The Reduction of Broken Appointment Rates Through an Automated Appointment Confirmation System


Abstract: Broken appointments continue to be an important productivity, quality assurance, and access gauge for private dental practices and academic dental centers. In November 2001, the University of Rochester Eastman Dental Center, an urban academic dental center, installed an automated confirmation system to address a high incidence of broken appointments. Following the installation of the system, the Eastman Dental Center experienced a marked decrease in the broken appointment rate. Over a twelve-month period, the center’s overall broken rate declined from 23.42 percent to 19.17 percent. The general dentistry rate declined from 23.67 percent to 19.77 percent, and the pediatric dentistry rate declined from 29.42 percent to 25.25 percent.

Broken appointments have always been and continue to be an adverse outcome at many healthcare facilities, including dental schools and community health centers. The number of broken appointments in a community health center has been reported to be as high as 48 percent. Broken appointments not only disrupt scheduling of patient visits but also diminish the efficiency of operation, increase operating costs, decrease revenue generation, and waste valuable human resources.

Several publications have documented factors responsible for broken appointments. Most studies have found that patients age forty-five and younger, especially pediatric patients, generally have a higher rate of broken appointments. The studies found that ethnicity was not a significant factor. However, patients of lower socioeconomic classes, the poorly educated, and those with larger families were most likely to miss their scheduled appointments. Several other factors have been associated with broken appointments: the length of time between scheduling and the appointment date, longer scheduling intervals, severe weather conditions, day and time of the week, payday, effective communication or doctor-patient relationship, customer satisfaction, and urgency of the appointment. Additional observations made at Eastman Dental Center were that patients who fail to keep appointments had often demonstrated such behavior in the past and patients referred to clinics following emergency visits had consistently higher rates of missed appointments than those referred from other sources.

Broken and canceled appointments can be viewed under the broader classification of compliance, defined as the extent to which a person’s behavior coincides with medical or health advice. In dentistry, a number of models have been suggested to explain an individual’s health care behavior in order to develop interventions that effect behavior change. For example, dealing with predisposing factors such as perceived need and attitudes has been used for various behavior change programs for the elderly as well as oral hygiene programs.

Active interventions are approaches that apply techniques that may be novel to a given system but can be integrated over time to be a part of the system.
once the initial pilot work shows them to be successful. Examples of interventions to help patients keep appointments are the use of prompts by telephone or postcard to remind the patient of his or her appointment. This technique has been successful across a wide variety of health care settings and populations.9-16 Studies show that with certain populations, postcard reminders are as effective as a telephone reminder and more cost-effective.17 Other investigators found that patients receiving an orientation letter one day before an initial appointment produced a lower no-show rate than patients who received nothing (17 percent vs. 43 percent respectively).18

When using telephone or postcard reminders, it is important that the person actually receives the prompt. One study initially found no difference in prompting conditions vs. placebo. However, after controlling for receipt of the prompt, it was found that the show rate was twice that of those who had not actually been contacted.19

Another potential, yet controversial, method is incentives. This approach uses behaviorally oriented positive reinforcement to increase attendance behavior.20 The incentives can take a number of forms such as services, discounts, or, in one of the most successful, monetary remuneration.21 The key is that the incentive is more “rewarding” than the reason for not keeping the appointment. Monetary incentives with low-income mothers for children’s vaccinations have produced a high level of success.17

After patients reach a critical number of missed appointments, policy interventions can include actual refusal of services to various types of “waiting” lists. The policy has to be flexible, however, to take into account extenuating circumstances encountered by the patient. This particular strategy has increased show rates but usually only after the person has violated the policy, been placed on the contingency list, and then allowed to return to the main patient pool.22

Scheduling interventions has been found to affect patient appointment-keeping behavior. A number of studies have demonstrated that, by keeping the time between appointments to two weeks, the show rate is greatly enhanced. This was shown to be especially true for first-time appointments.17,23 One reason given for this phenomenon is that, oftentimes, when people are shopping around for prospective healthcare providers, they will call various providers, make appointments, and then take the earliest possible opening while not canceling the others.

