

Association Between Personal Health Record Enrollment and Patient Loyalty

Marianne Turley, PhD; Terhilda Garrido, BSE, MPH; Alex Lowenthal, MPA;
and Yi Yvonne Zhou, PhD

Objectives: To examine the association between patient loyalty, as measured by member retention in the health plan, and access to My Health Manager (MHM), Kaiser Permanente's PHR, which is linked to its electronic health record, KP HealthConnect.

Design: We conducted a retrospective cohort observational quality improvement project from the third quarter of 2005 to the fourth quarter of 2008 for approximately 394,000 Kaiser Permanente Northwest members.

Methods: To control for self-selection bias, we used propensity scores to perform exact 1-to-1 matching without replacement between MHM users and nonusers. We estimated retention rates of the matched data and assessed the association between MHM use and retention versus voluntary termination. We also estimated odds ratios of significant variables impacting member retention.

Results: The probability of remaining a member or being involuntarily terminated versus voluntary termination was 96.7% for users (95% confidence interval [CI], 96.6%-96.7%) and 92.2% for nonusers (95% CI, 92.1%-92.4%; $P < .001$). In the logistic model, MHM use was a significant predictor; only tenure and illness burden were stronger predictors. Users were 2.578 (95% CI, 2.487%-2.671%) times more likely to choose to remain members than were nonusers. The impact was more substantial among newer members.

Conclusions: MHM use was significantly associated with voluntary membership retention. An indicator of patient loyalty, retention is critical to healthcare organizations.

(*Am J Manag Care.* 2012;18(7):e248-e253)

For author information and disclosures,
see end of text.

Among American healthcare consumers, considerable interest exists in integrated personal health records (PHRs). Across several consumer-focused surveys, 76% to 86% of respondents expressed interest in having Internet access to their health information, yet far fewer—7%—had experience doing so.¹⁻³ In a national survey, the majority of respondents reported the belief that online access to health information would have personal benefits that would improve the quality of healthcare.⁴ People pay more attention to and become more engaged in their health and medical care when they have easy online access to their health information.⁵

Most investigations report on adoption and the characteristics and preferences of users of online access websites or patient portals integrated with electronic health records (EHRs).⁶ Far fewer reports document the impact on outcomes of patient portals.⁷ Documented impacts include increased efficiency, increased patient contacts of all types, and improved Healthcare Effectiveness Data and Information Set (HEDIS) scores.⁸⁻¹¹ Operational cost savings related to reduced mailed and telephone communications have also been documented.¹²

An important potential outcome of patient access to an integrated PHR, in addition to clinical benefits, is increased loyalty to the delivery system as reflected in membership retention. Beyond the obvious negative impact to a healthcare organization's bottom line of member terminations, terminations are associated with significant costs for acquiring new members, transferring health records, and to some extent, liability related to transferring patients to other providers.¹³ Indirect costs may also occur related to the organization's reputation and physician dissatisfaction with the voluntary departure of patients from their care.

Our objective was to examine the association between the use of My Health Manager (MHM), Kaiser Permanente's integrated PHR, and health plan member retention.

METHODS

Population and Data Source

Kaiser Permanente is one of the nation's leading health-care providers and not-for-profit health plans, with 9 million

In this article
Take-Away Points / e249
Published as a Web exclusive
www.ajmc.com

members in 9 states and the District of Columbia. We conducted a retrospective cohort analysis of 394,215 eligible Kaiser Permanente Northwest members between the fourth quarter of 2005 and the third quarter of 2008. Eligible members included those in a mixture of zero- to high-deductible health maintenance organization (HMO) and point-of-service plans who were continuously enrolled or whose membership was terminated. Nearly 94% of the eligible members subscribed to HMO plans. We excluded members under the age of 13 years as they are not eligible to register for MHM access. Data on termination and member characteristics were obtained from KP HealthConnect, Kaiser Permanente's integrated electronic health record, and other administrative sources.

