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**Expanding the Definition of Outpatient Wait Times
to Predict Patient Satisfaction:
Harnessing the Power of Administrative Data
in a Cross-Sectional Study**

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**Expanding the Definition of Outpatient Wait Times to Predict Patient Satisfaction:
Harnessing the Power of Administrative Data in a Cross-Sectional Study**

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Background: Delays between appointment requests and scheduled and completion dates reduce patient satisfaction. Multiple administrative measures of these waiting times are used by healthcare managers, but relationships between these measures and satisfaction have not been studied. This paper is the first to capitalize on a unique national dataset to compare the ability of alternative measures of wait times to reliably predict self-reported patient satisfaction.

Methods: This is a cross-section study relying on administrative data from the Veterans Health Administration (VHA) appointment scheduling databases and survey data from the 2010 VHA Survey of Healthcare Experiences of Patients. Outcome measures include patient reported ability to get appointments as soon as needed, ease of accessing treatments or specialists, and overall satisfaction with healthcare. Wait time measures include capacity measures, and retrospective and prospective time stamp measures. The time stamp measures consist of either the date when the appointment was created in the scheduling system (create date), or the date the patient or provider desired the appointment (desired date) as the start date for wait time computation. All measures are calculated separately for new and returning patients. Logistic regression models predict patient satisfaction using these wait time measures.

Results: For new patients, the capacity measure and the retrospective and prospective time stamp measures using create date are significantly associated with patient satisfaction. The desired date prospective measure is significantly associated with patient satisfaction for returning patients.

Conclusion: Multiple different measures of waiting times are associated with patient satisfaction in subgroups of new and returning patients. Standard practices can be improved by making fairly simple modifications to scheduling systems to capture a wider variety of wait time measures that reliably predict patient satisfaction.

Key words: Wait time measures, patient satisfaction, VA, VHA

Background

Over a decade ago, the Institute of Medicine identified timely access to health care as an essential way to improve health care quality in the United States. Appointment wait times continue to be an essential measure of access as the health care system continues to struggle with long wait times.[1-3] For example, a national survey in 2009 found an average wait time of 20.3 days for an appointment in family practice.[4] Wait times for outpatient care are expected to further increase with the implementation of the Patient Protection and Affordable Care Act that expands health insurance coverage.[5-7] Negative consequences of delayed access to care include poor health outcomes especially among older and more vulnerable patient populations [7-11] and lower patient satisfaction.[12-14]

Reliable wait time measures are underdeveloped in the United States. One way to measure wait times uses physician surveys that ask how long it would take to get an appointment for patients with a non-emergent condition.[4, 15] Unfortunately, survey data is expensive to obtain and does not continuously monitor changes in wait times. As an alternative, proponents of scheduling interventions that are focused on decreasing wait times (e.g. Advanced Clinic Access (ACA)) have suggested capacity measures such as how many days until the third next available appointment for a physical exam.[16, 17] Capacity measures can be easily calculated from most scheduling systems but they do not measure how long an individual patient actually waits. Variation in provider practice schedules and clinic limitations related to appointment types may also make these measures less reliable.[16, 17]

As the Veterans Health Administration (VHA) shifted services from inpatient to outpatient care,[18] stakeholders developed a strong interest in knowing the timeliness of appointments for individual Veterans. Consequently, the VHA uses a wider variety of wait time

measures than the private sector. VHA also consistently measures patient satisfaction through patient surveys. This paper is the first to compare the ability of alternative measures of wait times to reliably predict patient satisfaction. To place the forthcoming analyses in context, the following section describes each of the wait time measures used by the VHA along with the advantages and disadvantages of each measure.

Wait Time Measures in the VHA

Capacity Measures

In response to complaints about long waits for VHA care, Congress requested information on outpatient waiting times starting in 1999.[19, 20] Early performance metrics focused on capacity measures such as the first next available appointment (FNA).[21, 22] This is a prospective wait time measure that uses the day an appointment is being created as the starting point and measures the time between that day and the day the first available open appointment slot occurs (Table 1). This measure counts only the day the clinics are open, ignoring weekends, holidays, or unavailable days for part time providers. FNA is considered a marker of the amount of backlogged appointments in the system in that it measures how far into the future a scheduler has to look before finding an open appointment.

