

Trust and Sources of Health Information

The Impact of the Internet and Its Implications for Health Care Providers: Findings From the First Health Information National Trends Survey

Bradford W. Hesse, PhD; David E. Nelson, MD, MPH; Gary L. Kreps, PhD; Robert T. Croyle, PhD; Neeraj K. Arora, PhD; Barbara K. Rimer, PhD; Kasisomayajula Viswanath, PhD

Background: The context in which patients consume health information has changed dramatically with diffusion of the Internet, advances in telemedicine, and changes in media health coverage. The objective of this study was to provide nationally representative estimates for health-related uses of the Internet, level of trust in health information sources, and preferences for cancer information sources.

Methods: Data from the Health Information National Trends Survey were used. A total of 6369 persons 18 years or older were studied. The main outcome measures were online health activities, levels of trust, and source preference.

Results: Analyses indicated that 63.0% (95% confidence interval [CI], 61.7%-64.3%) of the US adult population in 2003 reported ever going online, with 63.7% (95% CI, 61.7%-65.8%) of the online population having looked for health information for themselves or others

at least once in the previous 12 months. Despite newly available communication channels, physicians remained the most highly trusted information source to patients, with 62.4% (95% CI, 60.8%-64.0%) of adults expressing a lot of trust in their physicians. When asked where they preferred going for specific health information, 49.5% (95% CI, 48.1%-50.8%) reported wanting to go to their physicians first. When asked where they actually went, 48.6% (95% CI, 46.1%-51.0%) reported going online first, with only 10.9% (95% CI, 9.5%-12.3%) going to their physicians first.

Conclusion: The Health Information National Trends Survey data portray a tectonic shift in the ways in which patients consume health and medical information, with more patients looking for information online before talking with their physicians.

Arch Intern Med. 2005;165:2618-2624

Author Affiliations: National Cancer Institute, Bethesda, Md (Drs Hesse, Croyle, and Arora); Centers for Disease Control and Prevention, Atlanta, Ga (Dr Nelson); Department of Communication, George Mason University, Fairfax, Va (Dr Kreps); School of Public Health, University of North Carolina at Chapel Hill (Dr Rimer); and Department of Society, Human Development, and Health, Harvard University and Dana-Farber Cancer Institute, Boston, Mass (Dr Viswanath).

THE ENVIRONMENT IN WHICH patients consume medical and health information has changed dramatically during the past decade. Rapid diffusion of Internet technology within the public sphere has placed an unprecedented amount of health information within reach of general consumers.¹⁻⁴ Advances in information-tailoring tools and telemedicine have broadened the reach of health care specialists beyond the constraints of the traditional office.⁵⁻⁷ Increases in patient advocacy and consumerism have prompted pharmaceutical companies to launch direct-to-consumer advertising campaigns, while entertainment and the news media play host to an ever-increasing breadth of health and illness discussions.⁸ At the same time, concerns over a digital divide, due to the uneven diffusion of health technologies, merit close monitoring by the federal government.⁹

On the clinical side, the appointment in May 2004 of a health information "czar"

by the US Secretary of Health and Human Services to coordinate development of a National Health Information Infrastructure crystallized a commitment by the United States to make patients' medical records universally transportable through electronic means.^{10,11} As a result, data entry and review systems are becoming ubiquitous in hospital settings¹² and health care technologists are crafting applications in medical informatics to improve the quality of health care.^{13,14}

Although there has been much speculation, it is unclear exactly how these changes are influencing the ways in which individuals obtain health or medical information and what patterns of trust are associated with use of different information channels.¹⁵⁻¹⁷ Traditionally, physicians have served a central gatekeeping role in providing health care information and services to their patients.¹⁸ With such offerings as prescription drugs¹⁹ and detailed technical information on prevention and treatment options online,²⁰ the

communication dynamic between health care professionals and patients may be changing, potentially resulting in more shared decision making.²¹⁻²⁴ Most physicians are already experiencing the effects of patients showing up to their offices armed with printouts from the World Wide Web and requesting certain procedures, tests, or medications.²⁵⁻²⁷

To track the dramatic changes that are occurring in the health information environment nationally, the National Cancer Institute (a component of the US National Institutes of Health) fielded the Health Information National Trends Survey (HINTS) for the first time, from October 28, 2002, to April 14, 2003. Herein, we report data from the baseline administration of this biennial survey to generate precise population estimates for the public's use of, and trust in, different sources of health information.

METHODS

Data for the study were obtained from the 2002-2003 administration of the HINTS. Details of this survey are published elsewhere.²⁸ Briefly, HINTS is a nationally representative telephone survey of persons 18 years or older, scheduled to be conducted every 2 years. Data from the survey will be used by the National Cancer Institute to monitor changes in the public's medical information environment over time and to inform the National Cancer Institute's communication services and research efforts.

