# The Impact of Health Information on the Internet on the Physician-Patient Relationship

## Patient Perceptions

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## ABSTRACT

**Background**  Use of the Internet for health information continues to grow rapidly, but its impact on health care is unclear. Concerns include whether patients' access to large volumes of information will improve their health; whether the variable quality of the information will have a deleterious effect; the effect on health disparities; and whether the physician-patient relationship will be improved as patients become more equal partners, or be damaged if physicians have difficulty adjusting to a new role.

**Methods**  Telephone survey of nationally representative sample of the American public, with oversample of people in poor health.

**Results**  Of the 3209 respondents, 31% had looked for health information on the Internet in the past 12 months, 16% had found health information relevant to themselves and 8% had taken information from the Internet to their physician. Looking for information on the Internet showed a strong digital divide; however, once information had been looked for, socioeconomic factors did not predict other outcomes. Most (71%) people who took information to the physician wanted the physician's opinion, rather than a specific intervention. The effect of taking information to the physician on the physician-patient relationship was likely to be positive as long as the physician had adequate communication skills, and did not appear challenged by the patient bringing in information.

**Conclusions**  For health information on the Internet to achieve its potential as a force for equity and patient well-being, actions are required to overcome the digital divide; assist the public in developing searching and appraisal skills; and ensure physicians have adequate communication skills.

## INTRODUCTION

ALTHOUGH USE of the Internet continues to grow rapidly, its impact on health care is unclear. The advantages of the Internet as a source of health information include

convenient access to a massive volume of information, ease of updating information, and the potential for interactive formats that promote understanding and retention of information. Health information on the Internet may make patients better informed, leading to better health outcomes, more appropriate use of health service resources, and a stronger physician-patient relationship.[1] However, health information on the Internet may be misleading or misinterpreted, compromising health behaviors and health outcomes, or resulting in inappropriate requests for clinical interventions.[2-3] Physicians may accede to inappropriate requests, either because refusal is time-consuming or because they fear refusal would weaken the physician-patient relationship.[4-5] Responding to inappropriate patient requests may be particularly difficult in managed care, where patients may believe that physician refusals may be motivated by the need to control costs.[6]

A second area of uncertainty is the impact of the Internet on health disparities. The Internet might reduce disparities if health information becomes available to disadvantaged groups. However, it might increase disparities if only higher socioeconomic groups are able to access health information, distinguish accurate from inaccurate information, and apply it to their personal situation.

Finally, it is unclear how health information on the Internet will affect the physician-patient relationship, the cornerstone of good medical care. Will it improve the relationship, as patients become more active partners in their own health care? Or will physicians have difficulty adjusting as they no longer have unique access to medical information?

The evidence to date on these questions is scanty. Surveys of Internet use by the public have tended to use skewed samples, such as Internet users,[7] patients with specific conditions,[8-9] or health care providers.[10] These surveys are unable to provide population-based estimates of Internet use, its relationship to socioeconomic status, and patient concerns about the accuracy of health information on the Internet.

To analyze these issues, we undertook a large, population-based survey to determine the public's use of the Internet for health information; their views about the quality and effect of the information available; ability to appraise such information; impact on the physician-patient relationship; and impact on health service utilization. Previous studies have ascertained how often patients seek health information on the Internet. Our study goes further, by determining how often patients take information from the Internet to a physician and exploring what happens when this is done.

## METHODS

### SAMPLE

The survey was carried out between March 2000 and March 2001 on a household probability sample from the 48 contiguous states. Households were selected through computerized random digit dialing generated through the Genesys Sampling System. This stratified sampling technique ensured proper representation of households in different regions of the country and in central city, suburban, and rural areas. Random-digit selection also ensures sample representation of persons in households with "unlisted" telephone numbers. To ensure a random selection of respondents at household level, participants were selected on the "most recent birthday" technique that screens for an adult, 18 years or older, living in the household, who has had the most recent birthday.

