Disparities in Enrollment and Use of an Electronic Patient Portal

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BACKGROUND: With emphasis on the meaningful use of electronic health records, patient portals are likely to become increasingly important. Little is known about patient enrollment in, and use of, patient portals after explicit invitation from providers.

OBJECTIVES: To examine enrollment in, and use of, an electronic patient portal by race/ethnicity, gender and age.

DESIGN: Observational, cross sectional study.

PARTICIPANTS: Patients with attending physicians seen at one urban, academic primary care practice between May 2008 and October 2009 who received electronic orders inviting their participation in an electronic patient portal.

MAIN MEASURES: (a) Enrollment in the patient portal, (b) Solicitation of provider advice among enrollees, (c) Requests for medication refills among enrollees.

KEY RESULTS: Overall, 69% of 7,088 patients enrolled in the patient portal. All minority patients were significantly less likely to enroll than whites: 55% blacks, 64% Latinos and 66% Asians compared with 74% whites (chi-square $p < 0.05$ for all pairwise comparisons). These disparities persisted in adjusted analyses, although differences for Asians were no longer significant. In addition, the oldest patients were less likely to enroll than the youngest (adjusted OR 0.79, 95% CI 0.65–0.97). Although there were no racial/ethnic disparities in use of the patient portal among enrollees, we found differences by age and gender. The youngest patients were significantly less likely to solicit provider advice or request medication refills than any other age group in unadjusted and adjusted analyses. Similarly, male patients were less likely to solicit provider advice than women in all analyses.

CONCLUSION: Large racial/ethnic disparities were seen in enrollment in our patient portal. Among enrollees, use of the portal was similar by race/ethnicity, but not by age or gender. Future efforts to expand use of the patient portal need to address potential mechanisms for these disparities to ensure this technology is accessible to diverse patient populations.

KEY WORDS: race/ethnicity; disparities; Electronic Health Record; patient portal.

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INTRODUCTION

Recently, the Department of Health and Human Services released their final regulations for “meaningful use.” One of its core objectives is providing electronic information to patients upon request, which is consistent with strategies favored by many stakeholders to increase patient engagement in their health and health care.^{1,2} This objective can be achieved in a variety of ways, including sharing data between the provider’s electronic health record (EHR) and a personal health record (PHR) or by providing patients with an electronic entry point to the EHR itself (i.e., a “tethered” PHR which we will refer to as a “patient portal” throughout this paper).

Patient portals may be the most feasible, functional, and secure interface between patients and their health records. They have a range of possible features such as facilitating administrative tasks (e.g., paying bills), enhancing communication (e.g., answering patients’ questions about their medical issues or medications) and providing a vehicle for quality improvement and disease management programs. Although it is unclear whether patient portals improve quality or contain costs, they have the potential for achieving these goals by increasing the timeliness and quality of patient-provider communications and the patient-centeredness of care.

If patient portals are going to become a standard part of care delivery, it is important to ensure they are accessible to everyone and to minimize disparities in their use. Few studies have rigorously examined rates of enrollment in patient portals and variations in use among patient subgroups. Although preliminary results indicate possible disparities in enrollment by a variety of factors such as race/ethnicity, these studies did not examine whether this was due to differences in patients’ ability to access the internet, differential offering of the portal to patients by physicians, or rates of acceptance by patients after being offered access.^{3–6} Low rates of enrollment could be due to a variety of factors including patient level factors such as distrust in electronic communications or barriers to use (e.g., computer literacy). In addition, it is unclear whether there are differences in how

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often patients use patient portals after enrollment or their type of use (e.g., soliciting advice, requesting medication refills).

We examined variations in the enrollment in, and use of, a patient portal in a large academic general medicine clinic in patients directly offered this service by their providers.

