Patient Use of the Internet to Access Health and Medical Information

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Introduction

The nature of health care in the United States has changed drastically in the past century. Prior to 1900, very limited technology was available to treat disease. The practice of medicine was confined to a limited number of treatments and defined by a narrow scientific knowledgebase. Physicians were poorly trained in comparison to the high standards of today's practitioners, most of what doctors had to offer could be contained in a small black bag, and most of a physician's time was spent in homes rather than hospitals. Treatment outcomes depended in large part on the patient and the disease, rather than the treatment itself. *(1)* Indeed, while practitioners had limited positive influence over disease processes, the patients in their care had even less: much about the science of medicine remained undiscovered.

After 1900, technology began to develop as hospitals played a more important role in the delivery of health care and supported important research efforts. Hospitals evolved into care centers that offered special services not found elsewhere. From 1900-1940, technology in medicine made many advances; however, WWII brought with it even more massive technological growth. The country prepared for war by bringing together experts in wound treatment and started to anticipate health problems that would be caused by the impending battle. For the first time, the federal government began to direct and sponsor large research efforts that resulted in the development of antibiotics and new surgical treatments. These research efforts continued to expand, the funds for almost half of which were distributed through the National Institutes of Health (NIH). *(1)*

Hospitals evolved further, and became not only places for patient care but, more importantly, places of technological advance and research. Most major decisions in hospitals centered on medical technology and its use *(1)*, and health workers became increasingly skilled and specialized. With the advent of new information and technology, medicine became more complex and practitioners more specialized.

After World War II, patients could receive more specialized care and technologically advanced therapies: as options for both type of practitioner and type of treatment increased, patients began to take more interest in decision-making regarding health care. With the advent of managed care, patients were forced to take a more active role in their own health care by deciding on specific health plans and coverage issues.

The new abundance of technology has brought with it many issues regarding both availability and appropriate use. "Organ transplantation, gene therapies for various conditions, laser beams, and fiber optic surgical techniques are all accepted as merely the expected developments of the technological age." *(1)* One of the recent technological advances that promises to most impact patient care is not a new surgical procedure or a drug development, it is the Internet.

Pervasiveness of the Internet as a source of health information.

The penetration of the Internet into the lives of American adults has been rapid and extensive, entering homes, schools, and offices at an arguably faster rate than that of "earlier popular consumer technologies (such as television and video cassette recorders)." *(2)* According to a survey by Nielsen Media, 70.5 million (34.9 percent) of U.S. adults use the Internet. Of the 34.9 percent who use the Internet, 43 percent "are using the Internet to search for health information." *(3)* The number of Internet users continues to expand at a remarkable rate each day. According to the most recent research from the Pew Internet Project, "the number of American adults with Internet access grew from about 88 million to more than 104 million in the second half of 2000" alone. *(4)* One can imagine the number of people who use the Internet to search for health information has increased in proportion. In 1999, 81% percent of the consumers who did look for health and medical information online considered the information they found on the Internet to be useful or very useful. *(3)*

Common triggers for internet use

Keeping up with scientific developments in health care is becoming increasingly difficult for both providers and patients. The increasing technological complexity of medicine, along with

managed care's "pressures for increased productivity, and growing recognition that there is more to dealing with illness than the standard medical model, is prompting providers to share responsibility with patients. At the same time, there has been a separate but reinforcing trend toward patients and families wanting to participate in their own health care." *(5)*

As medicine is further integrated with business in the form of managed care, many patients are becoming savvy health care consumers, part by choice and part by necessity. As patients spend less time in the hospital and with their physicians than in the past, they are in fact "being forced to assume more responsibility for their care, but often not provided resources to do it." *(5)* The trend towards patients seeking health information on their own is accelerating and "may even come to replace much of traditionally delivered health care." *(6)* Indeed, patients must now evaluate health plans and doctor's advice the same way they might evaluate the choice of any other consumer product.

With an increased incentive for shared decision-making, patients need reliable sources of medical information, and more and more people are looking to the Internet for the answer. Since the inception of the Internet in the early 1990s, it has penetrated millions of homes, offices and schools. While its applications are numerous and the amount and variety of information it holds almost infinite, "much of the information on the Internet is health related, and researching health information is one of the most popular reasons for using the Internet." *(7)* Despite their large numbers, little is known about why patients use the Internet so extensively to search for health and medical information. While several theories have been put forth, we have little published research to help understand what factors actually prompt these patients to search for health information on the Internet.

Association between Internet use and the doctor-patient relationship

In the past, medical expertise has been concentrated in the minds and reference books of people who become physicians, placing several levels of medical knowledge between doctor and patient. As a result, in the past many patients have preferred to put health care decisions in the

hands of their doctors. The increased complexity of medicine and current move towards more of a shared decision-making between doctor and patient have changed the doctor-patient relationship and may be factors in driving patient Internet use. A recent article by Eng et al explained "the growth of the Internet and its ability to support people in making informed health decisions may amplify another trend, the decentralization and democratization of knowledge about medicine and health from traditional health providers to others." *(7)*

Internet use may be related to patient dissatisfaction with a relative lack of information from traditional sources, such as literature handed out at doctor visits. One study reported that "more than two-thirds of patients in the US do not receive information (in the form of literature) about their condition or their child's condition while at the physician's office and only one-third receive information about their medications." *(3)* However, little research literature exists that compares the use of the Internet as a source of medical information to other sources of information outside the doctor's office, such as newspaper articles, TV shows, and advice lines.

Patients may be turning to the Internet in response to the infiltration of managed care: "fearing that their insurers and health care providers do not have their best interests in mind, [patients] may seek independent sources of information to be sure they are being presented with all reasonable alternatives." *(6)* Judging from recent statistics on Internet use, the Internet may offer patients that information. While the US Health care is currently experiencing great change, "changes rarely include efforts to enhance consumer knowledge, skills, or power to become partners in their care." *(8)* The Internet may fill a gap in the current health care system.

Patients may also turn to the Internet not out of fear or dissatisfaction with their physician or health care system, but simply as a supplementary source of information. A recent article, aimed at physicians, explained "if your patient has breast cancer, three issues are likely foremost in her thoughts: survival, quality of life and access to information." Given this, "supplying your breast cancer patients with pertinent Web addresses that you have vetted is akin to recommending a good review article or suggesting a time-tested support group." *(9)* Thus, Internet use may

simply reflect a patient's desire to use as many sources of information as possible into her health care decisions.

Association between Internet Use and Health Status

The Internet has had varying effects on patient health behavior. A recent survey of Californians with Internet access showed that the majority (52%) felt information from their health care providers was most likely to influence their behaviors, while only 2% reported the Internet would influence their behaviors. *(10)* However, a study that examined patient use of an office-based, physician-developed Internet education system found 77% of users stated "they would change a health behavior because of information they had read on the Internet," and "92% would use the Internet center at the clinic again." *(11)* Thus, in certain contexts the Internet may be an effective way to initiate positive health behavior change. In addition, the Internet is a powerful component of Interactive Health Communications (IHC), an evolving tool in health care that "enables tailoring of information based on an individual's level of literacy, method and point of access, health status, and psychosocial variables." *(7)* One IHC program entitled CHESS: Comprehensive Health Enhancement Support System was tested in a randomized controlled trial on HIV positive patients. Among patients who were participants in the study, CHESS was found to "improve [patients'] quality of life and promote more efficient use of health care." *(8)*

While a limited number of studies have addressed the impact of the Internet on health behavior, few data exist regarding the impact of patient health status on Internet use. Evidence suggests that certain subpopulations of patients may be more inclined to use the internet to gain health information outside the doctor's office, based on disease status. Nearly half of those who search for medical information on the Internet seek information on "a specific disease condition." *(3)* Physicians see many diseases from very common to extremely rare. "One can't at first meeting, or even second, necessarily know everything about a particular disease. The family, however, may have the energy, determination, and time to research this disease and searching for this information has been made easier by the Information Superhighway." *(12)* In addition,

if specific health conditions are not well addressed by the medical profession or are sources of embarrassment for patients, they may turn to the Internet for answers before they turn to a physician.

Quality of and Patient Satisfaction with Internet Health Information

Unfortunately, the Internet is a potential source of misinformation, and people with specific health conditions may be more vulnerable than others. The Federal Trade Commission joined public health and consumer protection agencies in the US, Canada and Mexico to instigate a "Health Claim Surf Day" for the purpose of surfing the Internet "for potentially false or deceptive advertising claims concerning treatments for heart disease, cancer, AIDS, diabetes, arthritis, and multiple sclerosis." In just a few hours they found, "more than 400 World Wide Web sites and numerous Usenet newsgroups that contain promotions for packages or services purporting to help cure, treat or prevent these six diseases." Investigators also found that each of the six diseases investigated on Surf Day were subjects of "strong, unqualified claims promising 'miracle cures'" and that "people with arthritis are prime targets for unproven health claims." *(13)*

Because of its large user base, the Internet makes available false or unfounded health information to millions of people. The emotional states in which patients diagnosed with a serious may find themselves make them particularly vulnerable to false claims. For example, BioResonance Therapy (BRT) is called "the most effective new development for the natural elimination of tumors and their underlying causes yet discovered," and its promoters use the internet to spread their offer: a $9000 fee plus the cost of transportation allows a patient to participate in a research study using BRT as a treatment that claims an 80% success rate in cancer patients. In fact, the purported technology is "technical rubbish," a complicated gadget shown by medical research to be "incapable of measuring, diagnosing, or treating anything," and has been declared a "totally ineffective pseudomedical treatment." *(14)* One clinician tells of parents who declined pharmacological treatment of their son's acquired dystonia on the basis of

test results from a laboratory, found via the Internet, that identified the boy's "real" problem as selenium deficiency. *(12)*

In contrast to this, other anecdotal evidence has shown that "information that patients have gleaned from the Internet has, in general, been superior to that derived from newspaper articles." *(15)* While there is plenty of false or misleading information on the Internet, perhaps patients should be given some credit for being able to sort the quality information from the medically unsound. Perhaps "people who use the Internet are accustomed to accessing several sources of information on a particular subject and comparing the quality of information provided." *(15)* In addition, "of the consumers who use the Internet to gather health care data, 81 percent say they consider that information to be useful or very useful." *(3)*

What do patients do with medical information found on the Internet?

