Education Research: Electronic patient portal enrollment and no-show rates within a neurology resident clinic

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Abstract

Objective

To identify factors that affect appointment adherence and investigate the association of electronic patient portal (ePP) enrollment and patient adherence rates to appointments in the Neurology Resident Clinic (NRC).

Methods

Patients scheduled for an appointment during the months of October 2015, February 2016, and June 2016 in the NRC were included. ePP enrollment, date of clinic appointment, method of referral to the clinic, and key demographic criteria were collected. χ^2 tests were performed to assess the association of appointment status (i.e., no-show, showed, and canceled) with demographic, comorbidity, and visit information.

Results

Patients with ePP enrollment had significantly lower rates of no-show (19% vs 27%) and higher rates of showed (59% vs 48%) compared to patients without ePP enrollment. Younger patients (18–49) had the highest rates of no-show (28%), while older patients (65+) had the lowest rates of no-show (17%). Caucasian patients had significantly lower rates of no-show compared to non-Caucasian patients (14% vs 24%). Non-English-speaking patients had high rates of no-show (34%). Patients with a physician referral had significantly lower rates of no-show (20% vs 28%) and higher rates of showed (61% vs 44%) compared to patients with a self-referral.

Conclusions

Our study indicates that ePP enrollment, age, race, and physician referral might be associated with reduced no-show rates in the NRC.

Introduction

A nationwide increase in the adoption of electronic medical records (EMRs) by office-based physicians occurred from 2001 to 2015 (18.2% to 86.9%, respectively).[1–3] A majority of EMRs use an electronic patient portal (ePP), which allows patients to securely communicate with health care providers.[4–6] Thus far, implementing ePPs has yielded mixed results regarding clinic visit attendance; however, considerable variability exists in the methodology and scope of these studies.[4–7]

During academic year 2016–2017, 14,100 patients were seen in our neurology department's outpatient clinic. Currently, a 2-month waiting list exists for new patient visits, which is predicted to lengthen with increased demand. Anecdotally, there have been frequent no-shows to clinic, predominantly in the neurology resident clinic (NRC). This leads to unfilled patient slots and prevents those on an extended waitlist from being seen expeditiously. The effect of

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Glossary

EMR = electronic medical record; **ePP** = electronic patient portal; **IRB** = institutional review board; **NRC** = neurology resident clinic.

ePP electronic reminders upon patient adherence rates to clinic appointments remains unclear. In this study, we investigate how ePP enrollment, key demographic factors, and referral methods are associated with patient adherence rates to NRC appointments.

Methods

Our health system's EMR is Epic (Epic Systems Corporation, Verona, WI), which has been used in our outpatient clinics since 2013. MyChart is its accompanying ePP, and similar to other ePPs, delivers automatic appointment reminders. We reviewed patients scheduled in the NRC, which consists of a patient population scheduled with 18 neurology residents, during the months of October 2015, February 2016, and June 2016. These months were chosen to capture different time points during the academic calendar. We conducted a retrospective chart review of the following data: date of scheduled clinic visit, appointment status, MyChart enrollment, sex, age, race, preferred language, and method of referral to the clinic. Patients were defined as (1) no-shows (did not appear for or canceled the appointment <24 business hours from the appointment time), (2) showed (attended the scheduled visit), and (3) canceled (canceled ≥24 business hours prior to appointment).

Standard protocol approvals, registration, and patient consent

This retrospective study was approved by our institutional review board (IRB #10780). Given the nature of the study, the informed consent requirement was waived by the IRB. No experiments on live vertebrates or higher invertebrates were performed. No photographs, videos, or other recognizable information regarding participating patients has been submitted for publication.

Statistical analysis

We performed χ^2 tests to assess the association of appointment status (no-show, showed, and canceled) with MyChart enrollment, as well as predefined demographic, comorbidity, and visit information. We also used χ^2 tests to assess the association of MyChart enrollment with the predefined demographic, comorbidity, and visit information. Multinomial logistic regression analysis was performed to assess the association of appointment status with MyChart enrollment, after adjusting for other information. The testing level was set at 0.05. All analyses were done using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results

There were 1,113 total visits by 998 individual patients during the 3 selected months. Of these 998 patients, 897 had one visit, 87 had 2 visits, and 14 had 3 visits. In the 998 patients, 673 (67%) were female, 569 (57%) were African American, 919 (92%) spoke English, and the average age was 53.9 years (±18.9; range 18–100). The distribution of the appointment status was 230 (23%) no-show, 536 (54%) showed, and 232 (21%) canceled. Fifty-four percent (n = 540) were new visits, 67% (n = 670) were physician referrals, 50% (n = 501) had MyChart enrollment, and the visits were equally distributed over the 3 months (35% October, 31% February, and 34% June) (table 1).