Data for the baseline survey were collected between October 28, 2002, and April 14, 2003. A list-assisted design was used to identify household telephone numbers²⁹; telephone exchanges with high concentrations of Hispanic and black residents were oversampled to ensure adequate representation from the 2 largest minority groups in the United States. Response rates based on standards from the American Association for Public Opinion Research³⁰ were 55.0% at the household screening level (ie, the initial contact with the household used for sampling purposes) and 62.8% at the sampled person interview level (ie, completion of the interview by the sampled household member). Those rates are typical of response rates found in other national telephone health surveys.³¹ A total of 6369 persons were included in the final sample.

DEFINITIONS AND MEASURES

The survey covered general content areas related to the use of different health information channels, from the television to the Internet; health behaviors; knowledge of health risks; and adherence to guidelines for healthy living. We used the information channel items to generate population estimates for persons who reported going online to access the Internet, perform tasks on the World Wide Web, or use e-mail. Trust in health information sources was assessed based on individual questions about physicians, family or friends, newspapers, magazines, radio, television, and the Internet. Respondents were asked to rate their level of trust for each source as a lot, some, a little, or not at all.

Sociodemographic variables used in this study were age (18-34, 35-64, and ≥ 65 years), sex, race/ethnicity (Hispanic, non-Hispanic white, non-Hispanic black, and other), education level (less than high school, high school graduate, some college or technical school, and college graduate or more), and annual household income level (<\$25 000, \$25 000-\$49 999, and \geq \$50 000). Income bands were based on a trichotomous split of the data into approximately equal segments.

STATISTICAL ANALYSES

Data were weighted to produce overall and stratified estimates that would be nationally representative of the US population.³² Weights were derived initially from selection probabilities to compensate for planned oversampling procedures. The resulting weights were then calibrated using comparable population characteristics for sex, age, race, and education from data publicly available through the Current Population Survey. A set of 50 replicate weights was produced to allow for analyses that would produce an unbiased estimation of population variance.³³

Analyses were conducted using SAS statistical software, version 8.2 (SAS Institute Inc, Cary, NC) and other computer software (SUDAAN, version 8.0.1); the computer software (SUDAAN) was used to account for the complex survey design and to determine appropriate standard errors and 95% confidence intervals (CIs). Cross-tabulation procedures were used to generate population-based prevalence estimates for online activities across different sociodemographic strata and to investigate levels of trust in different information sources. Logistic regression models were analyzed using computer software (SUDAAN) to investigate the relationship between sociodemographic and health care access measures (independent variables) and level of trust for each of the health information sources (dependent variable). In these models, trust was recoded as a dichotomous variable (a lot or some vs a little or not at all).

RESULTS

INTERNET AND HEALTH USES

To develop a profile of Internet use patterns across the sample, we identified those respondents who indicated they had ever "gone online to access the Internet or World Wide Web, or to send and receive e-mail." From the HINTS data, we found that an estimated 63.0% (95% CI, 61.7%-64.3%) of adults (or roughly 132 million persons) reported ever using the Internet to access Web sites or to use e-mail, with a substantial majority of ever users (86.8%; 95% CI, 85.5%-88.1%) reporting personal access from home. Roughly two thirds (66.4%; 95% CI, 64.7%-68.1%) of those with home access went online through conventional telephone and modem connections, while almost a third reported going online through broadband connections such as a digital subscriber line (10.2%; 95% CI, 8.9%-11.5%) or cable (22.4%; 95% CI, 20.6%-24.2%). Connection rates through wireless devices (0.4%; 95% CI, 0.2%-0.6%) or some other means (0.5%; 95% CI, 0.2%-0.9%) were negligible.

We then took the online population and generated population estimates for different activities across levels of age, sex, race/ethnicity, education, and income (**Table 1**). Percentages represent proportions of the online population, those with Internet access, either at home or elsewhere. Overall estimates suggest that almost two thirds, or 63.7%, of adults online looked for some type of health or medical information either for themselves or for someone else through the Internet. Use of the Internet for health or medical information was generally more common among persons who were younger than 65 years, women, those who were white or other race (eg, Asian), and those who had higher levels of education and income.

Table 1. Adults Who “Ever Went Online” and Who Were Engaged in Health-Related Activities on the Internet During the Previous 12 Months*

