Health Information Technology

Public Attitudes about Health Information Technology, and Its Relationship to Health Care Quality, Costs, and Privacy

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Objective. To understand Americans' attitudes concerning health information technology's (IT's) potential to improve health care and differences in those attitudes based on demographics and technological affinity.

Data Sources/Study Setting. A random-digit-dial sample with known probability of selection for every household in the United States with a telephone, plus a supplemental sample of cell phone users. Telephone interviews were conducted from August 2009 through November 2009.

Study Design. Data were analyzed to present univariate estimates of Americans' opinions of health IT, as well as multivariate logistic regressions to assess hypotheses relating individuals' characteristics to their opinions. Characteristics used in our model include age, race, ethnicity, gender, income, and affinity to technology.

Findings. A large majority (78 percent) favor use of electronic medical records (EMRs); believe EMRs could improve care and reduce costs (78 percent and 59 percent, respectively); believe benefits of EMR use outweigh privacy risks (64 percent); and support health care information sharing among providers (72 percent). Regression analyses show more positive attitudes among those with higher incomes and greater comfort using electronic technologies.

Conclusion. The findings suggest that American's believe that health IT adoption is an effective means to improve the quality and safety of health care.

Key Words. Medical informatics, health care surveys, health knowledge, attitudes, practice, public opinion

The United States spends more on health care than any other country and has one of the fastest growth rates in health spending among developed countries (Organization for Economic Co-Operation and Development 2008). Yet the United States performs below other countries on measures such as life

expectancy, access to care, and demographic disparities (Kaiser Family Foundation 2007). There is also evidence that preventable errors lead to high costs and poor health care outcomes in the United States (Kohn, Corrigan, and Donaldson 2000; Fernandopulle et al. 2003; Zhan and Miller 2003; Encinosa and Hellinger 2008; Kumar and Steinebach 2008).

The Institute of Medicine has identified the use of health information technology (health IT) as a measure to help improve health care system performance and quality of care (Committee on Quality of Health Care in America, Institute of Medicine 2001). The health care system still operates primarily with paper-based records and lags behind many other industries in adoption of IT (Hillestad et al. 2005; Robert Wood Johnson Foundation 2006; Blumenthal and Glaser 2007; Shields et al. 2007; DesRoches et al. 2008; Furukawa et al. 2008; Jha et al. 2009). In 2004, President Bush set a goal of assuring that most Americans have electronic medical records (EMRs) within the next 10 years, and he announced several new initiatives, including doubling funding for demonstration projects on health IT, using the federal government to foster the adoption of health IT, and creating the position of National Coordinator for Health Information Technology (George W. Bush White House Archives 2004; Office of the National Coordinator 2008). More recently, President Obama set the goal of achieving EMRs for all Americans within 5 years (Childs, Chang, and Grayson 2009) and set aside more than U.S.\$20 billion (Congressional Budget Office 2009) in direct and indirect supports for health IT adoption as part of the American Recovery and Re-construction Act of 2009 (U.S. Congress 2009).

Although health IT has been demonstrated to improve medical care under certain conditions, there is no consensus on how to achieve these benefits across the U.S. health care system as a whole (Chaudhry et al. 2006; Blumenthal and Glaser 2007). Existing research on the slow adoption rate of health IT notes the high cost of adoption; technological change leading to system obsolescence, accreditation, and standardization issues; concerns about integration with administration systems; providers' productivity during implementation; identifying systems that meet organizational needs; and privacy and security concerns (Valdes et al. 2004; Hillestad et al. 2005; Robert

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Wood Johnson Foundation 2006; Shields et al. 2007; DesRoches et al. 2008; Furukawa et al. 2008; Blumenthal 2009; Jha et al. 2009). Most research has examined clinicians' and health care organizations' decisions and attitudes about health IT. There are only a handful of studies on consumer attitudes about health IT despite substantial evidence that consumer attitudes toward a technology are a very important factor in its adoption and success (Venkatesh 2000). An environmental scan to identify surveys on consumers' use and opinions on electronic health records (EHRs) and personal health record (PHRs) found few that were rigorous, noting that response rates and question development methods were generally unreported (Donelan and Miralles 2008).