Demographic associations

We found that appointment status is significantly associated with MyChart enrollment and age (table 1). Patients with MyChart enrollment had lower rates of no-show (19% vs 27%) and higher rates of showed (59% vs 48%) compared to patients without MyChart enrollment. Rates of cancellation were similar between the 2 groups (22% vs 25%). Younger patients (18–35 and 36–49) had the highest rates of no-show (29% and 27%, respectively), while older patients (65–79 and 80+) had the lowest rates of no-show (17% and 18%, respectively). Older patients (65–79 and 80+) had the highest rates of canceled appointments (26% and 34%, respectively).

In addition, we found significant associations of appointment status with race, language, and method of referral (table 1). This remained true when patients with unknown race, language, and method of referral were excluded (table 1). When considering patients with known race, Caucasian patients had the lowest rate of no-show (14%) and highest rate of canceled (27%), African American patients had the highest rate of no-show (25%) and lowest rate of showed (54%), and patients of other race—Hispanic, Asian, American Indian, and Native American/Pacific Islander—had the highest rate of showed (61%) and lowest rate of canceled (17%). Patients with unknown race had low rates of showed (28%) and high rates of no-show (40%) and canceled (31%).

Our non-English-speaking patients listed Spanish, Arabic, Chaldean, or Bengali as their preferred language. Despite this small sample size, they had high rates of no-show (34%) and low rates of canceled (8%). English-speaking patients had similar rates of no-show (22%) and canceled (24%).

Patients with a physician referral had lower rates of no-show (20% vs 28%) and canceled visits (19% vs 28%) and higher rates of showed (61% vs 44%) compared to self-referral.

The associations of appointment status with appointment type, month of appointment, sex, and the comorbidities

Table 1 Comparison of appointment status for MyChart enrollment and demographic, comorbidity, and visit information

Variable	Response	All patients (n = 998), n (%)[a]	No-show (n = 230), n (%)[b]	Showed (n = 536), n (%)[b]	Canceled (n = 232), n (%)[b]	Unadjusted *p* value[c]	Adjusted *p* value[d]
MyChart enrollment	Yes	501 (50)	95 (19)	297 (59)	109 (22)	<0.001	0.011
	No	497 (50)	135 (27)	239 (48)	123 (25)		
Appointment type	New	540 (54)	111 (21)	295 (55)	134 (25)	0.10	0.153
	Return	458 (46)	119 (26)	241 (53)	98 (21)		
Month of appointment	October	348 (35)	75 (22)	198 (57)	75 (22)	0.199	0.874
	February	308 (31)	63 (20)	168 (55)	77 (25)		
	June	342 (34)	92 (27)	170 (50)	80 (23)		
Sex	Male	325 (33)	73 (22)	171 (53)	81 (25)	0.683	0.847
	Female	673 (67)	157 (23)	365 (54)	151 (22)		
Age, y	18–35	203 (20)	59 (29)	105 (52)	39 (19)	0.012	0.010
	36–49	199 (20)	54 (27)	100 (50)	45 (23)		
	50–64	297 (30)	65 (22)	171 (58)	61 (21)		
	65–79	186 (19)	32 (17)	105 (56)	49 (26)		
	80+	113 (11)	20 (18)	55 (49)	38 (34)		
Race	Caucasian	271 (27)	37 (14)	162 (60)	72 (27)	<0.001 (0.004)[f]	0.006[f]
	African American	569 (57)	140 (25)	310 (54)	119 (21)		
	Other[e]	59 (6)	13 (22)	36 (61)	10 (17)		
	Unknown	99 (10)	40 (40)	28 (28)	31 (31)		
Language	English	919 (92)	202 (22)	499 (54)	218 (24)	0.014 (0.039)[g]	0.004[g]
	Other	38 (4)	13 (34)	22 (58)	3 (8)		
	Decline/do not know	41 (4)	15 (37)	15 (37)	11 (27)		
Referral	Self	294 (29)	82 (28)	130 (44)	82 (28)	<0.001 (<0.001)[f]	<0.001[f]
	Physician	670 (67)	137 (20)	406 (61)	127 (19)		
	Unknown	34 (3)	11 (32)	0 (0)	23 (68)		
Medical comorbidity	Diabetes	244 (24)	49 (20)	146 (60)	49 (20)	0.087	0.077
	CAD	78 (8)	23 (29)	38 (49)	17 (22)	0.369	0.008
	COPD	57 (6)	10 (18)	29 (51)	18 (32)	0.260	0.770
	CKD	83 (8)	14 (17)	47 (57)	22 (27)	0.357	0.256

Abbreviations: CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease.
[a] Column percentages.
[b] Row percentages.
[c] *p* Value from χ^2 test.
[d] *p* Value from multinomial logistic regression model.
[e] Other: Hispanic, Asian, American Indian, and Native American/Pacific Islander.
[f] *p* Value without unknown.
[g] *p* Value without decline/do not know.

diabetes mellitus, coronary artery disease, chronic obstructive pulmonary disease, and chronic kidney disease were not significant (table 1).

