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Patient attitudes toward using computers to improve health services delivery

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Abstract

Background: The aim of this study was to examine the acceptability of point of care computerized prompts to improve health services delivery among a sample of primary care patients.

Methods: Primary data collection. Cross-sectional survey. Patients were surveyed after their visit with a primary care provider. Data were obtained from patients of ten community-based primary care practices in the spring of 2001.

Results: Almost all patients reported that they would support using a computer before each visit to prompt their doctor to: "do health screening tests" (92%), "counsel about health behaviors (like diet and exercise)" (92%) and "change treatments for health conditions" (86%). In multivariate testing, the only variable that was associated with acceptability of the point of care computerized prompts was patient's confidence in their ability to answer questions about their health using a computer (beta = 0.39, p = .001). Concerns about data security were expressed by 36.3% of subjects, but were not related to acceptability of the prompts.

Conclusions: Support for using computers to generate point of care prompts to improve quality-oriented processes of care was high in our sample, but may be contingent on patients feeling familiar with their personal medical history.

Background

Improving health care quality remains an elusive goal as many barriers exist to changing: 1) health care systems, 2) physician behaviors and 3) patient behaviors [1,2]. Prior studies have shown that computerized reminders and decision support systems consistently increase the delivery of preventive services and improve the quality of outpatient care [3–9]. For example, in a randomized trial of 39 primary care physicians, McPhee and colleagues found that computerized reminders led to significant increases in fecal occult blood testing, pap testing, smoking cessation counseling, and diet counseling [7]. Although obstacles exist to incorporating reminder systems into routine care [10–12], to our knowledge, no study has examined patient acceptance of computerized reminders to improve routine health service delivery.

Table 1: Attitudes toward using computers to improve health services

	Frequency % (n)
To prompt your doctor to do health screening tests (like cholesterol) when they are indicated.	
Definitely yes	53.8 (64)
Probably yes	36.1 (43)
Don't know	7.6 (9)
Probably not	0.0 (0)
Definitely not	2.5 (3)
To prompt your doctor to counsel you about your health behaviors (like diet and exercise)	
Definitely yes	52.5 (63)
Probably yes	36.7 (44)
Don't know	7.5 (9)
Probably not	0.0 (0)
Definitely not	3.3 (4)
To prompt your doctor to change your treatments for conditions like high blood pressure and diabetes?	
Definitely yes	51.7 (62)
Probably yes	31.7 (38)
Don't know	10.0 (12)
Probably not	4.2 (5)
Definitely not	2.5 (3)

* the above questions were preceeded by the following statement: "overall, would you support answering questions using a computer before each visit to do each of the following..)"

The goal of this study was to examine patient acceptability of point of care computerized prompts as a method of improving quality of care among a diverse group of primary care practices in Rhode Island. We hypothesized that patients would support the use of computerized reminders for health screening tests and behavioral counseling, but not for prompting physicians to make changes to their treatment plans. We also hypothesized that interest in using computerized reminders would be strongly related to an individual's general level of comfort with computers.

Methods
Methods: measures
Computer Acceptability
A series of four focus groups were held with primary care patients to understand the important issues in designing and implementing patient-centered computer systems in primary care settings. Focus groups included 7–11 subjects, recruited from posters placed in public areas of the hospital and via emails send over the hospital intranet. Subjects were paid $30 for participating in the focus groups, and one of the investigators (CNS) served as the facilitator. Attitudes and concerns about using computers to improve health care quality that resonated among group members were considered for inclusion in the survey instrument.

Instrument items that were analyzed for this paper, reflecting domains identified in the focus groups, included: 1) patient attitudes toward the possible uses of computer technology to improve health care quality ("to prompt your doctor to do health screening tests", "to prompt your doctor to counsel you about your health behaviors", and "to prompt your doctor to change your treatments for conditions like high blood pressure and diabetes") and 2) concerns about data security (".. would you be concerned that someone would be able to steal your personal information" from the computer"). Attitude questions were asked on a 5-point Likert-type scale from "definitely no" (1), to "definitely yes" (5).

A summative variable representing acceptability of using computers to improve health services was created by summing responses to the three questions examining the acceptability of using computers for different uses ("prompt your doctor to do health screening tests", "prompt your doctor to counsel you about your health behaviors", "prompt your doctor to change your treatments for conditions like high blood pressure and diabetes") from Table 1. The variable had a minimum of 3 (least accepting) to 15 (most accepting).