METHODS

This study was conducted at the Northwestern Medical Faculty Foundation, the group practice for faculty of the Feinberg School of Medicine of Northwestern University, which uses a commercial EHR (EpicCare, version Spring 2007, Epic Systems Corporation). Access to the portal is offered to patients at the discretion of their providers. Providers typically discuss the patient portal with their patients and enter an electronic order for interested patients. Patients then receive instructions for enrolling in the portal, which they need to complete at home. Once they enroll, patients are able to perform multiple functions, including administrative tasks (i.e., scheduling appointments) and clinical exchanges (i.e., viewing test results, soliciting provider advice, or requesting medication refills).

Sample

We included only adult patients with established care with an attending physician in the general internal medicine (GIM) clinic and an electronic order inviting enrollment in the patient portal. We considered established care as at least two visits between May 2008 and October 2009. For the analyses of use of the portal, the denominator was restricted to patients who had completed enrollment (see below).

Outcomes

The primary outcomes of interest were: (a) enrollment in the patient portal, (b) use of the advice function after a patient had enrolled, and (c) request for refills after a patient had enrolled.

The first outcome of interest, enrollment, was determined by querying a data field that indicates whether the patient had enrolled in the portal at any point in time. Enrollment requires that a patient receives an electronic order from his/her provider, receives printed instructions containing an activation code, and successfully follows the full set of instructions to create a username and password for the account. To determine use of the advice function, we selected only those patient portal encounters coded as "advice" encounters and that identified the patient (not the provider) as the originator of the encounter. We confirmed the accuracy of this query to ensure these encounters reflected patient-initiated communications by examining communications for 20 randomly selected patients with *patient-initiated* advice encounters and five randomly selected patients with provider-initiated advice encounters. We found the classifications of these communications were

accurate, with only one exception. Lastly, to identify refill requests, we queried all encounters coded as "refills," which captures only patient-initiated, electronic refill requests.

Independent Variables

Our independent variables were race/ethnicity, age, gender, education and income.

Race/ethnicity, age, and gender were determined by data entered into the EHR. At this practice, administrative staff enters race/ethnicity data into the EHR during a patient's initial registration. Although there is no specific protocol for staff querying patients about their race/ethnicity prior to entering data into the EHR, a comparison of the data in the EHR with data from a large genome-wide association study that had patients self-report their race/ethnicity found very high agreement for white and black patients (kappa 0.98; unpublished data). Age was collected as a continuous variable and divided into four categories for analyses to facilitate interpretation of results (<35, 36–<50, 50–<65, 65+).

We were interested in adjusting for education and income because of their potential to confound our findings, however our records do not capture this information. To address this concern, we used an individual's home address to link to census block group (CBG) level data and determined the percent of people in the CBG who completed high school and the percent below the federal poverty level, both as continuous variables.

Lastly, attending provider was determined from the primary care provider field in the EHR and was considered as a confounder.

Analysis

We first determined the proportion of study subjects who enrolled in the patient portal after receiving an electronic order. To examine differences in enrollment by sociodemographic characteristics, we compared proportions who enrolled by race/ethnicity, age, and gender using chi-square statistics. To determine the independent association between these variables and the outcomes, we performed multivariate logistic regression adjusting for race/ethnicity (white, black, Latino, Asian, other), age (in categories), gender, education, income, and provider (as a random effect). In adjusted analyses, variances were adjusted to account for potential clustering by physician. We repeated similar analyses examining variations in use of the advice and refill functions (as dichotomous outcomes) among those who had enrolled in the patient portal. We considered $p < 0.05$ significant for all analyses.

Race/Ethnicity and Sensitivity Analyses

We also conducted sensitivity analyses because of the high proportion of subjects missing race/ethnicity data, 19%. In our sensitivity analyses, we assigned race/ethnicity based on CBG data, using cutoffs of 95%, 85%, and 75% of each

individual race/ethnicity group of interest. Based on previous quality improvement projects, CBG data with a cutoff of 67% has a kappa of 0.80 with self-reported race/ethnicity. To be more stringent, we used higher cutoffs and repeated the logistic regression analyses for all three primary outcomes: enrollment in the patient portal, use of the advice function, and use of the refill function and compared analyses with our baselines.

