The Effect of a Carve-out Advanced Access Scheduling System on No-show Rates

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Background and Objectives: *The relationship between advanced access scheduling and no-show rates in academic settings is unclear. The purpose of this analysis is to assess the effect of moving to a carve-out model of an advanced access scheduling system on no-show rates in an academic practice.* Methods: *A multivariable logistic regression with repeated measures analysis of patient visits was used to assess the relationship between the time to third-next available appointment and no-show rates.* Results: *The time to third-next available appointment was not a significant factor in appointment-keeping behavior. Rather, provider-patient continuity, wait time for an appointment, the number of previous appointments, and type of provider were strong predictors of a patient no-show.* Conclusions: *Implementation of the concepts of advanced access scheduling does not directly result in a reduction in no-show rates; rather, provider-patient continuity, wait time to an appointment, and other factors may be a more important measure.*

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Delays are common for patients seeking primary care services, with wait times for appointments as high as 60 days.[1,2] For academic practices, this delayed access is exacerbated by interrupted continuity clinic schedules, day-to-day variation in provider availability, and communication difficulties when residents are on hospital-based rotations that limit their ambulatory clinical time.[3]

Advanced access scheduling is recommended as a way for ambulatory practices to improve both access and continuity at the same time. Advanced access gives patients the ability to schedule an appointment with the provider of their choice, for virtually any service, within a day or two.[4] Many non-academic practices have experienced success with this scheduling model by demonstrating increased appointment availability, reduced no-show rates, increased patient satisfaction, and increased revenues.[2,5-9] Additionally, the Institute for Healthcare Improvement (IHI) has shown that advanced access scheduling increases the proportion of visits that are with a patient's primary provider, which increases the likelihood of a patient arriving for a visit.[11]

Some academic practices have seen a decrease in no-show appointment rates with the introduction of advanced access and attributed subsequent increases in visit volumes to this reduction.[10] Others, however, did not see an improvement in no-show rates.[12] This discrepancy may be due to a myriad of factors that have been shown to influence no-show rates, such as insurance status, clinical characteristics of the patient, type of provider to be seen, and system characteristics.[13-15]

Since the relationship between advanced access scheduling and no-show rates in academic settings is unclear, further study is warranted. The purpose of this analysis is to assess the effect of moving to a form of advanced access scheduling system on no-show appointment frequency within an academic practice. Our no-show rate in the year before we implemented advanced access varied each month between 20%–25%. Unlike previous studies that only examined no-show rate as one of many outcomes of advanced access implementation, we will examine the factors associated with no-shows within this environment in more detail.

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Methods

Settings

The Palmetto Health Family Medicine Center (FMC) is a residency teaching practice located in an urban setting in South Carolina. The practice provides more than 30,000 annual visits to a diverse panel of patients, including low-income and minority individuals, persons with disabilities, the elderly, and persons with multiple chronic diseases. The FMC is staffed by 14 faculty physicians, 30 residents, four fellows, and one nurse practitioner. Faculty and third-year (PGY-3) residents each average 12 half days of patient care per month; first-year (PGY-1) residents, second-year (PGY-2) residents, and fellows each average 7 half days per month. Panels are assigned according to provider full-time equivalent (FTE) count (ie, the number of half days of direct patient care each provider serves per week), with roughly 100 patients assigned per half day.

Advanced Access

The FMC began implementation of a form of advanced access scheduling in March 2005 as part of participation in an IHI Access and Efficiency Collaborative. Because of the unique characteristics of academic settings, we settled on a carve-out model to improve access. Two basic types of appointments were created: "Continuity" (which can be scheduled indefinitely into the future) and "Excel Care" (which become available only 48 hours before the appointment time). For faculty, PGY-3 residents, and fellows, four out of 12 appointments are Excel Care appointments. For PGY-2 residents, three out of 10 appointments were Excel Care appointments, and for PGY-1 residents, two out of eight appointments were Excel Care appointments. Excel Care appointments were spread evenly throughout the clinic schedule.