A key strength of FNA is the ability to benchmark performance with other organizations that use similar capacity measures, but there are a number of limitations (Table 2). Like all capacity measures, FNA does not reflect how long patients actually wait, but rather the capacity of the clinic to have open appointments. Individual patients may not actually want the FNA appointment because the appointment length or type does not meet their needs or because they want a follow-up appointment in the future. The latter case is more problematic for returning

patients who wish to schedule a follow-up than for new patients who most likely wish to be seen as soon as possible.[23]

FNA may also overestimate appointment availability. An open appointment may be the result of a late cancellation in an otherwise backlogged clinic and without the cancellation there would be little open space in the schedule. FNA also varies because of differences in how clinics display appointments in the scheduling system. Some clinics display multiple schedule profiles for the same provider (e.g. one schedule for new patients and one schedule for returning patients). The computer does not consult all available profiles for a provider when calculating FNA so the FNA may incorrectly determine that the provider has open appointments in one profile when in reality this time slot is committed.

Time Stamp Create Date and Desired Date

The limitations of FNA led VHA managers to consider time stamp wait time measures.[22, 24] Time stamps require choices in what to use as starting and ending points. The first starting point used was based on the Create Date (CD). CD is the date that an appointment is created (i.e. made), or the date the patient is entered into an Electronic Waiting List (Table 1). The main strength of this measure is that the CD time stamp is captured automatically, without human discretion (Table 2). Once created, the only way the CD time stamp can be changed is by the patient cancelling and rescheduling or the patient not showing up for the appointment.

The principal limitation of CD concerns follow-up appointments for returning patients. Since the CD time stamp captures the creation of an appointment, the results of measuring CD are believed to reflect the pattern of booking appointments. For example, suppose a patient comes in for a check-up and agrees to schedule a follow-up appointment in six months. If the clinic creates the follow-up appointment on the day of the initial appointment (“on today”) the

resulting measured wait time will be six months. Alternatively, the clinic might contact the veteran 5 months from “today” and create the intended 6 month follow-up appointment, resulting in a measured wait time of one month. Another limitation of this measure is that it does not take patient preferences into account. For example, a new patient may want the certainty of making an appointment “on today” but “for” a future time after a holiday or family gathering.

Recent VHA policy has attempted to overcome these limitations by focusing on desired date (DD) as the initial “start date.” (Table 1).[22, 25, 26] This time stamp designates the ideal time “a patient or provider wants the patient to be seen.”[26] If the patient has an established relationship with the provider and agrees to return for a future appointment (i.e. internal demand in ACA literature),[17] the date the patient and provider agree upon as the desired return date is the DD. If the patient is an established patient requesting an unanticipated appointment or is a new patient requesting their first appointment, the scheduling clerk is instructed to ask the patient when they would like to be seen (regardless of when they are able to see an open slot). The answer to this question establishes the DD for this “external demand” situation.[17] The strength of the DD time stamp measure is that it reflects the patient’s or provider’s wishes (Table 2). Additionally, it is not influenced by differences in local scheduling practices. For example, in the case of the patient who was scheduled to come back in six months, the DD for the follow-up appointment would be the date six months into the future regardless of when the appointment was ultimately scheduled.

The principal limitation of this measure is its reliance on schedulers to accurately determine desired dates. Initial audits of VHA’s scheduler performance in 2005 found DD correctly entered 40% to 60% of the time. Follow-up audits after educational efforts found DD was entered correctly over 90% of the time.[27]

Combinations of the time stamp measures described above are thought to reflect the patient experience. We hypothesize that patients who receive appointments closest to when it is desired will have higher satisfaction levels. This scenario is depicted in Figure 1 panel “A” and “B.” A patient could have their CD, DD scheduled (SA) and completed appointment (CA) all on (or close to) the same day. An example of this is when a patient walks in to request an appointment and the clinic gives them an appointment on the same day. Alternatively, as depicted in panel “B”, an appointment could be created at an earlier point in time than desired, while still being scheduled and completed on the desired date. An example of this situation is an established patient who schedules a future appointment. Panels C and D in Figure 1 show suboptimal situations where patient satisfaction for access is likely to be lower. In panel “C”, a backlogged clinic is unable to accommodate a “today” patient request while panel D depicts a backlogged clinic that cannot accommodate the follow-up appointment for an established patient when desired.

