A Profile of Patients Who Fail to Keep Appointments in a Veterans Affairs Primary Care Clinic

Elizabeth M. Boos, MPH; Marvin J. Bittner, MD; Michael R. Kramer, PhD

ABSTRACT

Background: Missed medical appointments ("no-shows") affect both staff and other patients who are unable to make timely appointments. No-shows can be prevented through interventions that target those most at risk to miss appointments. Young age, low socioeconomic status, a history of missed appointments, psychosocial problems, and longer wait times are some predictors that previously have been associated with higher no-show rates.

Objective: To determine predictors for outpatient appointment no-shows in primary care clinics of the Veterans Affairs Nebraska-Western Iowa Health Care System.

Methods: The study included 69,908 noncancelled primary care appointments between January 1, 2012 and December 31, 2013 among patients residing in ZIP codes within the Veterans Affairs Nebraska-Western Iowa Health Care System Service Area. Age, sex, race, presence of a mental health diagnosis, previous no-show rate in the past 2 years, appointment wait time, distance to clinic, and neighborhood deprivation index were extracted or measured for each patient.

Results: In log-binomial models accounting for clustering by ZIP code, the strongest predictors of no-shows were age between 20 and 39 (OR compared to 60+: 3.87, 95% CI, 3.48-4.31) or between 40 and 59 (OR compared to 60+: 2.23, 95% CI, 2.05-2.43), black (OR compared to white: 2.14, 95% CI, 1.98-2.31) or other nonwhite race (OR compared to white: 1.35, 95% CI, 1.17-1.56), male sex (OR compared to female: 1.30, 95% CI, 1.16-1.45), and presence versus absence of mental health diagnosis (OR: 1.16, 95% CI, 1.09-1.24).

Conclusion: These findings show that individuals who are younger, nonwhite, male, or have been diagnosed with mental health issues are more likely to no-show. Interventions to improve compliance could be targeted at these individuals in order to decrease the burden of no-shows on health care systems.

INTRODUCTION

Missed medical appointments ("no-shows") affect both staff and other patients. No-show rates in primary care settings range from 5% to 55%.[1] Previous studies at Veterans Affairs (VA) hospitals have found no-show rates of 23% (for nutrition appointment attendance) and 37% (for coronary artery disease testing and treatment).[2,3] No-shows yield loss of time, resources, and efficiency for physicians and other staff.[4] Scheduled patients who miss appointments cause a reduction in the quality of care for patients who meet challenges scheduling timely appointments.[5] There are also significant economic losses to health care systems. One study determined that no-shows reduce revenue by approximately 16%.[6]

Within the broader realm of health care systems, the Veterans Health Administration represents a unique model. It has a benchmark for "missed opportunities," which includes no-shows and doctor cancellations, of no more than 10%. Beginning in spring 2014, media reports drew attention to wait time issues and some possible manipulation of patient waiting lists. An investigation determined that the Phoenix, Arizona VA facilities maintained paper waiting lists in order to conceal veterans' actual times to appointment.[7] These issues make the current study particularly timely. The study of no-shows can be part of the solution to improving the flow of health care systems and reducing barriers to receiving care.

No-shows can be prevented through well-designed interventions such as mail, telephone, and short message service (SMS)/text message reminders and open access scheduling.[6,8-16] One study found economic benefit of interventions, but there was no assessment of whether economic gain was made without loss of quality of care. Nonetheless, appropriate interventions resulted in a reduction of revenue loss from 16% to between 3.8% and 10.5%.[6]

In order to create interventions that target those most at risk

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Author Affiliations: Department of Epidemiology, Emory University Rollins School of Public Health, Atlanta, Georgia (Boos, Kramer); US Department of Veterans Affairs, Nebraska-Western Iowa Health Care System, Omaha, Nebraska (Bittner).