Previous studies of consumers' perceptions of health IT studies have generally shown the public to be relatively unknowledgeable of health IT, but they have also yielded contradictory results. In a 2006 study, only 4 percent of respondents had doctors who used any form of health IT and less than one-third of Americans had heard of the federal government's efforts to create a nationwide system of EMRs (Harris Poll 2007). This study showed strong public support for the entire range of currently available health IT, and a 2006 survey showed that Americans overwhelmingly want to have electronic copies of their medical records. However, another study conducted at the same time found that only 34 percent of respondents believed that an EMR would improve the quality of health care they receive; some 24 percent did not believe an EMR would help improve quality; and 42 percent were undecided or needed more information (Robeznieks 2006). Most recently, a study conducted among members of a large, staff model managed care organization making use of health IT shows that patients agree that health IT can improve the efficiency of care delivery (Chen et al. 2009).

Prior surveys also reveal important consumer concerns over the potential exposure of their private medical information (Connecting for Health 2003; Harris Poll 2007). While some studies show that the majority of consumers trust in hospitals', public health agencies', and providers' treatment of their privacy (Harris Poll 2005), these studies indicated that the public is wary of the ability of the institutions to manage their personal data (Goodwin et al. 2002). A 2006 web survey found that individuals believe the expected benefits of EMRs to patients and society were offset by the risks to privacy (Harris Poll 2007).

Although useful, prior studies on consumer attitudes toward health IT have important limitations. First, most of these studies are 3–6 years old, and given the rapid developments in this field, the public's awareness of and attitudes toward health IT are likely to be changing rapidly as well. In addition, as noted above, these studies focused on a small group of specific questions or were

conducted with a very select group of respondents (e.g., closed panels of members from a single health plan). Finally, these studies used web panels, omnibus surveys, and polls with relatively small sample sizes, with the accompanying methodological problems such as nonrandom sampling, biased selection, and nonresponse bias, and limited statistical power. These methodological limitations are a possible explanation for the studies' often contradictory results.

In this paper, we present findings from a very recent, comprehensive, and methodologically rigorous survey of public attitudes toward health IT and EMRs in particular. The current study uses a large sample size (1,015), is based on probability-based random-digit-dial (RDD) sampling, was conducted using a stand-alone interview (and not a larger omnibus survey on many topics), and with rigorous callback rules and in-depth interviewer training, unlike many polls. While these approaches do not eliminate all potential sources of bias (e.g., from nonresponse), they do ensure that this study provides timely and rigorous results that are generalizable to the U.S. general population. We also explore a number of topics that have not been previously investigated.

METHODS

We selected a national RDD sample from households across the United States. Telephone numbers were drawn from telephone banks with at least one known working number. Interviewers asked for the youngest male, 18 years of age or older in the household, and, if no male was available, the youngest female aged 18 or older was asked to respond to the survey. If the successful contact was established between 9 A.M. and 5 P.M. Monday through Friday, a callback would be set to speak with the selected person if that person was not available at the time of the call. At all other times the selection set was based on persons at home at the time.

The final response rate was 43 percent (based on the widely accepted Council of American Survey Research Organizations, CASRO, method¹). Under this method, our response rate is calculated as the product of the resolution rate (86 percent), the screener rate (76 percent), and the interview completion rate (66 percent). This response rate is comparable to many RDD surveys of the general population (Goold, Fessler, and Moyer 2006; Centers for Disease Control and Prevention: Morbidity and Mortality Weekly Report 2007; Fuemmeler et al. 2007; Blendon et al. 2008a,b; Cantor et al. 2009). Experts have noted that RDD telephone survey participation has declined recently due to factors such as increased cell phone usage and call-screening

technologies; however, research suggests that this does not necessarily increase nonresponse bias (Curtin, Presser, and Singer 2005; Groves 2006; Keeter et al. 2006; Davern et al. 2010). A supplemental sample of individuals who use cell phones as their main telephone line was also collected to ensure the results are generalizable to cell phone users.²

Telephone interviews were conducted in English and Spanish by professional interviewers. The interviews took place from late August 2009 through early November 2009. The survey collected information on consumers' attitudes and experiences with EMRs, electronic prescribing, and electronic PHRs,³ as well as broader health IT questions related to security, electronic medical information sharing, and the patient–physician relationship. Formal cognitive testing was performed on a draft version of the instrument to ensure understandability and validity of survey questions. All questions were then piloted with a sample of 30 respondents prior to the study, and minor adjustments were made to items based on the pilot.