Completed vs. Scheduled Appointments

To calculate a wait time, in addition to the “start date,” an ending point time stamp must also be established (Table 1). One ending point is the CA date automatically collected by the computer. The CD and DD to CA measures are retrospective measures that include only successfully completed appointments. If a patient does not show up for the appointment or the appointment is canceled and never rescheduled, the appointment is excluded from these retrospective wait time measures.[28]

Wait times may also be measured prospectively by examining appointments that have not occurred yet.[22, 25] The VHA pending appointment list keeps track of all scheduled appointments (SA) and a snapshot measure of this list is taken bi-monthly. Waits are calculated

by subtracting the original CD or DD from the SA date (Table 1). Prospective measures do not reflect future actions such as cancellations or no-shows so all appointments are included (Table 1 and 2). Consequently, prospective measure results may be very different than retrospective measures. For example, if there are two appointments scheduled when a report is pulled and the waits are calculated to be 10 days and 28 days, the average SA wait time is 19 days (38/2). If the 28 day wait time appointment turns out to be a no-show, the average CA wait time will only be 10 days.

A weakness of any wait time measure used to reward performance, as done in the VHA, is that the measures can be thwarted.[29-31] Individuals could inappropriately hold open a FNA appointment, manage the times appointments are created, enter incorrect DD data or inappropriately cancel appointments. Educational efforts, mandatory quality reviews and feedback, and inspections are used to insure the integrity of the system.

This study is the first to compare these wait time measures in their ability to predict patient satisfaction. Results suggest that capacity and time stamp measures using CD significantly predict patient satisfaction for new patients while the prospective DD wait time measure predicts satisfaction for returning patients.

Methods

Scheduling System Wait Time Measures

We obtained wait time measures from 2010. These included the FNA, retrospective CA measures using CD and DD and prospective SA measures using CD and DD (Table 1). For analysis we need facility-level waiting times, not individual waiting times because individual satisfaction with waits is likely to be simultaneously determined with individual health status. Individuals who are in poor health tend to report lower satisfaction and also tend to have shorter

waiting times. It would be a mistake to conclude that shorter waits for these patients caused lower satisfaction. To avoid this problem we computed facility-level averages for each measure that were calculated separately for new and returning patients.^{7-10,22} A new patient was defined as a patient who has not had an appointment in a specific clinic (e.g. cardiology) in the previous 24 months.[26, 32] Wait times for 50 types of appointments used for performance measurement were weighted by national utilization patterns for each type of appointment and averaged together at each VHA medical center. Missing wait times were imputed with 0 when appropriate.[7-10, 33]

Patient Satisfaction

Satisfaction data came from the 2010 Survey of Healthcare Experiences of Patients (SHEP) that is modeled after the CAHPS® family of survey instruments. Human subjects IRB approval was obtained from the VA Boston Healthcare System. Managed by the VHA Office Quality and Performance, SHEP is an ongoing survey that seeks to obtain patient feedback on recent episodes of VHA inpatient or outpatient care to improve healthcare quality.[34] For outpatient care, a simple random sample of patients with completed appointments at VHA facilities was selected each month. The overall response rate was 53% and there were 221,540 respondents included in this study.

Dependent Variables

Five different patient satisfaction measures were taken from SHEP. Satisfaction with timeliness of care was measured by asking respondents how often they were able to get VHA appointments as soon as they thought they needed care, excluding times they needed urgent care. We also examined more general satisfaction measures that wait times for appointments may influence. Access to VHA tests or treatments and appointments with VHA specialists were

measured by asking how easy it was to get this care in the last 12 months. Response options for the above three measures included always, usually, sometimes and never. General satisfaction was measured by asking respondents to rate VHA health care in the last 12 months on a scale of 0 to 10 and their satisfaction with their most recent VHA visit using a Likert scale ranging from 1 to 7 with higher numbers indicating greater satisfaction.

Risk Adjustment

Risk adjustors included age, gender, race/ethnicity, education level, number of visits to a doctor's office in the last 12 months and self-reported health status, all obtained from the 2010 SHEP.

Analyses

STATA 10.0 was used to run logistic regression models that predicted patient satisfaction. Outcomes were coded for the timeliness of care and access to treatment and specialist measures as always or usually, versus sometimes or never. Models predicted ratings of 9 or 10 versus less than 9 for the rating of the VHA in the last 12 months measure and 6 or 7 versus less than 6 for the satisfaction with the most recent visit measure.