Data Analysis

To assess the effect of the scheduling change, the time to the third-next available appointment was measured for each faculty and resident physician. The IHI uses this measure, defined as the time period (in days) between when a patient seeks a physical exam appointment and the day on which that the third-next appointment is available,[16] to assess a patient's access to their provider. On the first working day of each month, each provider's schedule was checked, and their third-next available appointment for continuity appointments was recorded.

Data on continuity and no-show appointments were obtained via a query of our electronic medical record database (GE Centricity®). Continuity was defined in the percentage of visits for established patients in which the patient saw the provider listed in the electronic medical record as the patients' assigned primary provider. No-show appointments were defined as scheduled appointments that were not rescheduled or did not result in a patient visit, regardless of when the appointment was made. Information about visits that did occur was also collected for comparison. All measures were recorded beginning in March 2005 (when the carve-out advanced access model began) through May of 2006.

Patient characteristics obtained from the electronic medical record included gender, age, race, insurance status and type, the number of previous visits, and the number of previous no-show appointments. The appointment information included day, date and time of the appointment, when the appointment was created (date and time), appointment outcome (seen or no-show), with whom the appointment occurred (faculty versus resident), and if the appointment was with the patient's primary care provider. The difference between the date the appointment was scheduled and the date it was to occur was calculated in days; for same-day appointments, this value was set to zero. The third-next available appointment value for each scheduled provider during the month in which the appointment was created was used for analysis.

The characteristics of patients who did not show for their appointments were compared to those who did using chi-square tests. Multivariable logistic regression with repeated measures was used to determine the likelihood of a visit being classified as a no-show appointment. All analyses were adjusted for repeated measures; these methods were necessary due to patients having more than one appointment in the dataset. Without this adjustment, the estimates would have violated the assumption of independence. The dependent variable was appointment status (no-show versus arrived), and the independent variables included the patient and appointment characteristics described above as well as the provider-specific third-next available variable. Stepwise selection was used to arrive at the significant contributors to the predictive model. This analysis was classified by the Human Subjects Review Board as exempt.

Results

Patient and Visit Characteristics

This analysis examined 43,349 scheduled visits from March 2005 to May 2006. Patient visits were predominately by individuals who were non-white, over the age of 45, female, and were privately insured (Table 1). A majority of the visits were with resident physicians.

No-show Rates

Unadjusted analyses showed that one out of five (20.5%) scheduled visits during this period were designated as no-show (Table 1). Minority patients, patients with Medicaid or who were self pay, and younger patients were all more likely to no-show. Gender, however, was not associated with no-show rate. Also, appoint-

Table 1

Distribution of Patient and Visit Characteristics

	Distribution, %	No Show Appointments, %
All	100.0	20.5
Patient gender		
Male	25.7	20.1
Female	74.3	20.6
Patient race		
White	29.7	15.1*
Black	68.2	22.9
Other	2.1	19.6
Patient primary insurer		
Private	34.3	19.2*
Medicaid	14.0	17.3
Medicare	25.1	23.4
Self Pay	19.6	22.4
Other	7.0	18.1
Patient age group		
18–24	6.8	26.9*
25–34	11.5	26.5
35–44	17.4	23.9
45–54	26.0	21.1
55–64	20.6	17.1
>64	17.7	13.9
Appointment day		
Monday	17.9	21.7*
Tuesday	22.2	19.9
Wednesday	20.9	20.1
Thursday	21.2	20.2
Friday	17.8	20.8
Provider type		
Faculty	43.9	16.8*
Resident	56.1	22.8
Appointment with PCP?		
No	63.8	20.9
Yes	36.2	20.3

PCP—primary care provider

* No-show appointment rate is significantly different within the group, *P*< .05

ments that were scheduled to occur on Monday had a higher no-show rate than appointments scheduled for later days in the week. Appointments made with the patient's primary care provider did not have a significantly different no-show rate than those scheduled with a different provider. The no-show percentage varied by month, from a low of 17.6% in June 2005 to a high of 23.7% in November 2005 (Table 2). By contrast, rates in the year before our scheduling change varied from a low of 20% to a high of 25%.