Sampling weights were calculated to adjust for sample design aspects (such as unequal probabilities of selection) and for nonresponse bias arising from differential response rates across various demographic groups. Poststratification variables included gender, region of residence, age categories, educational level, and ethnicity/race. The weighted data, which thus reflect the U.S. general population, were used for all analyses.

Univariate results on the overall attitudes and opinions are reported as weighted frequencies and proportions (with confidence intervals [CIs]). Multivariate analyses used logistic regression to assess the relative importance of various respondent characteristics on specific attitudes. Respondent characteristics used in our model include age, race, ethnicity, gender, education, income, and level of affinity to technology. We included a number of different questions to assess affinity with computers and technology. However, because analyses conducted using several variations of these variables yielded similar results, we limited our final model to the two technology affinity variables that were most straightforward to interpret: respondents' level of comfort using new electronic technology and the amount of time respondents spent online.

RESULTS

Electronic Medical Records

The survey centered on respondents' opinions about health IT. As presented in Table 1, a large majority of respondents—77 percent (95 percent CI,

Table 1: Opinions of Likely Benefits of Adopting Electronic Medical Records (EMRs), Electronic Prescribing, and Personal Health Records (PHRs)

% (CI)	Yes	No	DK*	Agree	Neutral*	Disagree	DK*	Favor	Neutral*	Oppose	DK*
Questions on EMRs											
Before starting this survey, did you know what EMRs were?	N = 1,014 77 (74–81)	22 (18–25)	1 (0–2)								
EMRs are likely to improve medical care. Do you . . .	N = 1,012			78 (75–81)	2 (1–2)	19 (16–22)	1 (0–2)				
EMRs are likely to reduce the cost of medical care. Do you . . .	N = 1,014			59 (56–63)	3 (2–4)	34 (30–37)	4 (3–5)				
Do you . . .											
Do you favor or oppose your doctor using EMRs during your visit?	N = 1,004							78 (74–81)		17 (14–20)	5 (3–7)
Questions on electronic prescribing											
Before starting this survey, did you know prescriptions can be handled this way?	N = 1,014 64 (60–67)	36 (32–39)	1 (0–1)								
Has your doctor used electronic prescribing for your medication prescriptions?	N = 1,015 44 (40–48)	49 (45–52)	7 (5–9)								
Electronic prescribing is likely to improve medical care. Do you . . .	N = 1,014			74 (71–77)	2 (1–3)	23 (20–26)	1 (1–2)				
Electronic prescribing is likely to reduce the cost of medical care. Do you . . .	N = 1,015			56 (52–60)	3 (2–5)	37 (34–41)	4 (2–5)				

continued

Table 1. Continued

<i>% (CI)</i>	<i>Yes</i>	<i>No</i>	<i>DK^a</i>	<i>Agree</i>	<i>Neutral^b</i>	<i>Disagree</i>	<i>DK^a</i>	<i>Favor</i>	<i>Neutral^b</i>	<i>Oppose</i>	<i>DK^a</i>
Do you favor or oppose your doctor using electronic prescribing for your medication prescriptions?	<i>N</i> = 1,012							80 (77–83)		15 (13–18)	5 (3–6)
Questions on PHRs											
Before starting this survey, did you know what electronic PHRs were?	<i>N</i> = 1,014	57 (53–61)	43 (39–46)	0 (0–1)							
Do you have an electronic PHR?	<i>N</i> = 1,014	20 (17–23)	69 (65–72)	11 (9–14)							
Electronic PHRs are likely to improve medical care.	<i>N</i> = 1,015			71 (68–75)	2 (1–3)	25 (22–28)	1 (1–2)				
Do you ...											
Electronic PHRs are likely to reduce the cost of medical care. Do you ...	<i>N</i> = 1,015			58 (55–62)	2 (1–3)	36 (33–40)	3 (2–5)				
Electronic PHRs are likely to help patients be better informed about their health.	<i>N</i> = 1,015			79 (76–82)	2 (1–3)	18 (15–21)	0 (0–1)				
Do you ...											
Do you favor or oppose using electronic PHRs?	<i>N</i> = 1,012							68 (65–72)		27 (24–31)	5 (3–6)

^aInterviewers were instructed to record a “Neutral” or “Don’t know” response if offered unprompted by the respondent.