Verbal informed consent was obtained from all respondents before they began the interview. Eligibility was limited to English and Spanish speakers without cognitive or physical impairments that prevented completion of the interview. A small financial incentive was offered for completion of the interview. Where telephone numbers of nonrespondents could be matched with an address, a maximum of 2 letters were sent to encourage response. The average administration time was 20 minutes. All interviews were conducted by trained interviewers using computer-assisted telephone interviewing.

An oversample of individuals in poor health was achieved by screening a random subsample of households and including only respondents who described their health as fair or poor (rather than excellent, very good, or good); had a disability or handicap that prevented them from participating fully in school, work, housework, or other activities; or had been hospitalized within the past 12 months, for reasons other than a normal delivery.

## INTERVIEW AND DATA COLLECTION

The survey instrument was developed following literature review and focus groups and was pretested on 92 individuals. The interview was described as a survey on health issues, in particular how Americans make decisions about health care and their feelings about the health care available to them. No mention was made about the Internet in characterizing the study. The first substantive questions were about different sources of health information. Subsequent questions identified respondents who had looked for health information on the Internet in the last 12 months and explored their experience of this, their perceptions of the quality of such information, their self-rated ability to assess quality, and the use they had made of the information. The final set of questions identified respondents who had looked for health information on the Internet, found relevant information, and taken this information to their physician. These questions concerned patient expectations of taking the information to their physician, their perceptions of, and satisfaction with, the subsequent consultation, the impact on health service utilization, and the effect on the physician-patient relationship.

Demographic and socioeconomic data, including age, self-defined ethnic origin, educational achievement, household income per annum, health insurance status, and current health status were collected from all respondents. All respondents were also asked whether they had a relationship with a regular physician, whether they were in managed care, and how well they rated the overall level of care from their regular physician. All these independent variables were run against all outcome variables. For patients who brought information on the Internet to their physician, we derived an overall communication skill score by summing across 6 component ratings (on a 5-point scale: excellent, very good, good, fair, poor), including the amount of time spent discussing information, the physician's listening skills, how well they answered questions, their openness to the information, how seriously they considered the information, and the final decision or recommendation. A score of 18, corresponding to value at which the average value of the component parts was 3 (good) was used to dichotomize the scores into "high" ($\geq$18) or "low." Respondents were defined as being proactive about health care information if they stated they went out of their way to look for information on health topics of personal relevance, rather than simply reading it if they came across it, or not reading any such information.

## ANALYSIS

### Weighting

To maximize the generalizability of the results, data were weighted to adjust for unequal probability of selection (including the oversample of individuals in poor health). To adjust

for survey nonresponse, stratification weights were developed using the March 2000 Current Population Survey from the US Census Bureau as standard. The poststratification weights were based on gender within age within race, as well as education, health insurance status (insured vs uninsured), and household size. This weighting procedure results in a sample that is representative of the US population.

## Analytic Procedures

Univariate relationships between independent variables and the dependent variables (looking for health information on the Internet, effect on physician-patient relationship, and any resultant change in health care) were calculated using the $x^2$ statistic or Fisher exact test. Variables with significant univariate relationships ($P<.05$) were entered into logistic regression. As we had no a priori hypotheses, all variables with a significant univariate relationship were entered into the logistic regression, and an iterative process of forward and backward stepwise regression was undertaken to determine which variables provided the best fit for the model. The Hosmer-Lemeshow goodness-of-fit test was applied, and all results of multivariate analyses reported come from final models with adequate fit, defined as $P>.2$. As all data were weighted, the appropriate procedures to correct $P$ values and SEs were undertaken. We used the SVYTAB procedure in STATA to obtain the Rao and Scott F test $P$ values,[11] and the SVYLOGIT procedure in STATA to obtain corrected SEs for parameter estimates.

## Response Rate

A total of 3209 interviews were completed, including 489 in the oversample. This represents a completion rate of 72% for the main sample and 95% for the oversample and an adjusted overall response rate of 54%.

Response rates were maximized by making at least 15 attempts to contact each number. Where it was possible to correlate numbers with addresses, up to 2 letters were sent, explaining the purpose of the interview and encouraging response. A small incentive ($10-$50) was offered for completing the interview and was accepted by 75% of respondents.