Characteristic	Those Who Looked for Health or Medical Information Online						
	Generally	For Self	For Someone Else	Bought Medicines or Vitamins	Communicated With Physician or Physician's Office	Participated in Online Support Group	Other
Age, y							
18-34	64.4 (61.2-67.6)	52.0 (50.1-55.6)	44.3 (40.9-47.8)	5.5 (4.1-6.9)	6.4 (4.7-8.0)	4.1 (2.7-5.5)	6.8 (5.1-8.6)
35-64	64.4 (61.2-67.6)	50.7 (47.8-53.5)	48.4 (45.8-51.0)	11.3 (9.6-13.0)	7.7 (6.4-8.9)	4.0 (2.8-5.2)	8.4 (7.5-9.4)
≥65	48.2 (42.2-54.3)	36.9 (31.3-42.6)	31.3 (25.5-37.0)	11.6 (6.8-16.4)	5.2 (2.5-8.0)	2.8 (0.6-5.0)	3.5 (1.1-5.9)
Sex							
Female	69.8 (67.3-72.3)	58.1 (55.4-60.9)	52.2 (49.6-54.7)	8.2 (7.1-9.2)	6.4 (5.4-7.4)	5.3 (3.8-6.8)	8.8 (7.6-10.0)
Male	57.5 (54.1-60.9)	43.0 (40.0-46.1)	39.4 (35.9-42.9)	10.0 (8.3-11.8)	7.6 (6.0-9.3)	2.6 (1.5-3.6)	6.2 (5.0-7.4)
Race/ethnicity							
White	65.2 (62.9-67.5)	52.0 (49.8-54.2)	48.1 (45.9-50.3)	9.8 (8.4-11.3)	7.3 (6.2-8.4)	4.0 (2.7-5.2)	8.0 (7.2-8.9)
Black	60.5 (53.9-67.0)	47.5 (41.2-53.9)	36.3 (29.1-43.6)	5.2 (2.6-7.8)	6.1 (3.3-9.0)	4.8 (2.5-7.1)	5.5 (3.0-7.9)
Other (multiple)	69.4 (61.3-77.4)	54.1 (44.4-63.9)	50.5 (41.6-59.4)	11.6 (6.7-16.5)	7.2 (2.8-11.6)	5.8 (1.8-9.9)	9.6 (4.8-14.3)
Hispanic	56.5 (49.1-63.8)	42.8 (35.6-50.0)	40.0 (33.1-46.9)	6.6 (3.8-9.4)	6.4 (3.0-9.8)	2.1 (0.4-3.8)	4.8 (1.6-8.0)
Education							
College graduate	73.3 (70.7-75.9)	58.5 (55.4-61.5)	56.1 (53.4-58.8)	11.1 (9.5-12.7)	10.3 (8.6-12.0)	3.3 (2.3-4.4)	9.8 (8.3-11.3)
Some college	65.5 (61.8-69.3)	52.1 (48.9-55.2)	46.8 (43.2-50.3)	9.7 (7.8-11.7)	7.3 (5.6-9.0)	5.0 (2.8-7.3)	8.2 (6.4-9.9)
High school graduate	53.7 (50.0-57.4)	42.8 (39.2-46.3)	37.9 (35.0-40.8)	8.1 (5.4-10.8)	3.5 (2.4-4.7)	3.5 (2.1-4.8)	5.5 (3.7-7.3)
<High school	51.2 (41.1-61.2)	37.9 (29.4-46.4)	28.3 (17.8-38.8)	2.4 (0.0-5.0)	3.2 (0.1-6.2)	4.2 (0.0-8.6)	2.8 (0.2-5.4)
Annual income level, \$							
≥50 000	71.0 (68.1-73.8)	55.0 (52.2-57.8)	52.4 (49.7-55.1)	11.5 (9.6-13.5)	8.1 (6.8-9.4)	3.1 (2.0-4.1)	8.4 (7.2-9.7)
25 000-49 999	59.4 (55.5-63.2)	48.6 (44.3-52.9)	41.9 (38.5-45.3)	7.9 (6.3-9.5)	5.9 (4.2-7.5)	4.7 (2.6-6.8)	7.2 (5.2-9.1)
<25 000	56.6 (51.1-62.1)	45.5 (39.7-51.2)	39.5 (34.5-44.5)	5.6 (3.4-7.7)	7.9 (5.0-10.8)	6.2 (3.3-9.2)	6.9 (4.1-9.7)
Overall	63.7 (61.7-65.8)	50.7 (48.8-52.6)	45.8 (43.8-47.9)	9.1 (8.0-10.2)	7.0 (6.0-8.0)	3.9 (2.9-5.0)	4.7 (4.2-5.2)

*Data are given as mean percentage (95% confidence interval) of adults (weighted). The estimated percentage of those 18 years and older who ever went online was 63.0% (95% confidence interval, 61.7%-64.3%) of the adult population, or 132 008 543 Americans.

Table 2. Level of Trust in Specific Health Information Across Information Sources Among US Adults*

Source	Level of Trust in Cancer Information			
	A Lot	Some	A Little	Not at All
Physician	62.4 (60.8-64.0)	30.7 (29.2-32.2)	5.2 (4.4-5.9)	1.7 (1.1-2.4)
Internet	23.9 (22.4-25.4)	40.9 (39.3-42.6)	12.4 (11.3-13.4)	22.8 (21.6-24.0)
Television	20.0 (18.8-21.3)	51.0 (49.2-52.7)	21.2 (19.9-22.4)	7.8 (7.0-8.6)
Family or friends	18.9 (17.9-20.0)	48.9 (47.4-50.3)	25.3 (23.9-26.7)	6.9 (6.0-7.7)
Magazines	15.9 (14.7-17.0)	50.3 (48.7-51.9)	21.0 (19.9-22.2)	12.8 (11.8-13.8)
Newspapers	13.1 (12.0-14.2)	50.3 (48.6-52.0)	23.7 (22.3-25.1)	12.8 (11.7-13.9)
Radio	9.9 (8.8-11.0)	44.0 (42.2-45.9)	25.8 (24.3-27.4)	20.2 (18.9-21.6)

*Data are given as mean percentage (95% confidence interval) of adults (weighted).