Corresponding Author: Elizabeth M. Boos, MPH, 1518 Clifton Rd NE, Atlanta, GA 30322; phone 404.712.0914; fax 404.712.8392; e-mail elizabeth.boos@emory.edu.

to miss appointments, it is necessary to understand the multilevel factors that predict no-shows. Many individual-level characteristics may affect a patient's ability to attend an appointment, such as young age since younger patients may take less responsibility for attending appointments or have fewer medical issues.[9,17-22] Increasing wait times for clinic visits have resulted in higher no-show rates, which may be due to forgetfulness or a lack of reminders.[19] Area-based factors such as neighborhood deprivation and proximity to services also can impact no-shows as patients may have less access to transportation and appropriate care.

Previous studies of no-shows have focused largely on non-VA or nonprimary care clinics.[1-3,5,9,17-24] Robust and contemporary information about the significance of associations between comorbidities, such as psychosocial problems, and no-shows is thin.[9,23] This is particularly important considering approximately 46% of the general US population has a mental health diagnosis.[25] While neighborhood effects were assessed in a previous study of appointment keeping in a managed care setting, to our knowledge, they have not been assessed in previous studies of no-shows for primary care clinics.[24] This study aims to determine which individual, health system, and contextual factors are most associated with primary care appointment no-shows at the Veterans Affairs Nebraska-Western Iowa Health Care System in Omaha, Nebraska.

METHODS

Study Population

Medical records were retrieved for patients with visits between January 1, 2012 and December 31, 2013 at the VA Nebraska-Western Iowa Health Care System primary care clinics in Omaha, Nebraska. Inclusion criteria were nondeceased patients for these care clinics whose ZIP code was within the catchment area. Appointments cancelled by either patients or clinics were excluded. The initial dataset included 95,835 visits by nondeceased patients. Because the patients resided outside the catchment area, 1,741 visits were dropped, while 11,781 and 12,405 visits were excluded because they were cancelled by the patient and clinic prior to the visit, respectively. Following these exclusions, 69,908 visits remained for analysis.

Ethical Review

Research Service at the VA Nebraska-Western Iowa Health Care System and the Emory University Institutional Review Board reviewed the research protocol, characterizing the work as quality improvement and not classified as research.

Variables

Individual Level—Individual level variables of age, race, sex, any prior mental health diagnosis (yes or no), and rate of previous primary care no-shows were obtained from medical records. Age was categorized as 18-39, 40-59, and 60 or older. Race was determined through patient self-identification of either white, black/African American, Asian, American Indian/Alaska Native, Native Hawaiian/other, unknown, or declined to answer. Mental health diagnosis was determined as ever having a diagnosis with an International Classification of Disease code of 290 to 799.59. The rate of previous primary care no-shows was calculated by dividing the number of no-shows for primary care appointments in the study period by the number of primary care appointments during that time for each appointment. This was used to assess history of missed appointments.

Health Systems Level—Health systems variables of wait time and day of week of appointment also were obtained from medical records. Wait time was determined by calculating the time between the date the appointment was made and the date of the appointment itself. The resulting variable was then categorized into 0 to 14 days, 15 to 30 days, 30 to 90 days, and greater than 90 days.

Contextual Level—Patient residential ZIP codes were linked to socioeconomic data available from the census for calculation of the Neighborhood Deprivation Index and distance from each ZIP code to the clinic. The Neighborhood Deprivation Index was composed of 8 variables from the 2008-2012 American Community Survey (percent of males in management and professional occupations, percent of crowded housing, percent of households in poverty, percent of female-headed households with dependents, percent of households on public assistance, percent of households earning less than $30,000 per year estimating poverty, percent earning less than a high school education, and percent unemployed).[26] Five-digit ZIP Code Tabulation Areas were chosen as the geographical area of interest in order to merge American Community Survey data with the patient ZIP codes. Distances from home to clinic were determined by inputting both patient and VA Nebraska-Western Iowa Health Care System ZIP codes into Google maps and categorized as 0 to 5 miles, 5 to 10 miles, 10 to 30 miles, and greater than 30 miles.

Appointments for patients with residential addresses and ZIP codes within the catchment area were retained. American Community Survey data used to create the Neighborhood Deprivation Index and distance to clinic were merged with patient-level information by ZIP Code Tabulation Areas. Actual ZIP codes were stripped and replaced with anonymized values in order to carry out the analysis on deidentified data.