MHM as Treatment

By registering to use MHM on website kp.org, members gain access to a robust set of online functionalities. Registered users can view portions of their medical record—eg, a health summary including allergies, immunizations, health conditions, and clinical laboratory results—schedule or change office visit appointments, securely e-mail physicians and other healthcare providers, order prescription refills, view summaries from recent appointments and reminders for needed services, request an update to their medical record, and perform other healthcare-related activities. We defined MHM use as registration, activation, and at least 1 login event during the observation period; in our exploratory analyses, this definition was highly correlated with the number of login events and online functionalities used. During the study period, 162,022 members became MHM users. By March of 2012, 53.3% (218,456) of eligible Kaiser Permanente members in the Northwest region were registered users.

Outcome Measure

The outcome measure was retention of Kaiser Permanente membership. Health plan members participate in an annual “open period” during which they elect to retain an existing health plan or replace it; every member retained is a membership termination avoided. We identified retention as occurring in the same month in which the member's employer group renewed its contract with Kaiser Permanente; if the group renewed the contract and the individual did not terminate membership, we categorized the membership as retained. We considered involuntary termination as equivalent to re-

Take-Away Points

Among 394,000 eligible members in the northwest region, use of My Health Manager (MHM)—Kaiser Permanente's personal health record linked to its comprehensive electronic health record system—was associated with the greater likelihood of voluntary retention of membership.

- We conducted a retrospective cohort observational analysis, controlling for self-selection bias using propensity score estimates and exact matching methods.
- Member retention was assessed using the matched sample; MHM users were 2.578 times more likely to remain members than were nonusers.
- Patient access to MHM may have contributed to patient loyalty to an integrated health plan and delivery system.

ention; ie, members did not choose to discontinue membership. In contrast, we also identified voluntary termination as occurring in the same month as group contract renewal; if the individual did not renew membership, we categorized the termination as voluntary.

Statistical Analysis

We performed exploratory data analyses on the raw data and calculated retention rates for MHM users and nonusers. To control for self-selection bias in our observational design, we used matching methods to minimize any systematic differences of the known factors between the MHM users and nonusers.¹⁴ This method required a design phase to select a subset of data matched on significant covariates of MHM use; we used SAS 9.1 software to estimate propensity scores on each of the observations using logistic regression between the covariates and MHM use or nonuse, without including the outcome measure of membership retention.¹⁵ The covariates included age, gender, tenure (length of KP membership in years), membership type (subscriber, spouse/partner, or dependent), illness burden (measured by average per year, concurrent Diagnostic Cost Group scores), and the presence of diabetes and hypertension. Explanatory variables were treated as categorical; modeling them as continuous variables did not improve model fit.

After propensity scores were estimated to each observation, those with equivalent propensity scores, ie, similar to one another with respect to the multiple covariates, were matched 1 to 1 without replacement for MHM users and nonusers.¹⁴ We used the concordance index to assess the quality of the matching.¹⁶

In the second phase of the matching method, member retention rates were estimated for the matched data by MHM use and nonuse, and differences were tested between them. The matched data were also modeled with logistic regression with member retention as the outcome measure to estimate the effect of the covariates and MHM use on the outcome. We assessed overall model fit with the likelihood ratio test

■ **Table 1.** Characteristics of the Case (kp.org User) and Control (Nonuser) Groups Pre- and Post-matching