Little information exists on exactly what patients do with health and medical information obtained from the Internet. One editorial recognizes physicians "may pale at the patient who walks into the office with 20 pages printed from the Internet, but it is no good balking at the idea, it is here to stay." *(12)* Some physicians feel threatened by possibilities of the Internet and worry that as "[patients] become accustomed to easily accessible health education information on the Internet, [they] may also expect access to different treatments and full consultation from the physicians. Doctors may also find themselves at increased legal risk, as litigation and negligence claims are made by patients on the basis of guidelines and information obtained from Internet sources." *(16)* How many patients who use the Internet as a source of information actually share the information with their physicians?

If patients sense that their doctors are not open to information from the Internet, patients might keep the fact that they use the Internet to themselves. A study by Eisenberg et al found that patients who use alternative health care resources "often conceal alternative treatments from physicians because of fear that they will be criticized or ridiculed." *(6)* Little research has been done to determine similar practices regarding health information obtained on the Internet.

To help guide patient Internet use and aid the development of effective IHC programs that incorporate the Internet, health educators must better characterize Internet users and the factors that influence patient use of the Internet. For example, a recent survey of Californians with Internet access found that women are less likely than men to go online everyday and "when they do search the Internet for health information they are less satisfied than men with their searches." *(10)* Findings such as these can help tailor future information for patients in the most effective way possible.

Specific Aims

The specific aims of this research are:

1. Determine factors that distinguish among patients with computer and Internet access, those who use the Internet to search for health information from those who use other sources to access information.
   a. Investigate the association between Internet use and the doctor patient relationship. This will be accomplished via specific questions that ask respondents to assess aspects of the patient's relationship with their physician such as the level of trust and understanding.
   b. Investigate the association between health status/specific health conditions and Internet use.
2. Determine common triggers for patient Internet use.
   a. Determine the patterns and outcomes of patient Internet use.

From a public health standpoint, this research is likely to provide substantive new information that will help health educators and physicians design websites and other forms of interactive health communications that will be more responsive to patients' specific needs. In addition, it may be used to better counsel patients who use the Internet as a source of health and medical information by helping to understand and characterize these patients.

Methods

To complete this study, I developed an instrument to collect information about people who use the Internet to access health and medical information and those who do not. The instrument contained questions about demographic factors, health status, and the doctor-patient relationship. **(See Appendix A)** I administered the survey in Portland, OR over a 6-week period from mid-March through April of 2000.

Pilot Survey: The survey was piloted on a group of 10 students and health researchers to help establish validity and to screen for confusing and/or ambiguous questions. Participants in the pilot survey also helped to determine whether the survey flowed in a logical order and to assure the questions addressed each of the specific aims of the investigation. As a result of the pilot survey several changes were made. Many were minor changes in wording or ordering of questions. Other changes included

-Question 2 was changed from "in general, how would you rate your overall health now?" to "in general, how would you rate your overall health now compared to other people your age?"

-The first portion of question 17, "when you search the Internet for health/medical information, which method are you most likely to use?" (portal/search engine vs. go directly to a specific medical/health site)

-Questions 21, 22, and 23 (addressing whether health information received on the Internet had ever delayed or prevented treatment, or resulted in an adverse outcome) were added.

Study population

The subject pool comprised a convenience sample of patients in the waiting areas of two OHSU Satellite clinics in Portland: Sellwood-Moreland Internal Medicine patients and Gabriel Park Family Practice patients. From talking to physicians and an administrator affiliated with these clinics, I learned patients at the Sellwood-Moreland and Gabriel Park clinics were representative of a wide SES range, and generally reflective of the population in Portland and the surrounding

areas in terms of Internet use. I obtained approval for this project from the directors at each clinic, as well as the clinic staff. I approached patients in the waiting room of one of the two clinics on most weekdays over the six week time period and invited them to join the study. Subjects were eligible for the study if they were clinic patients, at least 18 years old, and literate in English for purposes of survey completion. Family members of patients who accompanied patients were not included in the study population.

Eligible subjects were screened for inclusion with two brief verbal questions:

1. "Do you have access to a computer?"
2. "Does this computer have Internet access?"

If the answer to both questions was "yes," the person was invited to participate in the study. If the answer to either of the questions was "no," the patient was excluded from the study. Subjects were not offered compensation for completion of the survey.

The survey

The survey instrument consisted of 42 single and multipart questions employing Likert-scales, "best answer," "mark all of the following that apply," and fill-in-the-blank questions. Some of the questions were original, while others were abstracted with permission from validated instruments (the SF36, a patient satisfaction survey from the Providence Health System, and a recent survey of California Internet users published on the Internet.) **REFERENCE**

Content: The survey comprised 5 sections. The introduction to each new section briefly explained the focus of that section to the participant (see sample survey).

1. **Computer access** determined where subjects' computers were located. (1 question)
2. **Health Information** examined the reason for the patient's visit, the patients' perceptions of their health status, and whether the patient had been diagnosed with specific medical conditions. (6 questions)
3. **Information seeking** studied the sources patients use to obtain health and medical information and why they chose these sources. This section contained the 13 questions that were answered only by those who use the Internet to obtain health and medical information. (17 questions total)

4. **Doctor-patient relationship** examined patients' satisfaction with their health care and their desire for shared decision-making about their health care. (9 questions)
5. **Demographics** gathered information about the patients' age, gender, ethnicity, socio-economic status, marital status, and education level. The contained no identifiers such as name, social-security number, phone number, or address. (9 questions)

The survey employed a skip pattern for those patients with access to the Internet who did not use it to search for health information. All subjects answered up to the last question in the "information seeking" section. Following this question, the survey asked whether the responder uses the Internet to access health and medical information. Those who do were instructed to answer all the questions. Those who do not use the Internet to search for medical information were instructed to skip to question 25, a question about various sources of health information, to complete the survey. Thus, participants who used the Internet to obtain health and medical information answered all 42 questions, while those with Internet access who do not use it to obtain health and medical information answered only 30 questions.

Data Management

Data were collected on paper-and-pencil survey instruments. The survey was administered prior to the doctor appointment. I distributed the survey and subjects read and completed the survey themselves. I was present if any questions regarding the survey arose during its completion. If the patient was called into the appointment prior to survey completion, he/she could take the survey into the examining room and complete it while waiting for the doctor. The clinic staff will had no role in the administration of the survey. I collected, numbered/coded and stored all surveys each day for later data entry.

Surveys were excluded from both data entry and analysis if the demographics page was not sufficiently complete to allow for meaningful analysis (a total of 5 surveys.) Data entry was checked for accuracy with double entry for 5% of the surveys. Once all 385 records were

entered into Epi Info, the data was converted into SPSS version 10.0. All further data management and analysis were conducted using SPSS version 10.0.

Data Analysis

A total of 385 patients completed surveys. Research shows that 43% of the population with Internet access uses the Internet to access health and medical information. I assumed a total clinic population of 1000. Calculations were based on a power of 0.80 and an alpha of 0.05. Based on these numbers, a population sample size of 274 was needed to detect significant differences between patients who use the Internet to search for health and medical information and those who do not. A total of 385 surveys were collected. 155/385 responders were from Sellwood-Moreland, and 230 were from Gabriel Park.

Descriptive analysis

First, I calculated frequencies for each variable. It was my intention in the study design to combine the two clinic populations into a single study group for analysis. Before doing so however, I had to determine that the populations were not significantly different from one another. To compare the demographic characteristics of the two clinic groups, I used Chi-square analysis to compare them with regard to age, gender, race/ethnicity, marital status, education level, and income. Due to small numbers of subjects who were not white, the race/ethnicity variable was dichotomized into "white/non-Hispanic," and "other." I compared the two clinic populations with regard to mean age and by age category. I collapsed the variable "education" as well. Due to small numbers, the category "completed less than high school" was combined with "completed high school" to create the new category "high school or less." College and graduate school were kept as separate categories. The two clinic populations were determined to be sufficiently similar, and were then combined into a single study population for the remainder of the analysis. (*See Table One*)

Frequencies were also used to determine patterns of patient use of resources (including the Internet and other sources such as books, television, or family) to look for health information

outside of a doctor visit. I collected a large amount of descriptive data on the patients who use the Internet to search for health and medical information. The data include information about patterns of Internet use, what factors initiate a search for information on the Internet, and most frequently visited websites. This data can be found in **Appendix** B at the end of the document.

Dependent variable

The primary dependent variable in this study was "Internet use to access health and medical information." This variable differentiated the two populations for comparison in the investigation—those who use the Internet to access health and medical information from those who do not. After completing the first portion of the survey, patients read the sentence "if you DO NOT use the Internet to search for health/medical information, skip to question #25." After data collection, the variable "internet use [for health and medical information]" was created. Respondents who skipped to question #25 were coded as "N" and those who continued with question 13 were coded as "Y." The study investigates that factors, such as patient health status and the doctor-patient relationship, that influence patient use of the Internet to access health and medical information.

Independent/Predictor variable groups

1. **Demographic variables.** This group included the variables "gender," "age in years," "education level," "annual income," "race," and "marital status." I used bivariate chi-square analysis to test the relationship between each of the variables in this group and "Internet use to look for health and medical information. I considered associations with p-values less than 0.25 for inclusion in the final model, based on Hosmer and Lemeshow's recommendation. If a variable was not dichotomous, I chose a referent category and made "dummy variables" for each level of analysis to obtain odds ratios when appropriate to examine differences among different categories within a single variable.

2. Variables related to health status. This set of questions included the variable "overall health," for which responders were asked to rate their health on a five-point scale from "excellent" to "poor." When tested against the dependent variable "Internet use to look for health and medical information," using chi-square this variable had a p-value of 0.302. (see **Table Three.**) Because of small numbers in the "fair" and "poor" categories, and because of differences I suspected between subjects who categorized themselves as having "good" to "excellent" health and subjects who categorized themselves as having "fair" to "poor" health, I dichotomized this variable. When tested against the dependent variable using chi-square analysis, the dichotomous variable had a p-value of 0.198 and was eligible for inclusion in the final model.

