patient was inf? 1Vrel 4NotRel	1	4	2.02	.65	408
accuracy of inf patient talked about? 1VAcc 4NotAcc	1	4	2.20	.59	407
reliability of inf on net? 1VConc 4NotConc	1	4	1.83	.67	865
patients assess inf reliable? 1Exc 5Poor	1	5	4.15	.76	866
patient brings printed material? 1Y 2N	1	2	1.51	.50	393
% Pts talked internet? 81–100% 61–80% 41–60% 21–40% 1–20%					861
.2% 2.3% 7.6% 30.8% 59.1%					
Physician Outcomes	*Min*	*Max*	*Mean*	*S.D.*	*N*
do what the patient wanted? 1Y 2Part 3N	1	3	1.92	.39	409
mean relation timeeff quality health (high = worse); α = .74 1help 2nodiff 3hurt	1	3	1.92	.39	409
Patient Outcomes					
mean 4 items 1HelpLot 3NoDiff 5HurtLot; α = .77	1	5	2.31	.50	867
mean challenge, not appropriate 1Y 2N; α = .55	1	2	1.76	.35	409

Note. "α =" is Cronbach's alpha.

TABLE 8.2
Summary Results From Multiple Regressions Explaining Physician and Patient Usage, and Physician and Patient Outcomes

Explaining Physician Usage		*Explaining Physician Outcomes*	
1. Use for purposes related to practice		*11. Most recent occasion patient talked about info saw on Internet they thought relevant to their own health—did what patient wanted?*	
Encourage patients look for info	.16 ***	Use to e-mail patients	.12 *
Evaluation of public health info	.11 ***	Accuracy online info patient talked about	.31 ***
Adj R^2 = .04, F = 21.3 ***, N = 877.		Adj R^2 = .11, F = 17.5 ***, N = 262	
2. Use to obtain clinical information		*12. As result of patient bringing this info, mean of: relationship changed; time efficiency; quality of care; health outcomes*	
Evaluation of public health info	.10 **	Use to e-mail patients	.16 **
Enough time to spend w/patients	.10 *	Often refer patients specific Web sites or other online resources for health-related info	.13 *
Adj R^2 = .02, F = 5.3 *, N = 627		Accuracy online info patient talked about	.18 **
		Relevance info to disease or condition	.22 ***
		Concerned reliability of online health info your patients access	−.16 **
		Adj R^2 = .23, F = 16.9 ***, N = 268	
3. Use to e-mail patients			
Hours/week on practice finances	−.16 ***		
Accuracy public health-related info	.11 **		
Encourage patients look for info	.11 **		
Effects of public health-related info	.09 *		
Adj R^2 = .06, F = 10.8 ***, N = 585			
4. Often refer patients specific Web sites or other online resources for health-related info			
Encourage patients look for info	.42 ***		
Patient type	.09 **		
Effects of public health-related info	.08 *		
Adj R^2 = .20, F = 63.9 ***, N = 743			

(Continued)

TABLE 8.2
(Continued)

Explaining Patient Usage		*Explaining Patient Outcomes*	
5. % patients talked with physician Internet info		*13. Mean of how your patients' access to online health information hurt: comm with physician, confident they are making own health decisions, take care of their own health, understand their health*	
Encourage patients look for info	.24 ***	Use to e-mail patients	.14 **
Number patients seen/week	.08 *	Often refer patients specific Web sites or other online resources for health-related info	.15 **
Adj R^2 = .06, F = 22.8 ***, N = 683		Accuracy online info patient talked about	.18 **
		How good patients assessing health Web site	.20 ***
		Relevance info to disease or condition	.17 **
		Adj R^2 = .24, F = 18.0 ***, N = 286	
6. Relevance info to disease or condition		*14. Mean feeling patient was challenging physician authority, wanted physician to do something was not appropriate*	
Effects of public health-related info	.26 ***	Accuracy online info patient talked about	−.24 ***
Accuracy public health-related info	.19 ***	How good patients assessing Web site	−.14 **
Hours/week related to care	−.12 *	Relevance info to disease or condition	−.12 *
Adj R^2 = .16, F = 20.7 ***, N = 310		Adj R^2 = .15, F = 23.2 ***, N = 405	
7. Accuracy of online info patient talked about			
Effects of public health-related info	.31 ***		
Evaluation of public health info	.16 **		
Accuracy public health-related info	.15 **		
Adj R^2 = .24, F = 33.6 ***, N = 311			
8. Concerned reliability of online health info your patients access			
Effects of public health-related info	−.25 ***		
Evaluation of public health info	−.14 ***		
Gender	.07 *		
Encourage patients look for info	.08 *		
Adj R^2 = .11, F = 21.7 ***, M = 686			
9. How good patients assessing health Web site			
Effects of public health-related info	.20 ***		
Accuracy public health-related info	.22 ***		
Encourage patients look for info	.09 **		
Enough time to spend w/patients	.08 *		
Evaluation of public health info	.08 *		
Adj R^2 = .17, F = 28.8 ***, N = 688			
10. Brought printed material			
Practice income	−.14 **		
Hours/week on practice finances	−.15 **		
Adj R^2 = .04, F = 7.0 ***, N = 299			

