

Reducing Wait Time in a Hospital Pharmacy to Promote Customer Service

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Purpose: The purpose of this study was to compare the effects of 2 different interventions on wait times at a hospital outpatient pharmacy: (1) giving feedback to employees about customer satisfaction with wait times and (2) giving a combined intervention package that included giving more specific feedback about actual wait times and goal setting for wait time reduction in addition to the customer satisfaction feedback. The relationship between customer satisfaction ratings and wait times was examined to determine whether wait times affected customer service satisfaction.

Subjects and Methods: Participants were 10 employees (4 pharmacists and 6 technicians) of an outpatient pharmacy. Wait times and customer satisfaction ratings were collected for “waiting customers.” An ABCBA’ within-subjects design was used to assess the effects of the interventions on both wait time and customer satisfaction, where A was the baseline (no feedback and no goal setting); B was the customer satisfaction feedback; C was the customer satisfaction feedback, the wait time feedback, and the goal setting for wait time reduction; and A’ was a follow-up condition that was similar to the original baseline condition.

Results and Conclusions: Wait times were reduced by approximately 20%, and there was concomitant increased shift in levels of customer satisfaction, as indicated by the correlation between these variables ($r = -0.57$ and $P < .05$). Given the current prescription-filling process, we do not expect that major, additional reductions in wait times could be produced. Many variables may account for the variability in any individual customer’s wait time. Data from this study may provide useful preliminary benchmarking data for standard pharmacy wait times.

Key words: *customer service, customer satisfaction, pharmacy, performance management, wait times*

Customer service is an essential element in any organization and has become a top priority within the health care industry.¹ Although many people do not consider customer service when they think about a medical facility, quality of customer service has become just as important as quality of patient care. Competition among a vast array of health care providers has been a key factor in increasing the importance of customer service.² Medical facilities recognize that customers, both internal (eg, employees and physicians) and external (eg, patients, their families, and organizational purchasers), are able to choose among competing providers.³

The quality of service received by customers affects their satisfaction with the organization. To increase the probability that customers will return to an organization, it is critical that customers are satisfied with the organization’s services. This, in turn, decreases the possibility that these customers will seek similar services elsewhere.⁴ Retaining existing customers has the potential to save the hospital’s time and money by reducing costs associated with advertising, reducing personnel, setting up new patient accounts, and explaining hospital procedures and treatment guidelines. Furthermore, the costs associated with attracting new customers are about 5 times more than maintaining current ones.^{5–7} Thus, customer service can affect an organization’s bottom line.

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The amount of time customers spend waiting in line can affect their satisfaction with an organization's services.⁸ "When waiting lines form, a small increase in service times for each customer magnifies into a significant increase in waiting time for the customer at the end of the line."^{8(p91)} For the customer at the end of the line, the long waiting time negatively affects his or her satisfaction and decreases the likelihood that he or she will return to the organization in the future. Furthermore, Maggard⁹ proposed that customer dissatisfaction could result in a loss of long-term profits because of decreased customer retention, fewer repeat visits, and conveyance of dissatisfaction with the organization to others. Therefore, the importance of reducing wait times is evident and should be considered when superior customer service is a major goal of an organization.

Task clarification, performance feedback, goal setting, and performance contingent rewards, either alone or in some combination, have been used to improve the customer service provided by employees.¹⁰⁻¹⁶ Wilson et al¹⁶ implemented a task clarification workshop for police officers to increase the knowledge of courteous behaviors (eg, promptness, voice tone, smiling, and greeting) and found increases in these behaviors ranging from 7% to 28%. Wilson and his colleagues further evaluated the effects of praise and corrective feedback in addition to task clarification. Praise and feedback provided by supervisors failed to produce major improvement in performance; however, courteous behaviors increased by approximately 13% when praise and corrective feedback were delivered by research assistants. The researchers suggested this might have been due to the fact that the research assistants were free of other work demands and were able to provide regular, immediate, and specific feedback.

In a study conducted with 26 hotel banquet employees, LaFleur and Hyten¹⁴ implemented a multi-component intervention package including task clarification (training, job aids, and checklists), graphic feedback, goal setting, and performance contingent monetary rewards to improve the accuracy and timeliness of hotel function setups. The quality of staff performance was defined as accuracy plus timeli-

ness of setups; it increased from about 70% to almost 100% when the treatment package was in place. High customer satisfaction ratings prior to the intervention left little room for improvement; however, high ratings were maintained and may have slightly increased during the intervention.

Crowell et al¹² used task clarification, feedback, and social praise to improve the customer service provided by the bank tellers. A total of 11 categories of verbal behavior were used to define customer service (eg, time to service, greeting, using the customer's name, voice tone, and closing). The 3 intervention components were implemented sequentially. Following the introduction of task clarification, the overall quality of customer service improved by 12% over the baseline (control) phase. The feedback component consisted of a publicly posted chart for each bank teller along with verbal feedback given by the manager. Once implemented, the feedback produced an additional 6% increase in customer service. Finally, the third intervention procedure, social praise, produced another 7% increase in the overall quality of customer service.

Similarly, Brown and Sulzer-Azaroff¹¹ examined the relationship between customer satisfaction and bank teller service friendliness. To assess this relationship, the authors developed a customer satisfaction data-collection system in which customers placed a poker chip into 1 of 5 labeled slots (eg, extremely satisfied and somewhat satisfied) in a survey box to indicate how satisfied they were with the service they had received from the bank teller. Service friendliness data were collected by recording the bank tellers' rates of greeting, smiling, and looking at their customers during the first 3 seconds of the interaction. The researchers also evaluated the effect of feedback on the 3 target behaviors. Results illustrated that the implementation of feedback increased rates of greeting, smiling, and looking. In addition, 520 of the 525 poker chips that were dispersed to customers were returned. This high response rate (99%) from customers demonstrated the effectiveness of the researchers' data-collection system. Furthermore, results indicated a correlation of 0.50 ($P < .05$) between customer satisfaction

and the presence of greetings initiated by the bank tellers.

Austin et al¹⁰ implemented a treatment package consisting of self-monitoring, task clarification, and public posting to improve the performance of customer service representatives at an insurance agency. Austin and colleagues targeted 2 customer service behaviors: (1) the percentage of transactions during which the customer's name was used and (2) the percentage of transactions during which tellers suggested additional services available to customers. The intervention produced an average of 51% improvement over baseline in the use of customer names and an average of 56% improvement over baseline in suggesting additional services.

