

# Factors Associated With Timeliness in Academic General Surgery Clinics: A Prospective Quality Assessment

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## ABSTRACT

**OBJECTIVES:** Previous investigations have identified examination room wait time in outpatient surgery clinics as a source of patient dissatisfaction. This study aimed to identify factors associated with timeliness in outpatient surgery clinics.

**STUDY DESIGN:** A prospective study was conducted in an outpatient clinic with 15 surgeons in the Department of General Surgery in an academic tertiary center.

**METHODS:** Clinic sessions with high slot utilization (>85%) and at least 3 hours of clinic time were preselected for the study. Overall wait time (OWT) was calculated by taking the time difference between the appointment's scheduled start time and the attending surgeon (AS)'s entrance into the examination room.

**RESULTS:** Ninety-eight appointments from 24 sessions were included. The mean (SD) OWT for all appointments was 26.2 (22.1) minutes. The AS' years of practice, average consultation length, and appointment overbooking were not associated with OWT. The scheduled appointment start time was also not associated with OWT. The involvement of an intermediate provider (IP; ie, a fellow, resident, or physician assistant) was associated with a significant increase in OWT (29.0 [22.8] vs 17.4 [15.8];  $P < .001$ ) without reducing the AS' consultation length (10.8 [6.7] vs 11.1 [8.1];  $P = .50$ ).

**CONCLUSIONS:** Provider- and appointment-specific factors, such as clinician experience and appointment overbooking, were not associated with the timeliness of outpatient surgery clinics. The involvement of an IP, however, was an independent contributor to longer OWT without reducing AS consultation length, which highlights the controversy regarding the utility of advanced practitioners and residents in enhancing the efficiency of outpatient clinics.

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The delivery of high-quality medical care necessitates sensitive and objective assessments of efficiency. In surgery, efficiency research has often focused on the lead time between the referral clinic visit and the date of surgery, which has been identified as an area of considerable patient dissatisfaction.<sup>1</sup> This finding was supported by the results of a recent investigation that explored patient satisfaction from referral through postoperative appointments.<sup>2</sup> This study also identified the time spent waiting in a clinic examination room as another common source of dissatisfaction.<sup>2</sup>

With respect to the aforementioned sources of surgical patient dissatisfaction, the waiting time between referral clinic visit and date of surgery is multifactorial and often outside of the surgeon's control. For instance, patients may need to schedule related appointments to obtain preoperative medical clearances before scheduling the surgery. Additionally, patients may need to plan around personal events, work commitments, or caregiver schedules. In contrast, examination room wait time is more likely to be influenced by the surgeon and the clinic office staff. Thus, surgeons could target examination room wait time as a metric for improvement in order to enhance efficiency, which may lead to higher satisfaction for the surgical patient.

To our knowledge, there is a paucity of literature on the factors that contribute to timeliness in outpatient general surgery clinics. Therefore, the present study aims to identify factors associated with examination room wait time for surgical patients in an academic healthcare setting.

## METHODS

A prospective quality assessment was conducted in the outpatient clinics within the Department of General Surgery at an academic tertiary care facility (Geisinger Medical Center, Danville, PA). The observation began on January 1, 2016, and ended on May 1, 2016. The data collected include time stamps to reflect the timeliness of patient interactions with 1 of 15 board-certified surgeons (bariatric, colorectal, general, or oncologic) who maintained a standard weekly clinic for the duration of the study period.

The clinics are staffed by full-time receptionists, licensed practical nurses, registered nurses, and physician assistants (PAs). Resident and fellow surgeons serve in the clinics at the discretion of the chief residents and departmental administrators. For the purpose of this study, each PA, resident surgeon, and fellow surgeon was classified as an intermediate provider (IP). For subgroup analyses, residents were classified as intern (first year), midlevel (second or third year), or chief resident (fourth or fifth year). All providers working in the clinic were informed about the study and instructed to proceed with clinic responsibilities as usual. Due to the quality assessment nature of the investigation, institutional review board approval and informed consent were waived per institutional policy.