Of note, although race/ethnicity was captured in the EHR and geocoding as white, black, Latino, Asian, or other, we maintained “other” as a separate category in all analyses, but do not present these results.

RESULTS

A total of 7,088 patients had an order placed to enroll in the patient portal (Table 1). Of these, 49% were white, 15% were black, 4% were Latino, and 2% were Asian; 12% were listed as “other”, and 19% were missing race/ethnicity data. The median age was 48 years, and 64% were women.

Enrollment in the Patient Portal

After receiving an electronic order from providers, 69% enrolled in the patient portal. In unadjusted analyses, there were significant disparities in the rates of enrollment by race/ethnicity, but not by age or gender (Table 2). White patients were significantly more likely to enroll than black, Latino, and Asian patients (74% vs. 55%, 64%, 66%, respectively, $p < 0.05$).

After adjustment for age, gender, education, income, and provider effects, disparities by race/ethnicity remained statistically significant for black (aOR 0.43, 95% CI 0.37–0.50) and Latino patients, (aOR 0.65, 0.49–0.87) (Table 3). The disparity in enrollment between Asian and white patients was no longer statistically significant, although the effect estimate was unchanged. In addition, older patients (65+ years) were significantly less likely to enroll in the patient portal compared

Table 2. Unadjusted Analyses for Enrollment and Use of Patient Portal

	My Chart Enrollment, %	My Chart Use: Advice, %	My Chart Use: Refills, %
Overall	69	76	22
Race/Ethnicity			
White	74	79	23
Black	55 *	78	24
Latino	64 *	77	20
Asian	66 *	73	24
Age			
18–34	69	69	15
35–49	69	75 *	21 *
50–64	70	80 *	27 *
65+	70	80 *	24 *
Gender			
Male	70	75	24
Female	69	77 *	21 *

* $p < 0.05$ for pairwise chi square test with reference group

with patients 18–34 years old (aOR 0.79, 0.65–0.79) in adjusted analyses.

Use of the Patient Portal after Enrollment

Among patients who enrolled in the patient portal, the majority (76%) used the patient portal to communicate with their providers (Table 2). In contrast to disparities seen in patient portal enrollment, there were no racial/ethnic disparities in the use of the patient portal to seek advice from providers. Patients 35 years and older as well as female patients were significantly more likely to seek provider advice. These disparities remained significant in multivariate analyses (Table 3); the adjusted odds ratio for women compared to men was 1.39 (1.18–1.65) and the adjusted odds for those 65 years+ compared with those 18–34 years was 1.59 (1.23–2.07).

Overall use of the patient portal to request medication refills was 22%. There were no differences by race/ethnicity in bivariate analyses, but female patients and those 35 years and older were significantly more likely to request medication

Table 1. Patient Characteristics (n=7088)

Age – N (%)	
18–34 years	1,498 (21.1)
35–49 years	2,280 (32.2)
50–64 years	2,292 (32.3)
65+ years	1,018 (14.4)
Race/Ethnicity – N (%)	
White	3,476 (49.0)
Black	1,059 (14.9)
Latino	277 (3.9)
Asian	137 (1.9)
Other	827 (11.7)
Missing	1,312 (18.5)
Female – N (%)	
Female	4,567 (64.4)
Percent living in high poverty area*	1,019 (14.4)
Percent living in low educational attainment area†	1,673 (23.6)

* High poverty area is defined as a census block group with $\geq 20\%$ of families living below the federal poverty level

† Low educational attainment area is defined as a census block group with $\geq 20\%$ of adults with less than a high school education

Table 3. Adjusted Analyses for Enrollment and Use of Patient Portal (n=6647)