Statistical Analysis

We assessed for collinearity among predictor variables. Wald chi-square tests were used to determine significant differences between patients who missed visits and those who did not. Log-binomial generalized estimating equation models were fit to estimate bivariate associations between each predictor variable (age, race, sex, previous no-show rate, mental health diagnosis, wait time, day of

week of appointment, distance, and Neighborhood Deprivation Index) and the binary outcome of "no-show" while accounting for possible correlation of individuals from the same ZIP Code Tabulation Areas. An assessment of all possible subsets of predictors was performed separately by predictor domain beginning with individual level predictors. The significant individual predictors of age, race, sex, and mental health diagnosis were then used as the foundation for modeling all possible subsets of health systems and contextual predictors. Statistical interaction between age and sex and between standardized Neighborhood Deprivation Index and 3 individual level variables of age, race, and mental health each were assessed in bivariate analyses and in the final model using an alpha of 0.05. All analyses were performed using SAS Statistical Software (SAS Institute, Cary, North Carolina).

RESULTS

The overall rate of no-shows in this study was 8.4%, but varied across individual predictors (Table 1). Table 1 shows the demographics of the set of study visits and the no-show frequency for each category of each predictor. No-shows were highest among 20-39 year olds, nonwhite patients, women, and patients with a mental health diagnosis. The frequency of missed appointments decrease as age increases. Although the majority of the visits (81.2%) were by white patients, 15.1% of black patients missed appointments compared to 7.2% whites and 9.6% of other races. Visits with wait times of 0 to 14 or 30 to 90 days appeared to have greater no-shows than when the wait times were 15 to 30 days or greater than 90 days. Patients living in the most deprived neighborhoods accounted for 38% of visits and 3.1% of missed appointments. Missed appointments by patients living in less deprived neighborhoods ranged from 0.9% to 2.0%.

Unadjusted bivariate analyses (Model 0, Table 2) show that patients age 20-39 were more than 3 times as likely to miss appointments as patients age 60 and older, and patients 40-59 were more than twice as likely as those over 60 to miss appointments. Black patients were twice as likely as whites to miss appointments. Men, who accounted for 91.6% of the visits, were less likely than women to miss appointments. Additionally, individuals diagnosed with mental health issues were more likely than those without mental health issues to miss appointments. Health systems predictors, contextual predictors, and interaction terms were all nonsignificant.

After assessing all possible subsets of individual predictors, we identified a subset of individual predictors for the adjusted individual model. While the odds ratios (OR) for age, race, and mental health diagnosis remained fairly constant across all models, the OR for men as compared to women changed from 0.80 in Model 0 to 1.30 in Model 1. No health systems predictors or area-based predictors were significantly associated with the outcome of no-show in the full model.

Table 1. Descriptive Statistics by Visits

Variables	Total Appointments (n=69,908) % or Mean	No-show (n=5,888) % or Mean	*P*-value[a]
Appointments	100%	8.4%	
Individual Predictors			
Age			**<0.0001**
20-39	10.6%	17.2%	
40-59	28.0%	12.0%	
60 and over	61.5%	5.3%	
Race (Missing = 153)			**<0.0001**
White	81.2%	7.2%	
Black	13.5%	15.1%	
Other[b]	5.3%	9.6%	
Sex			**<0.000**
Male	91.6%	8.3%	
Female	8.4%	10.2%	
Mental Health Diagnosis			**<0.0001**
Yes	60.6%	9.4%	
No	39.4%	6.9%	
Primary Care No-show Rate in Past 2 Years	**6.5**	**32.12**	**<0.0001**
Health System Predictors			
Day of Week of Appointment (Missing = 72)			**0.0002**
Monday	19.6%	1.8%	
Tuesday	22.1%	1.9%	
Wednesday	20.8%	1.7%	
Thursday	18.0%	1.4%	
Friday	19.2%	1.6%	
Saturday	0.4%	0.0%	
Wait Time (Mean In Days) (Continuous)	**28.38**	**28.17**	**0.5614**
Wait Time (Days)			**0.3553**
0-14	45.8%	3.9%	
15-30	17.6%	1.4%	
30-90	31.8%	2.6%	
>90	4.8%	0.4%	
Contextual Predictors			
Unique ZIP Codes (n=394)		68.8%	
Neighborhood Deprivation Index (Quintiles) (Missing = 6)			**0.0818**
1 - Least deprived	23.6%	2.0%	
2	12.9%	1.1%	
3	14.7%	1.3%	
4	10.9%	0.9%	
5 - Most deprived	38.0%	3.1%	
Distance to Clinic (Mean Miles) (Continuous)	**20.32**	**20.91**	**0.1082**
Distance to Clinic (Miles)			**0.0009**
0-5	22.0%	1.8%	
>5-10	27.3%	2.3%	
>10-30	31.0%	2.5%	
>30	19.7%	1.8%	
LN (Distance to Clinic) (ln Miles)	**2.38**	**2.41**	**0.0106**