74.1–80.8)—was aware of EMRs and reported that they knew what they were before taking the survey. A similar percentage—78 percent (95 percent CI, 74.4–80.8)—favored the use of electronic records in doctor's offices as part of the office visit, with only 17 percent (95 percent CI, 14.3–20.1) opposed to their use. Seventy-eight percent of respondents (95 percent CI, 75–81.3) believe that EMRs are likely to improve medical care. However, only 59 percent (95 percent CI, 55.6–63) of Americans believe EMRs will reduce the cost of care.

E-Prescribing

After hearing a brief description of e-prescribing, respondents were asked if they were aware of their physician ever prescribing their medications in this manner as well as about perceived benefits of using this tool. Sixty-four percent (95 percent CI, 59.9–67.2) of respondents previously knew that prescriptions could be handled electronically. While only 44 percent (95 percent CI, 40.4–47.9) of respondents indicated being aware of their physician using e-prescribing, large majorities agreed that e-prescribing had potential benefits. Eighty percent (95 percent CI, 77–83) of respondents favored use of e-prescribing, 74 percent (95 percent CI, 70.7–77.2) agreed that e-prescribing is likely to improve medical care, and 56 percent (95 percent CI, 52.1–59.6) agreed that e-prescribing would reduce the cost of medical care.

Personal Health Records

We asked respondents about their attitudes toward PHRs. After we provided a brief description of PHRs, 57 percent (95 percent CI, 53.5–61) indicated that they knew what PHRs were before the survey. While very few respondents indicated that they are currently using a PHR, 20 percent (95 percent CI, 17.3–23.2), most—71 percent (95 percent CI, 68–74.7)—agreed that PHR use could improve their health care. A large majority, 79 percent (95 percent CI, 76.4–82.4), agreed that using PHRs would help patients to be better informed about their health, while only 58 percent (95 percent CI, 54.6–62) agreed that PHR use would reduce medical care costs.

Health IT and Health Care Choices

We also asked respondents to discuss how their doctor's use of health IT might affect their interactions with the health care system. Despite their beliefs in the potential of EMRs to improve health care and reduce errors, only 32 percent (95 percent CI, 28.6–35.7) said that they would be more likely to choose a

doctor who uses health IT in his practice, while 57 percent (95 percent CI, 53.5–61) said it would make no difference, and 10 percent (95 percent CI, 7.5–11.8) responded that a doctor's use of health IT would make them less likely to choose that doctor. This ambivalence is evident when respondents were asked if they would be willing to pay a little more to increase the use of health IT. Nine percent (95 percent CI, 7.2–11.8) would be very willing to pay a little more, and 46 percent (95 percent CI, 42.2–49.7) would be somewhat willing to pay a little more (combined 55 percent [95 percent CI, 51.7–59.2]), but 44 percent (95 percent CI, 40–47.5) are not willing to pay more. However, when asked whether they support federal efforts to enable and enhance electronic sharing of information across providers, fully 72 percent (95 percent CI, 68.6–75.4) of Americans favor such efforts.

Privacy and Security

We asked respondents about their concerns regarding how use of health IT might affect privacy and security of health information. Forty-eight percent (95 percent CI, 44–51.5) of respondents indicate that they are very concerned about the privacy of medical records compared with 22 percent (95 percent CI, 18.7–25.1) who indicated that they are not concerned about the privacy of medical records. A majority of respondents—68 percent (95 percent CI, 64.7–71.7)—felt that EMRs were very or somewhat secure, and 64 percent (95 percent CI, 60.1–67.4) agreed or strongly agreed that the expected benefit of EMRs outweighs potential risks to privacy.