Use of the Internet for purposes besides health information seeking was much less common, with only 3.9% having participated in an online support group, 7.0% using e-mail to communicate with a physician or physician's office, 9.1% buying medicine or vitamins online, and 4.7% engaging in some other type of online activity (eg, looking up a physician's address).

TRUST IN HEALTH INFORMATION SOURCES

Data on trust of sources for information about cancer are listed in **Table 2**. Respondents expressed a high level of trust for information provided by physicians, especially in contrast to all the other sources. Trust in the Internet as a health information source was divided, with

about one fourth expressing a lot of trust and one fourth expressing no trust. Radio was the least trusted health information source.

Table 3 contains findings from logistic regression analyses in which the dichotomous outcome of high vs low trust was regressed on sociodemographic variables. Several consistent patterns emerged from these analyses. Trust in health information sources was strongly age and sex dependent, with persons aged 18 to 34 and 35 to 64 years and women generally more trusting of most sources. The differences in trust by age are especially pronounced for the Internet: adults aged 18 to 34 years were more than 10 times as likely, and adults aged 35 to 64 years were more than 5 times as likely, as those 65 years or older to report a lot or some trust in the Internet.

Table 3. Data for “Higher Level of Trust” (a Lot or Some) Regressed on Sociodemographic Characteristic by Channel*

Characteristic	Channel						
	Physician	Internet	Television	Family/Friends	Magazines	Newspapers	Radio
Age, y							
18-34	2.6 (1.4-5.0)†	10.3 (7.4-14.2)†	1.9 (1.4-2.6)†	1.4 (1.0-2.0)	1.9 (1.4-2.5)†	2.0 (1.5-2.6)†	2.4 (1.8-3.1)
35-64	1.4 (0.7-2.8)	5.2 (3.9-6.9)†	1.6 (1.2-2.1)†	1.5 (1.2-2.0)†	1.7 (1.4-2.1)†	1.3 (1.0-1.7)	2.1 (1.6-2.6)
≥65‡	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sex							
Female	2.1 (1.4-3.3)†	1.2 (1.0-1.5)	1.7 (1.3-2.1)†	1.3 (1.1-1.6)†	1.6 (1.3-1.9)†	1.5 (1.3-1.8)†	1.2 (0.9-1.4)†
Male‡	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Race/ethnicity							
White	1.9 (1.2-3.2)	1.3 (1.0-1.7)	0.9 (0.6-1.2)	1.5 (1.1-2.0)†	1.2 (0.8-1.6)	1.0 (0.7-1.4)	0.9 (0.6-1.2)
Black	2.3 (1.2-4.4)	1.4 (1.0-1.9)	1.6 (1.1-2.3)	1.3 (1.0-1.9)	1.4 (0.9-2.1)	1.1 (0.7-1.7)	1.0 (0.7-1.5)
Other (multiple)	1.5 (0.7-3.2)	1.1 (0.6-2.0)	1.0 (0.6-1.7)	1.2 (0.8-1.9)	0.9 (0.5-1.5)	0.8 (0.5-1.4)	0.9 (0.5-1.5)
Hispanic‡	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Education							
College graduate	4.7 (2.5-9.2)†	3.8 (2.8-5.2)†	1.4 (0.9-2.0)	1.4 (1.0-2.0)	2.7 (2.0-3.7)	2.4 (1.6-3.6)†	1.5 (1.1-2.2)
Some college	1.3 (0.6-2.9)	3.1 (2.3-4.3)†	1.7 (1.2-2.4)†	1.4 (1.0-2.0)	2.7 (1.9-3.7)†	2.1 (1.5-2.9)†	1.3 (0.9-2.0)
High school	1.5 (0.9-2.2)	1.7 (1.3-2.2)†	1.6 (1.2-2.2)†	1.4 (1.0-2.0)	1.6 (1.3-2.0)†	1.5 (1.1-2.0)†	1.1 (0.8-1.4)
<High school‡	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Annual income level, \$							
≥50 000	1.7 (0.8-3.5)	1.2 (0.9-1.6)	0.9 (0.7-1.2)	1.0 (0.8-1.3)	1.0 (0.8-1.2)	0.9 (0.7-1.2)	1.1 (0.9-1.4)
25 000-49 999	1.8 (1.1-2.9)	1.2 (0.9-1.6)	0.8 (0.6-1.1)	1.1 (0.9-1.4)	1.1 (0.9-1.4)	1.2 (0.9-1.5)	1.0 (0.8-1.3)
<25 000‡	1.0	1.0	1.0	1.0	1.0	1.0	1.0

*Data are given as odds ratio (95% confidence interval).