Abbreviation: LN, natural logarithm.
[a] *P*-value for comparison of no-show to show (numbers not shown).
[b] Other: Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, Unknown.

Table 2. Model Selection

Predictors	Model 0 Unadjusted Bivariate Models[a] OR	95%	CI	Model 1 Full Model OR	95%	CI
Individual Predictors						
Age						
20-39	3.74	3.36	4.15	3.87	3.48	4.31
40-59	2.45	2.25	2.67	2.23	2.05	2.43
60 and over (referent)	1.00			1.00		
Race						
White (referent)	1.00			1.00		
Black	2.29	2.13	2.46	2.14	1.98	2.31
Other[b]	1.36	1.16	1.60	1.35	1.17	1.56
Sex						
Male	0.80	0.72	0.89	1.30	1.16	1.45
Female (referent)	1.00			1.00		
Mental Health Diagnosis						
Yes	1.39	1.30	1.49	1.16	1.09	1.24
No (referent)	1.00			1.00		
Primary care no-show rate in past 2 years	1.07	1.07	1.07			
Health System Predictors						
Day of Week of Appointment						
Monday	0.93	0.59	1.45	0.89	0.57	1.38
Tuesday	0.83	0.54	1.30	0.82	0.53	1.27
Wednesday	0.80	0.52	1.25	0.76	0.50	1.17
Thursday	0.76	0.49	1.16	0.73	0.48	1.10
Friday	0.82	0.52	1.31	0.76	0.48	1.20
Saturday (referent)	1.00			1.00		
Wait time (days) (continuous)	0.99	0.97	1.01	1.00	1.00	1.00
Wait Time (Days)						
0-14 (referent)	1.00					
15-30	0.95	0.87	1.04			
30-90	0.97	0.91	1.03			
>90	1.05	0.94	1.17			
Contextual Predictors						
Standardized Neighborhood Deprivation Index (Quintiles)						
1 - Least deprived (referent)	1.00			1.00		
2	0.97	0.85	1.11	0.98	0.88	1.09
3	1.04	0.91	1.19	1.05	0.94	1.16
4	0.97	0.86	1.10	1.02	0.94	1.12
5 - Most deprived	0.93	0.83	1.04	1.01	0.93	1.11
Distance to Clinic (Miles) (Continuous)	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**
Distance to Clinic (Miles)						
0-5 (referent)	1.00					
>5-10	1.00	0.99	1.01			
>10-30	1.00	0.99	1.01			
>30	1.01	1.00	1.02			
LN (Distance to clinic) (ln miles)	1.04	1.00	1.07			
QIC				**38262.3**		

Abbreviations: QIC, Quasilikelihood under the Independence model Criterion; LN, natural logarithm.
[a] Unadjusted bivariate analyses of predictors with the outcome of no-shows.
[b] Other: Asian, American Indian or Alaska Native, Native Hawaiian or Pacific Islander, Unknown.

DISCUSSION

This study aimed to determine factors associated with missed VA primary care appointments. Individual factors of age, race, sex, and mental health diagnosis were found to be the primary factors associated with missed appointments, while measured health system and contextual factors were relatively noncontributory.