Eikenhout and Austin¹³ used feedback, goal setting, and reinforcement to improve 5 customer service behaviors of 115 employees of a large department store. They used the Performance Diagnostic Checklist to determine the components to be included in their intervention. The effects of feedback and a package intervention (feedback, goal setting, and reinforcement) were assessed using an ABAC reversal design with 3 employee groups, where A was the baseline control condition, B was the feedback condition, and C was the package intervention. All 5 customer service behaviors increased in frequency during both the feedback condition (B) and the package intervention condition (C) in comparison with the 2 baseline control conditions (A).

Only one known study has used feedback and goal setting (in combination with other variables) to improve customer service in a medical setting. Slowiak et al¹⁵ evaluated the effects of an intervention package that combined task clarification, goal setting, feedback, and contingent incentives on the telephone customer service of appointment coordinators in a medical clinic. They targeted 3 customer service behaviors: (1) using a standard greeting, (2) speaking in an appropriate tone of voice, and (3) using a standard closing. Implementation of an ABAB reversal design resulted in overall performance increases for the 3 target behaviors by all participants during both intervention phases (B) in comparison to the 2 baseline control conditions (A).

The literature reviewed above indicates that interventions that have incorporated performance feedback and goal setting have increased a number of different customer service behaviors in a variety of settings. However, very few studies have been carried out within the medical industry—an industry in which high levels of customer service are often expected and desired. The present study was conducted in the outpatient pharmacy of a hospital in which, according to customer testimonials, the amount of time customers had to wait for their prescriptions had been long. In fact, the pharmacy had lost customers because of the dissatisfaction with wait times. Management perceived that customer satisfaction with wait time was relatively low in general; however, no objective data had been collected with regard to wait time or customers' level of satisfaction with wait time. Nonetheless, because of this perception, management sought to reduce customer wait time to better serve its customers.

The objective of the current study was to compare the effects of 2 different interventions on wait times: (1) giving feedback to employees about customer satisfaction with wait times and (2) giving a combined intervention package that included giving feedback to employees about customer satisfaction but also incorporated more specific feedback about actual wait times and goal setting for wait time reduction. Reviews of the effectiveness of performance feedback^{17,18} indicate that (a) feedback does not always improve performance and (b) the combination of feedback with other procedures tends to result in more reliable effects than when feedback is used alone. Similarly, reviews of goal setting suggest that although it is generally effective in improving performance, results are more reliable when they are combined with feedback.^{19,20} We expected that the combined intervention would produce the greatest reduction in wait times because (1) participants received more direct feedback related to their performance (ie, wait time feedback), (2) participants set goals for wait time reduction in addition to receiving feedback, and (3) as part of the goal setting process, participants met as a team and were able to suggest and implement team-based solutions to improve

the prescription filling process. The relationship between customer satisfaction ratings and wait times was also examined to determine whether wait times affected customer service satisfaction.

METHODS

Participants

Participants were 10 employees (7 women and 3 men) of an outpatient pharmacy in a large hospital in southwest Michigan. Of these participants, 4 were pharmacists and 6 were pharmacy technicians. Participants' ages ranged from 20 to 56 years. The pharmacists had been employed with the hospital for approximately 4 years or less; the pharmacy technicians had been employed with the hospital for 7 months to 29 years. About 8 participants worked full-time and 2 pharmacy technicians worked part-time; all worked 8-hour shifts between 6:00 AM and 6:00 PM. The job roles of the pharmacists and pharmacy technicians were essentially the same. The only major difference was that the pharmacists were ultimately responsible for the final product (including any medication information provided to customers). Every other job task (eg, insurance processing, prescription entry, ordering stock, customer communication, cashiering, sweeping the floors, etc) could be performed by either a pharmacist or a technician. The pharmacy could not be open without a pharmacist on duty.

With respect to the current study, the pharmacy manager perceived that a reasonable level of "wait time" would be approximately 20 minutes; however, data had not been collected to determine what the wait time actually was or whether a 20-minute wait time would satisfy or be acceptable to their customers. Management introduced this study as a performance improvement project for the employees in the pharmacy. As with other performance improvement projects that the employees had been involved in, participation was required; however, employees were informed of the study before it began and told that the data collected during the study would not include any identifying information. Rather, only group data would be collected and reported. This study was approved by the site's institutional review board and

Western Michigan University's human subjects institutional review board.

Setting

The outpatient pharmacy was located in a large hospital that provided both inpatient and outpatient medical services. The outpatient pharmacy was housed on the first floor of the hospital and shared physical space with the hospital's gift shop. The pharmacy's hours of operation were from 7:30 AM to 5:30 PM Monday through Friday. The pharmacy consisted of an employee work area and a customer waiting area, which were divided by a wall with 2 windows. Customers brought their new or refill prescriptions to the "Drop Off" window and received their filled prescriptions at the "Pick Up" window.

Apparatus and Materials

Customer service card

Customer service cards were used to collect wait time data. These cards (Appendix A) were the size of an index card (approximately 4 × 6 inches) and included a header to identify the cards as related to this study (ie, hospital outpatient pharmacy customer service). Below the header was space to fill in the number of prescriptions dropped off, to check the type of prescription(s) dropped off (ie, "new," "refill," or "both"), and to stamp the date and time each prescription was dropped off and picked up.

Time stamp machines

Two identical time stamp machines were used to stamp the time on the customer service card when prescriptions were dropped off and picked up by customers who were going to stay in the waiting area until their prescriptions were filled. One was located at the "Drop Off" window and the other at the "Pick Up" window; the employee working at each of these windows was responsible for using the time stamp machine. These digital time stamp machines stamped the current date, time, and the message "in" at the "Drop Off" window and "out" at the "Pick Up" window.

Customer satisfaction survey box and tokens

A customer satisfaction survey box was located near the “Pick Up” window in the customer waiting area, yet out of the line of sight of pharmacy employees. Similar to Brown and Sulzer-Azaroff,¹¹ this survey box was used to collect data on customers’ satisfaction with the amount of time they waited to have their prescription filled. The survey box contained dividers to form 5 smaller boxes within it. Each smaller box had a slot labeled “extremely satisfied,” “very satisfied,” “satisfied,” “somewhat satisfied,” or “unsatisfied.” There also was a sign placed next to the box asking customers to place their token (ie, poker chip) in the slot that described the level of their satisfaction with the amount of time they waited to have their prescription(s) filled.

