



An empirical investigation into factors affecting patient cancellations and no-shows at outpatient clinics



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ABSTRACT

Medical facilities competing in the US Healthcare system must consider the likelihood of patient attendance when scheduling appointments. This paper analyzes a robust, panel style registration data set from 9 outpatient facilities consisting of 5 years of patients' attendance outcomes. The three outcomes, arrivals, cancellations prior to the scheduled appointment and failure to arrive (no-shows), distinguish this paper from prior empirical research that typically treats patient arrivals as a dichotomous outcome by grouping cancellations and no-shows together or excluding cancellations. Distinguishing cancellations from no-shows reveal different effects from patient age and appointment slot day and time. Findings focus on the variables having the greatest impact on attendance and conclude with the difficulty in predicting individual appointment outcomes and the observation that a rather small number of patients represent a disproportionately large percentage of no-shows. Four factors that have the greatest association with patient nonattendance are lead time (call appointment interval), financial payer (typically insurance provider), patient age, and the patient's prior attendance history. Lead time has the greatest impact and is the most addressable, whereas a patient's age, insurance provider and, to some extent, patient behavior cannot be altered. Results reveal quite a paradox that scheduling systems designed to help ensure full utilization on a future date also contribute to underutilization by increasing the chance that patients will not show.

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1. Introduction

Containing rising healthcare costs in the United States is becoming an increasingly important issue. The health industry alone is expected to be about \$3 trillion in 2011 [46]. The Congressional Budget Office (CBO) expects total spending on health care to increase from 16% of gross domestic product (GDP) in 2007 to 25% in 2025 and 37% in 2050 [13]. Medical costs are expected to increase by about 9% in 2011 alone [46]. Clearly these projected cost increases are unsustainable and there has to be concerted efforts to contain them. Reducing administrative costs and making the system more efficient is a key area for curtailing health care costs [25,26]. Studies on patient compliance including attendance may help in mitigating healthcare costs by reducing inefficiencies.

Failure by patients to attend scheduled medical appointments can increase medical care costs [55]. In addition it may affect treatment effectiveness [22]. Weinger et al. [55] list the following negative effects of short notice cancellations: they cannot be easily replaced leading to lost revenues with no reduction of labor or facilities costs, they reduce number of appointments available to all patients, and they may undermine clinician–patient relationship. These factors are possibly true in varying degrees to all patient cancellations. Therefore research on patient attendance contributes to strategies for reducing healthcare costs.

Medical literature on patient compliance includes barriers patients encounter in seeking medical care [36]. Topics such as appointment keeping have appeared for the past half century [45], yet the problem persists. This paper adds to the patient attendance literature by providing thorough analysis of an extensive and timely data set of patient attendance. Our study differs from others in that we collect and model three discrete outcomes: patients who arrive, patients who call to cancel prior to their appointment, and patients who fail to do either (no-shows).

Existing literature typically handles cancellations in one of three ways: cancellations grouped with no-shows as missed appointments,

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cancellations are explicitly excluded or there is no mention of cancellations. Patients may cancel for reasons such as scheduling conflicts, symptom resolution, visiting another provider or other issues, but at least demonstrate responsibility and communicates to the clinic that there was no confusion in the appointment being scheduled. Ideally the appointment is cancelled with sufficient time to provide the spot to another patient, thus recovering the capacity at the clinic. Our data set provides the opportunity to explore the mathematical relationship that a number of independent variables have on cancellations and no-shows including lead time (call appointment interval), patient age, insurance provider, weather, time of day, and a patient's prior history of keeping appointments.

The rest of this paper is organized as follows. We first discuss healthcare literature related to patient attendance, followed by a description of methodology of analysis. Next we present the results and revised model. Finally we conclude with discussion and areas for future research.

2. Related literature

The patient attendance literature explores a number of reasons patients may miss appointments. Deyo and Inui [16] provide an exhaustive table of potential “determinants” and to date is still one of the most comprehensive literature reviews on this topic. Bean and Talaga [4] provide additional reasons. Emotional issues may also account for missed appointments [29], particularly in patients with psychological or behavioral problems [21,43]. Call appointment interval, or lead time, is a commonly cited factor in patient attendance and it creates a barrier to care that could result in poorer medical outcomes [3,16,33]. Benjamin-Bauman et al. [5] conducted experiments finding higher attendance rates between lead times less than 7 days than lead times more than 2 weeks. Bean and Talaga [4] found lead time for appointment the most significant predictor of patient attendance.

Lead time is not a universal consideration in attendance models, sometimes due to the unavailability of when an appointment was scheduled [47]. In a study of psychiatric outpatient visits, Centorrino et al. [8] did not find lead time significant. George and Rubin [20] discuss the United Kingdom's goal of improving patient satisfaction and patient care by scheduling 90% of patients within 24 h for a primary care physician and 48 h for a general practitioner. Almog et al. [2] suggest patients may shop around for an earlier appointment and may not cancel other appointments. This could result in clinics competing as multiple appointments could be made for the same procedure.