The completed appointment date the VHA used to target individuals for the SHEP sample was matched to each of the wait time measures. For prospective measures (FNA, SA using CD and DD), the wait time in the month before the targeted appointment date was assigned to reflect waits when the appointments were requested or desired. This specification resulted in having eleven instead of twelve months of data in these models (because the first month had no previous month in our data). For the retrospective wait time measures, the wait time in the current month of the targeted appointment was assigned (so all twelve months could be used in

analysis). Wait time measures were categorized into quartiles (see Table 4) with the lowest quartile used as the reference group.

Results

The SHEP respondents in this study generally reflected the larger VHA patient population. Respondents were predominantly male (95%), in poor health, and frequent healthcare users. Nearly a third visited a doctor's office five or more times in the last 12 months. Satisfaction levels with VHA care were high. Over 80% of respondents reported obtaining appointments as soon as they wanted, and found it easy to obtain treatments or specialist appointments. Seventy-eight percent of the respondents rated VHA care in the last 12 months in the top two categories and 82% did the same for satisfaction with the most recent VHA visit (Table 3).

There was significant variation in measured wait times using the different methods of measurement for new and established patients (Table 4). Wait time measures that rely on the CD for appointments were the longest with means of 18 to 31 days for new patients and 31 to 72 days for returning patients. Measures that rely on the DD were shorter with means of 2 to 16 days for new patients and 3 to 18 days for returning patients. The mean wait time for the FNA appointment capacity measure was similar to the CD measures for new patients (20 days) and 8 days for returning patients.

New patients visiting VHA facilities with shorter FNA or CD waits (retrospective or prospective) were more satisfied as the odds ratio for wait times in the second, third and fourth quartile were significantly lower compared to the odds ratio on the first quartile for all five satisfaction measures (Table 5). For example, new patients visiting VHA facilities with the longest retrospective CD waits (Q4) were 17 to 34% less satisfied compared to patients visiting

facilities with the shortest retrospective waits. In contrast, there was no consistent relationship between the retrospective DD measure and patient satisfaction for new patients. Longer waits using the prospective DD measure were significantly associated with lower patient satisfaction for two of the five measures (VHA rating and treatment access).

For returning patients, there was a consistent and significant relationship between individuals visiting VHA facilities with longer waits using the prospective DD measure and decreased satisfaction (Table 6). Patients visiting facilities in the highest quartile of waits using the FNA were between 7 and 10% less satisfied than patients visiting facilities in the lowest quartile depending on the satisfaction outcome. The other three wait time measures did not reliably predict patient satisfaction for returning patients.

Discussion

This study is the first to associate operational measures of administrative wait times with commonly used measures of patient satisfaction. Findings suggest that health care systems should utilize a wider variety of wait time measures than are popular in current practice, since different wait time measures were associated with patient satisfaction for new and returning patients.

For new patients, longer waits using a capacity measure (FNA) and the retrospective and prospective wait time measures using CD were significantly associated with patient satisfaction on timely VHA appointments, ease of access obtaining treatments or specialist appointments, rating of VHA care and satisfaction with the VHA at the last visit (Table 5). The capacity measure finding is consistent with past research that finds a significant causal relationship between longer FNA waits and poorer health outcomes especially among older and more vulnerable veterans.[7-10] New patients typically want to be seen as soon as possible, often due

to a change in health status that is causing concern.[23] Consequently, it is not surprising that capacity or time stamp measures that use the date that an appointment request was made as the start date (see Table 1) were successful predictors of patient satisfaction. These wait time measures can be easily calculated from most scheduling systems to help health care providers continually track access for new patients.[16, 17]

Returning patients are more complicated because they may not be interested in obtaining the next available appointment for follow-up care. Surveys of patients have found that scheduling future appointments at convenient times or maintaining continuity of provider may outweigh concerns about long waits for appointments for follow-up care.[23, 35, 36] Recognizing these complexities, VHA policymakers recently shifted to using a DD approach to measure wait times where schedulers ask patients what day they desire their appointment.[26] Results from this study provide some support for the validity of these policy changes.

Returning patients visiting facilities with longer prospective DD waits were significantly less satisfied on all five patient satisfaction measures (Table 6). In contrast, the retrospective DD measure did not consistently predict patient satisfaction. For this measure, if the patient never comes for an appointment (no show rates are ~ 12.5%), or if a patient or clinic cancels an appointment and never reschedules it, the appointment is excluded, whereas the prospective DD measure includes all appointments on the day a report is pulled. The longer waits in the prospective DD wait time measure compared to the retrospective DD measure (Table 4) combined with the significant relationships between prospective DD and satisfaction (Table 6) suggest that prospective DD is a more accurate reflection of access to the system for returning patients. This is the first study to examine the association between DD and patient outcomes.

