Shorter Perceived Outpatient MRI Wait Times Associated With Higher Patient Satisfaction

Anna Holbrook, MD, Harold Glenn Jr, BS, Rabia Mahmood, MPH, Qingpo Cai, BS, Jian Kang, PhD, Richard Duszak Jr, MD

Abstract

**Purpose:** The aim of this study was to assess differences in perceived versus actual wait times among patients undergoing outpatient MRI examinations and to correlate those times with patient satisfaction.

**Methods:** Over 15 weeks, 190 patients presenting for outpatient MR in a radiology department in which “patient experience” is one of the stated strategic priorities were asked to (1) estimate their wait times for various stages in the imaging process and (2) state their satisfaction with their imaging experience. Perceived times were compared with actual electronic time stamps. Perceived and actual times were compared and correlated with standardized satisfaction scores using Kendall τ correlation.

**Results:** The mean actual wait time between patient arrival and examination start was 53.4 ± 33.8 min, whereas patients perceived a mean wait time of 27.8 ± 23.1 min, a statistically significant underestimation of 25.6 min (P < .001). Both shorter actual and perceived wait times at all points during patient encounters were correlated with higher satisfaction scores (P < .001).

**Conclusions:** Patients undergoing outpatient MR examinations in an environment designed to optimize patient experience underestimated wait times at all points during their encounters. Shorter perceived and actual wait times were both correlated with higher satisfaction scores. As satisfaction surveys play a larger role in an environment of metric transparency and value-based payments, better understanding of such factors will be increasingly important.

Key Words: Wait times, patient satisfaction, value-based payments, quality metrics, MRI

INTRODUCTION

Pursuing a variety of quality- and value-based payment initiatives, CMS began a major shift in its approach to provider reimbursement. Two years ago, it announced plans to transition its traditional fee-for-service hospital payment system to one that bases reimbursement on quality and value [1]. More recent announcements have targeted similar efforts for physician reimbursement [2].

This new focus on value-based purchasing increasingly directs attention to the patient experience. Hospital Consumer Assessment of Healthcare Providers and Systems surveys assess patients’ perspectives of care [3]. Although their association with clinical outcomes has been challenged [4], such surveys are now being used by CMS as a component of hospital incentive programs [5].

Although wait times are not specific components of Hospital Consumer Assessment of Healthcare Providers and Systems surveys, they could influence patients’ responses to a variety of generic survey questions [3]. Often attributed to an undesired but normal and sometimes unavoidable aspect of hospital operation, wait times play an influential role in the overall patient experience and begin far before patients interact with their clinical providers. Longer wait times contribute to patient anxiety and dissatisfaction and are frequently cited as a common reason for patients’ leaving a medical practice [6].

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Findings in Press Ganey’s [6] 2009 Medical Practice Pulse Report indicate, not surprisingly, that overall patient satisfaction declines as wait times increase. Yet patients typically respond to such surveys on the basis of their perceptions of wait times, rather than actual measured wait times. In non—health care markets, consumer estimates of wait times have been shown to be notoriously unreliable [7-9]. A better understanding of differences between the subjective and objective could help providers and hospitals improve patient satisfaction and ultimately their bottom lines. The ACR’s recent launch of the new Commission on Patient Experience [10] reflects a heightened awareness by the specialty of issues related to satisfaction, as well as opportunities for targeted research in this arena.

For these reasons, we aimed to assess differences in perceived and actual wait times among patients and to correlate these times with standard satisfaction scores, focusing on outpatient MRI services at our tertiary care academic medical center.

METHODS

This HIPAA-compliant study, which was initiated as a patient experience quality improvement project, was completed under a waiver from our institutional review board. Optimization of the patient experience is a stated strategic goal of our academic radiology department. For example, all new faculty and staff members attend day-long Radiology Service Excellence Institute retreats, and designated patient and family advisers participate in most strategic and capital planning sessions. As such, initiatives such as this support our departmental goals.

Over a 15-week period (October 14, 2014, to February 27, 2015) patients arriving for scheduled MR examinations during periods staffed by our patient service research team were asked to consider participating in this voluntary study and given assurance that their responses would not be shared with those involved in their care. For those agreeing, patient demographic information, various encounter component times, and the type of MR examination (brain, chest, abdomen, pelvis, spine, or breast) were captured and stored in a secure server database.

Our academic health system performs approximately 70,000 MR examinations per year at its 10 hospitals and outpatient imaging centers. Of these, 17,000 are performed on inpatients, 51,000 on outpatients, and 2,000 on emergency department patients. For this study, we focused on the outpatient MR facility at our primary university campus, which has two MR units and a volume of approximately 11,500 examinations per year. Our outpatient MR waiting room was specifically designed with the patient experience in mind, with ample reading materials, multiple large-screen televisions, and free Wi-Fi. Team members checked on patients periodically throughout their stays, offering progress updates, warm blankets, and coffee or water. Additionally, the research team was instructed to offer half of the patients iPad electronic tablet devices preloaded with games and Internet access as a wait distractor.