	Case	Control	Case	Control
	Pre-matching		Post-matching	
	N = 162,022	N = 232,193	N = 141,625	N = 141,625
Female	96,710 (59.7%)	111,515 (48.0%)	78,887 (55.7%)	80,206 (56.6%)
Age, y				
13 to 24	12,661 (7.8%)	57,814 (35.7%)	12,661 (8.9%)	12,965 (9.2%)
25 to 44	52,792 (32.6%)	67,708 (41.8%)	45,770 (32.3%)	45,157 (31.9%)
45 to 64	71,627 (44.2%)	68,495 (42.3%)	58,244 (41.1%)	56,540 (39.9%)
≥65	24,942 (15.4%)	38,176 (23.6%)	24,942 (17.6%)	27,233 (19.2%)
Diabetes	14,106 (8.7%)	12,545 (7.7%)	11,653 (8.2%)	11,513 (8.1%)
Hypertension	38,406 (23.7%)	37,164 (22.9%)	32,704 (22.6%)	32,948 (23.3%)
Tenure				
<1 y	13,814 (8.5%)	28,144 (17.4%)	13,680 (9.7%)	12,835 (9.1%)
1 to 3 y	41,437 (25.6%)	63,273 (39.1%)	36,707 (25.9%)	36,253 (25.6%)
>3 to 10 y	49,583 (30.6%)	69,513 (42.9%)	42,729 (30.2%)	43,627 (30.8%)
>10 y	57,188 (35.3%)	71,263 (44.0%)	48,509 (34.3%)	48,910 (34.5%)
Membership type				
Subscriber	112,978 (69.7%)	141,125 (87.1%)	99,301 (70.1%)	99,201 (70.0%)
Partner/spouse	38,812 (24.0%)	40,926 (25.3%)	32,103 (22.7%)	32,413 (22.9%)
Dependent	10,226 (6.3%)	50,142 (30.9%)	10,221 (7.2%)	10,005 (7.1%)
Higher than average illness burden^a	98,912 (61.0%)	93,568 (57.8%)	78,515 (55.4%)	78,771 (55.6%)

^aGreater than the average score across the national commercial insurer pool.

and the adjusted R^2 and used the Wald test to assess the model coefficients.

For the logistic model on the matched data, we computed odds ratio estimates and confidence intervals [CIs] for each significant coefficient in SAS. We also estimated retention rates within tenure categories to illustrate the effect of MHM use on retention even after we adjusted for tenure. Institutional review board approval was not required for our quality improvement project.

RESULTS

Exploratory Data Analysis

Table 1 displays the characteristics of the population. Our exploratory analyses revealed that, among 394,215 members observed, 162,022 used MHM and 232,193 did not. There were 27,158 voluntary member terminations: 5075 MHM users and 22,083 nonusers. The corresponding voluntary retention rates were 96.9% for MHM users (95% CI, 96.8%-97.0%) and 90.5% for nonusers (95% CI, 90.4%-90.6%; $P < .001$).

Matched Case-Control Methods: Design Phase

In the design phase, we obtained matches between 141,625 MHM users and 141,625 nonusers, with a concordance of 68.0% (Table 1). For the matched data, there were 15,723 voluntary member terminations: 4737 by MHM users and 10,986 by nonusers. The corresponding voluntary retention rates were 96.7% for users (95% CI, 96.6%-96.7%) and 92.2% for nonusers (95% CI, 92.1%-92.4%; $P < .001$).

Matched Case-Control Methods: Outcome Analysis

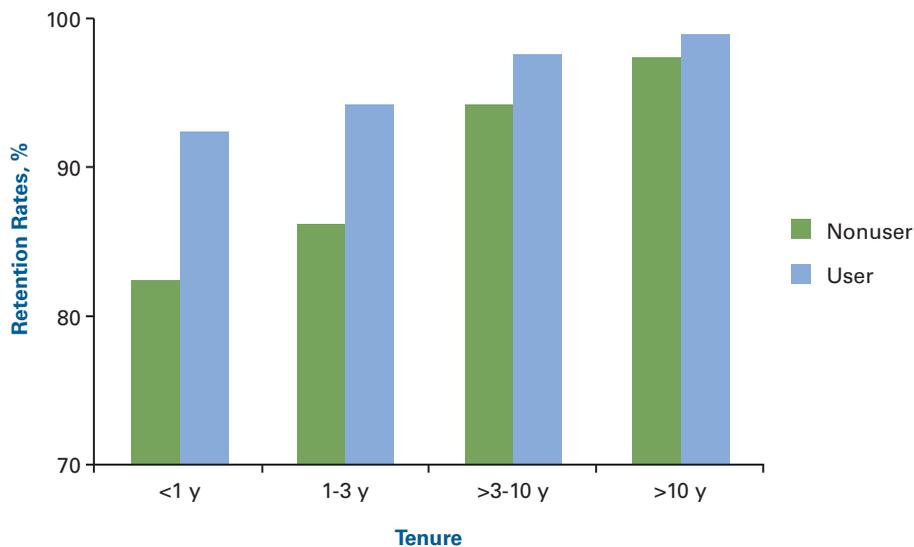
In the logistic regression analysis for the matched data with member retention as the outcome, the predictors were (in order of strongest prediction): tenure, illness burden, MHM use, age, membership type, hypertension, gender, and diabetes ($P < .001$ for all except diabetes $P = .005$). After adjusting for the other predictors, MHM users were 2.578 times more likely to remain members of Kaiser Permanente than were nonusers (95% CI, 2.487%-2.671%) (Table 2). With respect to the other predictors, members with some or all of the following characteristics were more likely to stay with KP than members with different values for these variables: more than 10 years of