## RESULTS

## CHARACTERISTICS OF RESPONDENTS

Both unweighted and weighted data for demographic and other characteristics of the 3209 respondents (including health status, insurance status, and satisfaction with care) are presented in Table 1. This table provides a measure of the representativeness of our sample; after the data have been weighted the sample has demographic characteristics statistically identical to those of the national population. The differences between the unweighted and weighted data are small, providing reassurance that even without weighting the obtained sample was similar to that of the US population.

| View this table:<br>[in this window]<br>[in a new window] | Table 1. Demographic and Health Characteristics of Respondents |
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Figure 1 presents the flow of respondents through the survey instrument. Because more detailed questions presuppose certain conditions, sample size diminishes. All data reported from this point on are weighted data.



Flowchart of respondents through the survey instrument.

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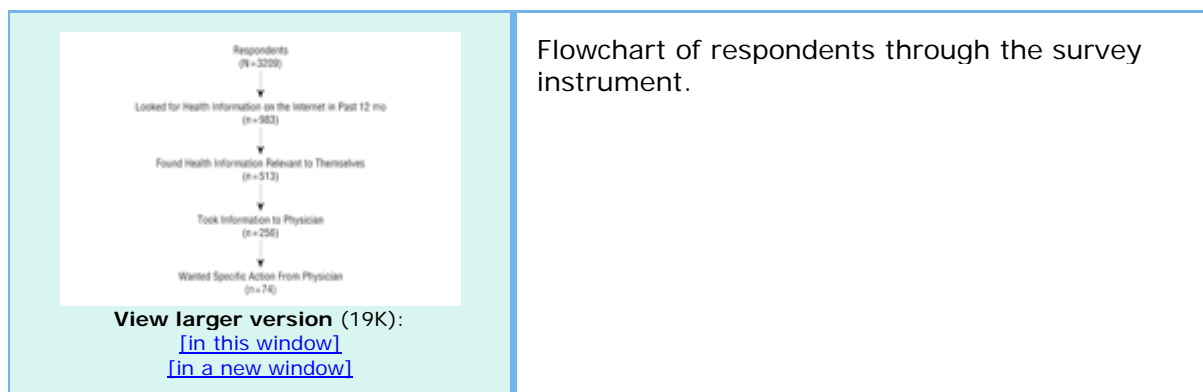
## SEEKING HEALTH INFORMATION ON THE INTERNET

Of the 3209 interviewees, 31% (95% confidence interval [CI], 29%-33%; n = 983) had looked for health information in the past 12 months. The factors that were most strongly associated with looking for information were socioeconomic. Younger, wealthier, better educated people were more likely to have looked for information (s 2), with education being the most important factor. African Americans were less likely than whites to look for information. Multivariate analysis showed that other factors independently associated with looking for information on the Internet were being in good health, having a proactive approach to health care information, and rating the quality of care from a regular physician as only fair or poor. For the sake of clarity, only factors that were significant in the univariate analysis are shown in Table 2. Several important variables were not independently associated with looking for health information, including gender, having a physician who encouraged patients to look for information, and being in managed care.

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Table 2. Factors Associated With Looking for Information on the Internet

## FINDING HEALTH INFORMATION ON THE INTERNET

Three quarters (75%; 95% CI, 71%-78%; n = 728) of the people who had looked for health information on the Internet found information relevant to their own health (53%; 95% CI, 49%-57%; n = 513), or the health of friends or relatives (57%; 95% CI, 53%-

61%; n = 557). Success in finding information relevant to the respondent's own health was associated with being proactive about health information (57% vs 49%; *P* = .03) and being in poor health (59% vs 51%; *P* = .05). Failure to find any relevant information was more prevalent in African Americans than other racial groups (39% vs 24%; *P* = .05), but no other demographic or health care factors were associated.

Most people (81%; 95% CI, 78%-84%) who had looked for information on the Internet found it easy to find information they perceived to be of high quality. However, there was widespread concern about the reliability of Internet information, with 72% (95% CI, 69%-76%) describing themselves as very or somewhat concerned about this. Only 35% (95% CI, 31%-38%) thought that they were excellent or very good at determining whether information on a Web site was reliable. Self-rated ability in appraising information was not related to educational status or any other socioeconomic or health status factors. However, respondents who viewed themselves as proactive about seeking health care information were more likely to consider themselves excellent or very good at appraising sites than those who did not go out of their way to look for health information (43% vs 28%; *P*<.001).