†Significant at $P < .01$.

‡Referent.

Level of education was also independently associated with trust of most health information sources: those with higher levels of education (ie, a high school education or greater) were more trusting of the Internet, magazines, and newspapers than persons with less than a high school education.

PREFERRED AND ACTUAL SOURCES FOR CANCER INFORMATION

To examine the relationship between trust and actual behavior, we turned to those items in the HINTS baseline instrument that did the following: (a) asked all respondents where they would go first for information about cancer as a specific disease type and (b) asked those who had looked for cancer information where they actually went. A striking contrast between where people preferred going and where they actually went is illustrated in the **Figure**.

Figure, A, clearly demonstrates that health care providers and the Internet are the dominant sources people would prefer to use first when seeking information about a specific disease (cancer). When asked where they preferred going for cancer information, 49.5% (95% CI, 48.1%-50.8%) reported wanting to go to their physicians first. There were also strong age-related differences: persons 65 years and older were almost 10 times more likely to go to health care providers first before going to the Internet (75.6% vs 7.7%), whereas persons aged 18 to 34 or 35 to 64 years were almost equally split between health care providers and the Internet, with the Internet being their first choice (38.9% vs 46.6%). Figure, B, demonstrates what happened when health informa-

tion seekers actually looked for information about cancer. Overall, 48.6% (95% CI, 46.1%-51.0%) reported going to the Internet as a source of first resort, while only 10.9% (95% CI, 9.5%-12.3%) reported going to health care providers first across all ages. Those in the 18- to 34-year age range were almost 9 times more likely to go to the Internet first before going to providers (61.1% vs 7.1%). An almost equal percentage of persons 65 years and older reported going to the Internet first compared with providers first (21.4% vs 20.9%).

COMMENT

The first population estimate of Internet use provided by a federal scientific survey placed penetration rate for Americans 3 years and older at 22.2% in 1997. Subsequent estimates documented a steady climb to 32.7% in 1998, 44.4% in 2000, and 53.9% in 2001.³⁴ Data from the first administration of the HINTS fixed the penetration rate for adults 18 years and older at 63.0% of the US adult population. That estimate is remarkably similar to data reported by the Pew Internet and American Life Project for the same period (also at 63%).³⁵ Subsequent reports by the Pew Research Center suggest that overall penetration has reached a plateau, and is hovering at the 63% mark for adults.³⁶ What has changed is the switch from dial-up to broadband access. About one third of the respondents in the HINTS sample accessed the Internet through high-speed connections in 2003. The most recent data from the Pew Research Center push that estimate up to more than half of the online user population. What is significant about the changeover is that the “al-

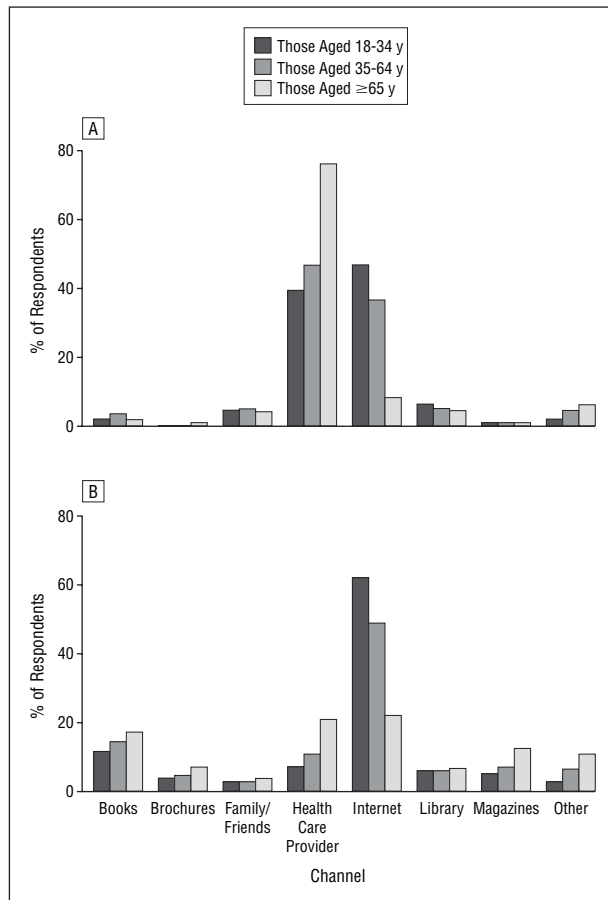


Figure. Indications of where respondents would go first when seeking information about cancer (A) and reports of where respondents actually went first when looking for information about cancer (B).

ways on” availability of broadband access encourages users to engage in new types of activities, including health activities, online.^{37,38}

ONLINE ACTIVITIES RELATED TO HEALTH

In the HINTS 2003 administration, health information seeking was by far the most commonly reported online activity, with 63.7% of the online population indicating that they had searched for health or medical information for themselves or for others at least once in the previous 12 months. The relatively high percentage of people in the HINTS interviews who reported looking for information for others is indicative of a secondary impact from the Internet, as observed previously by Fox and Rainie.⁴ The implication for physicians is that patients may come into the office with printouts that they did not personally collect; the implication for Web site designers is that health information seekers may be looking for easy-to-print materials to give others.