This part of the investigation also examined health status in terms of specific diseases. Survey question four asked responders if a physician had ever diagnosed them with any conditions from a list of 11 specific medical problems including diabetes, hypertension, depression, drug/alcohol abuse, arthritis, low back pain, cancer, chronic fatigue syndrome, fibromyalgia, any STD, and HIV/AIDS. No duration or severity of the conditions or severity was delineated: responders were asked to mark "yes" or "no" based solely whether they had been diagnosed by a doctor with the condition. Each condition was coded as a separate independent variable.

I used chi-square analysis to test which variables in this group were statistically significant predictors of the dependent variable (Internet use to look for health and medical information) on a bivariate level. I considered p-values less than 0.05 to be statistically significant. If a variable was not dichotomous, I chose a referent category and made "dummy variables" for each level of analysis to obtain odds ratios when appropriate.

Among the health status group of independent variables, five specific diagnoses were significant in the bivariate (chi-square) analysis based on my 0.25 cut-off for entry into the model. These variables were depression, diabetes, fibromyalgia, chronic fatigue syndrome, low

back pain, and drug and alcohol dependence. While depression, fibromyalgia, chronic fatigue syndrome, and drug and alcohol dependence were positively correlated with Internet use to access health and medical information, diabetes and low back pain were negatively correlated. **Table Three** summarizes the bivariate analysis for each health status predictor variable.

Correlation among variables: Prior to entering the chosen independent variables into the logistic regression model, I made a correlation matrix using Crohnbach's alpha statistic. This creates allows one to create a model of internal consistency based on the average inter-item correlation, and assumes a normal distribution across the population. A cut-off of 0.65 was selected as the value above which two or more variables would be considered correlated. I also used spearman's coefficient to calculate bivariate correlations between individual variables in the set. Some of the variables were correlated at a statistically significant level.

Despite the significant levels of correlation among certain variables, I could not find a theoretical means by which to collapse them into fewer than the 11 categories, with one exception. Fibromyalgia and Chronic Fatigue Syndrome were significantly correlated based on Spearman's coefficient. Some health-based websites combine chat rooms and information for people with Chronic Fatigue Syndrome and Fibromyalgia into a single location. In addition, both of these conditions are met with some ambivalence by the medical profession in terms of diagnosis and treatment. Thus, I combined these two conditions into a single category.

To gain more meaning from the set of health status variables as a whole, I made a summary variable titled "Mddiagnosis summary" (mddxsum.) This new variable provided a disease score for each subject by simply adding the number of diagnoses for each subject across the 11 questions. The most diagnoses a single subject had was seven, thus the range of scores went from zero to seven. Due to small numbers, I combined scores of 4,5,6, and 7 in to a single "4 or more diseases category." I then tested the collapsed variable "mddxsum2" against the dependent variable "Internet use to access health and medical information" using chi-square analysis. The p-value was 0.092 on bivariate analysis.

I thus had two different ways to assess health status' impact on Internet use in the final model. By using the MD diagnosis summary variable I could determine if amount of disease/disease burden was a significant predictor. And, by using the individual diagnoses found to be significant on bivariate analysis, I could determine if disease *type* was a significant predictor of Internet use to look for health and medical information.

3. <u>Variables regarding the doctor-patient relationship.</u>

Some survey questions explored the physicians' behavior around the use of supplemental medical information such as literature or the Internet. For example, question 26 asks how often "my doctor provides me with information in the form of literature about my health conditions," and question 27 asks whether "my doctor has encouraged me to use the Internet as a source of health and medical information. The variable that asked responders to state how often the physician "provides information in the form of health-related websites" was collapsed into a dichotomous variable with the categories "web information ever" and "web information never."

Each of these predictor variables was tested against the dependent variable "Internet use to search for health and medical information" using chi-square analysis. Results of the analysis are summarized in **Table Four**. All of the variables in this group could be considered for inclusion in the final model based on Hosmer and Lemeshow's criteria of a p-value less than 0.25. Because the "encourage" variable was not significantly different from the "discourage" variable on chi-square analysis, because the significance of the "encourage variable" was greater than that of the "discourage" variable, and because of the extremely small numbers of physicians who discouraged patients from using the Internet, I elected to include the "encourage" variable rather than the "discourage" variable in the final analysis.

Another question examined how often subjects tell their doctors about health and medical information obtained from any source outside the doctor's office, such as books, magazines, the newspaper, TV, family, or the Internet. This variable was tested as a predictor of the dependent

variable "Internet use to look for health and medical information" using chi-square analysis. It was found to be significant at a p-value <0.001. Although this variable was highly significant in the bivariate analysis, it was not made eligible for entry into the final model. The variable shows an association between Internet use to access health and medical information and how often patients tell their doctors about any health or medical information obtained outside the doctor's office.

In this bivariate analysis, a larger percentage of patients who "always" or "usually" tell their doctor about health information found outside the doctor's office use the Internet to access health and medical information than patients than patients who "never" tell their doctor about outside information. However, it may be that those who use the Internet are more likely to have information to tell the doctor about than those who do not use the Internet. Based on the unclear directionality in the relationship between these two variables, I decided that in a final model the meaning of the relationship between the independent and dependent variables would not be clear. However, I did include an "experimental model," Model three, which examined the effect of this variable in a multivariate model.

Other questions in this group explore the interpersonal relationship and communication between doctor and patient. Question number 31 is the main question about the doctor-patient relationship. The question has 10 parts and 10 corresponding variables. The 10 variables represent questions such as "Does your provider treat you with courtesy and respect," and "if your provider prescribes medicine for you, does he or she explain how to take the medicine in a way you can understand??"

Some variables in this group were collapsed and recoded into new variables due to small numbers in certain response categories. For example, the 10 parts of question 31 each employ a scale from "always" to "never." For each, the response categories "sometimes" and "never" were collapsed into a single category "some/never" due to small numbers. The responses "always" and "usually" were kept separate.

I used chi-square analysis to test which of the variables in this group were statistically significant predictors of the dependent variable "Internet use to look for health and medical information" on a bivariate level. P-values less than 0.25 (based on the criteria set by Hosmer and Lemeshow) were considered for inclusion in the final model. If a variable was not dichotomous, I chose a referent category and made "dummy variables" for each level of analysis to obtain odds ratios when appropriate. The bivariate analysis illustrating aspects of the doctor-patient relationship as predictors of Internet use to look for health and medical information is shown in ***Table Five.***

Correlation among variables: All 10 variables in this grouping are related to the doctor patient relationship, several with only very subtle differences from one another. To test correlations among the variables, I ran two tests. First, I ran a correlation matrix using Chronbach's alpha, which assumes a normal distribution across the population. Next, I used the non-parametric Spearman's coefficient to test bivariate correlations amongst all the combinations of doctor-patient relationship variables. Indeed, every variable in this grouping was statistically significantly correlated to each of the others.

Based on the results of these significant correlations, I decided it was appropriate to divide the 10 variables into two broad components of the doctor-patient relationship. I collapsed them into two separate categories rather than one, because the group of 10 questions examined two separate components of the doctor-patient relationship:

--Six of the ten questions focus on *general communication* between doctor and patient (see table one for display of questions.)

--The remaining four questions focus on the *amount of information* the physician provides to the patient in specific situations. (see table two for display of questions.)

To collapse the group of 10 into one group of 6 and one group of 4, I created a "scoring system" based on the response scale of each question. An answer of "always"=1, "usually"=2, "sometimes"=3, and "never"=4. To create the variable based on the group of six "general communication" questions, I summed each responder's score across the six variables to obtain a

"general communication satisfaction" score variable labeled "docpat01" (see ***Figure One.***) For the 4 "specific" questions, I summed each responder's score across the four variables to obtain a "specific satisfaction" score variable labeled "docpat02" (see ***Figure Two.***) Subjects who did not answer one of more of the questions in each group were labeled as "missing" by the computer. I did not impute any scores.

Figure One. Method of creating a single score for each subject based on responses to the six "general communication" doctor-patient relationship questions.

Doctor-patient relationship questions with a global focus.	SCORE Always=1, Usually=2, Sometimes=3, Never=4
Does your provider treat you with courtesy and respect?	1
Does your provider listen carefully to what you had to say?	1
When you ask questions, do you get answers you can understand?	2
Do you have confidence and trust in the provider treating you?	1
Are you as involved as you want to be in decisions about your treatment?	3
Does your provider spend enough time with you on each visit?	3
	11=TOTAL GENERAL COMMUNICATION SCORE

Figure Two. Method of creating a single score for each subject based on responses to the four "information" questions.

Doctor-patient relationship questions with a specific focus.	SCORE Always=1, Usually=2, Sometimes=3, Never=4
Does your provider explain your condition to you in a way you can understand?	2
Does your provider tell you what to do if your symptoms continue, get worse, or come back?	2
If your provider prescribes medicine for you, does he or she explain how to take it in a way you can understand?	2
Does your provider tell you about possible side effects medicines might have?	3
	9=TOTAL DOCTOR PATIENT INFORMATION SCORE

I then tested each of these predictor variables against the dependent variable "Internet use to access health and medical information" using chi-square analysis. The general communication variable had a p-value of 0.670. The specific information variable had a p-value of 0.247. Thus,

I included the "specific information" doctor-patient relationship variable as a continuous variable in my final model.

Results

Model-Building

The final step in the investigation was to build a logistic regression model that could predict which independent variables were significantly associated with the dependent variable "Internet use to access health and medical information." Given that my dependent variable was dichotomous, I used logistic regression to create a model using Hosmer and Lemeshow's Goodness-of-Fit test to determine how well the final model predicted Internet use to access health and medical information in this investigation.

Based on my criteria of a p-value less than 0.25 in the bivariate analysis for entry into the final model, I selected the independent variables from each predictor category. I created two initial models. Each incorporated the same demographic and doctor-patient relationship variables, but differed in the health-status variables. **Model One** tests the relative importance of disease *burden* by entering the summary variable "MDDXsum2," the continuous variable that categorizes respondents by number of diagnoses.

