

Predictive variables of the Use of Personal Health Record: the Hospital Italiano de Buenos Aires Study

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Abstract

Introduction: although trends in consumer research suggest growing interest in using electronic PHRs, actual utilization of PHRs technologies is still low. *Objective:* to identify those conditions that make patients at Hospital Italiano de Buenos Aires use a PHR and compared them to those that do not. *Study Design:* Analytic Cross-sectional study. *Results:* the average age was 55.5 years (SD 19.8), 60.5% are female (39.5%, IC95%). The rate of enrolled of PHR is almost 50% and the rate of use in the period of study was 29.1% (95% IC 28, 87 - 29.4). The characteristics of patients that are most likely to use our PHR are: the presence of at least one comorbidity (disabilities or chronic conditions), asked for medical assistance during the last year, female and middle age. *Conclusion:* In this study the characteristics of patients that are most likely to use our PHR are similar that other authors published. Future research is needed to understand social, cultural and organizational issues that influence in the high rate of adoption and use.

Keywords: Health Records, Personal, Consumer Participation, Diffusion of Innovation

Introduction

Electronic personal health record systems (PHRs) support patient centered healthcare by making medical records and other relevant information accessible to patients, thus assisting patients in health self-management [1-6]. Although trends in consumer survey research suggest growing interest in using electronic PHRs, actual utilization of PHRs technologies is still low [7-12]. One study found 91 different PHR commercial products in use by firms, institutions, or governments, and only 7% of American adults use PHRs [4]. Markle Foundation Connecting for Health found only 2.7% of adults have online PHRs, and 80% of those who have accessed their online PHRs considered it to be valuable [13]

Several studies show that the use of PHRs is associated with age, young people enroll more, but

older people use it more. According to gender women use it more than men [14, 15]. Also those with educational levels more extensive than a high school degree are more likely than those with only a high school degree or less. Respondents with a regular health care provider are almost twice as likely as those without a regular health care provider [7]. People with disabilities and chronic conditions, frequent users of healthcare services, and people caring for elderly parents tend to have the most interest in PHRs. Whether they actually adopt and use them is another matter [4, 16].

None of these characteristics were described in a Latinamerican country. The Hospital Italiano de Buenos Aires (HIBA) has a Health Information System since 1998 and implemented a PHR in 2007. Almost 50% of HIBA Health Maintenance Organization (HMO) affiliates is enrolled to the PHR [17]. Our hypothesis is that patients who use the PHR have different health characteristics compared to those who do not. The aim of this study is to identify the characteristics that make patients use the PHR and compare them to what other authors found.

Materials and Methods

Objective: to determine the PHR use prevalence of among our affiliates and to identify the conditions associated to higher use

Study Design: Analytic Cross-sectional study.

Setting: HIBA is a non-profit, tertiary care, teaching and research hospital with more than a 150 year-old history. It has two hospitals with 750 inpatient beds, 200 intensive care units, 600 home care beds. The Hospital admits 50.000 inpatients and has more than 2.800.000 outpatient visits annually at 25 primary care clinics. Every year the maternity ward shelters 3000 births and approximately 200 adults and pediatric transplants are done. For almost 30 years it also has its own Health Maintenance Organization (HMO) called

Plan de Salud that takes care of a population of 150,000 patients.

Study population: adult patients over 18 years old affiliated to Plan de Salud (HMO) before 01/01/2012 where considered eligible for the study.

Study period: 3 months

PHRs description: since 1998 all physicians at HIBA use an electronic health record (EHR) for clinical, financial and administrative purposes. Since 2007 the EHR is linked to the PHR giving patients access to aspects of the EHR kept by their doctor related to Health Care (laboratory, diagnosis, preventive information, medications lists), and some functionality that supports Communications with their doctor like messages system or with health services like appointments and medication delivery for Self management, among other things (Figure 1) [18]. The team that designs and develops the PHR is multidisciplinary, formed by physicians, medical informaticians and software engineers. The PHR was developed in Java language, in three tier Web Architecture, to provide a greater degree of flexibility and increased security, which can be designed for each service at each level. The user interface is developed using user-centered methodology based on usability techniques and continuous test with actual users of the portal [19].