Those who searched online the most tended to be younger, women, and better educated, and tended to have higher incomes than those who searched the least. These findings parallel conclusions from a recent analysis³⁹ of patient preferences for type of primary care, as documented in the medical literature. From their systematic

reviews, the researchers noted that those who are younger and who had higher incomes tended to be more active in their orientation toward primary care, while those who were older and had smaller incomes tended to be more passive. The effect may be generational, with those in the pre-World War II generation acculturated to be passive followers of physicians’ orders, and those in the post-war baby boom acculturated to be active consumers of health care. With the passing of the World War II generation and the “graying of the Baby Boomers,” the trend merits monitoring in future surveys.

Another trend that bears monitoring is the use of the Internet for personal health maintenance kinds of behaviors. The observation is what authors of the Pew Research Center’s *Trends 2005* report³⁶ referred to as the new normal, or an incorporation of the Internet into daily mainstream activities,⁴⁰ especially as more and more Americans access the Internet via broadband.^{37,38} In this regard, the estimated percentage of online consumers who bought medicine or vitamins through the Internet was 9.1% (95% CI, 8.0%-10.2%). Although that number is relatively low at this stage, the absolute number is high and bears monitoring in future administrations of the survey. The American Medical Association and the US Food and Drug Administration have expressed concern over online pharmaceutical purchases as substandard medical care.⁴¹

Similarly, the estimated percentage of online Americans who report using e-mail to communicate with their physicians is also relatively low at 7.0% (95% CI, 6.0%-8.0%), a finding borne out in at least 1 other scientific sample.⁴² Again, it is worth monitoring that trend as increases in the use of patient-initiated e-mail will undoubtedly signal accompanying changes in office management practices.⁴³ Efficiency concerns with e-mail may be exacerbated by ongoing and increasing concerns over spam (unwanted junk mail) and phishing (use of bogus e-mail to obtain private information) in the online e-mail environment.⁴⁴

The online behavior with the lowest frequency was participating in online support groups, at 3.9% (95% CI, 2.9%-5.0%) of the online population. That percentage is consistent with data from the National Health Interview Survey regarding the small numbers in the general population who use support groups at any given time.⁴⁵ However, data on what constitutes a successful online support group are mixed, and ongoing research is warranted.⁴⁶

TRUST AND RELIANCE

Analyses of the trust and reliance measures present an emerging picture of how the physician’s role may be perceived by the public in the changing health information environment. Respondents’ rating of trust in physicians in the HINTS data exceeded that of any other information channel for health or medical information, and the trend was strongest for respondents who were young, educated, and women. This is the same population that is online. Ongoing attention may be needed to adjust reimbursement policies for time spent with patients interpreting printouts,⁴⁷⁻⁴⁹ for accommodating shifts toward informed and shared decision making,⁵⁰⁻⁵² for steering consumers to credible information sources,^{53,54} and for at-

tending to the needs of those who fall through the cracks of the digital divide.^{8,55,56}

LIMITATIONS OF THE STUDY

The HINTS data were derived from a nationally representative sample of structured interviews conducted by telephone. The biggest limitations of the study come from the natural liabilities of a random digit-dial telephone survey, the limitations of a self-reported and largely retrospective survey method, the unknown validity of some of the measures at baseline, and diminishing response rates in telephone surveys.³¹ New methods are being explored within the National Cancer Institute to complement federal survey data collection with converging sources of evidence. Techniques such as ecological momentary assessment (or real-time data collection using portable technologies), Web-based surveys, online data capture, and network analysis are being explored as complementary sources of data.⁵⁷

In conclusion, evidence from the first administration of the HINTS interview gives credence to the observation that people are turning to the World Wide Web as an information source of first resort, while relying on health care providers as their most trusted arbiter of information quality. The finding heralds a change in the information role of physicians; physicians may no longer be seen as solitary caretakers but as trusted partners in helping patients sort through information derived from an expanding network of personal and mediated information channels. Although definitive conclusions from the national study are premature—the cross-sectional nature of the survey begs the question of causality—the biennial administration of a survey designed to study the public's use of health information should serve as an important bellwether for dramatic changes in the national health information environment.

Accepted for Publication: June 13, 2005.

Correspondence: Bradford W. Hesse, PhD, National Cancer Institute, 6130 Executive Blvd, Mail Stop Code 7365, Bethesda, MD 20892-7365 (hesseb@mail.nih.gov).

Financial Disclosure: None.