Dependent variable 1—wait time

Response definition

Wait time was defined as the amount of time that elapsed between the times that prescriptions were dropped off and picked up by customers remaining in the waiting area (ie, waiting customers). Wait time was calculated for each customer, and the average wait time per day was computed as the total amount of time customers spent waiting for their prescriptions to be filled divided by the total number of customers.

Recording procedures

Data were collected daily from 7:30 AM to 5:30 PM. When customers brought a new or refill prescription to the “Drop Off” window, the participant working at the “Drop Off” window asked each customer whether he or she was going to stay in the waiting area until the prescription was filled. If customers stated they would wait for the prescription, the participant used the time stamp machine to stamp the current time on the customer service card, gave the card to the customer, and asked the customer to give the card to cashier when he or she picked up the prescription.

When a prescription was filled and ready to be picked up, the customer’s name was called, and the

customer proceeded to the “Pick Up” window. The participant working at the cash register (ie, “Pick Up” window) stamped the current time onto the customer service card when the customer presented his or her card.

At the end of each day, the first author collected all of the customer service cards that were time stamped. These cards were kept in a box near the “Pick Up” window. Individual wait times for each customer were calculated, along with the day’s overall average wait time per customer. The average wait times were graphed daily so that trends over time could be detected.

Dependent variable 2—customer satisfaction

Response definition

Customers’ satisfaction with wait time was measured by counting the number of tokens in each satisfaction slot of the survey box. The employee at the “Drop Off” window gave customers a token and asked them to participate in the survey by depositing their token in the appropriate slot in the survey box located near the “Pick Up” window after they had received their filled prescription. The employee at the “Pick Up” window also prompted the customers to place their token in the survey box before they left the pharmacy.

Recording procedures

Customer satisfaction with wait time was collected daily from 7:30 AM to 5:30 PM. Each morning, the experimenter provided participants with a container of 100 tokens that was placed near the “Drop Off” window for participants to give to customers. At the end of each day, the experimenter counted and recorded the number of tokens deposited in each category (extremely satisfied, very satisfied, etc). The total number of tokens in the survey box was divided by the total number of tokens given out to determine the customer response rate for that day. The daily average level of customer satisfaction with wait time was graphed daily and compared with the graph of daily average wait time to observe for a relationship between wait time and customer satisfaction. The

percentage of tokens in each satisfaction category was also recorded and graphed each day.

Procedural integrity

At the beginning of each week, the first author verified that the time stamp machines were accurate (ie, both machines were synchronized, and the correct time, date, and message were displayed). In addition, observations were conducted randomly throughout the duration of the study to ensure that participant employees engaged in the behaviors required for the collection of accurate wait time and customer satisfaction data. The study lasted a total of 89 days. The first author observed 471 customer interactions during this time, of which 379 occurred with waiting customers. Six employee behaviors were observed: (1) asking the customer whether he or she was going to wait, (2) stamping the Customer Service Card at the “Drop Off” window, (3) giving the stamped card to the customer, (4) dispensing tokens to waiting customers, (5) stamping the customer service card at “Pick Up” window, and (6) reminding the waiting customer to participate in the survey. These behaviors occurred during 97.3%, 97.3%, 97.3%, 96.8%, 100%, and 88% of the observed interactions, respectively. Thus, employees were engaging in the behaviors required by the experimental protocol.

To assess whether the first author was accurately recording these interactions, the pharmacy manager also observed 8% of the interactions and independently recorded the data. Percent agreement between the first author and the manager was calculated by dividing the number of agreements by the total number of agreements and disagreements and multiplying that number by 100. An agreement was scored when both observers identified that the aforementioned behaviors either occurred or did not occur. A disagreement was scored when there was a discrepancy. There was 100% agreement between the observations made by the first author and the manager.

Interventions

The effects of 2 interventions were examined: (1) feedback on customer satisfaction with wait time and (2) a component intervention consisting of feedback

on customer satisfaction with wait time, feedback on wait time, and goal setting for wait time reduction. The interventions are described in detail in the “Experimental Procedures” section.

Experimental design

A within-subject reversal design was used to assess both wait time and customer satisfaction with wait times. Participants were exposed to the baseline control, customer satisfaction feedback, component intervention, and follow-up conditions in an ABCBA' sequence where A was the baseline (no feedback and no goal setting); B was the customer satisfaction feedback; C was the customer satisfaction feedback, the wait time feedback, and the goal setting for wait time reduction; and A' was a follow-up condition that was similar to the original baseline condition. As is typical with this type of design, daily measures were collected repeatedly during the first 4 conditions to determine how the experimental manipulations in each condition affected performance over time. Experimental control is demonstrated when the behavior on the dependent variables (in this case, wait time and customer satisfaction) changes as the different conditions are introduced, and if performance levels are similar in conditions when the same conditions are reintroduced.

To evaluate performance changes when conditions are introduced, it is helpful if behavior on the dependent variables is relatively stable before introducing the next condition. Originally, conditions were going to be changed only when wait times varied by no more than 10% above or below the mean performance in a condition during the last 5 sessions. After baseline data were collected for 24 daily sessions, however, it was apparent that the initial stability criterion was unrealistic and would have to be abandoned if the study were to be completed in the available time. Consequently, each customer satisfaction feedback (B) condition was terminated arbitrarily after 15 days. The combined intervention condition (C) was terminated after 2 consecutive weeks when the weekly average wait time goal of 16 minutes was not met.