Future research should confirm the reliability of DD by examining whether the association holds when predicting other health outcomes.

The main limitation of this study is that we cannot be certain that the identified relationships between longer wait times and patient satisfaction are causal since omitted variables may be responsible for the observed relationship. For example, a flu epidemic may increase waits for care and also decrease satisfaction levels because patients do not feel well. In this case, lower satisfaction cannot be blamed entirely on access. Due to the cross-sectional nature of this study we could not control for facility quality through facility fixed effects and our findings should be confirmed in future longitudinal studies. Despite this reservation, past research has found that longer wait times using capacity measures cause poorer health outcomes, especially among older and more vulnerable populations[7-11] so it is plausible that administrative wait times would be causally linked to lower patient satisfaction.

Conclusion

The recent popularity of interventions such as ACA has encouraged clinics to better utilize information available in the scheduling system since performance metrics based on the scheduling system are much cheaper and easier to obtain than provider surveys taken at sporadic intervals.[16, 17, 23] The VHA has a long history of using a wide variety of wait time measures and is now investing in research to link these measures to patient outcomes. In this study, capacity or time stamp wait time measures that use the date that an appointment request was made as the start date for measuring wait times were successful predictors of patient satisfaction for new patients. In contrast, wait time measures that used the date a patient desired for an appointment to take place consistently predicted patient satisfaction for returning patients. Fairly

simple modifications to current scheduling systems can support improved wait time measures that will better predict patient satisfaction across all patient populations.

List of Abbreviations

ACA=Advanced Clinic Access

VHA=Veterans Health Administration

FNA=First next available

CD=Create Date

DD=Desired Date

CA=Completed Appointment,

SA=Scheduled Appointment Date

NS=No-shows/cancellations.

Authors' Contributions

JCP conceived of the study, performed the analyses and led the writing. MLD provided VHA operational policy expertise, interpreted findings and reviewed drafts of the article. SDP conceived of the study, provided methodological expertise, interpreted findings and reviewed drafts of the article. All authors read and approved the final manuscript.

Competing Interests

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Table 1: Summary of Wait Time Measures

Measure	Algorithm	Example Calculation
First next available (FNA)- Capacity	First next available appt. - appt. request	Patient X requests first available appt. on 1/1/2010 and this is 1/15/2010. $1/15/2010 - 1/1/2010 = 15$ days.
Retrospective Create Date (CD)	Completed appt. date - appt. create date	Patient X requests an appt. on 1/1/2010, cannot take the offered 1/15/2010 appt. so the scheduler schedules, and patient completes an appt. on 1/21/2010. $1/21/2010 - 1/1/2010 = 21$ days.
Prospective Create Date* (CD)	Scheduled appointment date - appt. create date	Patient Y requests on appt. on 1/1/2010 and accepts a 1/10/2010 appt. date. Patient Y does not show up for the 1/10/2010 appt. This appt. is never included in retrospective wait time calculations. Patient X has a scheduled appt. for 1/21/2010 that was created on 1/1/2010. $1/21/2010 - 1/1/2010 = 21$ days.
Retrospective Desired Date (DD)	Completed appt. date - desired date	Patient Y has a scheduled appt. for 1/10/2010 that was created on 1/1/2010 $1/10/2010 - 1/1/2010 = 10$ days Patient X wanted an appt. on 1/15/2010 and was scheduled for and completed an appt. on 1/21/2010. $1/21/2010 - 1/15/2010 = 6$ days.
Prospective Desired Date* (DD)	Scheduled appt. date - desired date	Patient Y wanted an appt. on 1/20/2010 and was offered and agreed to an appt. on 1/27/2010. Patient Y canceled the 1/27/2010 appt. and never rescheduled. This appt. is never included in retrospective wait time calculations. Patient X has a scheduled appt. for 1/21/2010 and this patient desired this appt. on 1/15/2010. $1/21/2010 - 1/15/2010 = 6$ days.

Patient Y wanted an appt. on 1/20/2010 and was offered and agreed
to an appt. on 1/27/2010.