The PHR uses Secure Sockets Layer (SSL) to encrypt the information and have a save data transport. It is also portable, making it possible to use it from a personal computer with any navigator, or mobile devices getting safe information whenever and wherever you need it. Members are continuously informed about new PHRs features through multiple channels, including their physician at the point of care, a special magazine, an annual outreach reminder letter, and other communications.

Unit of analysis: patient **Source of data:** secondary databases. Outcome Variable: use.

Definition: a patient was considered a user of a PHR if he/her had entered at least once between September 3 to December 3 of 2012.

Predictive variables: Demographic: age, sex and residence place. **Health conditions:** Diabetes; Coronary artery disease; Cerebral vascular disease; Peripheral; Vascular Disease; Chronic Renal Failure; Chronic Heart Failure; Hypertension; Smoker. **Health system care use variables:** consultations and hospitalizations in the last 12 months.

Predictive Variable definitions: According to the problem list that physician use in our EHR trough Terminology Server [20, 21]

Figure 1 – PHR interface



Statistical Analysis:

The prevalence rate of use is expressed per 100 enrollees and 95% confidence interval (95% IC). Also the number of days that patients had entered was described as mean and standard deviation (SD). Other continuous variables are expressed as mean / median / IQR DS as appropriate. Categorical variables were expressed by n and %. Univariate analysis comparing predictive variables among those who use and those who do not use the PHR was done using t test or chi square test according to variable distribution. Logistic regression was performed to determine significant predictors of PHR use, variables in the model were, age, sex, Consultations, Hospitalizations. Confounder variables were selected based on clinical and/or statistical univariate significance. The adjusted Odds Ratio

(OR) and their 95% IC are reported for each variable. We use STATA for statistical analysis and consider p value <0.05 as statistically significant

Results:

The number of active patients affiliated to the “Plan de Salud del Hospital Italiano de Buenos Aires”, over 18 years of age, are 122,006. The average age was 55.5 years (SD 19.8), 60.5% are female (39.5%, IC95%). The rate of use of PHR was 29.1% (95% IC 28, 87 - 29.4). The characteristics of patients for the reference population are presented in Table 1 according to their user PHR condition (user/non user), disease or comorbidity, with outpatient consultation or hospitalization have had in the last year.

Table 1- Characteristics of affiliates according to their PHR user condition

Variables	User (n= 35544 pacientes)	Non User (n=86462)	OR (IC95%)	P valor
Demographics				
Age, mean (sd)	52,2 (18,5)	56,9 (20,1)		0,000
Age strata				
< 40	10941 (25,2)	21820 (30,8)	1	
40 - <65	14214 (40)	28563 (33)	0.99 (0.96- 1.02)	0,3
65 or more	10389 (29,2)	36070 (41,7)	0.57 (0.55- 0.59)	<0,000
Males, n %	12675 (35,7%)	35481 (41%)	0,79 (0,77-0,81)	
Comorbidities				
at least one comorbidity, n %	16,967(47,7)	42858 (49,6)	0.92(0.90-0.95)	
Hypertension , n %	12594 (35,4)	33739 (39)	0.85 (0.83- .87)	
Diabetes, n %	2259(7)	6037 (6,4)	0.90 (0.86-0.95)	
Dyslipidemia , n %	7614 (21,4)	19082 (22,1)	0.96 (0.93, 0.99)	
Cerebral vascular disease , n %	777 (2,2)	2278 (2,6)	0.82(0.76-0.89)	
Coronary artery disease , n %	734 (2,1)	1854 (2,1)	0.96 (0.88, 1.04)	
Chronic Heart Failure, n %	297 (0,8)	868 (1)	0.83 (0.72 0.94)	
Chronic Renal Failure, n %	1043 (2,9)	2465 (2,9)	1.03 (0.95 1.10)	
Peripheral Vascular Disease, n %	2294 (6,5)	5158 (6)	1.08 (1.03 1.14)	
Smoker, n %	6769 (19)	16852 (19,5)	0.97 (0.94- 1.00)	
Health system care use variables				
Consultations, n %	31942 (89,9)	60771 (70,3)	3.74 (3.61 3.89)	
Number consultations in the last year, mean (sd)	6,9 (5,9)	6,2 (5,9)		0,0000
Hospitalizations, n %	12103 (34)	24313 (28,1)	1.32 (1.28-1.35)	
Number consultations in the last year (Median-QIR)	1 (2-45)	1 (3-56)		0,0000
Location				
CABA (City)	23585 (66,4)	52693 (60,9)	1,47 (1.31-1.65)	<0,000
BS AS (State)	11570 (32,6)	32485(37,6)	1,01 (1.04, 1.31)	0.005
Other States	389 (1,1)	1284 (1,5)	1	