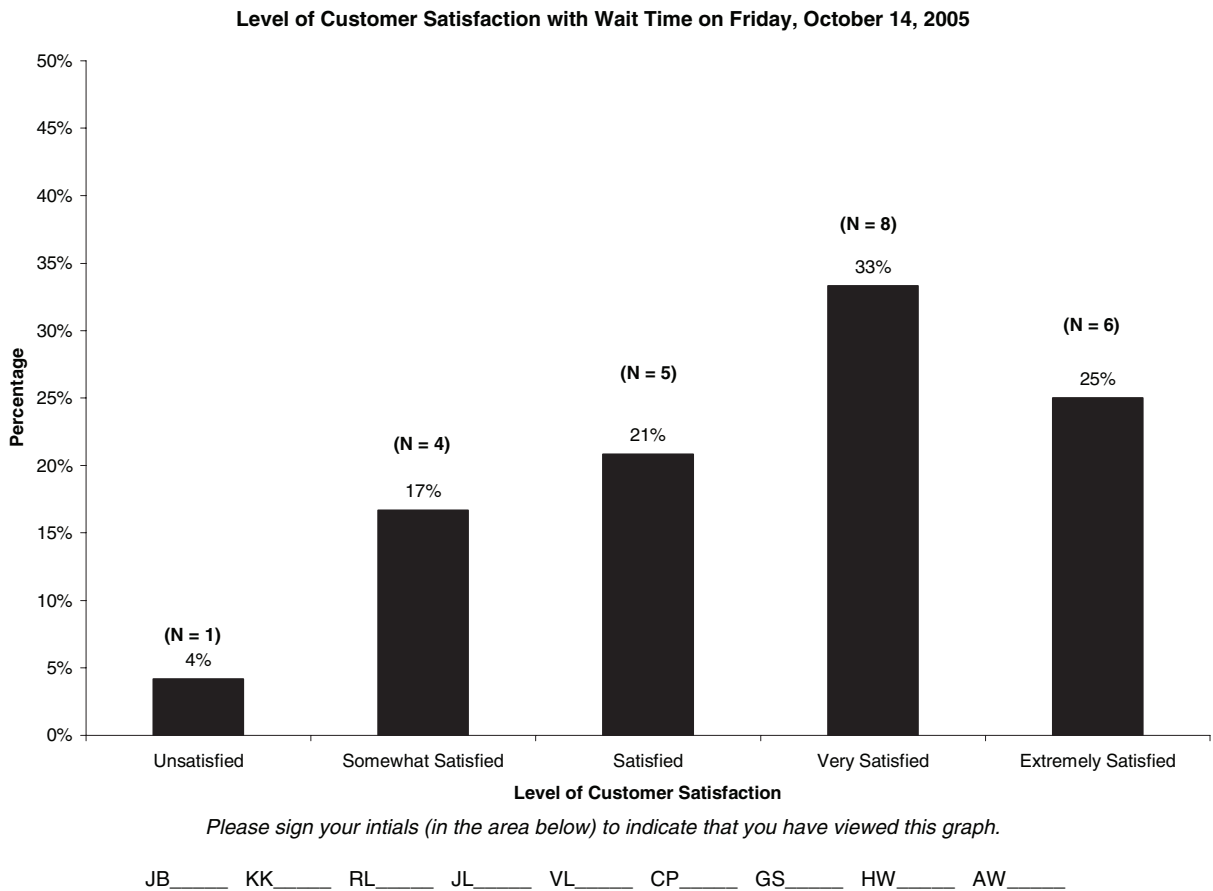


Figure 1. Customer satisfaction feedback graph posted during phases B and C.

Experimental procedures

Orientation and training

Participants were oriented to the study during their monthly staff meeting. Prior to the study’s start date, all participants were trained to use the time stamp machines to collect wait time data and to dispense tokens to customers to collect customer satisfaction data. Training was done in the participants’ work environment using modeling and role-playing techniques. The first author showed participants how to do all of the behaviors required to collect the wait time data and customer satisfaction data; participants then practiced the behaviors whereas the first author role-played the part of a customer. This training took approximately 30 minutes.

Baseline (A)

During baseline, data were collected on wait times and customer satisfaction using the procedures described above. No performance feedback or goals were provided to participants.

Customer satisfaction feedback (B)

Each day the first author graphed the percentage of tokens in each satisfaction category, e-mailed the graph to each participant, and posted the graph in a highly visible place in the work area (see Fig 1 for a sample graph). To ensure that participants looked at the graph, the first author used an option in the e-mail program that notified her when recipients opened the e-mail. Participants were also required to initial the posted graph each day.

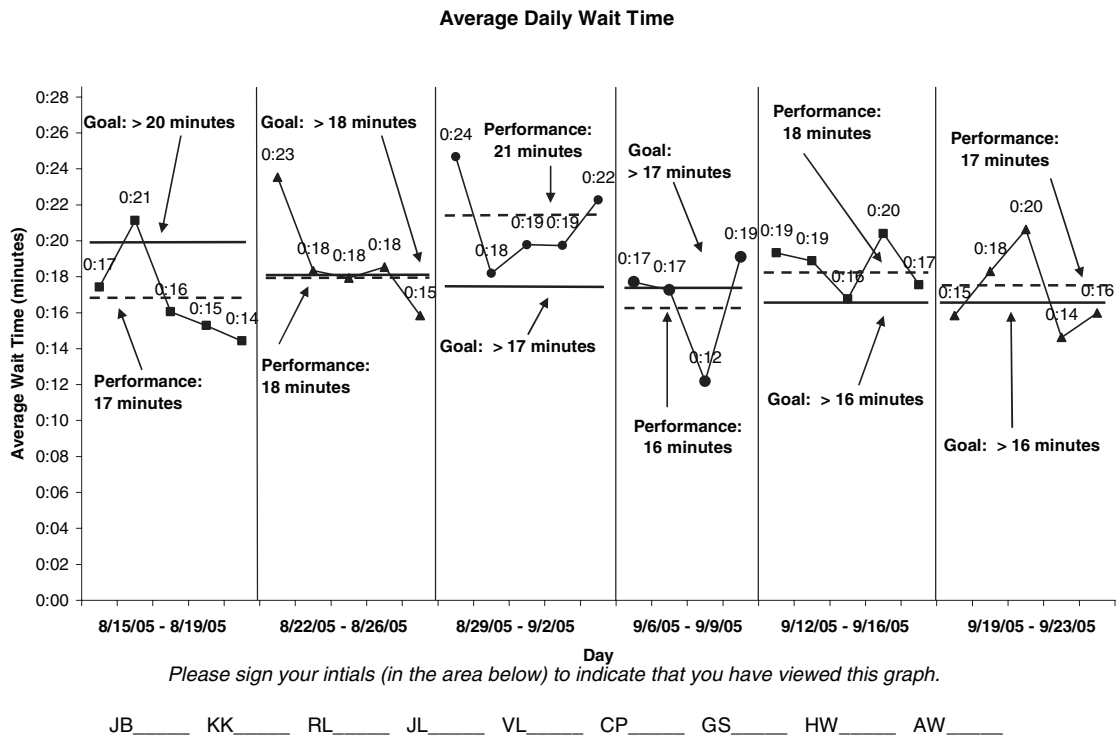


Figure 2. Average daily wait time feedback graph posted during phase C.