Model One: step one

Demographic variables	Health-status variables	Doctor-patient relationship variables
1. Age	1. Overall health (good–to-excellent vs. fair-to-poor)	1. Doctor-pt. *information* score
2. Gender	2. MDdiagnosis summary variable	2. MD encourages Internet use
3. Yearly income		3. MD provides any vs. no web info
4. Marital Status		4. MD provides literature about health conditions
5. Education completed		

Model Two tests the relative importance of disease *type* by entering the diagnoses that were significant at or below the 0.25 level in the bivariate analysis.

Model Two: step one

Demographic variables	Health-status variables	Doctor-patient relationship variables
1. Age	1. Overall health (good–to-excellent vs. fair-to-poor)	1. Doctor-pt. *information* score
2. Gender	2. Diabetes diagnosis	2. MD encourages Internet use
3. Yearly income	3. Depression diagnosis	3. MD provides any vs. no web info
4. Marital Status	4. Drug/Alcohol abuse diagnosis	4. MD provides literature
5. Education completed	5. STD diagnosis	
	6. Chronic fatigue/fibromyalgia diagnosis	
	7. Low back pain diagnosis	

For each model, I used stepwise regression to enter the variables into the model, and set criteria for entry into and exit from the model at the default settings of 0.05 and 0.10, respectively. I tried both forward entry and backwards elimination. I used backwards elimination for the final models. In model one, the backwards elimination produced a richer model with a better Goodness-of-fit and higher R-squared. In model two, forward entry and backwards elimination produced the exact same final model and summary statistics.

Model One

After entry of the above variables into the model, the predictors were age, income, the MD diagnosis summary variable, the doctor-patient information score variable, and the MD encourages Internet use variable. The referent category for "age" was the 30-50 category. The referent category for "income" was the lowest income category. The referent category for the "MD encourages Internet use" variable was "Never encourages use." The doctor-patient relationship score and the MD diagnosis summary variable were both continuous variables.

Interaction terms

I examined the possibility of an interaction between age and the number of diseases a patient has. It was possible that older patients may use the Internet to look for health information differently than younger patients with the same amount of disease. Thus, I included the

interaction term age X mddxsum2. Other biologically plausible interactions included interaction between income and number of diagnoses: patients in the lowest income bracket may use the Internet to look for health and medical information differently than those in the highest income bracket with the same amount of disease.

I entered all of the lowest-order variables that were found to be significant predictors into a second model using the Enter Method. I then created a second level with the interaction terms "age x MD diagnosis summary" and "income x MD diagnosis summary" to test for any significant interactions. Neither interaction term was significant at a level for entry into the final model, which indicates that the effects of age and disease burden acting together on the dependent variable "Internet use to access health and medical information is equal to the combined effect of age and disease burden acting separately. The same can be said for income and disease burden. *(18)*

Summary statistics

This resulted in the final Model One seen below. The Hosmer and Lemeshow test resulted in a Chi-square of 3.564, with 8 degrees of freedom and a significance of 0.894. The Nagelkerke R-squared was 0.163.

MODEL ONE

		Statistics								
		B	S.E.	df		Sig.	95.0% C.I.for EXP (B)			
	Variable						EXP(B)	Upper	Lower	
	AGE4			2		.075				
Age 18-29	AGE4(1)	-.284	.322	1		.378	.752	.400	1.416	
Age>50	AGE4(2)	-.713	.317	1		.024	.490	.263	.912	
Number of diseases	MDDXSUM2	.270	.121	1		.026	1.310	1.033	1.660	
	INCOME4			2		.094				
Middle $40,001-90000	INCOME4(1)	.551	.283	1		.051	1.735	.998	3.019	
Highest >$90,000	INCOME4(2)	.708	.439	1		.107	2.030	.859	4.794	
MD-pt infomation	DOCPAT04	.138	.056	1		.014	1.148	1.028	1.281	
MD encour-ages Net	ENCOUR2(1)	2.342	.754	1		.002	10.400	2.375	45.546	
	Constant	-.890	.450	1		.048	.411			

With the age category "30-50" as the referent category, this model indicates that patients over age 50 are about significantly less likely, 70 percent less, than those in the referent category to look for health and medical information on the Internet. Those in the age category "18-29" were not significantly more or less likely to look for such information on the Internet, although this category did enter into the model. It also illustrates that in this population, a higher income trends towards being a predictor of Internet use to look for health and medical information, although it is not statistically significant.

The number of diseases is a significant predictor of Internet use to look for health and medical information in this population. For each increase in the number of diagnoses by one (up to the three diagnoses,) there is an additional 1.3 times the likelihood of looking on the Internet for health and medical information. The number of diagnoses from 4 to 7 was collapsed into a single category due to small numbers. Thus, beyond 3 diagnoses, one must interpret the data to indicate an increase in likelihood of 1.3 when a patient moves from 3 diagnoses to 4 or more.

The doctor-patient relationship variable is another continuous variable and is a significant predictor of Internet use to access health and medical information. For each single point increase in this variable from a minimum score of 4 (an "always" score) to a maximum score of 16 (a "never" score,) a patient is 1.15 times as likely to use the Internet to look for health and medical information. Thus, for larger increases in score, e.g. a jump of 4 points, from an average score of "always" (4) to "usually" (8,) or "usually" to "sometimes" a patient in this population the increase in likelihood is 1.74. Thus, a patient who feels his doctor "sometimes" provides enough information about his condition, medications, etc during an office visit is 1.74 times more likely to use the Internet to access health and medical information than another patient who feels his doctor "usually" provides enough information when controlling for all the other predictors in this model.

Finally, patients whose doctors encourage them to use the Internet to look for health and medical information are more than ten times as likely to look for health and medical information

on the Internet than those patients whose doctors do not encourage them to look on the Internet when controlling for all the other predictor variables in the model. This predictor has a very broad confidence interval due to very small numbers of physicians who encourage patients to use the Internet for this purpose (n=29.)

Model Two

After entry of the listed variables into this model, the significant predictor variables were found to be income, diabetes, depression, chronic fatigue/fibromyalgia, low back pain, the doctor-patient relationship information score variable, and MD encouragement of patient Internet use. The referent category for "income" was the lowest income category. The referent category for each of the diagnoses categories was "no" for the particular diagnosis.

Interaction terms

To test for interactions between variables, I created four interaction terms. I made terms for each of the diagnoses that were significant in the initial model and the variable income. Again, it is biologically plausible that those with lower income levels behave differently than higher-income individuals with the same disease, in regards to the dependent variable "Internet use to look for health and medical information."

I entered all of the lowest-order variables found to be significant predictors of the dependent variable in the initial model into a second model using the Enter method. Next, I created a second layer with the interaction terms income x depression, income x diabetes, income x low back pain, and income x chronic fatigue/fibromyalgia. None of these interactions were significant at a level that allowed for entry into the final model.

Summary statistics

This resulted in the final Model Two seen below. The Hosmer and Lemeshow test resulted in a Chi-square of 6.750, with 8 degrees of freedom and a significance of 0.564. The Nagelkerke R-squared was 0.213. This model had a slightly inferior fit than model one yet accounted for more variance of the dependent variable that Model One.

MODEL TWO

		Statistics							
		B	S.E.	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)		
	Variable						Lower	Upper	
Step 9	INCOME4			2	.043				
	INCOME4(1)	.585	.274	1	.033	1.795	1.049	3.069	
	INCOME4(2)	.798	.422	1	.059	2.222	.971	5.086	
	ENCOUR2(1)	2.342	.762	1	.002	10.402	2.338	46.271	
	DIABETE2(1)	-1.229	.600	1	.041	.293	.090	.949	
	DEPRESS2(1)	.837	.296	1	.005	2.309	1.293	4.125	
	CHRFIBR2(1)	2.047	.842	1	.015	7.744	1.488	40.301	
	LOWBACK2(1)	-.504	.291	1	.083	.604	.342	1.069	
	DOCPAT04	.159	.058	1	.006	1.172	1.047	1.313	
	Constant	-1.101	.402	1	.006	.333			

Income was the only demographic variable that entered into the final model. Like model one, there is a positive trend that higher income is associated with greater use of the Internet to access health and medical information. At the level of annual income $40,001-$90,000, patients are 1.8 as likely to use the Internet use to access health and medical information when compared to the referent category (annual income $ 40,000 or less,) when controlling for the other variables in this model.

In this population, type of diagnosis proved to be an important predictor of Internet use to access health and medical information. The diagnoses that are the most significant predictors of Internet use to access health and medical information when controlling for income, doctor encouragement of Internet use, and the doctor-patient relationship score variable are diabetes, low back pain, depression, and chronic fatigue/fibromyalgia. A diagnosis of chronic fatigue/fibromyalgia in this population renders a patient almost 8 times as likely to use the Internet to look for health and medical information compared to patients that do not have the diagnosis, when controlling for diabetes, depression, and the other variables in the model. The

confidence interval around the relative risk is broad due most likely to the small numbers of the population diagnosed with either chronic fatigue syndrome or fibromyalgia.

A patient diagnosed with depression is more than twice as likely as a patient not diagnosed with depression to search for health and medical information on the Internet when controlling for the other variables in the model. The confidence interval about the relative risk is much more narrow for this variable, due most likely to a large sub-population of patients (close to 30 percent) that reported being diagnosed with depression.

A patient diagnosed with diabetes is *less* likely that a patient without diabetes to look for health and medical information on the Internet, with only 29% of the likelihood of using the Internet for this purpose compared to someone without the condition. Patients diagnosed with low back pain are also less likely to use the Internet to access health and medical information than those without low back pain when controlling for the other variables in the final model. The diagnoses of diabetes and low back pain were also "protective" against the dependent variable in the bivariate analysis.

The continuous variable "docpat04, " the doctor-patient relationship regarding information exchange between doctor and patient, was statistically significant in this model at a slightly higher level than in model one. For each increase in average score by one point, moving in a direction from a average score of "always" (4,) to "never" (16,) the model indicates a patient is 1.17 times as likely to use the Internet to access health and medical information. For larger increases in score the odds ratio increases based on the beta statistic. Thus, a patient who has an average score of 16 (answered only "never") compared to a patient with a score of 4 (answered only "always,") is 6.74 times as likely to use the Internet to access health and medical information. With a smaller increase of 4 points, as in the last model, a patient who feels her doctor "always" provides adequate and comprehensible information regarding her medical condition and medications will be 1.9 times less likely to use the Internet to access health and medical information than a patient in this population who feels her doctor "usually" (average score) provides this type of information.