Upon the completion of their MR examinations, patients were asked to complete a five-question survey (Fig. 1), which, on the basis of initial pilot testing, usually took between 1 and 3 min. The survey was administered on paper. In five cases, however, because of poor vision or need for an interpreter, questions were asked by a study team member and answered verbally. Patients were asked to rate their experience in the outpatient radiology department on a five-point, Likert-type scale, modeled after those in a typical Press Ganey patient survey. We asked how long they thought they waited between their arrival and when they were brought back to the MRI preparation area and how long they waited after being brought to the preparation area until their examinations began. These two perceived wait period components were combined to calculate the patient’s perceived total wait time. We also asked patients to estimate how long their examinations lasted, how long they had anticipated being in the department, and if they had been offered anything by the research or clinical team to pass their time.

Actual appointment time, time of arrival, and time of examination start and finish were all extracted from our institutional data warehouse using specific fields imported

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<th>How would you rate your experience in Radiology today?</th>
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<td>1</td>
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<tr>
<td>Very Poor</td>
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<th>How many minutes did you wait between checking in and prep?</th>
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<th>How many minutes did you wait between prep and starting the actual test?</th>
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<th>Roughly how many minutes was your actual test?</th>
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<th>How long did you anticipate being here today?</th>
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<th>While waiting, were you offered anything to pass the time?</th>
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Fig 1. Patient survey.
from scheduling, registration, and scanner software data sets. Actual and perceived wait times were compared using two-sample t tests. Actual and perceived examination durations were also compared using two-sample t tests.

We also compared how actual and anticipated total time spent in the department and the difference between the two correlated with reported satisfaction using Kendall τ correlation tests. We compared how the type of examination correlated with actual and perceived wait times or patient satisfaction using Kendall τ correlation tests. Finally, we compared how the offering of an iPad as a distractor affected perceived wait times, satisfaction, and the difference between perceived and actual wait times using two-sample t tests. All data and statistical analysis was performed using Excel 2010 (Microsoft Corporation, Redmond, Washington) and R (The R Foundation for Statistical Computing, Vienna, Austria).

RESULTS
Of 190 patients invited to participate, 11 declined, and 32 left the department before completing the survey portion of the study, yielding a sample of 147 patients for whom complete data were available. Of these, 73 patients (49.7%) were offered something by our research team to pass the time.

The mean time intervals between patient arrival and examination start, time of appointment and examination start, and time of arrival and time of appointment were 53.4 ± 33.8, 20.2 ± 53.6, and 33.0 ± 45.4 min, respectively. Patients perceived a mean of 12.7 ± 10.7 min elapsing between their time of arrival and their preparation and a mean of 15.7 ± 18.6 min elapsing between their preparation and the examination beginning, for a mean total perceived wait time of 27.8 ± 23.1 min. This represents an underestimation compared with actual wait time. The difference between perceived total wait time and the actual interval between arrival time and test start was statistically significant (P < .001), but there was no significant difference between the patients’ perceived wait times and the interval from time of appointment to time of test start (P = .116). Differences between actual and perceived component and total wait times are illustrated in Figure 2.

The median patient satisfaction score was 5 (Table 1). There was a statistically significant correlation between patient satisfaction scores and each component of actual and perceived wait times, with shorter wait times associated with higher satisfaction scores (actual arrival to test start, P < .001; appointment to test start, P = .002; perceived wait time between arrival and preparation, P < .001; perceived wait time between preparation and examination start, P < .001; and patient total perceived wait time, P < .001).

The mean examination duration was 47.1 ± 22.7 min, but patients estimated the duration of their examinations to be 31.6 ± 15.2 min. This underestimation was statistically significant (P < .001).

Mean anticipated time in the department was 71.7 ± 41.2 min. Mean actual time was 100.3 ± 42.3 min. The difference between the anticipated and actual times (27.5 ± 49.1 min) was statistically significant (P < .001) and was correlated significantly with patient satisfaction scores (P = .005). Mean perceived time in the department was 59.7 ± 29.6 min. The difference between the anticipated and perceived times (13.8 ± 44.6 min) was also statistically significant (P < .001). Smaller differences in anticipated and perceived time were associated with higher patient satisfaction scores (P = .007).

The difference between actual (100.3 ± 42.3 min) and perceived (59.7 ± 29.6 min) times was 40.2 ± 36.9 min, which was also statistically significant (P < .001). Differences between actual and perceived times in the department were not significantly correlated with satisfaction (P = .06).

There was no significant association between the type of examination performed and the actual time of arrival to

![Actual vs. Perceived Wait Times](image)

**Table 1. Frequency of satisfaction scores from patient survey**

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<thead>
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<th>Score</th>
<th>Frequency</th>
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<td>1</td>
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<td>2</td>
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examination start \( (P = .436) \), time of appointment to examination start \( (P = .060) \), perceived wait times \( (P = .796) \), or patient satisfaction score \( (P = .376) \).