1/27/2010-1/20/2010=7 days

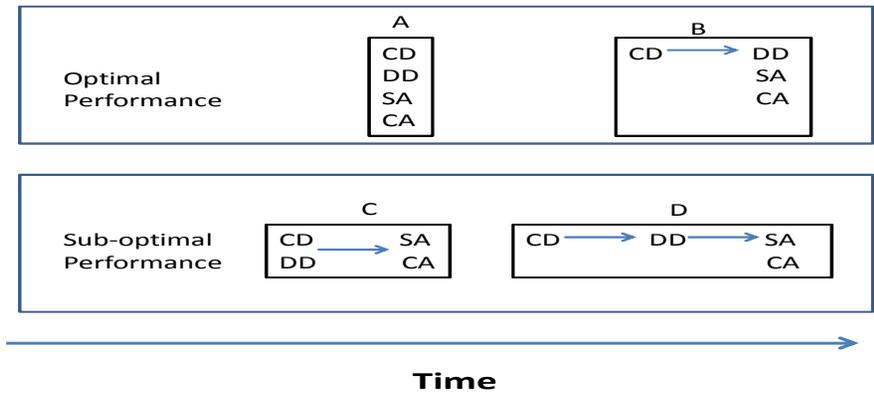
*A snapshot of all pending appointments in the system is taken on the first and fifteenth of each month to calculate prospective wait time measures.

Table 2: Key Comparisons of Various Features of Alternative Wait Time Measures

	FNA	Retrospective CD	Retrospective DD	Prospective CD	Prospective DD
Comparable to measures used in private sector	Yes	No	No	No	No
Automatically captured by scheduling system versus scheduler entry of dates	Yes	Yes	No	Yes	No
Captures when patient desires appointment versus clinic capacity or clinic booking patterns*	No	No	Yes	No	Yes
Includes all scheduled appointments versus just completed appointments	N/A	No	No	Yes	Yes

*May be especially important for returning patient requiring follow-up care

Figure 1: Graphic Display of Alternative Wait Time Measures*



*CD=Create Date
 DD=Desired Date
 CA=Completed Appointment Date
 SA=Scheduled Appointment Date

Table 3: Descriptive Statistics of SHEP Sample and Satisfaction Measures

Demographics (n=221,540)	Mean or %
Age	66.96
Male	95%
Had some college	53%
White	79%
Black	10%
Hispanic	5%
Other	6%
>=5 visits to a doctor's office in the last 12 months	31%
Excellent/very good self-reported health status in the last 12 month	25%
Patient Satisfaction Measures	
Timely Visit: Receiving an appt. as soon as you thought you needed Always or usually versus sometimes or never (n=158, 841)‡	83%
VHA rating: Rate all VHA care in the last 12 months on scale of 0 to 10 (10=highest rating) 9 or 10 versus <9 (n=219,772)	78%
Treatment Access: How often was it easy to get treatment or tests? Always or usually versus sometimes or never (n=181,250)	85%
Specialist Access: How often was it easy to get an appointment with a specialist? Always or usually versus sometimes or never (n=121,721)	82%
VHA satisfaction: Satisfaction with VHA care at most recent visit on scale of 1 to 7 (7=most satisfied) 6 or 7 versus less than 6 (n=218,677)	82%

‡ Sample sizes differ between models due to not all SHEP respondents answering every satisfaction question.

† Sample sizes differ between wait time measures due to the retrospective versus prospective nature of the different measures.

December 2009 wait time data (for (January 2010) are missing on the prospective measures.

Table 4: Descriptive Statistics of Wait Time Measures

	Mean	25%	50%	75%
New Patients				
First Next Available (n=201,819)†	20.06	17.24	19.53	22.14
Retrospective Create Date (n=221,540)	17.97	15.61	17.50	19.96
Prospective Create Date (n=201,819)	31.13	26.65	30.19	34.77
Retrospective Desired Date (n=221,540)	4.72	2.77	4.69	6.14
Prospective Desired Date (n=201,819)	15.65	12.11	15.42	18.61
Established Patients				
First Next Available (n=201,819)	7.88	5.41	8.01	10.17
Retrospective Create Date (n=221,540)	30.90	23.60	29.05	34.95
Prospective Create Date (n=201,819)	72.26	50.54	66.71	86.90
Retrospective Desired Date (n=221,540)	2.72	1.91	2.60	3.36
Prospective Desired Date (n=201,819)	17.19	13.75	16.79	19.91

Table 5: Logistic Regressions Predicting Patient Satisfaction Using New Patient Wait Time Measures