Customer satisfaction feedback, wait time feedback, and goal setting for wait time reduction (C)

The first author provided customer satisfaction feedback to participants as described above. She also graphed the average daily wait time and e-mailed and posted the graph of those data daily along with the customer satisfaction feedback graph. As in the preceding condition, the first author was notified by her e-mail program when participants opened the e-mail, and participants were required to initial the posted graphs. Weekly goals were set for wait time reduction using a participative approach to encourage teamwork. The pharmacy manager and participants met at the beginning of each week and agreed upon a goal for the week. Participants then discussed work procedures and behaviors that could be changed to meet the goal. Once the goal was attained, a new (lower) wait time goal was set for the following week. A goal

line was placed on the wait time feedback graph so that participants could compare their performance with the goal (see Fig 2 for a sample graph).

Customer satisfaction feedback (B)

The procedures described previously for this condition were reimplemented.

Follow-up (A')

A follow-up phase was added at the request of management. Conditions during follow-up were essentially the same as they were during the baseline phase; this phase is denoted as A' rather than A to indicate that the data were obtained on a weekly, rather than daily, basis. Approximately 1 month after the first 4 phases of the study ended, follow-up data were collected for 6 weeks. Data were always collected on Wednesdays because throughout the study data appeared to be the most stable on this day of the week.

Time-series intervention analysis

The statistical analysis used in this study is based on the general time-series intervention regression modeling approach initially described by Huitema and McKean^{21–23} and McKnight et al.²⁴ This approach accommodates both independent and autocorrelated error structures encountered in time-series intervention designs of the type used in behavioral research. Certain variants of this approach have been developed for the analysis of both simple and complex versions of single case designs (B. E. Huitema, PhD, unpublished data, 2007), including the 5 phase reversal design used in the present study.

The first stage of the analysis provides (1) numerical descriptions of the intervention effects on each dependent variable and (2) inferential statistical evidence regarding the effects. Two numerical descriptions are computed to characterize possible changes in behavior from one phase of the design to the next: level change and slope change. Both of these measures are based on a comparison of regression lines that have been fitted to data within adjacent phases. The first level change, for example, refers to the difference between 2 estimates of level at *the first time point past the intervention*. (This time point occurs at time point $n_1 + 1$ because there are n_1 observations in the first phase.) The first estimate of level is based on a model of the data in the first phase. This estimate is conceptualized as the expected value on the dependent variable that is projected to occur at time $n_1 + 1$ under the assumption that there is no effect of the intervention. The second estimate of level is also conceptualized as the expected value on the dependent variable at time $n_1 + 1$, but this estimate is based on a model of data that exist in the second phase. Because the first estimate of level assumes no intervention effect whereas the second estimate of level is based on data obtained under an intervention condition, the difference between the 2 level estimates is a reflection of the change associated with the intervention. If the intervention has no effect whatsoever, the value of the 2 estimates will be the same and the level change coefficient will be 0. If the intervention

has an effect, the level change coefficient will differ from 0.

Similarly, slope change refers to the difference between the slope that is computed on the first-phase data and the slope that is computed on the second-phase (postintervention) data. The slope describes the increase or decrease in behavior associated with a 1-unit increase in time. Level change and slope change are 2 different forms of intervention effect; an intervention may change either or both the level and the slope. Level and slope change measures are relevant to (and are provided for) each pair of adjacent phases. Although both level change and slope change parameters are included in the initial model, a follow-up test is performed to determine whether the slope change parameters are necessary to describe the data. If significant slope change is not present, a simpler model (measuring level change only) is justified.

In the second stage, the statistical analysis is carried out to pool the results of the first stage (described above); that is, the information describing change for each pair of adjacent phases is cumulated to provide an overall evaluation of intervention effects. The test for overall effects is based on both the size and the direction of change from one phase to the next. This test evaluates the joint null hypothesis stating that the 4-level change coefficients are equal to 0. Rejection of this hypothesis is interpreted as strong evidence that the interventions are associated with level change in the predicted direction and that the change is greater than the amount to be expected from the sampling error alone.

RESULTS

Preliminary analyses

The raw data for wait time and customer satisfaction are plotted in Figures 3 and 4, respectively. The preliminary test on slope change was not statistically significant for wait time ($F = 1.60$ and $P > .05$) or customer satisfaction ($F = 0.85$ and $P > .05$). Because slope change parameters were not required in the model, the ultimate model used to describe the