If a patient was offered an iPad tablet device to pass the time, it did not affect the patient’s perceived wait time \( (P = .408) \) or satisfaction score \( (P = .791) \) or the difference between his or her perceived wait time and the actual wait time \( (P = .588) \). There was no significant association between a patient’s being early or late for his or her examination and the patient’s perceived wait time \( (P = .006) \).

**DISCUSSION**

Contemporaneously capturing perceived and actual wait times for patients undergoing outpatient MR in an environment designed to optimize the patient experience, we found that patients underestimated their total encounter times by almost 30 min. For all components of the imaging encounter, shorter wait times, both perceived and actual, were significantly associated with higher encounter satisfaction scores. As the patient experience becomes an increasingly important component of public ratings websites and value-based reimbursement systems, this information may help radiology practices better align their workflows with societal imperatives.

Prior research in the nonradiology setting has shown that when patients received clinical information during their waits, they perceived shorter lengths of stay \([11]\). Because providing real-time clinical information to patients who are presenting for and undergoing diagnostic testing is impractical, our department has focused on providing whatever information possible (eg, information about the examination, anticipated delays) in as comfortable and patient-centric an environment as possible during each imaging encounter. Given the observational nature of our study (eg, we did not randomize patients to “old-school” institutional waiting environments), we cannot assert causation that these factors led patients to think that wait times were shorter than they really were. But our positive results in a patient-centered waiting environment may explain our favorable experience.

Prior studies comparing perceived and actual wait times in the health care setting are few and have yielded mixed results. Not unexpectedly, some researchers have found that patients overestimate wait times. Thompson et al \([12]\), for example, found that almost half of emergency department patients overestimated the time from triage to examination by a physician. Others, however, have reported, like us, that patients underestimated their wait times. In particular, Parker and Marco \([13]\) reported that the majority of emergency department patients underestimated their visit lengths by a median of 7 min. The explanation for this discordance could be a simple one. Rather than one report being right and the other being wrong, with patients always either over or underestimating wait times, we believe it is likely that patients estimate one way or the other on the basis of the environment in which their care was delivered.

In an era in which patient satisfaction scores are increasingly serving as value-based reimbursement metrics \([3]\), efforts to improve satisfaction will increasingly affect physician and facility bottom lines. Prior studies have reported associations between shorter perceived and actual wait times and improved satisfaction scores in the emergency department \([13]\) and ophthalmology clinic \([14]\) settings. Our study indicates that these reports can be generalized to the outpatient MRI setting as well. Practices may be able to improve actual wait times only so much, so focusing in parallel on the patient experience—and reducing the perceived lengths of those times, whatever they are—may yield complementary end results. In fact, perception may be more important here than reality; in one clinic waiting room setting, patient reactions were actually more strongly affected by perceived rather than actual wait times \([15]\).

We had expected that offering an iPad tablet device for patients to pass the time might shorten their perceived wait times and improve their satisfaction. Like Pruyn and Smids \([15]\), who did not find the presence of a television in the waiting room to decrease patients’ perceived wait times, we did not find this to be the case. The reason for this is unclear but could be related to many patients’ already having their own devices (something we had not expected and thus did not ask about). It could also be due in part to the fact that our department had already succeeded, through both staff development and facility design, to make the waiting experience as pleasant as possible. Because of both, the incremental value of distractors may have been mitigated. For these reasons, it is also not clear whether our findings that patient underestimate wait times will necessarily generalize to all radiology departments. For departments that find patients overestimating their wait times, however, some of our patient experience initiatives might be considered if corresponding patient satisfaction metrics are suboptimal.
There were several limitations in our study. First, because this was a single-institution study focusing on a single site of service, these results may not necessarily be generalizable to other environments (eg, freestanding outpatient imaging centers), which are structurally and organizationally very different from our academic medical center practice. Second, our team’s other obligations precluded them from being able to be present during the early morning (6–9 AM). Approximately 33% of patients were scheduled during these hours and were therefore not represented in this study, but we have no reason to believe that this group would be different in their opinions from other survey respondents. Additionally, several patients who had been recruited for the study did not receive the survey. This was due to factors such as patient fatigue, tardiness to other same-day appointments, and patients’ leaving forgetting that they had agreed to participate. We do not know what bias this may have introduced. Finally, patient participation was somewhat inversely proportional to scheduling capacity. When scanners were running on schedule, patients were taken back quickly for their examinations, and such patients were thus less likely to be enrolled. Conversely, when processes were running behind schedule (eg, because of a large number of emergency add-ons to the schedule), more patients were surveyed. This biased our study toward including patients with longer waits, suggesting we may have seen more favorable results if we were able to capture a more balanced sample.

**TAKE-HOME POINTS**

- In a modern patient-centric facility, patients undergoing outpatient MR tended to underestimate wait times.
- Shorter actual and perceived wait times were both correlated with higher patient satisfaction scores.

**REFERENCES**