Again, in this model as in model one, patients whose doctors encourage Internet use to access health and medical information are more than ten times as likely to do so than patients whose doctor does not encourage Internet use. The confidence interval is again large due to small numbers of doctors who encouraged patients compared with doctors who did not encourage patients in this population.

Model Three

In model three, I included the variable "tell your doctor about health information found outside the doctor's office." Recall this is a more controversial variable due to its more questionable directionality in relation to the dependent variable "Internet use to access health and medical information. I ran this experimental model using the same variables contained in model two, with the addition of the "tell doctor".

Model Three: step one

Demographic variables	Health-status variables	Doctor-patient relationship variables
1. Age	1. Overall health (good–to-excellent vs. fair-to-poor)	1. Doctor-pt. *information* score
2. Gender	2. Diabetes diagnosis	2. MD encourages Internet use
3. Yearly income	3. Depression diagnosis	3. MD provides any vs. no web info
4. Marital Status	4. Drug/Alcohol abuse diagnosis	4. MD provides literature
5. Education completed	5. STD diagnosis	5. Tell doctor about outside health info
	6. Chronic fatigue/fibromyalgia diagnosis	
	7. Low back pain diagnosis	

Summary statistics

This resulted in Model Three seen below. The Hosmer and Lemeshow test resulted in a Chi-square of 4.291, with 8 degrees of freedom and a significance of 0.830. The Nagelkerke R-squared was 0.264.

Model Three

Statistics	B	S.E.	df	Sig.	Exp(B)	95.0% C.I.forEXP(B)	
Variables						Lower	Upper
Income			2	.056			
Income	.634	.291	1	.029	1.885	1.066	3.333
Income	.723	.460	1	.116	2.060	.836	5.076
Encourage	1.920	.767	1	.012	6.820	1.516	30.673
Diabetes	-1.639	.651	1	.012	.194	.054	.696
Depression	.717	.310	1	.021	2.048	1.116	3.757
Chrfibr2	1.365	.821	1	.096	3.917	.784	19.572
Lowback2	-.525	.304	1	.084	.591	.326	1.073
Docpat04	.209	.063	1	.001	1.233	1.089	1.395
TellDoct			3	.007			
TellDoct	1.743	.527	1	.001	5.714	2.033	16.064
TellDoct	.683	.434	1	.116	1.979	.845	4.638
TellDoct	.487	.442	1	.271	1.627	.684	3.868
Constant	-1.947	.578	1	.001	.143		

This resulted in a model with predictors identical to those in Model Two, with the "tell doctor" variable in addition. This model had a slightly inferior goodness of fit, but accounted for about 5% more variance than Model Two. While all the variables that were in Model Two remained in this model, the significance of the individual predictor variables was altered. Neither low back pain nor chronic fatigue/fibromyalgia—both significant predictors in Models One and Two, were statistically significant predictors in this model. The other variables retained statistical significance, but at slightly different levels.

The "tell doctor" variable was statistically significant at one level only in this model. Those who "always" tell their doctor about health information found outside the doctor's office from any source (which could include the Internet) are 5.7 times as likely to use the Internet to access health and medical information that patients who "never" tell their doctors about such information.

Discussion

Demographic variables

Income and age were the most important predictors of Internet use to look for health and medical information in this investigation. Income entered into both models, while age entered only into model one, which examined the number of diagnoses as opposed to the type of diagnoses. There is little published research that examines the role of income in patient use of the Internet to look for health and medical information. The most recent research from the Pew Internet Project, published after the completion of this study, found that "the most dramatic disparities" in general Internet access are defined by income and age. *(4)* The percentages of both low-income individuals and individuals over age 65 with Internet access continue to grow, but lag behind younger individuals and people with higher incomes. It may follow that because of later access to the Internet compared to a younger, more affluent population, older patients and patients of low socio-economic status are also later to search for health and medical information. Because these demographic variables were important in the final models they will be interesting variables to examine in future studies.

The variable "age" has an interesting distribution: patients in the middle category "30-50" were more likely to use the Internet to look for health or medical information than either the "18-29" or "over 50" category on bivariate analysis. In Model One, the only final model into which age entered, patients in the "over 50" category were significantly less likely to look for health information on the Internet than patients in the "30-50" category. However, patients aged 18-29 were not significantly different than the referent "30-50" age category in the final model when controlling for the other predictors in the model. In addition, no interaction terms involving age entered into the final model. Interaction between age and number of diagnoses was not significant in this investigation.

Age will be an important variable to examine in future studies. According to the Pew Internet Project, it is an important variables in terms of online health and medical information. Most recently, the largest surge in the search of online health and medical information is taking place

in the 50-64 age bracket, with a 9 percent increase in that group's use from 54 percent to 63 percent in just half a year. *(4)* In this population, patients in the "30-50" category were the most likely to use the Internet to look for health and medical information on bivariate analysis. On multivariate analysis in Model One, patients over 50 years old were significantly less likely to use the Internet to look for health information than those aged 30-50. Thus, while the numbers of older patients who search for online health information is expanding, in this population the numbers that search for online health information still fell significantly short of their younger counterparts.

It may be a spurious finding that those in the youngest age category "18-29" were no different than patients aged 30-50 to use the Internet to access health and medical information in the multivariate analysis. Or, it may be that age has a different pattern in Internet use to access health and medical information than for Internet use in general. In future studies, a more normal age distribution with increased representation of subjects age 18-29 would be helpful. More knowledge about the role of age in Internet use to look for health and medical information can help physicians and health-related Internet companies to better understand the needs of the population with whom they work. It will also help to better target health information and method of dissemination of information according to age of the patient.

Gender did not enter into either of the models as an important predictor of Internet use to access health and medical information in this population. A higher percentage of females in this investigation used the Internet to access health and medical information than did males (60.5 and 53.8 percent, respectively.) This is in keeping with the Pew research, which found the pursuit of online health information is "more popular among online women than men." *(4)* An online survey of Californians found that men are more likely than women to go online everyday, *(10)* yet it is likely that there are important differences in the purpose for which men and women go online. This study did not attempt to differentiate between behaviors of men and women who use the Internet to look for health and medical information. However, due to certain medical conditions that are gender specific, such as prostate and breast cancer, or pregnancy, more

research in this area could help to understand how male and female populations differ in their use of the Internet to access health and medical information so that online information can be more effectively targeted.

Level of education did not factor into either model as a significant predictor of Internet use to access health and medical information. Overall, this population was well educated with over two-thirds having completed at least a college education. If the education level had been more evenly distributed to include a greater number of subjects who had completed high school only results may have differed. In addition, because subjects were required to have access to a computer with Internet access, both the variables income and education may be skewed towards the higher levels in this population.

Race was not a significant predictor of the dependent variable in this study. The subset of the population categorized as "other (non-white)" was quite small, however. The number of African Americans who use the Internet to search for online health information is expanding rapidly *(4)*. Future research may find important differences in a population with a more diverse ethnic background.

Health-status variables

This investigation found that there are two components of health status, disease burden and specific diagnosis, which are important predictors of Internet use to access health and medical information. Model Two, which contains specific diagnoses as predictors, has an inferior fit compared to Model One according to Hosmer and Lemeshow's criteria. It does however account for more variance in the dependent variable with an R-squared of 0.201 as opposed to an R-squared of 0.165. Thus, when controlling for factors such as income, specific elements of the doctor-patient relationship, whether or not one's doctor encourages Internet use, and in Model One, age, it is the specific type of disease rather than the amount of disease, that is a more significant predictor of Internet use to access health and medical information. The diagnoses

that were significant on bivariate analysis but did not meet criteria for entry into the final model were drug/alcohol dependence and any STD.

Based on these findings, it appears certain diagnoses may render one more likely to use the Internet to access health and medical information, while other diagnoses may cause someone to be *less* likely to use the Internet to access this information. It may be that in the case of certain diseases such as diabetes, patients are generally well educated about the condition. They must do a great deal of self-care and glucose monitoring in order to stay on top of the disease. Information on the Internet may be too simplistic or simply not helpful in their disease process.

Conversely, patients with depression, chronic fatigue syndrome and fibromyalgia were significantly more likely to use the Internet to access health and medical information. Patients with these conditions can be met with ambivalence by the medical profession in some cases, and may find it difficult to get the support needed from their physicians. The Internet may fill an important gap for these patients with information and acceptance via support groups or organizational home pages.

In addition, individual diagnoses had an additive effect on the dependent variable, as seen with the significance of the predictor variable MD diagnosis sum. Each disease with which a patient is diagnosed provides potential cause to search the Internet for health information. Thus, each new diagnosis may have an additive effect, increasing patients' likelihood to use the Internet as a source of information.

This is a useful area for future research: there may be important changes doctors can make in their approach to the discussion about and treatment of specific diseases that may improve patient care, and health-related websites may also be able to improve the quality and availability of information about specific diseases based on additional knowledge. In addition, if the assertion that increasing disease burden increases likelihood of Internet use to look for health and medical information is upheld, doctors who have patients with several co-morbid conditions can help these patients by providing information regarding medically-sound websites.

Doctor-patient relationship variables

Physician encouragement to use the Internet to access health and medical information was a highly significant predictor of patient Internet use to access health and medical information. Although very few physicians encouraged their patients in this way, the variable was a highly significant predictor in both final models. As stated, the confidence interval was broad in both models due to small numbers. Future studies with larger sample sizes may focus on this point and obtain a more precise measurement. Interestingly, there were patients who reported their physician *discouraged* them from using the Internet, and on bivariate analysis this was a significant predictor in favor of Internet use. However, due to the nature of the study, one cannot speculate about cause and effect, i.e. which came first, the patient Internet use to access health and medical information, or the physician discouragement.

The set of variables that explored the amount and quality of information doctors provide to patients about disease symptoms and medications were significant predictors of patient Internet use to access health and medical information. Whether controlling for number of diagnoses or type of diagnoses, this variable entered into the final models. Thus, patients who feel their doctors "always" explain medications and possible side effects and explain their medical conditions in an understandable manner are significantly less likely to use the Internet to access health and medical information than patients who feel their doctor, usually, sometimes, or never takes these steps. The fact that this information score was a significant predictor in all three models makes sense: the aspects of the doctor-patient relationship on which this variable focuses are areas for which the Internet can fill important gaps in information.