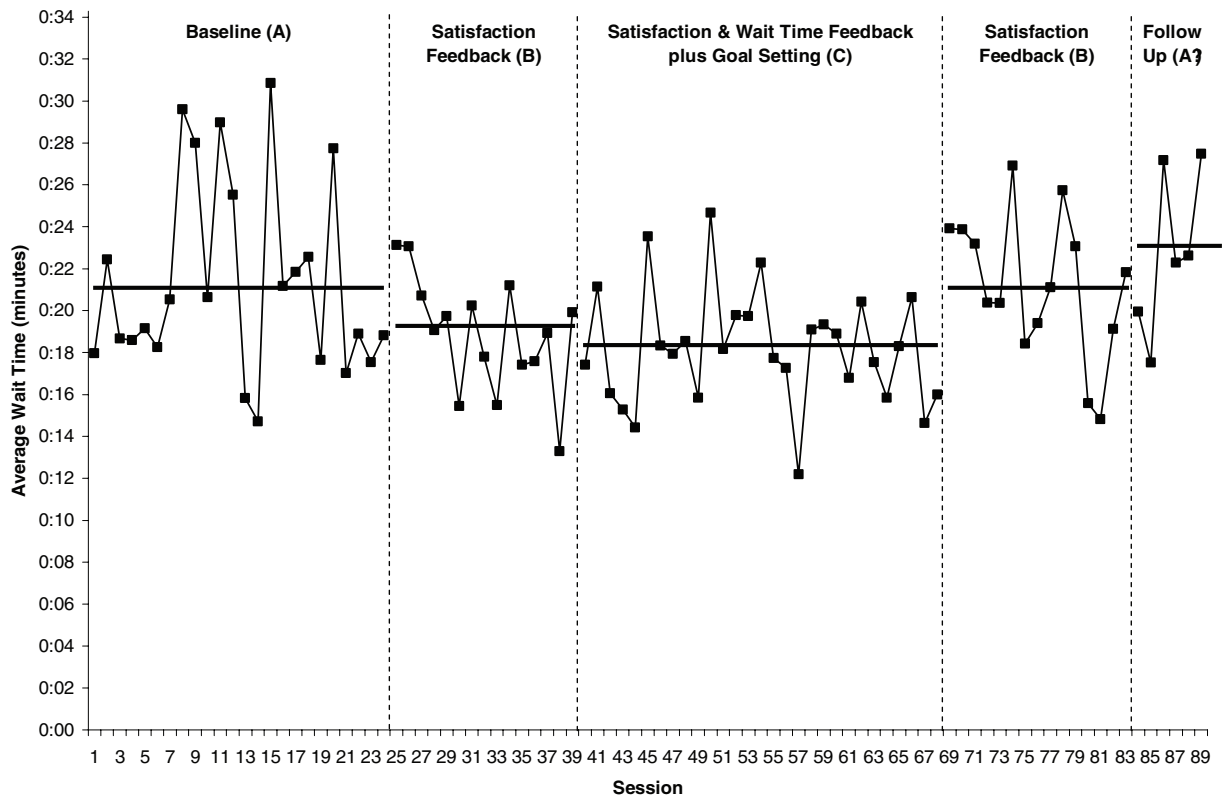


Figure 3. Average daily wait time for all study phases.

outcome on both wait time and satisfaction was a 5-phase level change model. The level change coefficients associated with this particular model are equivalent to the differences between adjacent phase means; therefore, we present these means and the mean differences in describing the results on each outcome (see Table 1).

Wait time level change

Figure 3 shows the average daily wait time for each session during all study phases, including the 6-week follow-up phase. During baseline (A), the average daily wait time ranged from 14 to 31 minutes with a mean of 21.00 (SD = 4.75). During the customer satisfaction feedback phase (B), the average daily wait time decreased by 2.47 minutes ($P = .04$) to a mean of 18.53 (SD = 2.88); the range was from 13 to 23 minutes. The second intervention (C) was introduced during phase 3; it included a combined intervention

package consisting of customer satisfaction feedback, average daily wait time feedback, and goal setting. During this phase, the average daily wait time ranged from 12 to 24 minutes with a mean of 17.79 (SD = 2.73). This is a mean reduction of 0.74 minutes ($P = .52$) relative to the phase 2 mean. Hence, the

Table 1

INTERVENTION EFFECTS ON WAIT TIME AND CUSTOMER SATISFACTION ACROSS PHASE CONDITIONS

	Phase change			
	A-B	B-C	C-B	B-A'
Level change coefficient				
Wait time	-2.467	-0.740	3.140	1.567
Customer satisfaction	0.110	-0.016	-0.152	-0.445

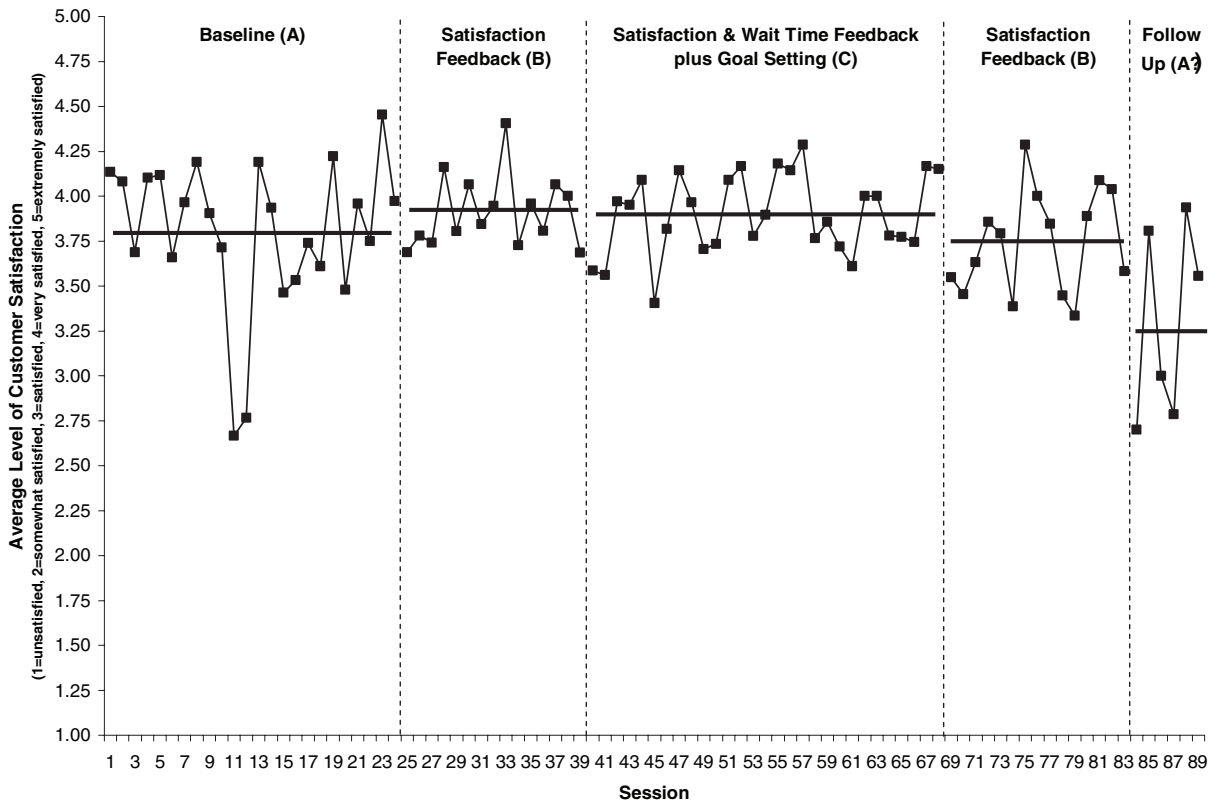


Figure 4. Customer satisfaction with wait time during all study phases.

direction of change in wait time levels observed after the introduction of the 2 interventions was consistent with the direction of change predicted for these conditions. The fourth phase of the project involved a reversal to the customer feedback alone condition (B). The daily wait time increased to a mean of 20.93 (SD = 3.76) minutes and ranged from 14 to 27 minutes. This is a level increase of 3.14 minutes ($P < .01$) relative to the level for the combined intervention condition (C).

