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Patient–provider communication and trust in relation to use of an online patient portal among diabetes patients: The Diabetes and Aging Study

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ABSTRACT

Patient–provider relationships influence diabetes care; less is known about their impact on online patient portal use. Diabetes patients rated provider communication and trust. In this study, we linked responses to electronic medical record data on being a registered portal user and using secure messaging (SM). We specified regression models to evaluate main effects on portal use, and subgroup analyses by race/ethnicity and age. 52% of subjects were registered users; among those, 36% used SM. Those reporting greater trust were more likely to be registered users (relative risk (RR)=1.14) or SM users (RR=1.29). In subgroup analyses, increased trust was associated with being a registered user among white, Latino, and older patients, as well as SM use among white patients. Better communication ratings were also related to being a registered user among older patients. Since increased trust and communication were associated with portal use within subgroups, this suggests that patient-provider relationships encourage portal engagement.

INTRODUCTION

Electronic health record (EHR) use is rapidly expanding, with hopes for improving efficiency for healthcare systems as well as patient health outcomes.[1] Federal incentives for 'meaningful use' have driven uptake of system-level EHRs as well as patient engagement with EHRs, such as through messaging providers or requesting medication refills (also sometimes referred to as shared or personal health records).[2] Studies specific to diabetes patients suggest that direct patient engagement through secure messaging (SM) and other portal services is associated with improvement in intermediate health outcomes, including glycemic control,[1] [3–5] suggesting potential for quality improvement.

However, there are documented patient-level differences in the uptake and use of portals, even within systems with widely promoted, mature electronic records.[6–10] Specifically, older or racial/ethnic minority patients, as well as those of lower socioeconomic status, have been less likely to use portals—reflecting trends in disparities in overall use of the internet in the USA,[11] a phenomenon sometimes referred to as the 'digital divide.' Significant racial/ethnic and age differences in portal use persist even after adjustment for socioeconomic status or internet use in everyday life,[7] [12] suggesting the influence of additional patient- and/or provider/system-level factors.

Less attention has been paid to the quality of the patient–provider relationship in relation to portal use, as this may be an important barrier to or facilitator of use. Among racial/ethnic minority and older individuals, provider communication and trust may be particularly important for diabetes care,[13] [14] and, by extension, whether a patient chooses to interact with the health system via health portals. In this study, we examine the cross-sectional associations between patient ratings of provider communication or trust with portal use within a well-characterized cohort of diabetes patients at Kaiser Permanente Northern California. We hypothesized that better patient–provider communication and trust ratings would each be related to patients (1) being a registered user of the portal and (2) use of SM with providers. We hypothesized that these associations might also differ across racial/ethnic and age groups (given trends in portal use), without specific expectations about the nature of the subgroup differences.

METHODS

We examined survey and administrative data in the Diabetes Study of Northern California cohort. In 2005–2006, researchers surveyed a racially/ethnically stratified sample of diabetes patients aged 30–75, in written, web, or interview formats in five languages (62% overall response rate). The survey contained 184 questions to capture demographics, social/psychological characteristics, and health-related information. Further details about the study have been published.[15] After excluding respondents who reported limitations in reading or speaking English and/or were legally blind (as the portal was not available in languages other than English or accessible for low vision), there were 14 102 individuals remaining for this analysis, 11 518 of whom responded to the full version of the survey that included interpersonal ratings of care. Survey responses were linked to administrative data to capture diagnoses and procedures, utilization, and online portal use through http://www.kp.org (available since 2000). As described previously,[9] [16] after patients opt-in and register, the portal offers a variety of features, including viewing visit summaries, medical history, and/or immunizations/allergies; making appointments; ordering medication refills; viewing the results of medical tests; and sending or receiving secure electronic messages with providers. Most features are automated, and providers respond to secure messages within 2 days.

This research was approved by the Kaiser Foundation Research Institute, the University of Chicago, and the University of California, San Francisco Institutional Review Boards.