Conversely, the subset of doctor-patient relationship variables that explored patient perceptions of general doctor-patient communication were not significant in the bivariate analysis according to Hosmer and Lemeshow's criteria. Thus, this subset of variables was not a candidate for entry into the final model. In this population, the level of patients' confidence and trust in their doctors, and whether the patients felt their doctors listened to them or treated them with

respect, were not significant predictors of patient Internet use to access health and medical information.

Model three, the model with the additional variable "tell doctor," is an important finding in this study. The specific aims of the study set out to differentiate patients who use the Internet to look for health and medical information from those who do not, and this research indicates that whether patients "always" or "never" tell their doctors about health information from any source outside of the doctor's office may be an important way to differentiate these populations. It may be that patients who have always looked for information outside the doctor's office, and always tell their doctors about this information have found a wonderful resource in the Internet and were more likely patients to use it. Conversely, it may be that patients who use the Internet to look for health information simply have more to tell their doctors. It is an area that needs additional research.

Conclusions

In conclusion, there is little published research on this subject. More and more patients are using the Internet as a source of health information, yet their motivations are not well characterized. As a result, it is difficult to anticipate what type of patient will look for health information on the Internet and what can be done to improve the process.

This research helps to better understand such patients and the factors that influence their use of the Internet. This investigation points to the influence of physicians on patient use of the Internet to access health and medical information. They can do so in at least two ways. First, whether or not patients' physicians encourage them to use the Internet to search for health information is instrumental in whether or not they do. In addition, the amount and type of information a physician provides a patient can have an important effect on Internet use to access health information. There is much room for improvement in communication between doctor and patient with regards to the Internet as an information source.

Physicians and educators should also be aware of patients with specific medical conditions, or multiple medical conditions. The Internet may fill important gaps in information and care for some patients, while for patients with different diseases, it may not be helpful in its current form.

I hope this research and more of its type can be used to make improvements in the Internet as a source of medical information for any patient who desires to use it. Further investigation into the influence of demographic factors is needed. In addition, more investigation is needed into the impact of specific diseases on Internet use to search for health and medical information. This can be done in the future with larger sample sizes. Finally, further investigation into physician impact on patient choices regarding Internet use will be essential to understand patient motivations to search.

Limitations

1. This was a descriptive study and not designed to test hypotheses. The data from this investigation can be used to generate hypotheses about patient use of the Internet to access health and medical information, which can be tested in future research.
2. In this investigation, there were small sample sizes in study subpopulations. This affected several variables, including "physician encouragement of Internet use" and many of the diagnosis categories, such as chronic fatigue syndrome, fibromyalgia, cancer, and HIV/AIDS. This led to large confidence intervals around some of the risk ratios, and to general instability of the final models.
3. The study population has limited generalizability. First, subjects were patients in doctor offices. Thus, they are a specific subset of the general population that both has health insurance and visits the doctor, which sets them apart from other people in the population that may use the Internet to look for health and medical information. In addition, all the patients were required to have access to a computer and the Internet. In Portland, at least 70 percent of the households have Internet access, a level matched in the US only by Seattle. *(17)* Thus, a higher proportion of Portland residents have

Internet access than in almost any other area of the county. This implies Portlanders are among the earliest to incorporate the Internet into their everyday lives, which may set them apart from people in other regions of the country. Finally, the study population had a skewed distribution around certain demographic variables. The majority was at least college-educated, and a large percentage was in higher income brackets. Finally, the youngest age bracket, age 18-29, was somewhat underrepresented in this population, which may have affected some of the results.

Tables 1-5 and
Logistic Regression Models 1-3

Patient use of the Internet to access health and medical information

Table One. Comparison of Sellwood-Moreland and Gabriel Park clinics by selected demographic characteristics.

	Sellwood-Moreland (N=155) n(%)[a]	Gabriel Park (N=230) n(%)[a]	p-value[b]
Gender			
Male	71 (46.1)	98 (42.6)	0.50
Female	83 (53.9)	132 (57.4)	
Age in years			
Mean (range)	41.0 (19-82)	41.0 (18-90)	0.98
Median	38.0	39.0	
Race			
White, non-Hispanic	127 (90.1)	188 (87.0)	0.38
Other	14 (9.9)	28 (13.0)	
Education completed			
High school or less	37 (24.2)	53 (23.0)	0.28
College	88 (57.5)	119 (51.7)	
Graduate school	28 (18.3)	58 (25.2)	
Annual income			
Below $20,000	26 (17.9)	30 (13.6)	0.18
$20-40,000	53 (36.6)	72 (32.7)	
$41-65,000	36 (24.8)	66 (30.0)	
$66-90,000	20 (13.8)	23 (10.5)	
Above $90,000	10 (6.9)	29 (13.2)	
Marital Status			
Single/never married	42 (27.5)	70 (30.4)	0.86
Married	82 (53.6)	115 (50.0)	
Divorced	24 (15.7)	39 (17.0)	
Widowed	5 (3.3)	6 (2.6)	

[a] The numbers of subjects (n) for a given category may not match the total number of subjects (N) because of missing data.

[b] Chi-square analysis, except for age (independent sample t-test.)

Table Two. Predictors of Internet use to look for health and medical information by selected demographic characteristics

	Use Internet to search for health information N=222 n(%)[a]	Do not use Internet to search for health information N=163 n(%)[a]	p-value[b]
Clinic n(%)			
Sellwood-Moreland	89 (57.4)	66 (42.6)	0.94
Gabriel Park	133 (57.8)	97 (42.2)	
Gender n(%)			
Male	91 (53.8)	78 (46.2)	0.19
Female	130 (60.5)	85 (39.5)	
Age (years) n(%)			
18-29	47 (51.6)	44 (48.4)	
30-50	127 (65.5)	67 (34.5)	0.01
>50	47 (48.5)	50 (51.5)	
Race n(%)			
White	185 (58.7)	130 (41.3)	0.43
Other	22 (52.4)	20 (47.6)	
Education completed n(%)			
High school or less	47 (52.2)	43 (47.8)	
College	116 (56.0)	91 (44.0)	0.096
Graduate school	58 (67.4)	28 (32.6)	
Annual income n(%)			
Below $20,000	27 (48.2)	29 (51.8)	
$20-40,000	66 (52.8)	59 (47.2)	
$41-65,000	65 (63.7)	37 (36.3)	0.13
$66-90,000	28 (65.1)	15 (34.9	
Above $90,000	26 (66.7)	13 (33.3	
Marital Status n(%)			
Single/never married	60 (53.6)	52 (46.4)	
Married	111 (56.3)	86 (43.7)	
Divorced	44 (69.8	19 (30.2)	0.19
Widowed	6 (54.5)	5 (45.5	

[a] The numbers of subjects (n) for a given category may not match the total number of subjects (N) because of missing data.

[b] Chi-square analysis, except for age (independent sample t-test.)

Table Three. Predictors of Internet use to search for health and medical information according to specific subject health conditions.

	Use Internet to look for health information N=222	Do not use Internet to look for health information N=163	OR (95% CI)
Overall health status			
Excellent n(%)	38 (64.4)	21 (35.6)	1.00(p=0.302)
Very good	70 (54.7)	58 (45.3)	1.50 (0.79-2.83)
Good	68 (55.3)	55 (44.7)	1.46 (0.77-2.78)
Fair	27 (60.0)	18 (40.0)	1.21 (0.542-2.68)
Poor	18 (75.0)	6 (25.0)	0.60 (0.20-1.75)
Overall health status, collapsed			
Good-excellent n(%)	176 (56.8)	134 (43.2)	0.198
Fair-poor	45 (65.2)	24 (34.8)	
Respondents asked "Have you ever been diagnosed by a doctor with one of the following conditions?":			
Diabetes			
Yes n(%)	6 (31.6)	13 (68.4)	0.32 (0.12-0.85)/0.017
Hypertension			
Yes n(%)	48 (60.8)	31 (39.2)	1.15 (0.67-1.91)/0.602
Depression			
Yes n(%)	75 (68.8)	34 (31.2)	1.91 (1.18-3.06)/0.008
Drug/EtOH use			
Yes n(%)	16 (76.2)	5 (23.8)	2.41 (0.86-6.76)/0.085
Arthritis			
Yes n(%)	33 (58.9)	23 (41.1)	1.04 (0.59-1.88)/0.874
Chronic Fatigue			
Yes n(%)	8 (80.0)	2 (20.0)	2.95 (0.62-14.08)/0.157
Fibromyalgia			
Yes n(%)	16 (88.9)	2 (11.1)	6.21 (1.40-27.78)/0.006
Low Back Pain			
Yes n(%)	57 (52.3)	52 (47.7)	0.75 (0.55-4.13)/0.222
STD			
Yes n(%)	26 (76.5)	8 (23.5)	2.53 (1.11-5.78)/0.023
Cancer			
Yes n(%)	12 (66.7)	6 (33.3)	1.51 (0.55-4.13)/0.416

Table Four. Univariate analysis between variables that address physicians use of literature and input regarding patient use of the Internet and the dependent variable, Internet use to search for health and medical information.

	Use Internet to search for health and medical information	Do not use Internet to search for health and medical information	
	N=222	N=163	P-value
Responders asked whether:			
Physician provides you with literature about health conditions			
Always n(%)	19 (65.5)	10 (34.5)	
Usually	39 (54.2)	33 (45.8)	0.23
Sometimes	94 (53.4)	82 (46.6)	
Never	59 (64.8)	32 (35.2)	
Physician encourages you to use Internet as a source of medical information			
Yes n(%)	27 (93.1)	2 (6.9)	
No	183 (54.6)	152 (45.4)	<0.001
Physician discourages you from using Internet as a source of medical information			
Yes n(%)	6 (100.0)	0 (0)	
No	205 (57.7)	150 (42.3)	0.037
Physician provides you with information in the form of health-related websites			
Always n(%)	5 (71.4)	2 (28.6)	
Usually	3 (60.0)	2 (40.0	0.058
Sometimes	21 (84.0)	4 (16.0)	
Never	184 (57.0)	139 (43.0)	

Table Five. Analysis between variables that address the doctor-patient relationship and the dependent variable Internet use to search for health and medical information.