Because the wait time level decreased when the combined intervention (C) was implemented and increased when only the customer satisfaction feedback component (B) was reintroduced, the data suggest that the combined intervention was more effective than the customer satisfaction feedback alone, although wait time decreased only slightly when the combined intervention was initially implemented.

During the 6-week follow-up phase (A') when all interventions were withdrawn, daily wait times increased further, ranging from 17 to 27 minutes with a mean of 22.50 (SD = 3.94). Hence, the follow-up level increased by 1.57 minutes ($P = .37$) relative to the level of phase 4. These results regarding the 4 level changes were then incorporated in an overall test for level change.

Even though only 2 of the 4 individual level change coefficients were statistically significant, the cumulative evidence from all 4 level changes resulted in an overall test statistic on wait time that was statistically significant ($z = 3.10$ and $P < .01$). The size of the overall effect of the set of intervention conditions on wait time was measured using R^2 . In the present context this statistic describes the proportion of the total observed variation on the dependent variable time-series that was associated with the interventions. The

obtained value of $R^2 = 0.18$, which is considered a medium effect size.

Another useful way of describing the results is to average the level estimates for similar conditions and then to compare the resulting values. We compared the averaged A levels (ie, mean of phase 1 and phase 5 means) with averaged B levels (ie, mean of phase 2 and phase 4 means) to describe the overall difference associated with the comparison of conditions A and B. This difference was 2.02 minutes ($P = .04$). Next, we compared the averaged B means with the mean of phase C to describe the average BC difference. This difference was 1.94 minutes ($P = .02$).

Notice that the overall effect of condition B relative to condition A is to reduce wait time approximately 2 minutes; the overall effect of condition C relative to condition B is to reduce wait time an additional 2 minutes. The standardized effect sizes associated with these interventions are $\hat{\delta}_{AB} = 0.56$ and $\hat{\delta}_{BC} = 0.53$; these are medium effect sizes.

Customer satisfaction with wait time

Figure 4 shows the average daily level of customer satisfaction with wait time for each day, including the follow-up phase. Customer satisfaction was rated on a scale of 1 to 5, where 1 = unsatisfied, 2 = somewhat satisfied, 3 = satisfied, 4 = very satisfied, and 5 = extremely satisfied. Across all phases of the study, the overall average rating of satisfaction was 3.72, indicating that customers were generally satisfied with the amount of time they had to wait for their prescriptions. About 13% ($N = 319$) of waiting customers who participated in the survey ($N = 2434$) indicated that they were “unsatisfied” or only “somewhat satisfied” with their wait time; 64% of waiting customers reported they were either “very satisfied” or “extremely satisfied” with their wait time. The highest percentage of unsatisfied customers during any phase (29%) was detected during the follow-up period, when wait times were the longest.

The level of customer satisfaction ranged from 2.67 to 4.45 with a mean of 3.80 ($SD = 0.42$) during baseline. When customer satisfaction feedback (condition B) was introduced during the second phase, customer satisfaction increased slightly to a mean of 3.91

($SD = 0.20$) and ranged from 3.69 to 4.41. Hence, the level of satisfaction increased by 0.11 points on the 5-point scale; the corresponding standardized effect increase was 0.34. This increase is not statistically significant ($P = .30$). After condition C (the combined intervention condition) was introduced, customer satisfaction with wait time ranged from 3.40 to 4.29 with a mean of 3.90 ($SD = 0.22$). This level decrease of 0.01 points relative to the previous condition (a standardized effect size of -0.05) is not statistically significant ($P = .88$); it indicates that the level of customer satisfaction remained about the same during the initial B and C intervention phases. After reversing from condition C to condition B (customer satisfaction feedback alone), the customer satisfaction ranged from 3.33 to 4.29 with a mean of 3.75 ($SD = 0.29$). This decrease of 0.15 points (standardized effect size = -0.47 and $P = .14$) in customer satisfaction coincides with the increase in wait times throughout this phase. Finally, the follow-up phase reveals customer satisfaction scores that range from 2.70 to 3.94 with a mean of 3.25 ($SD = 0.54$). Hence, the satisfaction level decreased by 0.45 points when interventions B and C were removed. This corresponds to a standardized effect size of -1.38 , which is statistically significant ($P < .01$).

Although only 1 of the 4 level change coefficients was statistically significant, the cumulative evidence from these 4 individual tests provides convincing evidence for an overall effect of the interventions. Pooling data from similar conditions provides additional evidence for intervention effects.

When the data on changing conditions from A to B are combined with the data on changing conditions from B to A, the overall standardized effect size = 0.67 ($P < .01$). Hence, the overall customer satisfaction level is about two thirds of a standard deviation higher under condition B than it is under baseline conditions. This is a medium effect size. Correspondingly, the overall standardized effect size associated with conditions B and C is 0.21; this value is not statistically significant ($P = .35$).

In summary, the overall results indicate that customer satisfaction with wait times usually increased when intervention conditions B and C were

introduced and decreased when these conditions were withdrawn. The overall test for level change on customer satisfaction was statistically significant ($z = 2.58$ and $P < .01$). The proportion of the total variability on customer satisfaction that was associated with the manipulation of conditions was 0.19; this R^2 value is considered a medium effect size.

Relationship between wait time and customer satisfaction

A lag-zero cross correlation was computed to determine the relationship between the average daily wait times and customer satisfaction ratings. The results revealed a significant, negative relationship; $r = -0.57$ and $P < .05$. As wait times increased, customer satisfaction ratings decreased; as wait times decreased, customer satisfaction ratings increased. These data indicate that customer satisfaction was related to wait times and thus validated the efforts to improve customer service by reducing wait time.

DISCUSSION

This study was designed to reduce wait times and increase customer satisfaction with wait times in an outpatient pharmacy. The comparison of the average of the 2 “no treatment” A phases (1 and 5) with the C phase average suggests a decrease of approximately 4 minutes for the combined treatment condition. It should be understood, however, that this estimate is not necessarily trustworthy if it is interpreted as an estimate of what the effect would be in an experiment only with conditions A and C.