	My Chart Enrollment, OR	My Chart Use: Advice, OR	My Chart Use: Refills, OR
Race/Ethnicity			
White	1.00	1.00	1.00
Black	0.43 (0.37–0.50)*	1.03 (0.81–1.31)	1.08 (0.85–1.37)
Latino	0.65 (0.49–0.87)*	1.10 (0.74–1.64)	1.05 (0.70–1.57)
Asian	0.70 (0.48–1.03)	0.68 (0.41–1.11)	1.01 (0.60–1.71)
Age			
18–34	1.00	1.00	1.00
35–49	0.98 (0.84–1.15)	1.39 (1.15–1.69)*	1.37 (1.09–1.71)*
50–64	0.99 (0.84–1.16)	1.73 (1.41–2.12)*	1.90 (1.52–2.37)*
65+	0.79 (0.65–0.97)*	1.59 (1.23–2.07)*	1.50 (1.15–1.97)*
Gender			
Male	1.00	1.00	1.00
Female	1.13 (0.99–1.28)	1.39 (1.18–1.66)*	1.01 (0.85–1.19)

Analyses adjusted for education and income and clustered by physician, random effects

refills (Table 2). Only differences by age remained significant in adjusted analyses (Table 3).

Sensitivity Analyses

With the addition of race/ethnicity assigned to missing data based on geocoding, we decreased the subjects with unknown race/ethnicity from 19% to 16%, 12%, and 8% based on cutoffs of 95%, 85%, and 75% for race/ethnicity, respectively. We saw no differences in the results in unadjusted or adjusted analyses after repeating analyses including race/ethnicity assigned by geocoding.

DISCUSSION

We found that after patients were offered access to an electronic patient portal by their physicians, almost one third did not enroll. There were large disparities in enrollment by race and ethnicity, with only one quarter of whites failing to enroll compared to almost half of blacks. Once patients enrolled, use of the patient portal was similar across race and ethnicity. In contrast, patients 65 years and older were significantly less likely to enroll in the patient portal, but were more likely to seek provider advice and medication refills once enrolled compared with those younger than 35 years. Lastly, although there were no differences in enrollment by gender, women were significantly more likely to seek provider advice than men.

Few studies have examined patient portal use. A study from Kaiser Permanente-Northern California⁴ found that patients who were more likely to register online were white, female and between the ages of 30 and 65. Further analyses examined use of the patient portal among patients with presumed internet access and found similar patterns: being white or female was associated with higher use. A subsequent study from Kaiser Permanente-Georgia showed higher enrollment in the patient portal among white patients.³ Finally, a more recent study from Kaiser Permanente-Northern California of patients with diabetes showed persistence of racial and ethnic disparities in enrollment even after adjustment for health literacy.⁵ The only study of a patient population outside of Kaiser Permanente examined enrollment in a patient portal among patients at an academic practice in Boston. This study found that in a small, random sample that patients who were younger, female, or white were more likely to be enrolled in a patient portal⁶, but did not consider whether patients had been offered access by their providers.

Although the lower rate of enrollment among non-whites and older persons seen in our study is similar to these previous studies, our enrollment process and methods differed significantly. First, our study was conducted outside of an integrated delivery system. Patients in an integrated delivery system may view their relationship with their health care team differently than others, and our findings may more accurately reflect the uptake and use of the patient portal among patients in general practice. In addition, unlike in the other systems studied, our practice encourages health care providers to discuss the portal with their patients and requires that

providers write an electronic order allowing each patient to enroll. This process may overcome basic barriers to the patient portal because: (a) providers may directly inform patients about the patient portal and its potential benefits, and (b) providers may discuss access to the internet with their patients and write orders only for those with access. Furthermore, this process may also motivate patients to enroll for several reasons: (a) provider recommendation alone motivates health-related behaviors (e.g., smoking cessation), (b) patients may have increased trust in the portal because of a provider recommendation, and (c) patients may be motivated to enroll in order to obtain results of testing performed during the same visit where the patient portal was offered. However, our findings suggest that even when physicians directly encourage patients to enroll in the patient portal, enrollment rates remain lower for minorities and older persons.