Table 2. Odds Ratio of Member Retention Versus Termination for Logistic Regression Parameters

Parameter	Odds Ratio Estimate	Wald 95% Confidence Limits		P
		Lower	Upper	
Membership tenure				
<1 y vs >10 y	0.192	0.180	0.204	<.0001
1 to 3 y vs >10 y	0.235	0.222	0.249	<.0001
3 to 10 y vs >10 y	0.561	0.528	0.695	<.0001
Illness burden high vs low	2.561	2.467	2.660	<.0001
PHR user vs nonuser	2.578	2.487	2.671	<.0001
Age, y				
13 to 24 vs 45 to 64	0.807	0.762	0.854	<.0001
25 to 44 vs 45 to 64	0.772	0.746	0.798	<.0001
≥65 vs 45 to 64	1.803	1.671	1.945	<.0001
Dependent vs subscriber	0.955	0.877	1.040	.039
Partner/spouse vs subscriber	0.820	0.788	0.853	<.0001
Presence vs absence of hypertension	1.354	1.270	1.443	<.0001
Female vs male	0.872	0.842	0.902	<.0001
Presence vs absence of diabetes	0.856	0.784	0.934	.0005

PHR indicates personal health record.
 Note: Parameters listed in order of best model fit.

Figure. Member Retention Rates for MHM Users and Nonusers by Membership Tenure, Matched Data



MHM indicates My Health Manager.

membership, high illness burden, 65 years or older, subscribers, males, and diagnosed hypertension.

We also estimated retention rates of the matched data at specific levels of membership tenure (Figure). These estimates illustrated that, even after the data have been adjusted for membership tenure, MHM use has an impact on retention, especially among newer members. For members with less

than 1 year of membership, the retention rate was 92.4% for users (95% CI, 92.0%-92.9%) and 82.5% for nonusers (95% CI, 81.8%-83.1%)—a difference of 10 percentage points ($P < .001$). For membership tenure of 1 to 3 years, the retention rate was 94.2% for users (95% CI, 93.9%-94.4%) and 86.4% for nonusers (95% CI, 86.0%-86.7%)—a difference of 8 percentage points ($P < .001$).

The effect of MHM use on retention diminished as membership tenure increased. For members with tenure of at least 3 but less than 10 years, the retention rate was 97.6% for users (95% CI, 97.4%-97.7%) and 94.2% for nonusers (95% CI, 94.0%-94.5%)—a difference of 3 percentage points ($P < .001$). Finally, for members with more than 10 years, the retention rate was 99.0% for users (95% CI, 98.9%-99.1%) and 97.4% for nonusers (95% CI, 97.3%-97.6%)—a difference of almost 2 percentage points ($P < .001$). Quantifying the association between My Health Manager use and member retention in specific groups may help us direct resources to the areas where the data suggest greatest impact.

DISCUSSION

Kaiser Permanente Northwest members who used MHM on kp.org were 2.578 times more likely to choose to remain members than were those who did not use it. Following membership tenure and illness burden, MHM use was the third-strongest predictor of remaining a member. The effect of use on membership retention was strongest among those with shorter membership tenures.