The overall no-show rate in this study (8.4%) was within the range reported by previous studies of 5% to 55%, but was less than those reported for non-primary care visits at other VA hospitals (23% and 37%).[2,3] This study's findings reinforce previous findings that suggest a strong association between individual factors and missed appointments. In previous literature, younger patients were found to be associated with greater missed appointments.[19,21] Older patients tend to have more health issues that require regular attendance. Lacy et al[18] described a lack of understanding of the health care scheduling system, which could be more prevalent in younger patients and aid in explaining this difference.

Smith and Yawn[21] also found that white patients had lower no-show rates than Hispanic or African American patients. The direction of the association between sex and no-show was varied in previous literature.[20,22] Our finding that men were significantly associated with more no-shows is similar to that reported by Sharp and Hamilton.[20]

The association between mental health diagnosis was not explored deeply in recent literature of primary care clinics. It might be expected, as we found, that certain mental health issues would be barriers to keeping appointments. This finding is particularly important in the study population, with 60% having a mental health diagnosis compared to 46% prevalence among the general US population.[25] It is also plausible that mental health issues represent a much larger set of barriers to care that should be attended in order to provide high quality care.

We primarily found associations between no-shows and the individual level factors described above. This contradicted findings in recent literature, which reported higher no-show rates with longer wait times and appointments on specific days of the week.[19,20] Previous

studies also found an association between high neighborhood deprivation and poor appointment-keeping.[24]

Our findings can allow the primary care clinics in this study to target interventions at these high-risk groups to reduce no-shows and thus improve delivery of quality care. A number of potential interventions can be implemented, from mail, telephone, or SMS/text reminders to open access scheduling.[6,8-16] The San Francisco VA Medical Center implemented an orientation clinic for new patients that significantly reduced no-shows for first appointments from 45% in the preintervention group to 18% in the orientation clinic group.[13] Another effective intervention has been use of advanced or open access scheduling.[15]

Strengths and Limitations

Our study has several strengths. We performed a complete analysis of all noncancelled primary care visits in a specified catchment area. The study assessed predictors of no-shows for primary care clinics that, to our knowledge, had not been explored previously. Our finding that having a mental health diagnosis is associated with increased risk of no-show fills a gap in contemporary literature and is worthy of further study. However, we were unable to discriminate among types of mental health diagnoses. Finally, our exploration of neighborhood effects is an important contribution to the literature. Even though we did not find significant effects of neighborhood deprivation on no-shows for this study, it is possible that the effect could be different for other VA locations, other types of clinics, or other geographic scales.

There were several study limitations. For confidentiality reasons, we were unable to link visits by patient ID, which made it impossible to account for clustering by patient. Additionally, not having patient IDs resulted in use of visit rather than patient as the unit of analysis. However, the variable of previous primary care no-show rates was calculated by the VA electronic health system for unique patients and is, therefore, still valid. We also did not have access to specific medical diagnoses of patients, which resulted in the inability to assess whether presence of major medical conditions was associated with missed visits.

Also due to confidentiality constraints, patient addresses could not be used to determine census tracts for area-based measures. We did capture ZIP code of residence, which allowed at least partial control for clustered events. ZIP Code Tabulation Areas are derived from ZIP codes, which are created by the US Postal Service. Although they are more useful than ZIP codes, ZIP Code Tabulation Areas are still areal representations of these ZIP codes and have inherent limitations. They may not represent the contextual environment or distances that are actual barriers and facilitators for access to care.

Due to the nature of this study as a medical record review, we only had demographic variables collected during routine doctor visits to assess as barriers to care. We did not have information about perceived barriers to care, which could have a greater effect on patient attendance. We created the "wait time" variable from the date patients scheduled their appointments and the actual appointment dates. It also may have been useful to assess the time between the patient's desired appointment date and the date for which they were scheduled, as well as the purpose of the appointment.

CONCLUSION

These results show that individuals who are younger, nonwhite, male, or have been diagnosed with mental health issues are more likely to no-show. To decrease the burden of no-shows on health care systems, interventions to improve compliance could be targeted at these individuals. Further research is needed to understand more completely the barriers to keeping appointments in order to develop effective interventions.

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