Subgroup Differences and Multivariate Analyses

We present results for subgroup differences from the multivariate logistic regression in Table 2. As might be expected, the subgroup of respondents who are more comfortable using new technologies have greater odds of agreeing that the usage of EMRs, e-prescribing, and PHRs is likely to improve medical care (2.5, 2.1, and 2.1 times, respectively), than those who are not comfortable using new technologies. Similarly, this subgroup also had greater odds (2.1 times) of considering EMR data to be secure than those who are not comfortable with new technology.

Income and age also showed effects ($p < .05$) in our model for some of the outcomes reported. Specifically, respondents aged 35–64 had only 0.45 times the odds while those with household incomes above U.S.\$100,000 had 2.4 times the odds of being willing to pay more to increase health IT adoption, respectively, compared with younger respondents and those with incomes

Table 2: Characteristics Related to Opinions on Benefits of Electronic Medical Records (EMRs), Electronic Prescribing, Personal Health Records (PHRs), Willingness to Pay, and Security

	Probability of “Strongly Agree” or “Agree”			Probability of “Very Willing” or “Willing”	Probability of “Very Secure” or “Somewhat Secure”
	EMRs Are Likely to Improve Medical Care. Do You Strongly Agree, Agree, Disagree, or Strongly Disagree?	Electronic Prescribing Is Likely to Improve Medical Care. Do You Strongly Agree, Agree, Disagree, or Strongly Disagree?	Electronic PHRs Are Likely to Improve Medical Care. Do You Strongly Agree, Agree, Disagree, or Strongly Disagree?	Would You Be Willing to Pay a Little More for Your Health Care to Increase the Use of Health IT?	In General, Do You Think Computerized Medical Records Are Very Secure, Somewhat Secure, or Not Secure?
	Relative Odds (n = 815)	Relative Odds (n = 816)	Relative Odds (n = 817)	Relative Odds (n = 816)	Relative Odds (n = 817)
Female (ref: male)	0.744	0.747	0.84	1.226	0.938
Age 65+ (ref: 18–34)	1.255	2.465	1.342	0.622	0.685
Age 35–64 (ref: 18–34)	1.052	1.663	1.023	0.45	0.614
Black (ref: white)	1.511	3.364	1.772	1.679	1.312
Other (ref: white)	0.863	1.668	1.28	1.755	0.797
Not Hispanic (ref: Hispanic)	0.845	0.638	1.012	0.742	0.887
U.S.\$100,000+ (ref: <25K)	1.276	2.042	1.332	2.355	1.118
U.S.\$50,000–U.S.\$99,999 (ref: <25K)	1.092	0.979	0.811	1.371	0.963

continued

Very or somewhat comfortable w. technology (ref: neutral or uncomfortable)	2.454	2.065	2.115	1.474	2.089
Never online (ref: online daily)	1.017	0.901	0.787	1.625	1
Online few times a year to a few times a month (ref: online daily)	0.854	0.498	0.706	1.57	1.035
Online once a week to a few times a week (ref: online daily)	1.19	0.849	0.977	1.316	1.25

Note. $p < .05$ in bold italics.

below U.S.\$25,000 per year. Further, those 65 years of age and older had 2.5 times the odds of agreeing that usage of e-prescribing will improve medical care. Our results also show that black respondents have greater odds of believing that e-prescribing will improve medical care than white respondents.

DISCUSSION

While our results may suggest an improvement in attitudes toward health IT in the general population relative to findings from earlier studies cited above, it is important to acknowledge that this study did not directly replicate the methods used in those prior studies and therefore the variation in findings across these studies may result from variation in study design rather than a true trend.

Importantly, in the context of the newly enacted Recovery Act provisions, our results show that a large majority of Americans support use of health IT. Although the public generally believe that health IT can provide important benefits to the system overall, on a more personal level, many are not convinced that the technology will affect their individual interactions with health care providers. More than half of Americans are willing to pay more to see more widespread use of health IT, and almost three quarters support federal efforts to increase the sharing of health information among providers. Only a third of the public thinks the privacy and security risks outweigh the benefits associated with health IT. Overall, these results suggest that the public views health IT positively. Furthermore, the results may be seen as being consistent with federal efforts to promote adoption of health IT and health information exchange (HIE) through incentives and other direct investments managed by the Office of the National Coordinator for Health Information Technology.