Respondents who had looked for health information on the Internet in the last 12 months were overwhelmingly positive about it. When asked about the effect of the information in general, 97% (95% CI, 95%-98%) believed that it gave patients more confidence to talk to a physician about their concerns, 96% (95% CI, 94%-97%) believed that it improved patients' understanding of their condition, and 85% (95% CI, 82%-88%) thought that it encouraged patients to follow their physician's advice. Ninety-three percent (95% CI, 91%-94%) reported that having access to such information challenged physicians to be more up-to-date with the latest treatments. Respondents recognized that there might be some adverse effects to the information, with 39% (95% CI, 36%-43%) agreeing that it could cause unnecessary visits to a physician, 37% (95% CI, 34%-41%) thinking that it caused patients to take up more of their physician's time, and 22% (95% CI, 19%-25%) saying that it could interfere with the physician-patient relationship.

When asked about the effect of looking for information on them personally, respondents remained very positive. Eighty-six percent (95% CI, 83%-88%) said that it had helped their understanding of their problem, 74% (95% CI, 71%-78%) said that it been beneficial to their decision-making ability, 69% (95% CI, 65%-72%) said that the information had helped them take better care of their health, and 62% (95% CI, 59%-66%) said it had improved communication with their physician. For each of these questions, fewer than 1% said that the information had been harmful; the remainder believed it had a neutral effect.

## TAKING HEALTH INFORMATION ON THE INTERNET TO THE PHYSICIAN

Of the 513 people who had found information relevant to their own health, 50% (95% CI, 45%-55%; n = 256) had taken the information to their physician. The main reasons for not taking information to the physician were that it was not important enough (42%) or that they had just wanted to be informed (11%). Relatively few people had scheduled a visit to their physician specifically (4%; 95% CI, 2%-7%) or partly (14%; 95% CI, 9%-21%) to discuss information they had found on the Internet. Rather, they had needed to see the physician anyway and used the opportunity to mention information found on the Internet.

The main factors associated with taking information to the physician were respondents' self-rated ability to critically appraise health information on the Internet and their health status. Respondents who rated themselves as excellent or very good at assessing the reliability of information on the Internet were more likely to take information than respondents who rated themselves as good, fair, or poor (61% vs 44%; *P* = .004).

People in poor health were more likely to talk to their physician about information than those in good health (62% vs 47%; $P$ = .007), as were patients whose physicians encouraged them to look for information compared with those whose physician did not encourage them to do so (58% vs 42%; $P$ = .05). No demographic or health care factors (including being in managed care) were associated, nor was the frequency with which respondents used the Internet for health information, their concern about the reliability of Internet information, or whether they found it easy or difficult to find good information on the Internet.

Of the 256 people who took information to the physician, 71% (95% CI, 64%-77%) stated they did so because they just wanted the physician's opinion about the information, rather than wanting the physician to do something specific such as order a test, change medication, or arrange a referral. Patients who were confident about their ability to critically appraise Web sites (self-rated skill excellent or very good vs good, fair, or poor) were more likely to want the physician to do something specific (39% vs 22%; $P$ = .009). Similarly, people who use the Internet frequently for finding health information were more likely to want the physician to do something specific than those who seldom use it (32% vs 14%; $P<.001$), as were people who rated their regular physician's care as fair or poor rather than good, very good, or excellent (50% vs 27.5%; $P$ = .03). Demographic and care factors appeared to have no impact on wanting something specific done.

Taking information to the physician was perceived as beneficial by the patients, with 83% (95% CI, 77%-88%) reporting that they felt more in control, and 78% (95% CI, 72%-83%) stating they felt more confident during the consultation as a result. Only 6% (95% CI, 4%-11%) of patients reported negative feelings, such as embarrassment as a result of taking information to their physician, but 15% (95% CI, 10%-21%) had felt hurried during the consultation.