Studies have shown that both satisfaction with services in general and satisfaction with the interpersonal skills of the healthcare provider and support staff are robust predictors of appointment keeping. This has been demonstrated in both adolescent and adult populations across a variety of healthcare settings.24,25 While the literature demonstrates a relationship between patient appointment keeping and patient satisfaction with the provider, it is not clear if interpersonal skills can be taught or are a function of personality traits idiosyncratic to the individual healthcare provider.26 Of ancillary interest is the finding in two studies of medical residents that resident turnover did not adversely affect the return visit failure rate or subsequent appointment-keeping rate.26,27

As an urban academic dental center, Eastman Dental Center’s overall percentage of missed appointments peaked at 35 percent in December 1996. Our highest patient visit volume takes place in two clinics: General Dentistry with twenty-eight (AEGD) residents, and Pediatric Dentistry with nine residents. The broken appointment rates in these clinics peaked at 37 percent (January 1997) and 44 percent (June 1997) respectively. While internal strategies to reduce these percentages (such as centralized and decentralized manual confirmations and introduction of broken and cancellation policies) brought our overall percentage down to 23.42 percent in 2001, in-house staff confirmations were inconsistent and made it difficult for front-end staff to attend to other job responsibilities.

The objective of this study was to assess the effectiveness of an automated confirmation system by comparing the system’s performance with manual confirmation strategies with respect to reduction of broken appointment rates. Prior to its installation, we hypothesized that the system would reduce the broken appointment rates appreciably.

**Methods**

In November 2001, the Eastman Dental Center purchased a desktop automated confirmation system (HouseCalls, Televox Software Inc., Mobile, AL). With this system, our appointment data file was uploaded into the automated confirmation system software. Custom confirmation messages were pre-recorded for each dental discipline within the Eastman Dental Center. The custom messages allowed us to create specific messages for specific
appointment types. For example, new patient appointment confirmations noted an earlier check-in time for processing of initial paperwork.

With the automated confirmation system message-building technology, interactive voice technology blends seamlessly with the Eastman Dental Center’s existing computer data systems, allowing the center to stay connected with a wide variety of personalized messages. Integration with the automated system was achieved by using a custom “bridge” that exports the data from any clinic system to the automated system. The voice message was seamless, smooth, and recorded in the voice of a familiar staff member.

Once the initial set-up of the system was completed, a daily routine of uploading the appointment files and recording any new patient names into the system was put into place. Timing of the confirmation calls is determined by choice. We elected to place our calls during the late afternoon/early evening hours when the potential for the patient to be at home was the greatest. With the automated confirmation system, we also elected to have an interactive message when the confirmation call was answered by an individual. The recipient has the option of confirming the appointment, canceling the appointment, or leaving a voice message. If the call goes to an answering machine, the system leaves the same detailed message but without the respond options noted above. Once all calls have been completed, the confirmation system automatically generates a calling log and informs the staff if any respond messages have been recorded.

The specific aims of this study were to assess the effectiveness of the automated confirmation system by comparing the system’s performance for a twelve-month period (November 2001-November 2002 data) with a centralized and decentralized manual confirmation strategies (November 1996-October 2001 data) for the Eastman Dental Center’s overall, General Dentistry, and Pediatric Dentistry no-show rates. The previous manual confirmation systems included decentralized confirmations by front desk staff within each department area (as a consequence, confirmation duties were incorporated as time allowed) and a full-time centralized confirmation position that confirmed all appointments for the entire center.

Next, we compared automated system performance (November 2001-November 2002 data) with decentralized department front desk confirmer strategy (October 2000-October 2001 data) for the Eastman Dental Center’s overall, General Dentistry, and Pediatric Dentistry no-show rates. These analyses were carried out by performing t-tests to compare the mean no-show rate for automated system confirmation with staff confirmation services.

Additionally, we compared automated confirmation performance (November 2001-November 2002 data) with the confirmation services provided by a centralized dedicated FTE confirmer (July 1999-August 2000 data) and with the decentralized department front desk confirmation services (September 2000-October 2001 data) for the overall, General Dentistry, and Pediatric Dentistry no-show rates. These analyses were carried out by performing one-way-analysis of variance (ANOVA) to compare the mean no-show rate for automated system confirmation with the confirmation services made by the front desk receptionist and with the dedicated receptionist services (SAS version 8.2 statistical package, SAS Institute Inc., Cary, NC).28

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**Results**

When the Eastman Dental Center entered into this undertaking (November 2001), our average no-show rate for the previous twelve months was 23.42 percent. Twelve months after the installation of the automated confirmation system, the overall no-show rate dropped to 19.17 percent (Figure 1). The clinical areas that have benefited the most are General Dentistry, where the no-show rate dropped from 23.67 percent to 19.77 percent, and Pediatric Dentistry, dropping from 29.42 percent to 25.25 percent. Given the volume of patient visits these improvements represent, we estimate that we have increased our patient care revenue by $473,000 during the twelve-month period (Figure 2). With the increase in attended appointments, our resource utilization has improved, and our front-end staff have been able to focus their attention on face-to-face customer relations.