We believe the results of this study have direct, practical implications because wait time was reduced by approximately 20%, and there was a concomitant increased shift in the level of customer satisfaction. Given the current processes for filling prescriptions, we do not anticipate that major, additional reductions in wait times can be produced. This could change if dramatic improvements in system-related errors and delays beyond the control of pharmacy staff were made. Nevertheless, the moderate decrease in wait times found in this study translates to improvement in satisfaction as indicated by the correlation found

between average wait time and customer satisfaction. Additionally, data from this study may provide useful preliminary benchmarking data for standard pharmacy wait times.

It should be mentioned that obtained results on wait time during the multicomponent intervention phase (C) did not support the use of team-developed goals to reduce wait time. During this phase, a consistent downward trend average wait time was expected as each week’s wait time goal was met; however, goals were not met during 3 of the 6 weeks during this phase. The first author observed that some employees were willing to try the new ideas suggested by the team whereas others were not. Some of the ideas included increasing communication among employees (eg, letting pharmacists know when “priority” prescriptions needed to be checked) and making small changes to the current prescription filling process (eg, marking only those prescriptions for waiting customers as “priority”). Reasons for the observed lack of adherence to ideas generated by the team may have been the failure to monitor, prompt, and/or provide consequences for the implementation of the new, potentially performance-enhancing changes. It may also be that employees would have adopted these team-based suggestions if rewards had been provided for meeting wait time reduction goals.

The teamwork approach was used because it was consistent with the organization’s culture; however, a standardized filling process, initiated by management, may have been more effective in reducing wait time by streamlining some of the procedures. At the time of this study, different employees performed the same task (eg, processing a prescription) in a variety of ways. Many of the employees had previously worked at other pharmacies and had performed similar tasks; thus, some of their current behaviors had no doubt transferred from their previous jobs. Determination of the most efficient prescription filling process, together with employee training, feedback, and provision of appropriate consequences for complying with a new process, might have led to larger reductions in wait time. On the other hand, many of the variables that affect wait time are outside of the control of the employees and, therefore,

it is not clear that wait time could be reduced much further.

A weakness in the present study was that there were no data to indicate why wait time decreased. The pharmacy processed a high volume of prescriptions each day, filling an average of approximately 370 per day. There were many variables that may have accounted for the number of minutes a customer waited for his or her prescription and, hence, the variability in wait time. These variables included, but were not limited to, the number of prescriptions being processed at any given time, the number of waiting customers, the complexity of prescriptions, insurance problems, and incorrectly written prescriptions. Anecdotal data and observations suggested that longer wait time during the study was most commonly due to insurance problems, prescription problems, and failure to mark prescriptions for waiting customers as "priority" orders. However, even though some of the reasons for longer wait time were discovered, we do not know what the employees did differently during the phases when wait time decreased. Regardless, the systematic decreases in wait time when the interventions were implemented, and the increase when they were withdrawn during the follow-up period strongly suggest that the interventions were responsible for lower wait time during these phases, rather than systematic fluctuation of any of the operational variables mentioned above (eg, insurance problems, number of prescriptions to be filled, and prescription problems).

The study had several strengths. First, data were collected for 89 days, at least 15 days per phase (not including follow-up). Thus, employees were repeatedly exposed to the various experimental conditions as they worked, increasing confidence that the changes observed were due to the experimental manipulations, and furthermore, that the changes were not highly transitory. An analysis of 881 published studies that used within-subject experimental designs revealed that the most frequent number of observations during the initial baseline phase was between 3 and 4. Subsequent phases tended to include even fewer observations.^{25,26} Therefore, the duration of data collection adds confidence to the results. Fur-

thermore, the follow-up phase allowed for the additional analysis of performance during a second baseline control condition, wherein wait time increased when the interventions were withdrawn.

A second strength of the present study is that measurement systems for assessing wait time and customer satisfaction were developed, neither of which previously existed in this setting. These measurement methods were designed such that they would be easy to implement and could be used in the future if desired. Although employees reported that giving out the customer service cards and tokens was cumbersome at first, they stated that these procedures became more manageable and habitual as time went by. Management had mentioned they might, in the future, use one or both of these measurement systems to occasionally assess wait time and satisfaction, and compare obtained results with the findings of this study.

Finally, the customer response rate for indicating their level of satisfaction with wait time was very high (95%). The customer satisfaction rating procedure was modeled after the one used by Brown and Sulzer-Azaroff.¹¹ The high response rate is similar to the response rate Brown and Sulzer-Azaroff reported, further demonstrating the effectiveness of this type of data-collection method. This is probably due to the fact that the response effort of dropping a token into a survey box is much less than having to fill out a customer satisfaction survey questionnaire.

The results of the current study are generally consistent with those of previous performance management and customer service-related research studies. Feedback about customer service satisfaction was found to be an effective intervention alone; however, when combined with goal setting, the combination produced lower wait times. This supports previous reviews of feedback¹⁸ and goal setting,¹⁹ along with customer service studies employing multicomponent interventions.^{13,15} Furthermore, during the combined intervention, participants were given more direct and informative feedback related to their performance (ie, wait time feedback). The graphic feedback during this phase allowed employees to compare the current day's average wait time with wait time for all

previous days. Reviews of performance feedback suggest that graphic feedback, which allows individuals to compare the group's current performance with its previous performance, produces more consistent and desirable effects than feedback that displays only current performance.^{17,18}

The findings of the present study are likely to generalize to other similar pharmacy settings, such as those that process a high volume of prescriptions on a daily basis. In addition, comparable results would be expected in any customer service setting where many different variables affect a customer's wait time with an order he or she has placed. For example, a fast-paced restaurant may struggle with a high volume of customers and may run into problems preparing orders in a timely manner. Similarly, results may generalize to any busy setting in which customers stand in lines for prolonged periods of time (eg, customer service counters and airports). One would expect that reducing wait time in any of those settings would increase customer satisfaction regarding wait time and customer service overall.

Few performance management applications that have targeted customer service behaviors have also evaluated the effects of these interventions on customer satisfaction.^{11,14} Future research should continue to examine whether improvements in customer service behaviors impact customer satisfaction and customer behavior. A more detailed analysis of the specific customer service behaviors that are important to an organization's customers would also be helpful to future researchers. In addition, more research is needed in highly variable, applied settings to aid our understanding of how we can improve performance in such settings. This is necessary because the most successful organizations are those that are constantly changing and adapting to their external environment, which includes demanding customers with high expectations.

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