

# E-mail Reminders: A Novel Method to Reduce Outpatient Clinic Nonattendance

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## Abstract

**Introduction:** Although reminder systems have been studied previously, there is no published study on the effectiveness of e-mail reminders in reducing clinic nonattendance. Our objective was to evaluate the effectiveness of e-mail reminders in reducing clinic nonattendance.

**Methods:** We measured the monthly nonattendance rate at an employee health outpatient clinic in an academic medical center 3 months before and after implementing an e-mail reminder system. The nonattendance rate of patients who received e-mail reminders was compared to a control group.

**Results:** The mean nonattendance rate for patients (5,407 appointments) who received e-mail reminders decreased by 35% (from 9.7% to 6.3%,  $p = 0.002$ ). There was no change in the nonattendance rate among patients (567 appointments) who did not receive the intervention (pre- and post-intervention 5.3% & 4.7%,  $p = 0.8$ ).

**Conclusions:** E-mail reminders were effective in reducing clinic nonattendance in an academic outpatient clinic.

## BACKGROUND

In the current milieu of system inefficiency, medical errors and rising costs, a careful and systematic examination of the various aspects of healthcare delivery is essential to the success of any organization. 'No-shows' or 'nonattendance' to a clinic are a cause of significant concern to the delivery of optimal quality of care. Prior studies suggest that nonattendance rates range from 3% to 80% based on the type of clinic and characteristics of the patient population (Hixon, Chapman, & Nuovo, 1999). For the purpose of this study, clinic nonattendance has been defined as patients who are expected, but do not turn up for their appointments. We did not include patients who cancel their appointment in advance.

Prior studies suggest that numerous factors (Andrews, Morgan, Addy, & McNeish, 1990; Moore, Wilson-Witherspoon, & Probst, 2001) including barriers to access, forgetfulness (Little, Cannon, Whitson, & Jarolim, 1991), lack of transportation, particularly for low-income and elderly patients (Little et al., 1991; Paul & Hanna, 1997), personal or family illness (Little et al., 1991), chronicity of

illness or chronic medical problems (Bigby, Pappius, Cook, & Goldman, 1984; Vikander et al., 1986), fear of medical encounter (Little et al., 1991), insurance status (Lilja, 1994; Rose & Chung, 2003; Rust, Gallups, Clark, Jones, & Wilcox, 1995), age (Campbell, Staley, & Matas, 1991; Weingarten, Meyer, & Schneid, 1997), race (Goldman, Freidin, Cook, Eigner, & Grich, 1982), socioeconomic status (Ide, Curry, & Drobnies, 1993), provider experience (Moser, 1994) and lack of prior provider-patient relationship (Bean & Talaga, 1995) influence no-show rates. However, demographic information is often an inconclusive predictor of non-attendance (Bean & Talaga, 1992). In addition, there is often a poor correlation between the research findings of different studies due to the heterogeneity of research design and populations studied, which leads to variations in study outcomes.

One significant factor related to nonattendance that can be successfully addressed, is patient forgetfulness (Little et al., 1991). To our knowledge, there are no published studies examining the effectiveness of e-mail reminders. This study was conducted to determine the effectiveness of an e-mail

reminder system on reducing patient nonattendance in an Academic Outpatient Clinic.

**METHODOLOGY**

**DESIGN**

A retrospective study was conducted analyzing attendance rates of all appointments to the clinic between December 2003 to May 2004. As a routine, patients to the Clinic usually receive a mailed letter reminder confirming the time and venue of the appointment. These reminders are sent shortly after the appointments are made, and are not necessarily shortly before the scheduled appointment.

The e-mail reminder system was introduced as an intervention in March 2004. Nonattendance rates were obtained for all Clinic patients 3 months prior to, and after the intervention, from December 2003 through May 2004. The intervention arm consisted of employee patients who received e-mail reminders three days prior to the scheduled appointments in addition to the standard mailed letter. The control arm consisted of non-employee patients and pre-employment patients who did not receive email reminders, and received only the mailed letter. The nonattendance rates of patients in both arms were compared. The monthly nonattendance rate was computed as a percentage of the number of patients who failed to turn up for their appointments compared to the total number of appointments for that month. Approval was obtained from the Institutional Review Board for this study.