Note. Both physician and patient measures are from the physician's perspective. All results are final summary regressions using two blocks of explanatory variables, with variables entered stepwise within blocks. For usage, the blocks are Physician Characteristics and Patient Characteristics. For outcomes, the blocks are Physician Usage and Patient Usage. Values are standardized beta coefficients. None of the variables in each dependent set was intercorrelated more than r = .3, except *Accuracy of online info patient talked about* was correlated with *Relevance info to disease or condition* r = .45 *** and with *How good patients assessing health Web site* r = .33 ***. No simple dimensional or reliable scales were derivable from the six patient use variables, so each use variable was run in a separate regression. However, there is some shared variance across some of the dependent variables, so significance levels are somewhat overestimated.

their patients were on Medicaid, members of minority groups, or had incomes less than $20,000.

Physicians' Use of the Internet. Concerning physicians' use of the Internet, 61% had used the Internet for some aspect of their practice, rarely to obtain clinical information, rarely to communicate by e-mail with their patients, and hardly ever referred their patients to specific Web sites or other online resources for health-related information.

Patients' Use of the Internet. Eighty-four percent of the physicians reported that, in the prior 12 months, their patients had talked to them in person about information they thought was relevant to their own health that they had seen on the Internet. However, this does not represent large percentages of patients; nearly 60% indicated that 20% or less of their patients had done so, about a third indicated that between 21% and 40% had done so, and less than 10% indicated that more than 40% of their patients had done so. The physicians felt that the information was somewhat relevant, but the accuracy of the information that the patient talked about was less than somewhat accurate. They were fairly concerned about the reliability of the online health information that their patients accessed, especially as they felt that their patients were not good at assessing the reliability of online health information. About half of the time, patients brought some printed information from the Internet with them.

Physician Outcomes: How Did the Physicians Feel This Affected Their Own Practice? In general, the physicians did, in part but not completely, what the patient had requested. They felt that bringing the information to the visit neither helped nor hurt (using the mean of relationship with patient, time-efficiency of visit, quality of care, ultimate health outcomes).

Patient Outcomes: And How Did They Feel This Affected Their Patients? Overall (considering how well they communicate with the physician, how confident they are in making their own health decisions, how well they take care of their own health, and how much they understand their health conditions and treatments), they felt that their patients' access to online health information helped a little. Three quarters of the physicians did not feel that the patients were challenging their authority or wanting them to do something inappropriate by bringing health information from the Internet to the visit.

Summary Multiple Regression Results

Influences on Physicians' Use of the Internet. Table 8.2 shows that (1) physicians were more likely to use the Internet for practice-related purposes if they also encouraged their patients to look for online information about their own medical conditions or treatments, and if they more positively evaluated the recent increase in Internet health information available to the public. In particular, they (2) used the Internet to obtain clinical information if they had a more positive evaluation of public health information (ads, articles, Web sites, friends/family), and had enough time to spend with their patients; and (3) used it to communicate by e-mail with their patients if they spent less time on their practice finances, more positively evaluated public health information, encouraged their patients to look for information, and more positively assessed the effects of Internet health-related information. They were also more likely to (4) refer their patients to specific Web sites or other online health information if they generally encouraged their patients to seek out more medical information, had wealthier patients, and more positively assessed the effects of Internet health information.