Measures

Our primary outcomes were portal use in the 2 years during or following survey completion (2006–2007). First, we examined whether patients had a kp.org account (referred to throughout as a 'registered user'), indicating they completed the online registration process sometime up until 2007. Additionally, we examined SM use among registered users (rather than more passive features such as viewing visit summaries or laboratory results) as an indicator of engagement with the portal.[17] A secure message encounter or 'thread' was the unit of analysis, defined as the total set of messages related to an original message by successive replies,[18] and we dichotomized at ≥2 encounters to capture more sustained use.

Our primary exposures were patient survey responses about their relationships with providers in the prior year. First, ratings of overall communication were based on the validated Consumer Assessment of Healthcare Providers and Systems (CAHPS) provider communication composite,[19 20] which measured ratings of how often their providers listened carefully, showed respect, explained things well, and spent enough time with them (responses from 'always' to 'never'). Items were linearly transformed and averaged across questions, resulting in a total possible score from 0 to 100. We dichotomized this summary score at the lowest quartile (67 out of 100). Second, we examined reports of trust in provider using a validated, single item on the Trust in Provider scale ('How often have you felt confidence and trust in your personal physician?').[21] Based on previous convention, we analyzed this item as never/rarely versus usually/always.

Covariates included: (1) age (30–49, 50–59, 60–69, or ≥70 years), (2) sex, (3) education (≤high school, some college, or ≥college graduate), (4) race/ethnicity (white, black, Latino, East Asian (ie, Chinese, Japanese, Vietnamese, or Korean), Filipino, and Other), and (5) marital status (married vs not). Finally, we used diagnoses and utilization data to calculate a co-morbidity score for each individual, according to the validated DxCG algorithm.[22]

Analyses

We examined the unadjusted associations between the communication and trust ratings and our portal outcomes using χ^2 tests. Next, we examined these associations using relative risk regression models (modified Poisson regressions with a binomial family, log link, and robust SEs[23]) adjusted for age, sex, education, race/ethnicity, marital status, and co-morbidity score. Due to documented racial/ethnic and age differences in interpersonal communication ratings,[24–28] we ran additional models specifying interaction (ie, cross-product) terms with the interpersonal ratings, to determine if the associations differed significantly across subgroups. Given the lower power to detect interactions, we used a higher level of significance (p<0.1). All adjusted regression models were weighted for both survey design (non-proportional sampling fractions) and non-response using the sampling and Horvitz–Thompson weights.

RESULTS

Overall, 50% of the sample was aged ≥60 years (with 17% of the sample aged ≥70), 49% were female, 70% were married, 34% had an undergraduate degree or more, and 67% were racial/ethnic minorities (23% black, 16% Latino, 10% East Asian, 12% Filipino, and 6% Other). Two-thirds had high co-morbidity (DxCG score of ≥2). In addition, there were overall high ratings of provider communication, as the mean CAHPS score was 81, and 91% of respondents reporting usually or always having trust in their provider.

Registered users of the portal

Fifty-two percent of respondents were registered users of the portal. In unadjusted comparisons, those with higher communication and higher trust ratings were modestly more likely to be registered users: 54% of those in the upper three quartiles of CAHPS scores were registered portal users, compared to 49% of those in the lowest quartile (p<0.05). Similarly, 52% of those who reported usually or always having trust in their provider were registered portal users, compared to 48% who reported never/sometimes having trust (p<0.05). In adjusted models (table 1), CAHPS communication scores did not significantly predict the overall likelihood of being a registered user. However, there remained a significant but modest adjusted association between increased trust and being a registered user (RR=1.14).

We evaluated interactions in these adjusted models to see if the patterns differed significantly across age and race/ethnicity. There was a significant interaction between communication scores and age (p=0.04), with a significant association between communication and use occurring only among patients ≥70 years of age (RR=1.38). There were also significant interactions between trust and race/ethnicity (p=0.03) and age (p=0.08). Latino subjects were more likely to be a registered user when there was higher trust in the provider (RR=1.51), as were white subjects, although the effect size was more modest (RR=1.16). Similarly, subjects ≥70 of age were more likely to be registered users when there was trust in the provider (RR=1.83).