On key questions, respondents who are more experienced with electronic technology have more favorable attitudes toward health IT. This result is consistent with findings from broader technology studies indicating that individuals who are highly proficient with technology are more enthusiastic about its use in important societal activities (DeYoung and Spence 2004). We also found that in some cases, when controlling for technology affinity and other demographic variables, older Americans were more likely to support health IT adoption than younger Americans. This may result from the fact that older Americans tend to have greater interaction with the health care system (DeFrances et al. 2008; Schappert and Rechtsteiner 2008) and may have spent more time considering health care topics in general.

Our findings also show evidence that there are gaps among specific groups' appreciation of health IT. For some key questions, those with higher incomes are more likely to have positive opinions of the benefits of health IT. Health care providers that treat patients who show greater appreciation for health IT may be more motivated to adopt health IT compared with other providers (absent other incentives), for example, those that treat low-income populations. As health IT is adopted in more health care organizations, the benefits of health IT could tend to accrue more to the segments of the population, including the wealthy, that show a greater appreciation for health IT. In this way, results of our survey suggest the appropriateness of the policy created under ARRA to reserve the largest incentives for health IT adoption for providers whose practice substantially includes low-income patients that rely on Medicaid (Centers for Medicare and Medicaid Services 2010).

Another policy approach may be to address the gaps in appreciation for health IT through public education efforts geared toward helping consumers from all sociodemographic groups understand the potential benefits of health IT and encourage consumers to talk to their providers regarding health IT adoption. Finally, public awareness and appreciation for health IT can improve through greater adoption of applications that engage patients directly through patient portals, PHRs, clinical decision aids, or other tools. A useful policy mechanism in this regard may be the consumer engagement component of "meaningful use" rules that govern eligibility for provider incentive payments for EHR adoption under ARRA. As patients and providers jointly develop greater awareness and understanding of health IT, its potential value will be more fully realized.

As with all surveys, these findings should be reviewed in the context of important limitations. Because those who elected not to respond to our survey may have different characteristics and views on health IT relative to our responders, our results are subject to some measure of nonresponse bias. Interpretability of our results may also be limited by the complexity of health IT issues in general and the difficulty some respondents may have had in grasping the question fully and providing a valid response. However, cognitive testing done during the pilot stage suggests that this is not likely to be a major issue. Finally, it is important to note that technology in general and health IT in particular is a rapidly evolving field, and the general public is exposed to new experiences and information on these topics on very regular basis; therefore, any study of this kind is merely a snapshot of the public's views at the time the question was asked rather than a measure of an attitude or belief that is stable over time.

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NOTES

1. The CASRO response rate is equivalent to the American Association of Public Opinion Research (AAPOR) response rate 3 (RR3), and for this study consisted of a resolution rate of 86 percent (13,762 of the total 16,000 numbers sampled were resolved to be a working residential number); a screener rate of 76 percent (among 2,267 working residential numbers we were able to determine eligibility of 1,721 households), and an interview completion rate of 66 percent (among the 1,541 households where we selected an eligible respondent, 1,015 fully completed the interview). The CASRO rate of 43 percent is the product of 86 percent, 76 percent, and 66 percent.
2. Supplemental analyses of the predominantly cell phone users were entirely consistent with the results from our main sample. Accordingly, results presented in this paper are for the main sample only.
3. The survey instrument was organized according to topic domain, with descriptions of the particular technology introducing that section. For EMRs, the description was as follows, "The next questions are about Electronic Medical Records. Medical records document information about your doctors' visits, the care you receive, and your illnesses and conditions. In the past, this information was recorded on paper charts. Some doctors are now using computer programs to record this information. These are called Electronic Medical Records." The electronic prescribing description read, "The next questions are about Electronic Prescribing. In the past, doctors hand wrote prescriptions on paper. Some doctors are now using computers to process and send prescriptions. This is called Electronic Prescribing." Lastly, the introduction to the PHR section was, "The next questions are about Electronic Personal Health Records. An Electronic Personal Health Record allows patients to view key medical information gathered from their doctor or insurance company by logging in to a secure website from their personal computer. Information available for viewing would include things like health conditions, prescriptions, and lab tests."

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of this article:

Appendix SA1: Author Matrix.

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