Patients perceived that the physicians reacted positively in 67% (95% CI, 60%-73%) of cases, neutrally in 27% (95% CI, 21%-33%), and negatively in only 7% (95% CI, 4%-12%). However, 15% (95% CI, 10%-22%) of respondents reported that their physician had "acted challenged" when they brought the information in. Physicians of uninsured patients were much more likely to act challenged than those treating insured patients (48% vs 12%; $P$ = .02). Patients who described themselves as excellent or very good at critically appraising information on the Internet were also more likely to perceive their physician as acting challenged (21% vs 9%; $P$ = .04), as were patients who perceived the overall level of care from their physician as fair or poor rather than excellent, very good, or good (32% vs 14%; $P$ = .03). No other demographic, health care, or use of Internet factors were associated with the physician acting challenged.

Taking information on the Internet to their physician could have a positive or negative impact on the physician-patient relationship, depending on the physician's reactions and communication skills (Table 3). Thirty percent (95% CI, 23%-37%) of respondents stated that the relationship had been improved; 66% (95% CI, 59%-73%) said it had remained the same, and only 4% (95% CI, 2%-8%) said that it had worsened. If the patient felt more in control during the consultation, the relationship was likely to be improved. However, the relationship was likely to be damaged if the physician was perceived by the patient as "acting challenged," if the patient rated the communication skills of the physician as inadequate, or if the patient felt hurried during the consultation.

| View this table: | Table 3. Factors Associated With the Patient Taking Information |

| | From the Internet to the Physician Having a Negative Impact on the Physician-Patient Relationship |
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Several variables did not affect the physician-patient relationship. Feelings of embarrassment or increased confidence had no impact. Twenty-six percent of the people who asked their physician for a test, change in medication, or referral did not get any of these interventions. This did not appear to have an impact on the physician-patient relationship, as these people were no more likely than people who got what they requested to consider that the relationship had deteriorated or improved after the visit. Demographic and health care factors were not associated with a positive or negative impact on the physician-patient relationship.

As a result of dissatisfaction with the consultation, 12% of the 256 respondents who brought information to their physician sought a second opinion from another physician, 4% changed their physician, and 1% changed their health plan. Overall, 17% (95% CI, 12%-23%) carried out at least one of these actions. Such serious dissatisfaction was strongly related to the physician's communication skills and perceived reaction to the information (Table 4). In particular, if the physician was perceived as being threatened by the patient bringing information in, 49% of patients evinced serious dissatisfaction as defined above, compared with 11% of patients whose physician was not perceived as acting challenged. Other important predictors of seeking a second opinion or changing health care provider or plan were feeling hurried during the consultation, or rating the physician's communication skills as only fair or poor. Demographic and health care factors were not associated.

| View this table:<br> | Table 4. Factors Associated With Changing Something After Visiting the Physician as a Result of Not Being Satisfied With the Physician's Response to the Patient Bringing Information From the Internet to the Visit |
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## COMMENT

This is the first large population-based survey to go beyond patients' use of the Internet for health information and examine the use patients make of the information once they have found it. These data have substantial implications regarding public access to the Internet; patients' ability to find, appraise, and use health information; and the resulting impact on health service utilization and on the physician-patient relationship.

### ACTION TO OVERCOME THE DIGITAL DIVIDE

We found lower rates of using the Internet to obtain health information in this general population sample than have been previously reported in surveys of people with Internet access. Lack of access to the Internet may be a barrier to wider use of online sources of

health information.[12] Although we found a strong digital divide in terms of access to health information on the Internet, once access has been achieved, socioeconomic status and education do not predict whether patients find relevant information or bring it to physicians. Hence, if access to the Internet can be made more equitable, disadvantaged populations may be able to reap the benefits of health information on the Internet. Other studies have found that providing Internet access can reduce disparities in health outcomes.[13]

## ASSISTANCE WITH FINDING RELEVANT INFORMATION

One quarter of respondents who looked for health information on the Internet were unable to find relevant information. Because this was not related to educational status, it is unlikely to be due to problems with spelling or literacy levels. Thus additional strategies are needed to help people locate pertinent information once they are online.