Secure messaging

Among registered users of the portal, 36% had at least two secure message threads with their provider(s) (median 1, IQR 0–4). While there were no significant unadjusted associations with either communication or trust ratings and SM use, after adjustment there was a significant association between trust in provider and overall SM use (RR=1.29; table 2).

We similarly evaluated race/ethnicity and age interactions for SM use. There was a significant interaction only between trust in provider and race/ethnicity (p=0.01). Trust in provider was significantly related to an increased likelihood of SM use among white patients (RR=1.29), but significantly lower likelihood of SM use among those of other race/ethnicity (RR=0.55).

DISCUSSION

Our study examined patient ratings of provider communication and trust and use of an online portal among diabetes patients in an integrated healthcare delivery system. There were modest but significant overall associations between trust in provider and both types of use, that is, being a registered user and using SM. However, findings varied across racial/ethnic and age subgroups. Higher communication scores were associated with being a registered user only among the oldest respondents, and the associations between trust and being a registered user were significant for white, Latino, and older patients. Furthermore, SM use was only significantly higher among white patients reporting greater trust in provider. This suggests that patient–provider communication and trust may not be influencing portal use uniformly across patient subgroups.

Table 1 Adjusted associations of the likelihood of being a kp.org registered user

Overall models		Race-stratified associations		Age-stratified associations	
	Adjusted RR (95% CI)		Adjusted RR (95% CI)		Adjusted RR (95% CI)
CAHPS communication score (n=10 533): Upper three quartiles (68–100) versus lower quartile (0–67)					
Overall effect	1.05 (0.99 to 1.11)**	White	1.03 (0.96 to 1.10)	<50	1.04 (0.93 to 1.16)
		Black	1.01 (0.87 to 1.16)	50–59	0.99 (0.91 to 1.06)
		Latino	1.17 (1.00 to 1.37)*	60–69	1.02 (0.92 to 1.14)
		Asian	1.01 (0.87 to 1.16)	≥70	1.38 (1.11 to 1.72)*
		Filipino	1.29 (1.00 to 1.66)*		
		Other	1.12 (0.88 to 1.42)		
		Overall χ^2 test for interaction=5.63, p=0.34		Overall χ^2 test for interaction=8.41, p=0.04	
Trust in provider (n=10 599): Usually/often versus never/sometimes					
Overall effect	1.14 (1.03 1.25)*	White	1.16 (1.02 to 1.32)*	<50	1.09 (0.89 to 1.32)
		Black	1.06 (0.88 to 1.27)	50–59	1.02 (0.91 to 1.15)
		Latino	1.51 (1.13 to 2.03)*	60–69	1.23 (0.98 to 1.55)†
		Asian	1.14 (0.87 to 1.50)	≥70	1.83 (1.13 to 2.94)*
		Filipino	0.85 (0.63 to 1.14)		
		Other	0.85 (0.67 to 1.08)		
		Overall χ^2 test for interaction=12.7, p=0.03		Overall χ^2 test for interaction=6.84, p=0.08	

Adjusted models controlling for age, sex, race, education, co-morbidity score, and marital status, and weighted for survey design and non-response. Race-specific associations also include an interaction between race and interpersonal communication measure. Age-specific associations include an interaction between age and interpersonal communication measure.
*p≤0.05; †p<0.10.
CAHPS, Consumer Assessment of Healthcare Providers and Systems; RR, relative risk.

Previous research has documented provider influence on patient use of portals. Specifically, diabetes patients in another integrated delivery system were more likely to use the portal if their providers were high utilizers of SM with their patient panel (ie, >20% of encounters via SM)[29] or encouraged them to use the shared record system.[7] In contrast, another qualitative study suggested that provider *dis*trust may be related to increased portal use.[30] While our findings suggest that communication and/or trust influence portal use, the effect (while statistically significant) is modest, and it will be important to identify other factors that can encourage portal use.