There are several possible reasons for the racial and ethnic disparities in enrollment observed in this study. First, non-white patients may perceive fewer benefits to enrolling in the patient portal. For example, non-white patients may value having a verbal conversation with their provider about ongoing clinical issues rather than emailing questions. Similarly, non-white patients may perceive little benefit in having an electronic copy of their medication list or lab results. Although some may feel this appropriately reflects patient preferences around communication, in the context of increasing efforts to use the patient portal to deliver interventions to improve health care, this difference in patient preference may lead to increasing health and health care disparities. Promotional materials marketing the patient portal to patients and providers should convey the current and future benefits of the patient portal to patients. Second, non-white patients may experience more difficulty completing the enrollment process. After an electronic order is entered, patients must complete several steps to complete enrollment. If non-white patients have lower computer literacy, they may have more difficulty navigating the webpage and overcoming technical difficulties; this may lead to disparities in enrollment. Enrollment instructions and website design should be mindful of patients with varying literacy levels, and institutions need to offer robust support for patients who wish to use the portal. Third, non-white patients may be more distrustful of using web-based communications for sensitive health information. Further research will need to examine optimal message design to address and allay this concern. Fourth, non-white users may be more reluctant to inform their providers that they lack internet access during discussions about the patient portal, however, recent data suggests there are now minimal disparities in access to the internet in Chicago.⁷

Interestingly, we found no racial or ethnic disparities in the use of the patient portal among those enrolled. White and non-white patients were equally likely to use the patient portal to communicate with their providers and request medication refills. This suggests that overcoming barriers to enrollment in the portal is the most crucial next step to minimizing disparities in use of patient portal technology. Institutions seeking to expand use of patient portals should focus on the strategies outlined above.

In addition to racial and ethnic differences, we identified age and gender differences in enrollment and use of the patient portal. Patients 65 and older may be less likely to enroll because of lower computer literacy compared to younger individuals.

Once enrolled though, older patients are more likely to use the portal to seek provider advice or request medication refills. The higher use of these functions among older patients most likely reflects the increased number of chronic medical conditions and use of prescription medications in this population. The possible reasons for the higher use of the portal by women soliciting provider advice are less clear. In general, women tend to use more health care services than men.^{8,9} Further studies need to validate these findings in other clinic populations and examine the content of electronic communications.

There are several important limitations to our study. First, we relied on race/ethnicity data recorded in the EHR. These data are not ideal because these are not based on self-report, however, previous analyses have shown very high agreement between race/ethnicity data in our EHR and patient self-report (see methods). Second, we did not have race/ethnicity data on a large proportion of patients. Although sensitivity analyses using geocoding to assign race and ethnicity showed no differences compared with our baseline analyses, it is possible that our results would have been different with more complete demographic information. Third, we lacked data on patients' actual internet access. Although we are unable to control for access to the internet, data from unpublished patient interviews at our clinic and regional data show there are few racial and ethnic disparities in access to high speed internet. Thus, it is unlikely that the racial/ethnic differences that we found in enrollment rates were due to differences in internet access alone. Fourth, we did not have individual measures of education or income and relied on a proxy measure of these variables; however the use of census block group level data represents a reasonable proxy for individual level data.^{10,11} Lastly, our analyses are limited to one site and may not be generalizable.

Despite these limitations, our study suggests that even when providers encourage patients to enroll in a patient portal to the EHR, rates of enrollment are suboptimal overall and significantly worse among non-whites and older persons. Future studies need to elucidate patient, provider, and systemic barriers that decrease enrollment and disproportionately affect certain populations, particularly minorities. Addressing these barriers is essential for minimizing future disparities in health as patient portals become an increasingly important means of engaging patients in their health care.

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