**PARTICIPANTS**

Patients who visited the Preventive and Occupational Medicine Clinic at a tertiary medical center formed the study participants. Physicians in this Clinic include Preventive Medicine, Occupational Medicine, and Internal Medicine Faculty as well as Internal Medicine Residents and Preventive Medicine Fellows. Employees of the institution and their dependants form the predominant patient subgroup to this Clinic. The demographics of the patient population are summarized in Table 1. All employee patients have a unique e-mail address, and have access to e-mail at their worksite.

**Figure 1**

Table 1: Basic Demographics of Clinic Patient Population

Age	Percent*
Less than 20	4
21-30	17
31-40	16
41-50	24
51-60	23
61-70	10
80 +	5
<b>Race</b>	
Black	1
Caucasion	93
Hispanic	1
Other	2
Asian/Pacific Islander	2

\*rounded

**STATISTICAL ANALYSIS**

The mean nonattendance rate for each appointment type was calculated before and after the intervention. The paired sample t-test was used to compare the mean nonattendance rate before and after each intervention for significance (p-value < 0.05). JMP 5.1 (SAS Institute Inc.) was used to perform the analysis.

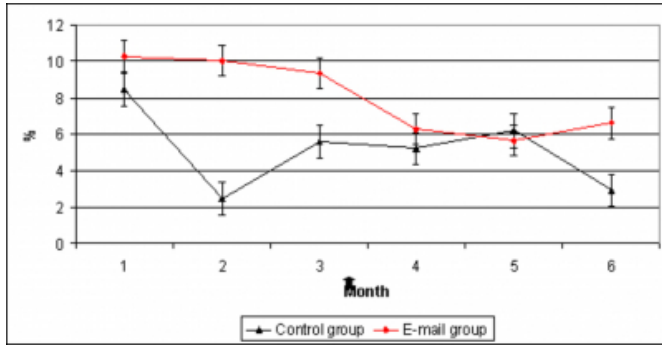
**RESULTS**

Of the 5,974 appointments during the 6-month study period, 5,407 (91%) received the intervention. There were a total of 462 no-shows throughout the study period. The mean nonattendance rate for the intervention arm decreased from 9.7% (95% CI: 8.7, 10.6) before the intervention to 6.3% (95% CI: 5.4, 7.3) after the intervention (p = 0.002). There was a decrease in the mean nonattendance rate among all patient sub-groups (Figures 1 and 2). However, the mean nonattendance rates for follow-up medical and occupational medicine visits decreased significantly from 14.7 (95% CI: 10.5, 18.8) to 6.0% (95% CI: 1.9, 10.1) (p = 0.01) and 11.3 (95% CI: 9.2, 13.5) to 5.7% (95% CI: 3.5, 7.8) (p = 0.007) respectively following the intervention. There were nonsignificant decreases in the nonattendance rates for general medical and prevention visits (from 7.3 (95% CI: 2.1, 12.6) to 3.0% (95% CI: -2.2, 8.2), p = 0.2), acute illness visits (from 2.3 (95% CI: 0.6, 4.1) to 1.0% (95% CI: -0.7, 2.7), p = 0.2), and return visits for test results (from 17.0 (95% CI: 11.8, 22.2) to 12.7% (95% CI: 7.4, 17.9), p = 0.2).

No change was observed in the mean nonattendance rate for new occupational medicine visits.