Table 1 illustrates the results of the analysis for automated system performance (November 2001-November 2002 data) in comparison to a variety of staff confirmation services (November 1996-October 2001 data) for the center’s overall, General Dentistry, and Pediatric Dentistry no-show rate. The mean no-show rate for the automated system performance overall was 19.17 percent from November 2001 to
November 2002, in comparison to a no-show rate of 26.25 percent from November 1996 to October 2001 when a variety of confirmation methods were used. These differences were statistically significant, t-test p<0.0001. For the General Dentistry department, the mean no-show rate for automated system performance was 19.77 percent vs. 27.44 percent using the variety of staff confirmation configurations prior to the introduction of the automated system. These differences were statistically significant, t-test p<0.0001.

Similarly, for the Pediatric Dentistry department, the differences in mean no-show rates were statistically significant at p<0.0001.

Table 2 illustrates the results of the analysis for automated system performance (November 2001-November 2002 data) with decentralized departmental front desk confirmation services (October 2000-October 2001 data) for the overall, General Dentistry, and Pediatric Dentistry no-show rates. In other words, we compared mean no-show rates twelve months...
prior to the installation of the automated confirmation system with twelve months after the installation of the system.

When the dental center entered into the new automated system, its overall no-show rate for the period from October 2000 to October 2001 was 23.42 percent. Twelve months after the installation of the system, the overall no-show rate dropped to 19.17 percent (p=0.0002). The clinical areas that benefited the most were General Dentistry, where the no-show rate dropped from 23.67 percent to 19.77 percent (p=0.004), and Pediatric Dentistry, where the rate dropped from 29.42 percent to 25.25 percent (p=0.004).

Based on the one-way analysis of variance (ANOVA), our comparisons of automated confirmation performance (November 2001-November 2002) with the centralized dedicated confirmmer performance (July 1999-August 2000) and with the decentralized services made by the departmental front desk receptionist’s services (October 2000-October 2001) for the overall, General Dentistry, and Pediatric Dentistry no-show rates were statistically significantly different (p<.0001). By group comparison tests we found that automated confirmation performance (November 2001-November 2002) was superior to the confirmation services made by a centralized dedicated confirmmer service (July 1999-August 2000) and the decentralized services made by the departmental front desk receptionist’s services (October 2000-October 2001) for the overall, General Dentistry, and Pediatric Dentistry at the 0.05 significance level. The results of ANOVA group comparisons are presented in Table 3.

**Discussion**

In the past, various efforts to reduce broken appointments were undertaken by the Eastman Dental Center. These included in-house staff confirmations, transportation-bus tokens, patient profiling, patient education, and implementation of harsh broken/canceled patient policies, including schedule restrictions. With an average of 350-375 patient visits per day, it became an overwhelming task to try and confirm appointments amid the daily duties of the normal workday. While our personnel efforts did decrease our broken appointment rate, we hit a plateau and were unable to decrease our rate any fur-
ther, though we still had an unacceptable level of broken appointments (Figure 1). Additionally, with diminishing resources and increasing financial constraints in healthcare, and with 88,000 patient visits annually in the center’s hub (not including off-site faculty practices and hospital activity), we recognized the opportunity that existed in lowering the level of missed appointments.

The disruptive impact of broken appointments can be altered by a diversity of methods such as sensible overbooking based on individual programmatic broken rate characteristics; elimination of the automatic reappointing of patients who have previously broken appointments; and introduction of complementary technology. At the Eastman Dental Center, following diligent market research, an automated confirmation system was identified, tested, and implemented, while maintaining our supplementary strategies of transportation-bus tokens, patient profiling, patient education, and implementation of harsh broken/canceled patient policies.

Other modules developed by the automated confirmation system vendor include electronic birthday messages, patient satisfaction survey, multilingual calling, billing related activity, and emergency office closings, all of which are currently planned for implementation and analysis.

### Conclusions

The literature suggests that broken appointments are not that unusual. Patient no-shows are found across a wide variety of healthcare settings, adversely impacting health care outcomes and revenue flow. However, the literature suggests that carefully planned and applied interventions can ameliorate the problem.

While we still have patients who do not keep their appointments, the use of the automated confirmation system has been a more cost-effective and efficient method for handling no-shows than the aforementioned means. The ability to place confirmation calls after normal business hours, to have a consistent routine of confirming each appointment, and to be able to refocus front-end staff on tasks that create a more patient-centered approach has made a consequential difference.

The Eastman Dental Center is currently conducting an in-house survey to assess patient satisfaction with the system. In addition, discussions are currently being held with the vendor regarding implementation of automated medication reminders, pre- and post-visit instructions, and birthday greetings. These services are intended to improve customer relations and patient compliance, further reduce broken appointment rates, improve practice revenues, reduce front-office workload, and increase overall efficiency.

### Acknowledgments

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### REFERENCES