Two other themes that emerged from the focus groups were 1) ability to use computers and 2) ability to answer questions about their health. Ability to use computers was assessed with the following item: How comfortable do you feel using computers, in general?" measured on a 6 point scale from "very comfortable" (6), "somewhat comfortable" (5), "neither comfortable nor uncomfortable" (4), "somewhat uncomfortable" (3), "very uncomfortable" (2) and "I have never used a computer" (1). Ability to answer questions about one's health was assessed using the following item "Do you think you could use a computer to answer questions about your health?" and was scored a 5-point Likert-type scale from "definitely no" (1), to "definitely yes" (5). The questionnaire item regarding computer acceptability was adapted from the Pew Internet Tracking Project [13].

Patient assessment included demographic information. Brief screening questions for age, gender, educational attainment, chronic health conditions (e.g., diabetes, depression) and health risk factors were adapted from the year 2000 Behavioral Risk Factor Surveillance Survey [14] and the 1995 National Health Interview Survey.

Methods: subjects
As part of a larger study to examine the feasibility of using a tailored message computer program to enhance physical

activity and smoking cessation, one hundred and thirty letters were sent to a random sample of primary care providers in the Providence area. Eleven physicians expressed interest and were enrolled. After recruitment, one physician, a general internist, later dropped out of the study after moving his practice. The ten remaining community-based primary care practices enrolled in the study included family practice (4), internal medicine (5) and obstetrics (1).

From 3/1/2001 to 6/1/2001, two research assistants approached 148 consecutive adult outpatients (10–15 per office) to recruit 124 patients (83%) to complete the survey after their visit with their doctor, but before they had left the office. The introduction to the survey described the planned use for the computerized reminder system in which physician's offices would have computers installed and "each patient would spend 5–10 minutes answering questions on the computer before every visit with their doctor". The introduction specified that the computerized prompts would be based on data entered by patients, but did not specify whether or not additional data sources (e.g., electronic medical records) would be used to supplement or verify data entered by patients. The protocol was approved by Institutional Review Board of The Miriam Hospital.

Methods: data analysis
All data analysis were carried out using SPSS for Windows, version 10.1.0. Groups were compared using chi-square testing for categorical variables and analysis of variance testing for continuous variables. Due to the presence of some missing data, some row totals are less than 124. The Student's t-test (variables with 2 categories) and Analysis of Variance testing (variables with > 2 categories) was used to examine group differences among categorized variables. Variables significantly associated with acceptability of using computers to improve health services were included in a multiple linear regression model to test for an association between attitudes toward computers and acceptability of using computers to improve health services, while adjusting for potential confounders.

Results
The average age of participants was 42.8 years and nearly 75% were female (see Table 1). Approximately half of participants reported using a computer at least weekly (49.2%) while 12.7% had never used a computer.

Over 85% of patients answered "yes" (either "definitely yes" or "probably yes") when asked about their support for using computers to prompt their doctor to either do health screening tests (92.2%), do health behavior counseling (92.2%) or change patients' medical treatments if necessary (85.5%). See Table 2 for results of bivariate test-

ing. Males, patients who were more comfortable using computers and patients who were more comfortable using a computer to answer questions about their health were more accepting of using the point of care computerized prompts to enhance the quality of care. For example, those who were the most comfortable in their ability to answer questions about their health using a computer had a mean acceptability score of 13.7 (of 15) compared to 9.7 for those least confident (p = .001). Age, education level, minority status, concern about data security and presence of chronic illnesses were not associated with acceptability of using computers to improve health services.

In multivariate testing, the only variable associated with acceptability of using point of care computerized prompts to enhance the quality of care was a patient's comfort in their ability to answer questions about their health using a computer (beta = 0.39, p = .001).

Discussion
The main findings in our study were 1) point of care computerized prompts to enhance the quality of care, specifically preventive services, health behavior counseling and chronic disease management, were highly acceptable to primary care patients, 2) patients' ability to answer questions about their health, but not patients' experience in using computers, was significantly associated with acceptance of the computerized prompts and 3) concerns over data security, while present, were not associated with acceptance of the computerized prompts.

As the use of medical informatics becomes more widespread, computerized reminders and decision support systems may play an important role in improving the delivery of preventative services and outpatient care. An important component of the success of these programs is patient acceptability, yet no study to our knowledge has examined this. Over 85% of patients answered "yes" (either "definitely yes" or "probably yes") when asked about their support for using computers to prompt their doctor to either do health screening tests (92.2%), do health behavior counseling (92.2%) or change patients' medical treatments if necessary (85.5%).

We suspect this support for computerized reminders systems reflects a general belief that computerized feedback is accurate, and possibly more accurate than the decisions made by their physicians. In their 1999 publication, "To Err Is Human", the Institute of Medicine concluded that as many as 98,000 patients die each year from medical errors [15]. This book has received much press coverage and may have enhanced consumer awareness of the prevalence of errors and, therefore, the need for computer systems that help physicians make complex medical decisions.