Influences on Patients' Use of the Internet. Physicians (5) reported that a greater percent of their patients talked with them about Internet information if they encouraged them to look for medical information in general, and if they saw fewer patients per week. Physicians were then asked several assessments of this information they talked about. They were (6) more likely to assess this information as relevant to the patient's disease or condition if they had more positive assessments of the effects of Internet health information, felt that public health information was more accurate, and spent fewer hours per week on patient-related care. The information was (7) seen as more accurate if the physician had more positive assessments of the effects of Internet health information, more positively evaluated the recent increase in public health information, and felt public health information was more accurate. They were (8) more concerned about the reliability of the online health information that their patients accessed if they had more positive assessments of the effects of Internet health information, more positively evaluated the recent increase in public health information, were male, and encouraged patients to look for medical information. They were (9) more likely to feel their patients were good at assessing health Web sites if they had more positive assessments of the effects of Internet health information, felt public health information was more accurate, encouraged their patients to look for medical information, had enough time to spend with their patients, and had

more positive evaluations of general public health information. Finally (10), their patients were more likely to bring printed material from the Internet to their visit if the physician's practice income was lower, and the physician spent less time on practice finances.

Influences on Physician Outcomes: How Did the Physicians Feel This Affected Their Own Practice? Physicians were (11) more likely to do what the patient wanted in the most recent occasion when a patient talked about information they saw on the Internet if they also used e-mail more frequently to communicate with their patients, and had more positive evaluations of the accuracy of the online information the patient talked about. They were (12) more likely to feel that, as a result of their patient bringing this information, improvements in their relationships with the patient, their time efficiency, the quality of care, and the patient's health outcomes, all improved, if they used e-mail more frequently to communicate with their patients, referred their patients more frequently to specific Web sites or other online resources for health information, felt the online information the patient talked about was more accurate and was more relevant to their disease or condition, and were more concerned about the reliability of the online health information their patients accessed.

Influences on Patient Outcomes: And How Did They Feel This Affected Their Patients? Physicians were (13) more likely to feel that patients' access to online health information helped their communication with the physician, and improved their confidence in making their own health decisions, taking care of their own health, and understanding their health, if the physicians used e-mail more frequently to communicate with patients, more frequently referred patients to health Web sites or online resources, and felt the accuracy of the online information was better, their patients were better able to assess the health Web sites, and the information was relevant to the patients' disease or condition. They were (14) more likely to feel that patients were not challenging physician authority, or wanting the physician to do something that was not appropriate, if they felt that the accuracy of the online information was better, their patients were better able to assess the health Web sites, and the information was relevant to the patients' disease or condition.

Figure 8.1 summarizes these relationships, showing both the unique and common influences across physician and patient Internet use and outcomes. The strongest influences on usage overall are physicians' perceptions of the evaluation, accuracy, and effects of publicly available health information and encouraging their patients to look for their own medical and health information. The strongest influences on outcomes