Prior appointment keeping behavior is frequently mentioned as a determinant of patient attendance. Dove and Schneider [17] found prior no-shows as the greatest predictor of future no-shows. Bean and Talaga [3] reported an increased likelihood to miss appointments among past appointment skippers. George and Rubin [20] found mixed results from looking at prior attendance. Patient attendance history is quantified in a variety of ways which may explain mixed results; rate of failed attendance, count of appointments missed or kept, or with an indicator variable for patients missing a specified number of appointments within a specified time frame. Shonick and Klein [51] used a proportion of appointments made but did not mention cancellations. Goldman et al. [21] calculated the percentage of appointments kept in the last year, excluding cancellations. Indicator variables for patients missing a certain number of appointments were used by Neal et al. [42] and Qu et al. [47]. Goldman et al. [21] found no effect on attendance rate from tenure with the clinic or tenure with the physician.

There are conflicting results among demographic and socio-economic factors, possibly confounded with method of payment. Goldman et al. (1982) did not find an effect from method of payment on attendance rates. George and Rubin [20] found patients with state sponsored insurance, self funding or less coverage more likely to miss

appointments. Lowes [33] suggested Medicaid patients may miss appointments due to transportation difficulties, a covariate difficult to obtain. Lower education and lower socio-demographic status has been associated with lower attendance of appointments [3,16]. Age is another common factor, with younger patients having lower attendance rates [3,16]. Goldman et al. [21] found older patients more likely to keep appointments, but the effect disappeared for patients older than 80.

Race or ethnicity of the patient is commonly investigated. Deyo and Inui [16] noted an unclear relationship between race and attendance. Goldman et al. [21] found higher attendance rates among white patients. Bean and Talaga [3] found that race did not have much impact. George and Rubin [20] found mixed results in race as a predictor for nonattendance. Gender is not significant in many of the studies [16,21]. Bean and Talaga [3] did find studies where men had higher rates of appointments kept, but later [4] found men had lower attendance with lead time above 7 days. Marital status was mostly non-significant [3,16]. Goldman et al. [21] found a higher rate of attendance keepers among sufferers of cardiovascular, endocrine, respiratory and hematological medical problems. George and Rubin [20] found chronic illness sufferers more likely to show up.

The review of nonattendance models by George and Rubin [20] found lower attendance on Monday than on Friday. Bean and Talaga [3] report lack of consistent findings for day of the week and time of the appointment. Dove and Schneider [17] correlated longer driving distances with higher no-show rates. Bad weather, specifically precipitation, correlates with lower attendance [37]. Differences exist among the literature regarding the inclusion of cancellations with no-shows. Some literature bundles the cancellations and no-shows calling them missed appointments. Some studies remove cancellations from analysis [8], while others do not mention cancellations [51]. Concern over exclusion of cancellations was noted by Deyo and Inui [16], and Bean and Talaga [3]. A patient may try to cancel, but be unable to get through to the clinic [20,42]. Appendix 1 summarizes results from past studies.

Many methods for dealing with missed appointments exist: reminders and orientation letters, [2,3,6,20,34], exit interview education [23], email reminders [31], text messages [18,53] and reducing the call-appointment interval [5]. One solution, same day appointment scheduling, referred to as “advanced access,” is often credited to Murray [7,38–41,48]. Same day scheduling reduces waste from no-shows, cancellations, confirming appointments and rescheduling, but may require adding short term capacity to work down the backlog of appointments. One challenge of same day scheduling is ensuring continuity of care, which has been linked to more preventative care visits [19], fewer emergency room visits [10,11] and higher quality care [12] among pediatrics.

Other yield management techniques, such as overbooking are prescribed in [30,32]; however, Sharp and Hamilton [50] caution that overbooking may increase waiting times for patients showing up. Predicting individual appointment arrivals have been described as “extremely inaccurate” and “futile” [16]. Shonick and Klein [51] suggest focusing on patients prone to no-shows. Miller et al. [36] propose future research for “identifying persons at greatest risk for noncompliance.” One practitioner [24] put habitual no-show offenders on probationary status. Knox et al. [28] recommend establishment of a pre-operative assessment clinic to reduce elective surgical case cancellations. The restaurant industry may advocate charging for no-shows [14,35], an unlikely solution in healthcare where an insurance carrier requires service for payment. Some high tech approaches to improve resource utilization in healthcare have been proposed in specific settings. Walczak et al. [54] develop a decision support tool to predict resource utilization of costly hospital resources. Day et al. [15] propose a dynamic allocation of cardiac testing time slots using real time scheduling decisions. Taracki et al. [52] incorporate buy-in from patients in show-up rate depending on level of technology in a specialty hospital offering

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