Table 2: Background characteristics by interest in using computers in the doctor's office to improve health services

	Frequency % (n)	Acceptability of using point of care computerized prompts[*]	P
Age:			.30
18–30	26.0 (31)	13.5	
31–50	39.8 (48)	13.1	
51–87	34.1 (40)	12.5	
Gender:			.05
Female	74.6 (85)	13.2	
Male	25.4 (29)	12.1	
Education level:			.29
Less than high school	19.4 (24)	12.8	
High School	32.3 (40)	12.5	
Some College	27.4 (34)	13.4	
College or Graduate school	18.5 (23)	13.6	
Minority status:			.35
White and non-Hispanic	87.9 (109)	12.9	
Non-white or Hispanic	12.1 (15)	13.6	
Chronic Illnesses (of 11 possible):			.69
None	37.1 (46)	12.9	
At least one	62.9 (78)	13.0	
Would you be concerned that someone would be able to steal your personal information from the computer?			.73
Definitely yes	24.2 (30)	13.4	
Probably yes	12.1 (15)	13.3	
Don't know	12.1 (15)	12.5	
Probably not	26.6 (33)	12.7	
Definitely not	21.8 (27)	12.8	
How comfortable do you feel using computers, in general?			.006
Very comfortable	38.1 (45)	13.6	
Somewhat comfortable	35.6 (42)	13.2	
Don't know	4.2 (5)	12.0	
Somewhat uncomfortable	8.5 (10)	12.7	
Never used	12.7 (15)	10.9	
Do you think you could use a computer to answer questions about your health?			.001
Definitely yes	59.2 (71)	13.7	
Probably yes	22.5 (27)	12.6	
Don't know	7.5 (9)	13.3	
Probably not	2.5 (3)	11.0	
Definitely not	8.3 (10)	9.7	

[*] sum of responses to three questions (see Table 1) with a minimum of 3 (least accepting) to 15 (most accepting).

In our study, acceptability was related to patients' confidence in their ability to answer questions about their health, even after adjusting for patients' self-reported experience in using computers. We feel that this is due mainly to patients' lack of knowledge about their health, specifically their knowledge of test results, as they would be required to enter these results into the computer to use the proposed system. Not being aware of one's medical history, such as blood pressure or cholesterol values, would prevent them from participating in such as system.

This is consistent with the findings of Branch and colleagues, who noted that patients who were unaware of their test results, despite being tested, were less likely to report receiving other health promotion services [16]. Among 4298 patients who reported being tested for hypertension and hyperlipidemia in the previous year, 449 (10.4%) did not know either test result, and a presumably greater percentage did now know at least one of the test results. The lack of knowledge of one's health history may be related to an individual's health literacy which, though

not measured in the current study, has been associated with poorer health outcomes, such as hospitalization, and knowledge of one's chronic disease [17,18].

Though the computer system described in the introduction to the survey was located in a doctor's office, more than a third (36.3%) of the patients in our sample had concerns that their personal information would be stolen from the computer. Though the Health Insurance Portability and Accountability Act (HIPAA) of 1996, which includes standards for privacy of individually identifiable health information, may allay these concerns over data security [19], the present study shows that these concerns were not related to acceptability of the computerized prompts. This is consistent with the history of internet commerce which has grown at an impressive rate, despite individual's concerns over the security of their credit card and other personal information [13].

The study has several noteworthy limits. First, the small sample size and geographical range limit the generalizability of the findings. However, the rates of health conditions including high cholesterol (23.5%) and high blood pressure (20.7%) are similar to other larger samples [20]. These findings will need to be repeated in other populations and in larger sample sizes. Second, the brevity of the survey, due to concerns over subject burden in the primary care setting, leaves open the possibility that an unmeasured variable, such as health literacy [18] may be a source of residual confounding. Future studies should include measures of health literacy, such as the Test of Functional Health Literacy in Adults [21].

Conclusions

Computerized reminders and decision support systems have repeatedly been shown to improve the quality of outpatient care. Though the personal computer and the Internet have tremendous potential for changing the way that health care is delivered, both have failed, as yet, to facilitate the dissemination of computerized reminder systems. This study shows that acceptability of point of care computerized prompts to enhance the quality of care is high. To use such systems, however, patients will need to be more knowledgeable about their health, to enable them to feel comfortable answering questions that will be used to create the computerized prompts.

List of abbreviations

Health Insurance Portability and Accountability Act (HIPAA)

Competing interests

None declared

Author's contribution

CNS participated in the collection of data, the statistical analysis and in the preparation of the manuscript.

JD participated in the interpretation of results and in the preparation of the manuscript.

PM participated in the design of the study and in the statistical analysis and interpretation of results.

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