Strengths of our project include the large population, voluntary termination data, and our ability to gauge the association between MHM use and membership retention relative to other factors, such as membership tenure and illness burden. One limitation was that our models did not account for significant portions of the data variation (15% for the matched data). Including other factors, such as market forces, would likely improve the model fits but is outside our study's scope.

Some of the benefits of observational designs include the facts that the data are more realistic than in a randomized controlled trial and have already been collected.¹⁷ To control for self-selection bias, we performed a matched case-control analysis with propensity scoring and exact matching; propensity score matching methods control for confounding factors to some degree but do not address causality. We obtained a high percentage of case matches (87%) and had high concordance between the matches (68%). Our large sample size added to the robustness of the estimates to detect statistical differences in member retention between MHM users and nonusers. The odds ratio estimates provided additional insight into the factors impacting member retention. A data assumption was that both voluntary and involuntary terminations may have occurred in the contract renewal month, leading to an overestimate of the latter; however, the rate of voluntary terminations we report matches data from internal surveys conducted with members who terminated their Kaiser Permanente memberships for any reason.

Few health plans have accurate and operational definitions of voluntary disenrollment, and segmentation of mem-

bers with respect to their likelihood to disenroll is limited.¹⁸ We limited our observation period to the time that voluntary termination data were available. Raising satisfaction scores on measures such as the Consumer Assessment of Healthcare Providers and Systems (CAHPS) can be viewed as a strategy to increase member retention, but research on satisfaction frequently fails to identify drivers of member retention and loyalty.^{19,20} Plans reporting 90% satisfaction rates also report 20% to 40% disenrollment rates.¹³ To the best of our knowledge, ours is the first study to document the association between patient loyalty, measured as member retention, and access to an online integrated PHR like MHM.

We illustrated the association between member retention and MHM use by tenure category to show that, although both users and nonusers were likely to remain with their current healthcare providers (Figure), significantly more retention occurred within the user group. For newer members, these estimates may illustrate the value of having online access. The technology may serve as a bridge strategy as they establish a relationship with care teams within the first 3 years of their membership tenure.

If extrapolated to include all eligible members, our findings could represent an additional 3000 members retained annually. With increased retention, some marketing efforts could be redirected to membership growth; providing access to a PHR may be a strategically sound choice.

Future work is required to confirm our results in other settings and to explore causative relationships, as well as to quantify potential financial and health outcomes impacts. However, our findings have important policy implications. In an era of expanding investment in EHRs, it is noteworthy that use of an integrated PHR is both viewed favorably by patients (as documented in the introduction section) and positively associated with patient loyalty and health plan choice, which can help justify deployment costs. Our project suggests that, for patients, access to an integrated PHR may constitute highly meaningful use.

Acknowledgments

We gratefully acknowledge the support of Di Meng, PhD, Dale Kirkbride, MS, MBA, Linda Radler, MBA, Kaiser Permanente Northwest physicians and staff providing care with kp.org, and the Internet Services Group. Jenni Green, MS, provided editorial assistance.

Author Affiliations: From Health Information Technology Transformation and Analytics (MT, YYZ), Kaiser Permanente, Portland, OR; Kaiser Permanente (TG), Oakland, CA.

Author Disclosures: The authors (MT, TG, AL, YYZ) report employment with Kaiser Permanente, the funder of the study.

Authorship Information: Concept and design (MT, TG, AL, YYZ); acquisition of data (MT, YYZ); analysis and interpretation of data (MT, TG, AL); drafting of the manuscript (MT, AL); critical revision of the manuscript for important intellectual content (TG, AL); statistical analysis (MT); obtaining funding (TG); administrative, technical, or logistic support (TG, YYZ); and supervision (TG).

Funding Source: Kaiser Permanente.

Address correspondence to: Marianne Turley, PhD, 500 NE Multnomah St, Ste 240, Portland, OR 97232. E-mail: marianne.c.turley@kp.org.