Table 2- Variables with significant association to PHR use

Use	Odds Ratio	Std. Err	z	P> z	[95% Conf. Interval]
Comorbidity	1.244747	.0206144	13.22	0.000	1.204992 - 1.285813
Consultations	4.393572	.0883035	73.65	0.000	4.223865 - 4.570098
Hospitalizations	1.144624	.0161243	9.59	0.000	1.11-3453- 1.176667
Gender	.865562	.0119347	-10.47	0.000	.842-4837 -.8892725
Age	.9775626	.0004181	-53.05	0.000	.9767434 - .9783825

The univariate analysis shows that the portal is used by youngers and women and less used by those that had comorbidities (except in those that have peripheral arterial disease), however after adjusting for age and for the other variables including in the model, those with at least one comorbidity had a 24% increased use of the PHR compared to those that are healthier. The main predictor of PHR use was that a patient asked for medical assistance during the last year, increasing in almost 4 times the PHR use. Sex and age remained with the same direction and significant association to PHR use (Table 2). The functionality support to the needs of patients that had used the PHR is showed in Table 3.

Table 3- Needs of patients that used the PHR.

Functionalities	Patients (N)
Mean entrance per patients during 3 months.	6
Self management (appointments and medication delivery)	111.307
Communications (messages system)	11.891
Health Care (laboratory, diagnosis, preventive information)	68.546
Levels of use	Patients (%)
One functionality	1717
Two functionalities	9276
Three functionalities	122

Discussion:

The rate of use of PHR was 29.1%. This number is higher than the ones we found in published literature [12]. In fact, Wagner described in his paper that currently 10% of the public report using a PHR, increase from 3% in 2008. Another national survey indicates a 7% use rate, double

that noted 2 years earlier. In a large health cooperative offering and encouraging PHR use for all members, 42% signed up but only about 16% have become active users [22]. This higher rate is probably by the characteristics of our HMO[23]: middle outcome income, female, and middle age (Age mean is 45 when includes population under 18 years too). Although we couldn't found data about PHR use for countries in Latin-American region, these characteristics were associated with increase of PHR adoption in US, Canada and Europe [4, 7, 24]. Another factor that could influence in adoption and use is usability issue. PHR adoption has many perceived and real barriers[4]. As with any new technology, failure can often be linked to little consumer involvement during planning, design, and implementation. Our PHR has been developed based in user centered design [19]. In this study the characteristics of patients that are most likely to use our PHR are: the presence of at least one comorbidity (disabilities or chronic conditions), asked for medical assistance during the last year, female and middle age similar that other authors found [4]

Conclusion

The successful adoption of a PHR is affected by environmental factors including operational, organizational and cultural features of socio-technical perspective. The characteristics of our PHR users are similar to those that are described in other settings. Future research is needed to understand social, cultural and organizational issues that influence in the high rate of adoption and use [25]

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