	Timely visit (n=144,538)‡	VHA rating (n=200,207)	Treatment access (n=165,053)	Specialist access (n=110,807)	VHA satisfaction (n=199,219)
FNA^ (ref=Q1)±					
Q2	0.89†*	0.96*	0.93*	0.94*	0.95*
Q3	0.82*	0.92*	0.83*	0.84*	0.91*
Q4	0.74*	0.86*	0.73*	0.74*	0.85*
Retrospective					
CD^ (ref=Q1)	(n=158,841)	(n=219,772)	(n=181,250)	(n=121,721)	(n=218,677)
Q2	0.84*	0.95*	0.87*	0.86*	0.93*
Q3	0.78*	0.91*	0.80*	0.81*	0.89*
Q4	0.66*	0.83*	0.65*	0.66*	0.81*
Prospective CD (ref=Q1)	(n=144,538)	(n=200,207)	(n=165,053)	(n=110,807)	(n=199,219)
Q2	0.88*	0.97*	0.88*	0.85*	0.96*
Q3	0.85*	0.95*	0.86*	0.85*	0.91*
Q4	0.73*	0.88*	0.72*	0.71*	0.85*
Retrospective					
DD^ (ref=Q1)	(n=158,841)	(n=219,772)	(n=181,250)	(n=121,721)	(n=218,677)
Q2	1.06*	1.00	1.01	1.05*	1.01
Q3	1.10*	0.98	1.06*	1.10*	1.01
Q4	1.06*	1.01	1.02	1.08*	1.02
Prospective DD (ref=Q1)	(n=144,538)	(n=200,207)	(n=165,053)	(n=110,807)	(n=199,219)
Q2	1.00	0.96*	0.96*	1.02	1.01
Q3	0.95*	0.92*	0.94*	0.96	0.95*
Q4	0.89*	0.89*	0.86*	0.89*	0.90*

^FNA=first next available, CD=Create Date, DD=Desired Date

± For the range in days of each quartile on the wait time measures refer to Table 4.

‡Sample sizes differ between models due to the retrospective versus prospective of wait time measures and not all SHEP respondents answering every satisfaction question.

† Reported numbers are Odds Ratios. * $P < 0.05$

Table 6: Logistic Regressions Predicting Patient Satisfaction Using Returning Patient Wait Time Measures

	Timely visit	VHA rating	Treatment Access	Specialist Access	VHA satisfaction
FNA [^] (ref=Q1)±	(n=144,538)‡	(n=200,207)	(n=165,053)	(n=110,807)	(n=199,219)
Q2	1.01†	0.97	0.99	1.00	0.99
Q3	1.00	0.95*	1.02	1.03	0.98
Q4	0.90*	0.90*	0.90*	0.90*	0.93*
Retrospective					
CD [^] (ref=Q1)	(n=158,841)	(n=219,772)	(n=181,250)	(n=121,721)	(n=218,677)
Q2	0.92*	0.96*	0.89*	0.94*	0.98
Q3	0.92*	0.95*	0.87*	0.89*	0.93*
Q4	1.01	1.06*	0.95*	0.99	1.01
Prospective CD					
(ref=Q1)	(n=144,538)	(n=200,207)	(n=165,053)	(n=110,807)	(n=199,219)
Q2	0.92*	0.92*	0.87*	0.90*	0.92*
Q3	0.93*	0.94*	0.89*	0.89*	0.91*
Q4	1.12*	1.07*	1.03	1.05	1.02
Retrospective					
DD [^] (ref=Q1)	(n=158,841)	(n=219,772)	(n=181,250)	(n=121,721)	(n=218,677)
Q2	0.99	0.94*	0.97	0.98	0.97
Q3	1.05*	0.98	1.03	1.02	1.00
Q4	0.96*	0.95*	0.94*	0.97	0.98
Prospective DD					
(ref=Q1)	(n=144,538)	(n=200,207)	(n=165,053)	(n=110,807)	(n=199,219)
Q2	0.91*	0.93*	0.91*	0.88*	0.92*
Q3	0.84*	0.86*	0.85*	0.81*	0.86*
Q4	0.78*	0.85*	0.75*	0.74*	0.83*

[^]FNA=first next available, CD=Create Date, DD=Desired Date

± For the range in days of each quartile on the wait time measures refer to Table 4.

‡ Sample sizes differ between models due to the retrospective versus prospective of wait time measures and not all SHEP respondents answering every satisfaction question.

† Reported numbers are Odds Ratios. * $P < 0.05$