REFERENCES

1. Neuhauser L, Kreps GL. Rethinking communication in the E-health era. *J Health Psychol.* 2003;8:7-23.
2. Rice RE. The Internet and health communication: a framework of experiences. In: Rice RE, Katz JE, eds. *The Internet and Health Communication: Experiences and Expectations.* Thousand Oaks, Calif: Sage Publications; 2001:5-46.
3. Harris LM, ed. *Health and the New Media: Technologies Transforming Personal and Public Health.* Mahwah, NJ: Lawrence A Erlbaum Associates; 1995.
4. Fox S, Rainie L. *Vital Decisions: How Internet Users Decide What Information to Trust When They or Their Loved Ones Are Sick: Technical Report From the Pew Internet and American Life Project.* Washington, DC: Pew Research Center; 2002.
5. Institute of Medicine. *Speaking of Health: Assessing Health Communication Strategies for Diverse Populations.* Washington, DC: National Academies Press; 2002.
6. Balch DC, Tichenor JM. Telemedicine expanding the scope of health care information. *J Am Med Inform Assoc.* 1997;4:1-5.
7. Strode SW, Gustke S, Allen A. Technical and clinical progress in telemedicine. *JAMA.* 1999;281:1066-1068.
8. Kline K. Popular media and health: images, effects, and institutions. In: Thompson TL, Dorsey AM, Miller KI, Parrott R, eds. *Handbook of Health Communication.* Mahwah, NJ: Lawrence A Erlbaum Associates; 2003:557-581.
9. National Telecommunications and Information Administration. *Falling Through the Net: Defining the Digital Divide.* Washington, DC: US Dept of Commerce; 1998.
10. US Department of Health and Human Services. *Secretary Thompson, Seeking Fastest Possible Results, Names First Health Information Technology Coordinator.* Washington, DC: US Dept of Health and Human Services; 2004. News release.
11. US Department of Health and Human Services. *Information for Health: A Strategy for Building the National Health Information Infrastructure.* Washington, DC: US Dept of Health and Human Services; 2001.
12. Kim MI, Johnson KB. Patient entry of information: evaluation of user interfaces. *J Med Internet Res.* 2004;6:e13. Available at: <http://www.jmir.org/2004/2/e13>. Accessed April 15, 2005.
13. Institute of Medicine. *Networking Health: Prescriptions for the Internet.* Washington, DC: National Academy Press; 2000.
14. Hersh WR. Medical informatics: improving health care through information. *JAMA.* 2002;288:1955-1958.
15. Eng TR, Maxfield A, Patrick K, Deering MJ, Ratzan SC, Gustafson DH. Access to health information and support: a public highway or a private road? *JAMA.* 1998; 280:1371-1375.
16. Eng TR, Gustafson DH, eds. *Wired for Health and Well-being: The Emergence of Interactive Health Communication.* Washington, DC: US Dept of Health and Human Services; 1999.
17. Pearson SD, Raeke LH. Patients' trust in physicians: many theories, few measures, and little data. *J Gen Intern Med.* 2000;15:509-513.
18. Arora NK. Interacting with cancer patients: the significance of physicians' communication behavior. *Soc Sci Med.* 2003;57:791-806.
19. Voelker R. Northern R,-posure: US, Canada clash on cross-border medication sales. *JAMA.* 2003;290:2921-2925.
20. Chen X, Siu LL. Impact of the media and the Internet on oncology: survey of cancer patients and oncologists in Canada. *J Clin Oncol.* 2001;19:4291-4297 Medline:11731511.
21. Smith R. The future of healthcare systems. *BMJ.* 1997;314:1495-1496.
22. Briss P, Rimer B, Reiley B, et al. Promoting informed decisions about cancer screening in communities and healthcare systems. *Am J Prev Med.* 2004;26:67-80.
23. Sheridan SL, Harris RP, Woolf SH. Shared decision making about screening and chemoprevention: a suggested approach from the US Preventive Services Task Force. *Am J Prev Med.* 2004;26:56-66.
24. Harrington J, Noble LM, Newman SP. Improving patients' communication with doctors: a systematic review of intervention studies. *Patient Educ Couns.* 2004; 52:7-16.
25. Coelho PC. The Internet: increasing information, decreasing certainty. *JAMA.* 1998; 280:1454.
26. Berland GK, Elliott MN, Morales LM, et al. Health information on the Internet: accessibility, quality, and readability in English and Spanish. *JAMA.* 2001;285: 2612-2621.
27. Murray E, Lo B, Pollack L, et al. The impact of health information on the Internet on the physician-patient relationship: patient perceptions. *Arch Intern Med.* 2003; 163:1727-1734.
28. Nelson DE, Kreps GL, Hesse BW, et al. The Health Information National Trends Survey (HINTS): development, design, and dissemination. *J Health Commun.* 2004;9:443-460.
29. Tucker C, Casady RJ, Lepkowski J. A hierarchy of list-assisted stratified telephone sample design options. In: *1993 Proceedings of the Section on Survey Research Methods.* Alexandria, Va: American Statistical Association; 1993:982-987.
30. American Association for Public Opinion Research. Standard definitions: final dispositions of case codes and outcome rates for surveys. Available at: <http://www.aapor.org/pdfs/newstandarddefinitions.pdf>. Accessed August 19, 2003.
31. Krosnick JA, Chang L. A comparison of the random digit dialing telephone survey methodology with Internet survey methodology as implemented by Knowledge Networks and Harris Interactive. Available at: <http://www.psy.ohio-state.edu/social/krosnick.htm>. Accessed July 17, 2003.
32. Deville JC, Sarndal CE. Calibration estimators in survey sampling. *J Am Stat Assoc.* 1992;87:376-382.
33. Korn EL, Graubard BI. *Analysis of Health Surveys.* New York, NY: John Wiley & Sons Inc; 1999.
34. US Department of Commerce. *A Nation Online: How Americans Are Expanding Their Use of the Internet.* Washington, DC: US Dept of Commerce; 2002.
35. Madden M. *America's Online Pursuits: The Changing Picture of Who's Online and What They Do: Technical Report From the Pew Internet and American Life Project.* Washington, DC: Pew Research Center; 2003.
36. Pew Research Center. *Trends 2005: Information for the Public Interest.* Washington, DC: Pew Research Center; 2005.
37. Fox S. *Health Information Online: Technical Report From the Pew Internet and American Life Project.* Washington, DC: Pew Research Center; 2005.