Third-next Available Appointment and Continuity

The number of days to the third-next available appointment measure decreased across all provider types during the time period, from 30.7 days to 9.0 days. The third-next available appointment for resident physicians fell from 33.1 days to 11.2 days, while the third-next available appointment for faculty physicians fell from 24.5 to 5.1 days (Table 2). During the study period, the proportion of appointments scheduled with the patients' primary care provider increased from 64.0% in March 2005 to 68.2% in May 2006 (Table 2).

Regression Results

Using multivariable regression with repeated measures, we were able to identify factors most highly associated with the presence of a no-show appointment (Table 3). Factors most strongly predictive of a no-show appointment included the wait time to appointment, the number of previous visits, scheduling an appointment with the patient's primary care provider, the type of provider (resident versus faculty) with which the appointment was scheduled, patient race, and primary method of payment. The day of the week or the appointment, as well as appointment month, were weak predictors. In contrast to earlier reports on advanced access, the third-next available appointment measure, by provider, was not a significant contributor to the model.

Discussion

This analysis found that, despite an increase in appointment access as measured by the third-next available appointment measure, our no-show appointment rate did not decline as expected. Other factors, such as provider-patient continuity, the time difference between when the appointment was scheduled and the appointment date, the number of previous visits, and the type of provider were stronger predictors of no-show appointment behaviors. These results are similar to those found by Belardi et al, who demonstrated a reduction in third-next available wait time but were not able to significantly reduce their no-show rate.[12]

Others have shown a decrease in no-show rate with the conversion to an advanced access model of appointment scheduling.[2,4-9] Academic settings are more complex due to the part-time nature of faculty patient care, as well as the fluctuation in clinic schedules for residents. These differences make it difficult for patients to schedule their ideal appointment and often results in them sacrificing the ability to see their own physician for seeing one that is available at a desired time. The results from this analysis indicate that a modest increase in appointment availability (as measured by third next

Table 2

Third-next Available Appointment, No-show Rate, and Continuity Rate by Appointment Month

	Third-next Available Appointment (%), All *	*Third-next Available Appointment (%), Faculty* *	*Third-next Available Appointment (%), Residents* *	*No-show Rate (%), All* *	*Continuity Rate (%)* *
March	30.7	24.5	33.1	19.7	64.0
April	23.8	23.6	23.9	18.6	64.8
May	23.1	23.9	22.8	20.3	62.7
June	27.2	20.0	32.6	17.6	53.1
July	15.9	17.9	14.2	20.8	59.4
August	24.3	21.1	26.0	19.6	65.6
September	25.7	25.4	25.0	20.0	59.2
October	17.5	14.9	18.8	18.3	70.3
November	19.4	22.8	17.8	23.7	65.6
December	15.1	7.1	19.4	22.2	64.4
January	19.2	18.4	19.6	21.1	65.0
February	9.8	8.4	10.6	21.3	68.0
March	11.6	11.4	11.7	21.6	68.8
April	12.0	10.9	12.6	21.7	68.3
May	9.0	5.1	11.2	19.3	68.2

* *P<.0001*

All numbers in the table represent percentages. Continuity was defined by the percentage of visits by established patients in which patients saw their assigned primary provider.

available appointment) did not significantly influence the no-show rate in this setting.

We hypothesize two reasons why our no-show rate did not decrease. First, due to irregular provider schedules inherent in the academic setting, we were not able to fully implement an advanced access model. Rather, we created a carve-out model in which a certain number of appointments in each provider's schedule could not be prescheduled prior to 48 hours in advance of the appointment time. The introduction of the carve-out variation of advanced access can be directly tied to the decrease in third-next available appointment measurement but not necessarily with a subsequent reduction in no-show rates.

Another is the moderate change in provider-patient continuity of the appointments. This percentage fluctuated throughout the study period, ranging from a low of 53.1% in June 2005 to a high of 70.3% in September 2005. There was not, however, a significant correlation between the two variables. The regression results indicated that provider-patient continuity was positively associated with arriving for a visit. These results suggest that the carve-out model of advanced access, while

decreasing the third-next available appointment measure, may not be fully adequate to improve continuity or wait time to an appointment.