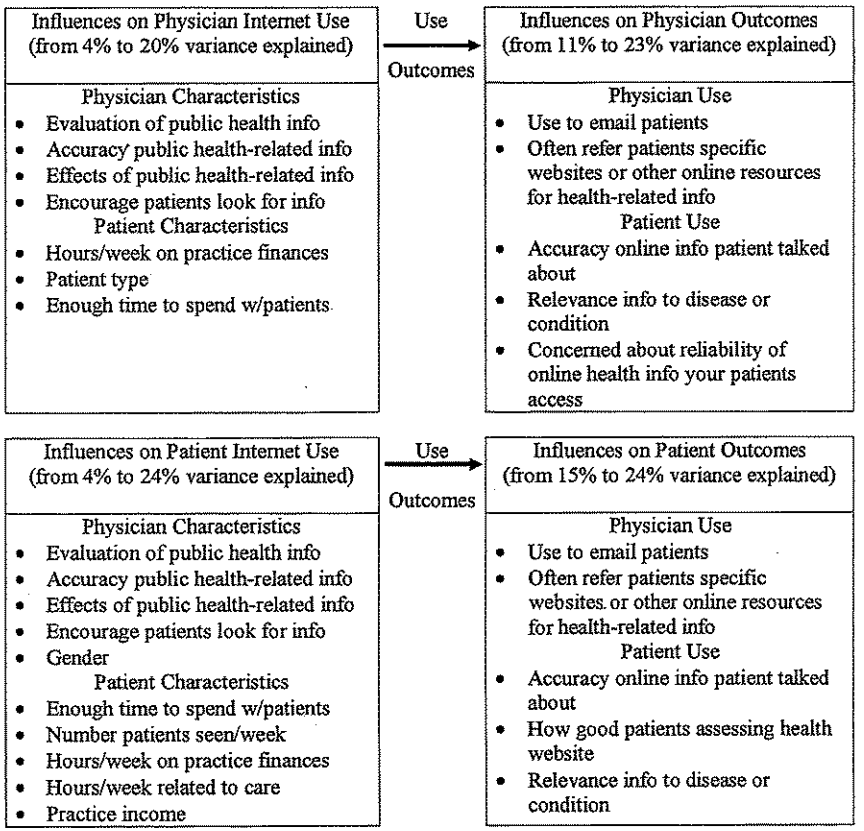

FIG. 8.1. Summary of influences of physician and patient characteristics on physician and patient use, and of physician and patient use on physician and patient outcomes.

overall are physicians' use of e-mail to communicate with their patients, their evaluations of the accuracy and relevance of the online health information their patients talk about, and how good their patients are at assessing health Web sites.

CONCLUSION

Analysis of survey responses lends further evidence of the positive side of the Internet in terms of information and self-empowerment. At the same time, they reveal little evidence of negative effects in precisely one of those

areas that had elicited concern, namely how it would affect the quality of physician delivery of health care.

Views of the Internet among physicians tend to cohere around a dimension of sentiment towards digital resources. Those who like the Internet and e-mail, for instance, also are more positive about their patients' use of them. This is not unexpected, perhaps, but needs highlighting to remind the reader of the limitations of an area-by-area or service-by-service approach to the analysis of the diffusion of new services.

Although many of the physician-based conclusions reached from our analysis of the Robert Wood Johnson survey data support prior research findings, there are conflicts in need of further study. More investigation needs to be done about exactly *how* patients represent Internet health information in doctors' visits, the effect of time constraints on referring patients to health sites and discussing Internet information during appointments, and the somewhat ironic relationship between physicians' reporting somewhat positive benefits from their patients' using Internet information and their skepticism about the accuracy, relevance, and reliability of their patients' Internet information.

Another result worthy of further investigation is the surprising inverse relationship between positive views of Internet health care information accuracy and the number of hours per week devoted to patient care. One possible explanation is that those physicians who have positive views of Internet information accuracy are engaging in wishful thinking in that they would want their patients to be more positive in their outlook. It may also suggest that anticipatory efficiencies exist in terms of exploiting the Internet as a better source of information for patient health care.

The most significant questions about physician views of patient use of Internet information can only be answered by comparative research. A study that combined both patients' and physicians' behaviors and attitudes in controlled situations would allow a combined and comparative analysis of doctors' views on patient Internet health seeking with patients' views on their own health seeking.

Although physicians remain skeptical of the merits of Internet health information, it appears that the Internet does indeed have the ability to contribute positively to the patient–physician relationship. This remains an underdeveloped resource, however, as barriers of communication and constraints of time remain. Technological and service innovations could help create an environment that would enhance patients' ability to care for their health, and physicians' ability to play a more effective role in the process. This might be accomplished, for example, by creating a virtual space for discussion and mutual decision making. Some of the financial pressures on the health care system in the United States, where most patients pay at least part of their health bills and some pay all, might be alleviated while also empowering both physicians and patients.

At the same time, it is intriguing to put health care communication in perspective with the way in which increasing bandwidth and computing power has been applied to animate and enrich home entertainment, mobile gaming, and portable music. Many consumers are able to effectively create their own rich and highly personalized environments, and tailor them precisely to their own situation. By contrast, it would seem that barriers to enhanced and personally tailored health care information for patients stem from financial, legal, and organizational issues, rather than from computer architecture and richness of communication. The research discussed in this chapter highlights the perceptual and content gap between highly trained experts (physicians) and lay people (patients) who use a vast information resource to address health care needs. Understanding the gap and how to close it could be an important service to increasing health care efficiency and effectiveness.

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