	Use Internet to search for health and medical information N=222	Do not use Internet to search for health and medical information N=163	Row totals	P-value
Respondents were asked:				
Does your provider treat you with courtesy and respect? Always n(%)	162 (56.8)	123 (43.2)	285	
Usually	37 (56.1)	29 (43.9)	66	0.664
Sometimes/Never	14 (66.7)	7 (33.3)	21	
Does your provider listen carefully to what you had to say? Always n(%)	139 (56.0)	109 (44.0)	148	
Usually	43 (52.4)	39 (47.6)	82	0.061
Sometimes/Never	29 (74.4)	10 (25.6)	39	
When you ask questions, do you get answers you can understand? Always n(%)	109 (52.9)	97 (47.1)	206	
Usually	79 (61.7)	49 (38.3)	128	0.127
Sometimes/Never	23 (67.6)	11 (32.4)	34	
Do you have confidence and trust in the provider treating you? Always n(%)	120 (54.1)	102 (45.9)	222	
Usually	61 (59.2)	42 (40.8)	103	0.084
Sometimes/Never	31 (72.1)	12 (27.9)	43	
Are you as involved as you want to be in decisions about your treatment? Always n(%)	120 (56.9)	91 (43.1)	211	
Usually	66 (60.0)	44 (40.0)	110	0.826
Sometimes/Never	25 (55.6)	20 (44.4)	45	
Does your provider spend enough time with you on each visit? Always n(%)	88 (52.7)	79 (47.3)	167	
Usually	75 (59.1)	52 (40.9)	127	0.163
Sometimes/Never	46 (65.7)	24 (34.3)	70	
Does your provider tell you what to do if your symptoms continue, get worse, or come back? Always n(%)	137 (55.2)	111 (44.8)	248	
Usually	44 (55.7)	35 (71.2)	79	0.036
Sometimes/Never	32 (76.2)	10 (23.8)	42	
If your provider prescribes medicine for you, does he or she explain how to take it in a way you can understand? Always n(%)	147 (54.9)	121 (45.1)	268	
Usually	48 (65.8)	25 (34.2)	73	0.120
Sometimes/Never	18 (69.2)	8 (30.8)	26	
Does your provider tell you about possible side effects medicines might have? Always n(%)	104 (52.8)	93 (47.2)	197	
Usually	58 (61.7)	36 (38.3)	94	0.105
Sometimes/Never	48 (65.8)	25 (34.2)	73	
Does your provider explain your condition to you in a way you can understand? Always n(%)	120 (52.9)	107 (47.1)	227	
Usually	68 (65.4)	36 (34.6)	104	0.090
Sometimes/Never	22 (61.1)	14 (38.9)	36	

Appendix A: Survey Instrument

For several reasons, patients are becoming increasingly interested and knowledgeable about their own health care. We are interested in the factors that lead patients to obtain health and medical information outside of a doctor visit. Information sources may include books, magazines, TV, friends and family, web sites, and alternative health care providers.

This survey is entirely voluntary and your answers will not affect your health care in any way. *Your answers are confidential and will only be reported with a group of answers from people like yourself. This survey takes about 10 minutes to complete.*

Computer use

1. Where is the computer that you use **most often** located?

☐ ***At my home***
☐ ***At my office***
☐ ***At school***
☐ ***At my local public library***
☐ ***Other*** *[SPECIFY]*_____

Health Information

We are very interested in how people use the Internet for health-related reasons. The following questions ask you about your health and how you use the Internet.

2. In general, how would you rate your **overall health** now compared to other people your age?

☐ ***Excellent***
☐ ***Very good***
☐ ***Good***
☐ ***Fair***
☐ ***Poor***
☐ ***Don't know***
☐ ***Refused***

---

3. In the past 6 months, have you been a patient in a hospital overnight or longer?

☐ ***Yes***
☐ ***No***
☐ ***Don't know***
☐ ***Refused***

---

4. Have you ever been told by a doctor that you have any of the following conditions?

		Yes	*No*	*Don't know*	*Refuse*
a.	***Diabetes***				
b.	***Hypertension*** *(High blood pressure)*				
c.	***Depression***				
d.	***Drug or alcohol addiction***				
e.	***Arthritis***				
f.	***Chronic fatigue syndrome***				
g.	***Fibromyalgia***				
h.	***Lower back pain***				
i.	***Cancer***				
j.	***HIV/AIDS***				
k.	***Herpes/Other STD***				

5. Which of the following best describes the reason for your visit today?

☐ ***Urgent care for a serious illness or injury***
☐ ***Care for chronic or ongoing condition such a diabetes, asthma, or allergies***
☐ ***Care for a minor illness or injury such as a sore throat or sprained ankle***
☐ ***Routine care such as an annual check-up or an appointment for immunizations***
☐ ***Don't know***
☐ ***Other (please tell us)*** _____

6. Have you ever used the Internet to get information about the reason for the visit you marked above?

☐ ***Yes***
☐ ***No***

6a. ***If yes***, did you use it to prepare for today's visit?

☐ ***Yes***

☐ ***No***
If yes:

6b. What Internet site did you go to get this information?

6c. What type of information did you get at this site? (Please mark all that apply)

☐ ***General information about condition***
☐ ***Medical advice***
☐ ***Information about a medication***
☐ ***Support***
☐ ***Reasons for development of condition***
☐ ***Information about how to prevent disease/illness from becoming worse***
☐ ***Other (please tell us)***

---

7. Did you come to the doctor's office with unanswered questions today?

Yes
No

Information Seeking

We are interested in what sources of health and medical information are helpful to patients. The following questions ask about several sources of such information and how you might use them.

8. Where do you <u>most often</u> obtain health/medical information outside your doctor?

☐ ***Family member***
☐ ***Friend***
☐ ***Alternative health care provider such as a naturopath, chiropractor, or acupuncturist***
☐ ***Telephone advice line (1-800#)***
☐ ***Employee assistance program***
☐ ***Newspaper articles***
☐ ***Health and medicine advice book such as the Healthwise Handbook***
☐ ***Magazine or journal articles***
☐ ***Internet***
☐ ***Health Fair***

---

9. In the past 6 months, did you seek health/medical information outside of a visit to the doctor?

☐ ***Yes***
☐ ***No***

---

10. In the past 6 months, which of the following are reasons you looked for health/medical information outside of a doctor visit? (please mark all that apply)

☐ ***Wanted to learn more about a personal health issue.***
☐ ***Wanted to research treatment options***
☐ ***Wanted information about prognosis of disease***
☐ ***Wanted info about a rare disease***
☐ ***Wanted info on medicines***
☐***Wanted to access a support group***
☐ ***Too embarrassed to discuss a health issue with doctor***
☐ ***Had question but not important enough to go to the doctor***
☐ ***Desire for a second opinion (outside of my doctor's opinion)***
☐ ***Didn't understand doctor's explanation***
☐ ***Forgot doctor's explanation***
☐ ***Condition not remedied by doctor***
☐ ***Not enough time to discuss issue with doctor***
☐ ***My doctor suggested it or gave me information about the Internet***
☐ ***My health plan suggested it/sent me information about the Internet***

11. In general, I tell the doctor about the health and medical information I find from other sources.

☐ ***Always***
☐ ***Usually***
☐ ***Sometimes***
☐ ***Never***

If you DO NOT use the Internet to search for health/medical information, skip to question #25.

12. The last time you searched for health/medical information **on the Internet**, what caused you to search?

☐ ***Wanted to learn more about a personal health issue.***
☐ ***Wanted to research treatment options***
☐ ***Wanted help finding a doctor***
☐ ***Wanted to find out how to care for myself***
☐ ***Wanted information about prognosis of disease***
☐ ***Wanted information about a rare disease***
☐ ***Wanted information on medicines***
☐ ***Wanted to access a support group***
☐ ***Too embarrassed to discuss a health issue with doctor***
☐ ***Had question but not important enough to go to the doctor***
☐ ***Desire for a second opinion (outside of my doctor's opinion)***
☐ ***Didn't understand doctor's explanation***
☐ ***Forgot doctor's explanation***
☐ ***Condition not remedied by doctor***
☐ ***Not enough time to discuss issue with doctor***

---

13. Was this search for information about a specific health /medical condition?
☐ ***Yes***
☐ ***No***

13a. If so, what was the condition? _____

---

14. Did you find the information you were looking for on the Internet?
☐ ***Yes***
☐ ***No***

---

15. **IF YES**, where did you find this information?
☐ ***Web MD***
☐ ***DrKoop.com***
☐ ***Adam.com***
☐***Betterhealth.com***
☐ ***Healthfinder.gov***
☐ ***Center for Disease Control website (CDC.gov)***
☐ ***Medline***
☐ ***My health plan's website (please tell us which health plan)***_____
☐ ***Online support group (please tell us which group)***_____
☐ ***Chat room (please tell us which chatroom)***_____
☐ ***Advocacy group (please tell us which group)***_____

☐ ***Site related to health condition (please tell us which site)***_____
☐ ***Other (please specify)*** _____
_____

16. **IF NO**, what kept you from getting the information you wanted?
☐ ***No good/quality sites found***
☐ ***Searching for health/medical information was too confusing***
☐ ***No sites existed on what I was looking for***
☐ ***Other (please tell us)***_____
_____

17. When you search the Internet for health/medical information, which method are you more likely to use (please mark one only):

☐ ***Portal/search engine such as Yahoo, Lycos, Alta Vista***
☐ ***Go directly to a specific medical/health site***

17a. If you are to use a specific health/medical Internet site, which site are you **most likely** to use?
☐ ***Web MD***
☐ ***DrKoop.com***
☐ ***Adam.com***
☐***Betterhealth.com***
☐ ***Healthfinder.gov***
☐ ***Center for Disease Control website (CDC.gov)***
☐ ***Medline***
☐ ***My health plan's website (please tell us which health plan)***_____
☐ ***Online support group (please tell us which group)***_____
☐ ***Chat room (please tell us which chatroom)***_____
☐ ***Advocacy group (please tell us which group)***_____
☐ ***Site related to health condition (please tell us which site)***_____
☐ ***Other (please specify)*** _____

18. How did you find out about this site?

☐ ***Internet ad***
☐ ***A link within another site***
☐ ***Friend/family member***
☐ ***Doctor/health care provider***
☐***Search engine led me to site***
☐ ***TV ad***
☐ ***Newspaper article***

19. What is the best thing about this site?

_____

_____

20. Would you visit this site again?

☐ ***Yes***
☐ ***No***

---

21. Has information you have <u>received on the Internet</u> about your health/ a medical condition ever **<u>delayed</u>** your seeking care from your health care provider?