It is also interesting to note that some patient characteristics, most notably prior visit behavior, were strong predictors. Having an appointment that was the patient's first visit with the practice increased the likelihood of a no-show appointment by nearly 20%, while each previous no-show appointment increased the odds of a future no-show by 3%. Indeed, patients who have scheduled their first appointment with the practice are more likely to not keep the appointment than established patients, even after controlling for the appointment wait time. Also, a patient who requests an appointment, but is not able to see their primary care physician or who must wait more than 2 weeks for that appointment, is less likely to keep the appointment.

These results indicate some ways in which academic health care providers can improve their no-show rate beyond expanding access. First, the time difference between when the appointment was scheduled and the date of the appointment itself is a significant contributor. Theoretically, a decrease in third-next available

Table 3

Factors Associated With a No-show Appointment

	Estimate	*OR*	*95% CI*
Third-next measure	0.0003	1.00	(1.00, 1.00)
Wait for appointment	0.018	1.02	(1.02, 1.02)
Continuity provider	-0.1928	0.82	(0.75, 0.90)
Number of previous visits	-0.3292	0.72	(0.69, 0.75)
Appointment with faculty	-0.4134	0.66	(0.60, 0.72)
Race			
White			
Black	0.4716	1.60	(1.45, 1.77)
Other	-0.1391	0.87	(0.65, 1.16)
Primary payer			
Private			
Medicare	0.2665	1.31	(1.14, 1.50)
Medicaid	0.2584	1.29	(1.17, 1.43)
Self pay	0.3201	1.38	(1.23, 1.54)
Other	0.0225	1.02	(0.85, 1.23)
Appointment month			
September 2005			
October	-0.0775	0.93	(0.77, 1.11)
November	0.2138	1.24	(1.03, 1.49)
December	0.8179	2.27	(1.85, 2.77)
January 2006	0.8311	2.30	(1.90, 2.78)
February	0.8549	2.35	(1.95, 2.84)
March	0.8973	2.45	(2.04, 2.95)
April	1.0025	2.73	(2.26, 3.29)
May	0.7897	2.20	(1.80, 2.70)

OR—odds ratio
CI—confidence interval

* Nonsignificant covariates not displayed included age, gender, and day of the week.

physicians, whose third-next available appointment time did not decrease as much over this period.

Implementing a broader, team-based approach to care may also reduce the number of patients not being seen by their provider of choice. While the continuity percentage increased slightly during the study period, it did not ultimately affect the no-show rate. If patients identified themselves more with a team of providers, rather than one provider in particular, it may be possible to increase the likelihood of arrival.

The third-next available appointment measure was applied to the entire schedule month, since it was only measured once per month. It is possible that access, as indicated by this measure, may fluctuate throughout a month but would not be detected. Also, we do not have information about the preferences of the patient for each appointment; in other words, were they unable to schedule an appointment with their preferred provider, and did that influence the likelihood of arrival? Using patient-provider continuity is a proxy for patient preference but an incomplete one.

This analysis is important since it identifies many of the factors that contribute to patients not arriving for their scheduled appointment. While advanced access scheduling has proven to reduce this no-show rate in many settings, it is clear that our setting did not experience this outcome. The results do indicate, however, several areas for system interventions to reduce the no-show rate in a more concentrated manner.

These results have the potential to better inform academic teaching practices about the interaction between access to care, organizational characteristics, and no-show behavior among patients. Based on our findings, we will continue to monitor access (as measured by third-next available appointment) and no-show rates but also focus on provider-patient continuity and wait time to an appointment as a method of assessing our patients' ability to access our services. Interventions that focus on improving continuity and emphasizing team-based care will be implemented and evaluated for their effect on access and no-show behaviors.

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appointment time would reduce this wait, but this was not the case for our setting. It is possible that providers changed their patient scheduling behaviors in response to the increase in access (eg, bringing patients back for a follow-up visit more often or more frequently). Also, a majority of the visits were scheduled with resident

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