In the multivariate analyses, the association between appointment status and MyChart enrollment remained significant after adjusting for the other demographic, comorbidity, and visit information (table 1). The associations of appointment status with age, race, language, referral status, and coronary artery disease were also significant.

We assessed the associations of MyChart enrollment with demographic, comorbidity, and visit information and found that patients with MyChart enrollment were more likely to be female, younger, Caucasian, and referred by a physician (table 2).

Discussion

Our study investigated and determined an associative relationship between ePP enrollment and no-show rates within an NRC. Characteristics such as geographic location, insurance status, and the duration of time between the date an appointment was made and the date of the actual appointment have been shown to increase the likelihood of no-shows.[8–12] In addition, the demographic of younger age—a small subset of the overall patient population—paradoxically may overwhelmingly contribute to the total no-shows within a clinic.[9] Prior to EMR implementation, various interventions (i.e., mailed reminders, telephone calls, text messages, automated reminders) to reduce no-shows have been studied.[13–16]

The concept of no-shows takes particular importance when considering the impact upon the resident clinic, where trainees

Table 2 Comparing patients with and without MyChart enrollment

Variable	Response	MyChart enrollment (n = 501), n (%)	No MyChart enrollment (n = 497), n (%)	*p* Value
Appointment type	New	256 (51)	284 (57)	0.055
	Return	245 (49)	213 (43)	
Month of appointment	October	181 (36)	167 (34)	0.476
	February	146 (29)	162 (33)	
	June	174 (35)	168 (34)	
Sex	Male	127 (25)	198 (40)	<0.001
	Female	374 (75)	299 (60)	
Age, y	18–35	122 (24)	81 (16)	<0.001
	36–49	113 (23)	86 (17)	
	50–64	140 (28)	157 (32)	
	65–79	85 (17)	101 (20)	
	80+	41 (8)	72 (14)	
Race	Caucasian	165 (35)	106 (25)	0.008
	African American	282 (59)	287 (68)	
	Other	30 (6)	29 (7)	
Language	English	474 (97)	445 (95)	0.144
	Other	15 (3)	23 (5)	
Referral	Self	131 (27)	163 (34)	0.018
	Physician	354 (73)	316 (66)	
Medical comorbidity	Diabetes	113 (23)	131 (26)	0.162
	CAD	34 (7)	44 (9)	0.224
	COPD	24 (5)	33 (7)	0.208
	CKD	34 (7)	49 (10)	0.079

Abbreviations: CAD = coronary artery disease; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease.

have a relatively reduced number of patient encounters compared to attending physicians. As Sir William Osler said, "He who studies medicine without books sails an uncharted sea, but he who studies medicine without patients does not go to sea at all."[17] From our findings, residents miss out on seeing almost one quarter of patient volume (approximate 23% no-show rate), or approximately 4 missed patient encounters per resident per month. Furthermore, we observed that enrollment in the ePP correlated with lower no-show rates, which has been demonstrated by several other groups.[6,13] It may seem intuitive that a younger generation would tend to be higher portal adopters; however, we determined that patients who were female, Caucasian, and referred by a physician also adopted portals at a higher rate. These demographic findings are consistent with those previously seen in a variety of practice settings; however, in addition, preferred language, type of insurance, and economic status contributed to portal adoption.[5,7,13,18] Given there is no singular factor contributing to portal adoption, there have been several modalities and suggestions to encourage utilization of this resource.[19,20] It remains uncertain how this translates into an NRC; thus further investigation and validation will be necessary.

Limitations

Our study has several limitations, mainly those inherent to retrospective investigations such as being prone to certain biases and unforeseen confounders. In addition, we sampled only 3 months to capture different time points within the academic year and seasons, and we were only able to determine if a patient enrolled in MyChart but not the rate of ePP utilization. Also, we did not capture the gap between the date when the appointment was scheduled and the date of the actual appointment. Relying solely on the ePP may be feasible for certain populations; however, it likely should serve as a supplement to additional modalities. Furthermore, how no-shows are defined by different institutions may influence the generalizability of our data. Overall, no-shows are of great detriment to the education of trainees and to the stability of our fragile health care system. Further investigation is necessary to determine the most effective approach to decreasing no-shows and increasing patient adherence to clinic appointments, which will ultimately benefit patient well-being, resident education, and provider satisfaction.

Author contributions

K. Shah: study design, study concept, data collection, drafting and revising the manuscript. A. Alshammaa: study design, data collection. M. Affan: data collection. L. Schultz: data analysis. T. Walbert: study design, manuscript revision. I. Zaman: study concept, manuscript revision. All authors reviewed the final submitted manuscript.

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