☐ ***Yes***
☐ ***No***

22. Has information you have <u>received on the Internet</u> about your health/a medical condition ever **<u>prevented</u>** your seeking care from your health care provider?

☐ ***Yes***
☐ ***No***

23. If you answered yes to either of the above, did you ever experience an adverse outcome as a result of delaying care or not seeking care?

☐ ***Yes***
☐ ***No***

---

24. In general, I tell the doctor about the health and medical information I find on the Internet.

☐ ***Always***
☐ ***Usually***
☐ ***Sometimes***
☐ ***Never***

25. For each source of health information listed below, which are you most likely to listen to and trust? Please mark a box for each letter choice.

	Never use	Very reliable	Reliable	Don't know/neutral	Somewhat Reliable	Unreliable
a. Doctor						
b. Family member						
c. Friend						
d. Telephone advice line (1-800#)						
e. Employee assistance program						
f. Newspaper articles						
g. Magazine or journal articles						
h. Health and medical advicebook such as the Healthwise handbook						
i. Internet						
j. Health Fair						
k. Alternative health care provider such as a naturopath, homeopath or acupuncturist						

Doctor-Patient relationship

Next, we have some general questions about you and your doctor.

26. My doctor provides me with information in the form of **literature** about my health conditions

☐ ***Always***
☐ ***Usually***
☐ ***Sometimes***
☐ ***Never***

---

27. My doctor has encouraged me to use the **Internet** as a source of health/medical information

☐ ***Yes***
☐ ***No***

---

28. My doctor has discouraged me from using the **Internet** as a source of health/medical information

☐ ***Yes***
☐ ***No***

---

29. My doctor provides me with information in the form of **health-related websites**

☐ ***Always***
☐ ***Usually***
☐ ***Sometimes***
☐ ***Never***

---

30. It is

☐ ***Very important***
☐ ***Somewhat important***
☐ ***A little important***
☐ ***Not important at all***

to participate with my doctor in making decisions about my own health care.

31. Thinking about the last 12 months:

	Always	**Usually**	**Sometimes**	**Never**
a. Does your provider treat you with courtesy and respect?				
b. Does your provider listen carefully to what you had to say?				
c. When you ask questions, do you get answers you can understand?				
d. Do you have confidence and trust in the provider who was treating you?				
e. Does your provider explain your condition or treatment to you in a way you can understand?				
f. Are you as involved as you want to be in decisions about your treatment?				
g. Does your provider tell you what to do if your symptoms continue, get worse, or come back?				
h. If your provider prescribes medicine for you, does he or she explain how to take the medicine in a way you can understand?				
i. Does your provider tell you about possible side effects the medicines might have?				
j. Does your provider spend enough time with you on each visit?				

32. We would like to know your overall rating of the health care you receive from the doctor you see most often. Circle any number from 0 to 10. Zero is the worst health care possible, and 10 is the best health care possible.

0	Worst health care possible
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	Best health care possible

33. Have you ever been to see an alternative health care provider, such as a naturopath, homeopath, chiropractor, acupuncturist, or hypnotist?

☐ ***Yes***
☐ ***No***

If yes,

33a. Which type of alternative health care provider have you been to see? Mark all that apply.

☐ ***Naturopath***
☐ ***Homeopath***
☐ ***Chiropractor***
☐ ***Acupuncturist***
☐ ***Hypnotist***
☐ ***Massage therapist***
☐ ***Other (please tell us)***

33b. Please mark the reasons you went to ANY of the providers listed above.

☐ ***For pain***
☐ ***I wanted to change a behavior (for example, stop smoking or drinking)***
☐ ***I wanted a second opinion***
☐ ***I wanted help relaxing/dealing with stress***
☐ ***My regular doctor was not helping me solve my medical problem***
☐ ***Wanted access to drugs I could not get from my doctor***
☐ ***Other (please tell us)***_____

_____

Demographics

The following information is helps to characterize the people who complete this survey and is completely confidential. Again, your answers will not affect your healthcare in any way.

Age (years) _____

Gender ☐M ☐F

Marital status:

☐ Single/Never married
☐ Married
☐ Divorced
☐ Widowed

Number of children _____

There are _____ people in my household

Race/ethnicity_____

Highest level of education completed:

☐ junior high
☐ high school
☐ college
☐ graduate school

Income level:

☐ below $20,000/year
☐ $20,000-40,000/year
☐ $41,000-65,000/year
☐ $66,000-90,000/year
☐ greater than $90,000/year

My health care provider is a:

☐ resident
☐ doctor, non-resident
☐ nurse-practitioner
☐ don't know

Appendix B: Tables 6-8

Patient use of the Internet to access health and medical information

Appendix B

Descriptive analysis

The descriptive analysis investigated the use pattern among those subjects that use the Internet to access health and medical information. Currently in the literature there are limited data about patient patterns of Internet use, yet patient Internet use is clearly quite common (and growing.) In this investigation over 57% of patients with Internet access use the Internet to access health and medical information. This is slightly higher than a report in the literature, which estimated that 43 percent of the general population with Internet access used the Internet to search for health and medical information.

One of the aims of the investigation was to look at what type of need caused a patient to look for health information on the Internet. ***Table Six*** illustrates the reasons subjects in this investigation used to Internet to search for such information and the accompanying frequencies. The top five reasons patients most recently searched the Internet for health information all involved a patient's desire for self-education and a need for more information about a medical condition. Fewer subjects in this study used the Internet for such needs as a support group or help finding a doctor, and very few did so due to a lack of understanding about a doctor's explanation or because an explanation was forgotten.

Table Seven illustrates that the majority of the subjects who use the Internet to search for health and medical information use the Internet to look for information on a specific medical condition, and that 83.3 percent of patients were able to find the information they were looking for.

While this study does not address the quality of the information the 83 percent of subjects found on the Internet, it does suggest that the majority of subjects have not allowed information obtained on the Internet interfere with visits to their doctor. Only 5.1 percent of subjects stated that health information found on the Internet had caused them to delay seeking care, and 3.76 percent stated such information had prevented them from seeking care from a provider. Of the very small numbers who reported the Internet had caused them to delay or prevent a health care

visit (n=11 and 8, respectively) one subject reported experiencing a bad outcome as a result of delaying or not seeking care. One must bear in mind, however, that these subjects were sampled from a clinic-going population and may thus be more likely to visit the doctor than the general population.

Table Eight highlights the most frequently visited health-related websites and most common methods for discovering a website exists. Subjects reported that they most often discover sites via the Internet itself, either by way of a search engine or site link. Doctors ranked above only the newspaper as a source of information for patients about health-related websites, and patients were over twice as likely to find out about health-related websites from friends or family than from their physician.

Table Six. Reasons patients searched during last Internet search for health and medical information.

	N=222 n (%)[a]
Wanted to learn more about a personal health issue	141 (65.3)
Wanted to research treatment options	89 (41.2)
Wanted information on medicines	70 (32.4)
Wanted information about self-care	66 (30.6)
Wanted information about prognosis of disease	45 (20.8)
Desire for second opinion (outside my doctor's opinion)	25 (11.6)
Had question, but not important enough to go to doctor	22 (10.2)
My condition was not remedied by my doctor	15 (6.9)
Did not have enough time to discuss issue with doctor	12 (6.9)
Wanted help finding a doctor	14 (6.5)
Wanted access to a support group	11 (5.1)
Wanted information about a rare disease	22 (10.2)
Did not understand my doctor's explanation	3 (1.4)
Forgot my doctor's explanation	4 (1.9)

[a] The number of subjects in each given category (n) is greater than the total number of subjects (N) due to the fact that many subjects chose more than one of the above responses.

Table Seven. Subjects who use the Internet to search for health information---Patterns of use.

Survey question N=222 n (%)[a]	Yes	No
The last time you searched for health/medical information on the Internet, was the search for information about a specific health/medical condition?	187 (85.39)	32 (14.61)
Did you find the information you were looking for on the Internet?[b]	180 (83.33)	24 (11.11)
Has information you have received on the Internet about your health/a medical condition ever delayed your seeking care from your health care provider?	11 (5.11)	204 (94.89)
Has information you have received on the Internet about your health/a medical condition ever prevented your seeking care from your health care provider?	8 (3.76)	205 (96.24)

[a] The numbers of subjects (n) for a given category may not match the total number of subjects (N) because of missing data.
[b] 12 subjects, or 5.56% of responders stated they found "some" information.

Table Eight. Subjects who use Internet to search for health and medical information---methods of searching for information and frequented websites.

Survey question	N=222 n (%)[a]
When you search the Internet for health/medical information, which method are you most likely to use?	
Portal/search engine such as Yahoo or Lycos	152 (72.38)
Go directly to a specific health/medical site	52 (24.76)
Use both methods	6 (2.86)
Which health/medical Internet site are you most likely to use?	
WebMD	67 (38.95)
Medline	23 (13.32)
Healthfinder.gov	17 (9.88)
Site specific to health condition	16 (9.30)
DrKoop.com	12 (6.98)
Betterhealth.com	10 (5.81)
Health plan's website	6 (3.49)
Adam.com	4 (2.33)
Chatroom	2 (1.16)
Advocacy group	2 (1.16)
Other/don't remember	40 (23.26)
How did you find out about this site?	
Search engine led to it	86 (46.23)
A link within another site led to it	42 (22.58)
Friend/family member	38 (20.43)
TV ad	23 (12.37)
Internet ad	19 (10.21)
Doctor	16 (8.60)
Newspaper	11 (5.91

[a] The numbers of subjects (n) for a given category may not match the total number of subjects (N) because of missing data and/or multiple responses.

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