REFERENCES

1. **Fricton JR, Davies D.** Personal health records to improve health information exchange and patient safety. In: Henriksen K, Battles JB, Keyes MA, Grady ML, eds. *Advances in Patient Safety: New Directions and Alternative Approaches. Vol. 4. Technology and Medication Safety.* Rockville, MD: Agency for Healthcare Research and Quality; 2008.
2. **Wen KY, Kreps G, Zhu F, Miller S.** Consumers' perceptions about and use of the internet for personal health records and health information exchange: analysis of the 2007 Health Information National Trends Survey. *J Med Internet Res.* 2010;12(4):e73.
3. **Patel VN, Dhopeswarkar RV, Edwards A, et al.** Consumer support for health information exchange and personal health records: a regional health information organization survey. *J Med Syst.* 2010;36(3):1043-1052.
4. **Markle Foundation.** Survey finds Americans want electronic personal health information to improve own health care. New York, NY; November 2006.
5. **Lake Research Partners.** Consumers and health information technology: a national survey. Oakland, CA: California Health Care Foundation; April 2010.
6. **Emont S.** Measuring the impact of patient portals: what the literature tells us. Oakland, CA: California Health Care Foundation; May 2011.
7. **Wunder SS.** Pursuing the promise of patient portals. *HFM Magazine.* 2009; Spring/Summer. <http://www.hfma.org/Publications/Leadership-Publication/Archives/Special-Reports/Spring-Summer-2009/Pursuing-the-Promise-of-Patient-Portals>. Published May 1, 2009. Accessed June 2, 2011.
8. **Liederman EM, Lee JC, Baquero VH, Seites PG.** Patient-physician web messaging: the impact on message volume and satisfaction. *J Gen Intern Med.* 2005;20(1):52-57.
9. **Chen C, Garrido T, Chock D, Okawa G, Liang L.** The Kaiser Permanente electronic health record: transforming and streamlining modalities of care. *Health Aff (Millwood).* 2009;28(2):323-333.
10. **Zhou YY, Garrido T, Chin HL, Wiesenthal AM, Liang LL.** Patient access to an electronic health record with secure messaging: impact on primary care utilization. *Am J Manag Care.* 2007;13(7):418-424.
11. **Zhou YY, Kanter MH, Wang JJ, Garrido T.** Improved quality at Kaiser Permanente through e-mail between physicians and patients. *Health Aff (Millwood).* 2010;29(7):1370-1375.
12. **Gardner E.** Will patient portals open the door to better care? Health Data Management. http://www.healthdatamanagement.com/issues/18_3/will-patient-portals-open-the-door-to-better-care-39853-1.html?pg=3. Published March 1, 2010. Accessed January 9, 2012.
13. **Wood SD.** Strategies for improving health plan member retention. *Healthc Financ Manage.* 1999;suppl:1-5.
14. **Stuart E, Rubin D.** Best practices in quasi-experimental designs: matching methods for causal inference. In: Osborne J, ed. *Best Practices in Quantitative Social Science.* Thousand Oaks, CA: Sage; 2007:155-176.
15. **SAS version 9.1** [computer software]. Cary, NC: SAS Institute; 2005.
16. **Harrell FE Jr, Califf RM, Pryor DB, Lee KL, Rosati RA.** Evaluating the yield of medical tests. *JAMA.* 1982;247(18):2543-2546.
17. **Fairies D, Leon A, Haro J, Obenchain R.** *Analysis of Observational Health Care Data Using SAS.* Cary, NC: SAS Institute; 2010.
18. **Wood SD, Flanagan-Hyde S, Bruce M.** *Retention Benchmarking 2000: A National Study.* Scottsdale, AZ: The HSM Group; 2000.
19. **Huppertz JW.** Predicting health plan member retention from satisfaction surveys: the moderating role of intention and complaint voicing. *Health Mark Q.* 2008;25(4):383-404.
20. **Tai-Seale M.** Does consumer satisfaction information matter? evidence on member retention in FEHBP plans. *Med Care Res Rev.* 2004;61(2):171-186. ■