**Figure 2**

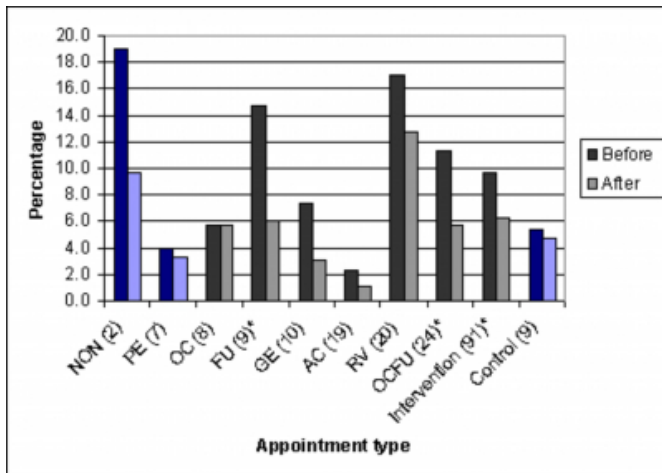
Figure 1: Monthly nonattendance rates for patient groups that did or did not receive e-mail reminders, December 2003 through May 2004.



Block arrow represents month in which e-mail reminders were implemented (implementation occurred at the start of the month)

**Figure 3**

Figure 2: Mean nonattendance rates before and after e-mail reminders by appointment type



Legend:

- NON - Non-employee appointments (control)
- PE - Pre-employment examination (control)
- OC - Occupational medicine visit
- FU - Follow-up medical visit
- GE - General medical and prevention examination
- AC - Acute illnesses

- RV Return visit for test results
- OC FU - Follow-up occupational medicine visit
- Intervention- Intervention group consisting of all appointments except for those in the control group
- Control - Control group consisting of non-employee and pre-employment appointments

Proportion of all appointments in parenthesis \*  $p < 0.05$

The patients in the control arm (567 appointments) experienced a small and statistically nonsignificant decline over the same time period (pre-intervention rate 5.3% (95% CI: 1.5, 9.2) vs. post-intervention rate 4.7% (95% CI: 0.8, 8.5),  $p = 0.8$ ). Of the patients in the control group, the non-employee patients had a decline of 19.0 (95% CI: -6.6, 44.6) to 9.7% (95% CI: -15.9, 35.2) ( $p = 0.5$ ), while pre-employment examinees declined from 4.0 (95% CI: 1.9, 6.1) to 3.3% (95% CI: 1.3, 5.4) ( $p = 0.6$ ) in mean nonattendance rates.

**DISCUSSION**

Although previous studies have demonstrated the effectiveness of patient reminders in the form of telephone calls and mailed postcards (Bigby, Giblin, Pappius, & Goldman, 1983; Hashim, Franks, & Fiscella, 2001; Koren, Bartel, & Corliss, 1994), these interventions are often resource intensive and expensive. Furthermore, postcard reminders have a lag time for delivery and are associated with a possibility of delay or even failed delivery. The use of e-mail has proliferated over the past decade and has become one of the mainstays of modern communication. It is estimated that 48 million Americans send or read e-mail daily (Anonymous, 2004). However, studies are lacking on the use and effectiveness of e-mail reminders for patient clinic appointments. One study that used a triage-based e-mail system found no difference in the no-show rates between the intervention and control group (Katz, Moyer, Cox, & Stern, 2003). However, the intervention did not incorporate patient appointment reminders via e-mail.

To our knowledge, there is no published literature on the effectiveness of e-mail reminders in reducing nonattendance by clinic patients. In this study e-mail reminders were effective in significantly reducing patient nonattendance rates. The effect of the intervention was immediate as observed by the dramatic drop in nonattendance rates shortly after implementation of email reminders. Overall

nonattendance rates decreased by 36% with this low cost and non-labor intense intervention. Among the patient intervention groups, higher reductions of 50 to 60% were seen in patients presenting for follow-up medical and occupational medicine visits.

Since this was a retrospective study, this study has significant limitations including the size of the study population in each arm. Because of the universal availability of encrypted e-mail in the employee population of this clinic, this group served as the intervention group, and the non-employees (non-employee and pre-placement examinees), the control group. It is possible that potential differences in the characteristics of the two groups of patients may have contributed to differences in nonattendance rates. To address these limitations, a randomized controlled trial is being planned to confirm the effectiveness of e-mail reminders in reducing nonattendance rates in our outpatient clinic.

In conclusion, this study demonstrates that e-mail reminders significantly reduced patient nonattendance rates, particularly among patients with follow-up appointments for medical and occupational-related medical conditions, in an academic outpatient clinic.

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