38. Horrigan J, Rainie L. *The Broadband Difference: How Online American's Behavior Changes With High-Speed Internet Connections at Home: Technical Report From the Pew Internet and American Life Project*. Washington, DC: Pew Research Center; 2002.
39. Jung HP, Baerveldt C, Olesen F, Grol R, Wensing M. Patient characteristics as predictors of primary health care preferences: a systematic literature analysis. *Health Expect*. 2003;6:160-181.
40. Eysenbach G. The impact of the Internet on cancer outcomes. *CA Cancer J Clin*. 2003;53:356-371.
41. US General Accounting Office. *Internet Pharmacies: Some Pose Safety Risks for Consumers: Report to the Chairman, Permanent Subcommittee on Investigations, Committee on Governmental Affairs, US Senate*. Washington, DC: US General Accounting Office; 2004. Technical document 04-820.
42. Baker L, Wagner TH, Singer S, Bundorf MK. Use of the Internet and email for health care information: results from a national survey. *JAMA*. 2003;289:2400-2406.
43. The Institute for the Future. *Health and Health Care 2010: The Forecast, the Challenge*. 2nd ed. San Francisco, Calif: Jossey-Bass; 2003.
44. Fallows D. CAN-SPAM a year later. Available at: <http://www.pewinternet.org>. Accessed May 31, 2005.
45. Hewitt M, Breen N, Devesa S. Cancer prevalence and survivorship issues: analyses of the 1992 National Health Interview Survey. *J Natl Cancer Inst*. 1999; 91:1480-1486.
46. Eysenbach G, Powell J, Englesakis M, Rizo C, Stern A. Health related virtual communities and electronic support groups: systematic review of the effects of on-line peer to peer interactions. *BMJ*. 2004;328:1166-1170.
47. Kemper DW, Mettler M. *Information Therapy: Prescribed Information as a Reimbursable Medical Service*. Boise, Idaho: Healthwise Inc; 2002.
48. DiMatteo MR. The role of the physician in the emerging health care environment. *West J Med*. 1998;168:328-333.
49. Robinson TN, Patrick K, Eng TR, Gustafson D. An evidence-based approach to interactive health communication: a challenge to medicine in the information age. *JAMA*. 1998;280:1264-1269.
50. Street RL. Communication in medical encounters: an ecological perspective. In: Thompson TL, Dorsey AM, Miller KI, Parrott R, eds. *Handbook of Health Communication*. Mahwah, NJ: Lawrence A Erlbaum Associates; 2003:63-89.
51. Epstein RM. The science of patient-centered care. *J Fam Pract*. 2000;49:805-807.
52. Anderson EB. Patient-centeredness: a new approach. *Nephrol News Issues*. 2002; 16:80-82.
53. Eysenbach G, Diepgen TL. Towards quality management of medical information on the Internet: evaluation, labeling, and filtering of information. *BMJ*. 1998; 317:1496-1500.
54. Silberg WM, Lundberg GD, Musacchio RA. Assessing, controlling, and assuring the quality of medical information on the Internet: caveat lector et viewer—let the reader and viewer beware. *JAMA*. 1997;277:1244-1245.
55. Viswanath K, Finnegan JR. The knowledge gap hypothesis: twenty-five years later. In: Burleson B, ed. *Communication Yearbook 19*. Thousand Oaks, Calif: Sage Publications; 1996:187-227.
56. Lenhart A, Horrigan J, Rainie L, et al. *The Ever-Shifting Internet Population: A New Look at Internet Access and the Digital Divide: Technical Report From the Pew Internet and American Life Project*. Washington, DC: Pew Research Center; 2003.
57. National Cancer Institute. The science of real-time data capture: self-reports in health research, September 5-7, 2003. Available at: <http://cancercontrol.cancer.gov/hprb/real-time>. Accessed April 15, 2005.