## ASSISTANCE WITH APPRAISING INFORMATION

We found widespread concern about the reliability of information on the Internet, and only one third of respondents were comfortable with their ability to appraise information. Current proposals to help patients assess online information include "kitemarking" (seals of approval) of health sites and development of trusted Web sites.[14] The large number and rapid growth of Web sites makes kitemarking infeasible,[15] while promoting the use of trusted Web sites is unlikely to be successful given that 50% of our sample did not know the site on which they found information. Other reports suggest that people do not visit specific Web sites for health information, but instead use search engines and visit the first sites listed.[16] Thus, new strategies are needed to help patients better appraise the quality of medical information they find online.

## IMPACT ON HEALTH SERVICE UTILIZATION

Our data do not support concerns that health information on the Internet currently results in many requests for inappropriate care. Moreover, most patients apparently accepted physician judgments that requested interventions were not appropriate. Being in managed care had no discernible impact on requesting interventions. However, these data suggest that health information on the Internet may have a significant impact on physician time. Although we have no objective measure of time spent during a consultation, our data show that patients who felt hurried during a consultation were also more likely to report serious dissatisfaction and a worsened physician-patient relationship. Even though only 8% of the sample took information to the physician, as Internet use becomes more prevalent and people become more confident about their ability to appraise information, more people are likely to take information to their physician and request specific interventions.

## IMPACT ON PHYSICIAN-PATIENT RELATIONSHIP

Our data suggest that patients believe health information on the Internet has more positive than negative effects on the physician-patient relationship. Patients were more likely to report a worsened physician-patient relationship if the physician was perceived to have poor communication skills or acted as if their authority had been challenged, but not when they did not receive requested interventions. Being in managed care or in disadvantaged groups was not associated with a worsened physician-patient relationship after bringing in information from the Internet. These findings are consistent with patients trusting physicians to interpret information they had obtained independently. Some physicians appear to have difficulty with this role, either lacking the necessary communication skills to discuss health information from the Internet adequately, or acting as if their professional authority is being challenged. Results from our survey of

physicians show that visits where the physician felt challenged were also associated with worsened quality of care and health outcomes (unpublished data). There is an urgent need to elucidate the cause of this feeling in order to implement preventive policies. Health care organizations, medical educators, and professional societies need to consider how to ensure that their physicians acquire the skills needed to interpret information brought in by patients, discuss the implications, and negotiate a mutually acceptable management plan in a cost-effective manner.

## METHODOLOGICAL CONSIDERATIONS

The major strength of this study lies in its population-based sampling and inclusion of an oversample of individuals in poor health who were more likely to look for health information on the Internet. Although the response rate is only moderate, the weighting corrects for unequal probabilities of selection and nonresponse at the survey level, maximizing the generalizability of the findings to the entire American population. Approximately 95% of all households in the United States have telephones, and absence of a telephone does not affect health parameters.[17] As the preamble to the interview did not specify that the topic of interest was the Internet, it is unlikely that there was systematic bias in the sample due to differential consent rates among individuals with strong views about the Internet. Other recent population-based telephone surveys have achieved similar response rates,[18] with a secular trend to declining survey response rates being noted.[19] Moreover, Biemer[20] has shown that because the total survey error consists of both overall nonresponse rate plus nonresponse to individual questions, and as the latter is much lower in telephone interviews than face-to-face interviews, "a computer-assisted telephone interviewing survey can produce data that compare well in quality to those produced by a face to face survey for many characteristics, despite a difference in response rates of more than 20 percentage points."

There are some limitations to the study, including the absence of any objective measurements to confirm patient perceptions, for example, concerning the appropriateness of requests. The relatively small number of respondents who had sequentially looked for information, found information relevant to their own health, and taken it to the physician for discussion limits the power of the study at this point. However, we were able to determine large effect sizes likely to be clinically important.

## CONCLUSIONS

The Internet has the potential to transform access to health information, thus enhancing patient satisfaction and participation in health care. However, some problems must be addressed before its true potential as a force for equity and patient well-being can be realized. First, Internet access must be improved for disadvantaged groups. Second, the public needs to improve their information search and appraisal skills. This might be achieved through a combination of government and private actions, including tutorials in these skills. Finally, physicians and trainees need to develop their communication skills to include discussions about information from the Internet brought by patients.