Several studies have documented significantly lower portal use among racial/ethnic minority groups; however, few have been able to examine potential factors driving these differences

Table 2 Adjusted associations of the likelihood of having two or more secure message threads

Overall models		Race-stratified associations		Age-stratified associations	
	Adjusted RR (95% CI)		Adjusted RR (95% CI)		Adjusted RR (95% CI)
CAHPS communication score (n=5575): Upper three quartiles (68–100) versus lower quartile (0–67)					
Overall effect	1.03 (0.93 to 1.14)	White	1.05 (0.93 to 1.19)	<50	1.13 (0.91 to 1.40)
		Black	0.92 (0.71 to 1.20)	50–59	1.15 (0.97 to 1.37)
		Latino	1.22 (0.88 to 1.70)	60–69	0.89 (0.75 to 1.05)
		Asian	0.87 (0.68 to 1.11)	≥70	0.91 (0.67 to 1.25)
		Filipino	1.34 (0.97 to 1.85)†		
		Other	0.77 (0.49 to 1.20)		
		Overall χ^2 test for interaction=7.83, p=0.17		Overall χ^2 test for interaction=5.80, p=0.12	
Trust in provider (n=5554) Usually/often versus never/sometimes					
Overall effect	1.29 (1.02 to 1.62)*	White	1.29 (1.02 to 1.62)*	<50	1.40 (1.00 to 1.97)*
		Black	1.22 (0.85 to 1.76)	50–59	1.08 (0.84 to 1.45)
		Latino	1.02 (0.67 to 1.56)	60–69	1.02 (0.71 to 1.55)
		Asian	0.89 (0.60 to 1.32)	≥70	1.16 (0.59 to 2.32)
		Filipino	1.34 (0.78 to 2.29)		
		Other	0.55 (0.36 to 0.82)*		
		Overall χ^2 test for interaction=14.9, p=0.01		Overall χ^2 test for interaction=2.03, p=0.57	

Adjusted models controlling for age, sex, race, education, co-morbidity score, and marital status, and weighted for survey design and non-response. Race-specific associations also include an interaction between race and interpersonal communication measure. Age-specific associations include an interaction between age and interpersonal communication measure.
*p≤0.05; †p<0.10.
CAHPS, Consumer Assessment of Healthcare Providers and Systems; RR, relative risk.

beyond the influences of socioeconomic status. There are likely other underlying factors not examined here that affect patterns of portal use across racial/ethnic groups that should be explored in future work. In particular, patient preferences for care (such as in-person vs remote self-management support[31]) and other provider and system characteristics (such as providers' preferences for and engagement with SM, as well as system-wide marketing) were not examined here.

Of note, there were no significant findings for black or Asian patients, and there was a negative association between trust and SM use among patients of Other race/ethnicity. It is important to note that the Other race/ethnicity category had the smallest sample size (n=630), and was heterogeneous as it included Pacific Islanders, South Asians, Native Americans, and those of mixed race/ethnicity, diminishing the interpretability of this estimate.

This study has several other limitations. Our analyses were descriptive and cross-sectional. Therefore, we cannot determine the direction of causality regarding whether trust and communication affect portal use or vice versa. Although we used standard patient-level ratings of interpersonal care, the distributions of responses were skewed as many patients reported high ratings. However, we dichotomized these responses to avoid this ceiling effect as much as possible. Finally, our findings might not be generalizable to other healthcare settings or patient populations.

Our findings have implications for providers and systems currently using, or planning to implement, portals or other similar patient-facing technologies. While educating patients and promoting the portal directly to patients is important, the role of the patient–provider relationship in engaging patients in portal use should not be ignored. Providers may be able to leverage existing relationships to encourage patients to use the new technology. Furthermore, understanding factors that might encourage more diverse patients to engage in portal use (particularly across all age and race/ethnic groups) will be particularly important for ensuring that the introduction of innovative care processes does not exacerbate existing health and healthcare disparities.[32]

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