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## REFERENCES

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1. Kassirer JP. Patients, physicians, and the Internet. *Health Aff (Millwood).* 2000;19:115-123. ABSTRACT

2. McClung HJ, Murray RD, Heitlinger LA. The Internet as a source for current patient information. *Pediatrics.* 1998;101:E2.

3. Kiley R. Does the internet harm health? some evidence exists that the Internet does harm health. *BMJ.* 2002;324:238-239. **FREE** FULL TEXT

4. Gallagher TH, Lo B, Chesney M, Christensen K. How do physicians respond to patient's requests for costly, unindicated services? *J Gen Intern Med.* 1997;12:663-668. FULL TEXT | ISI | PUBMED

5. Bell RA, Wilkes MS, Kravitz RL. Advertisement-induced prescription drug requests: patients' anticipated reactions to a physician who refuses. *J Fam Pract.* 1999;48:446-452. ISI | PUBMED

6. Gallagher TH, St Peter RF, Chesney M, Lo B. Patients' attitudes toward cost control bonuses for managed care physicians. *Health Aff (Millwood).* 2001;20:186-192. ABSTRACT

7. Fox S, Rainie L. The online health care revolution: how the Web helps Americans take better care of themselves. Pew Internet & American Life Project: online life report. Available at: http://www.pewinternet.org. Accessed December 1, 2001.

8. Chen X, Siu LL. Impact of the media and the Internet on oncology: survey of cancer patients and oncologists in Canada. *J Clin Oncol.* 2001;19:4291-4297. **FREE** FULL TEXT

9. O'Connor JB, Johanson JF. Use of the Web for medical information by a gastroenterology clinic population. *JAMA.* 2000;284:1962-1964. **FREE** FULL TEXT

10. Diaz JA, Griffith RA, Ng JJ, Reinert SE, Friedmann PD, Moulton AW. Patients' use of the Internet for medical information. *J Gen Intern Med.* 2002;17:180-185. FULL TEXT | ISI | PUBMED

11. StataCorp. *Stata Reference Manual Release 7.* College Station, Tex: Stata Press; 2001.

12. Brodie M, Flournoy RE, Altman DE, Blendon RJ, Benson JM, Rosenbaum MD. Health information, the Internet, and the digital divide. *Health Aff (Millwood).* 2000;19:255-265. ABSTRACT

13. Gustafson DH, Hawkins R, Pingree S, et al. Effect of computer support on younger women with breast cancer. *J Gen Intern Med.* 2001;16:435-445. FULL TEXT | ISI | PUBMED

14. Eysenbach G, Diepgen TL. Towards quality management of medical information on the Internet: evaluation, labelling, and filtering of information. *BMJ.* 1998;317:1496-1500. **FREE** FULL TEXT

15. Delamothe T. Quality of websites: kitemarking the west wind. *BMJ.* 2000;321:843-844. **FREE** FULL TEXT

16. Eysenbach G, Kohler C. How do consumers search for and appraise health information on the world wide web? qualitative study using focus groups, usability tests, and in-depth interviews. *BMJ.* 2002;324:573-577. **FREE** FULL TEXT

17. Anderson JE, Nelson DE, Wilson RW. Telephone coverage and measurement of health risk indicators: data from the National Health Interview Survey. *Am J Public Health.* 1998;88:1392-1395. ABSTRACT

18. Kessler RC, Soukup J, Davis RB, et al. The use of complementary and alternative therapies to treat anxiety and depression in the United States. *Am J Psychiatry.* 2001;158:289-294. **FREE** FULL TEXT

19. Eisenberg DM, Davis RB, Ettner SL, et al. Trends in alternative medicine use in the United States, 1990-1997: results of a follow-up national survey. *JAMA.* 1998;280:1569-1575. **FREE** FULL TEXT

20. Biemer P. Nonresponse bias and measurement bias in a comparison of face to face and telephone interviewing. *J Official Stat.* 2001;17:295-320.