The time that an attending surgeon (AS) enters the examination room is not electronically captured as a time stamp in the clinic's electronic records. To accurately capture this time, a study team member carefully observed the clinic flow and manually recorded the time of entrance into examination rooms. For each clinic session, a detailed datasheet was used to record patient wait times and provider consultation lengths. For each patient, check-in time upon arrival to the clinic and check-out time upon departure from the clinic were recorded to capture the entire clinic visit. Clinic sessions with high slot utilization (>85%) and least 3 hours of clinic time were preselected for the study.

Overall wait time (OWT), defined as the interval between the scheduled appointment start time and the entrance of the AS into the examination room, was the primary outcome for this investigation. The length of the AS' consultation was also recorded.

The wait time data from clinic sessions were analyzed with univariate analysis for categorical variables and linear regression for continuous variables. Categorical variables included section leader and on-call status. The title of section leader was assigned to 1 physician in each subspecialty within the department. This designation was used to assess whether the AS' administrative responsibilities affect timeliness. The on-call status for the AS indicates whether the AS was also responsible for any inpatient issues that arose for the respective surgical service during the clinic day. This was used to assess whether such additional clinical responsibilities affect timeliness. Continuous variables included the AS' experience, which was measured by the number of years that the clinician had been an AS. As a measure of clinic overbooking, the average slot utilization for each provider was

calculated for all clinic sessions during the study period. The average length of time the AS spent with each patient was also calculated for all appointments observed during the study period.

Multivariate linear regression with backwards selection was performed with selection stopping when all variables in the model had a  $P < .20$ . Analysis was completed using SAS version 9.4 (SAS Institute Inc; Cary, North Carolina). All statistical tests were 2-sided, and  $P$  values  $< .05$  were considered statistically significant.

## RESULTS

Ninety-eight appointments from 24 clinic sessions were included. The distribution of appointments by provider is summarized in **Table 1**. General surgeons were the largest group of attending surgeons and accounted for the highest number of appointments (49; 50%). Surgical residents were the most common IP (39 appointments; 39.8%), with interns participating in 20 of these appointments.

The mean (SD) OWT for all appointments was 26.2 (22.1) minutes. The prospective data were analyzed to describe the flow of patients and to determine if there were physician- or appointment-specific factors associated with timeliness. With respect to AS-specific factors, the designation of section leader did not demonstrate a statistically significant relationship with patient wait time

**Table 1. Distribution of Providers and Appointments**

	Providers (n)	Appointments (n)	Appointments (%)
<b>ATTENDING SURGEON</b>			
General	6	49	50.0
Colorectal	3	26	26.5
MIS/bariatric	3	13	13.3
Surgical oncology	3	9	9.2
<b>FELLOW SURGEON</b>			
MIS/bariatric	2	6	6.1
None	N/A	92	93.9
<b>RESIDENT SURGEON</b>			
Intern	5	20	20.4
Midlevel	4	8	8.2
Upper	3	11	11.2
None	N/A	59	60.2
<b>PHYSICIAN ASSISTANT</b>			
General surgery	2	9	9.2
Colorectal surgery	1	5	5.1
Surgical oncology	1	4	4.1
None	N/A	80	81.6

MIS indicates minimally invasive surgery; N/A, not applicable.

**Table 2. Univariate Analysis of Overall Wait Time**

	Appointments (n)	Mean OWT (min)	95% CI	P
<b>Overall</b>	98	26.20	21.77-30.64	
<b>Section Leader</b>				.92
Yes	35	25.91	17.12-34.70	
No	63	26.37	21.28-31.45	
<b>AS Status</b>				.32
On-call	38	23.42	17.25-29.59	
Not on-call	60	27.97	21.77-34.17	
<b>Intermediate Provider</b>				.001
None	35	17.40	11.96-22.84	
Fellow	6	51.50	26.34-76.66	
Resident	39	30.46	23.93-36.99	
Physician assistant	18	25.67	11.69-39.65	
<b>Resident Classification</b>				.09
Intern	20	29.95	22.69-37.21	
Midlevel	8	19.25	1.36-37.14	
Upper	11	39.55	23.47-55.62	

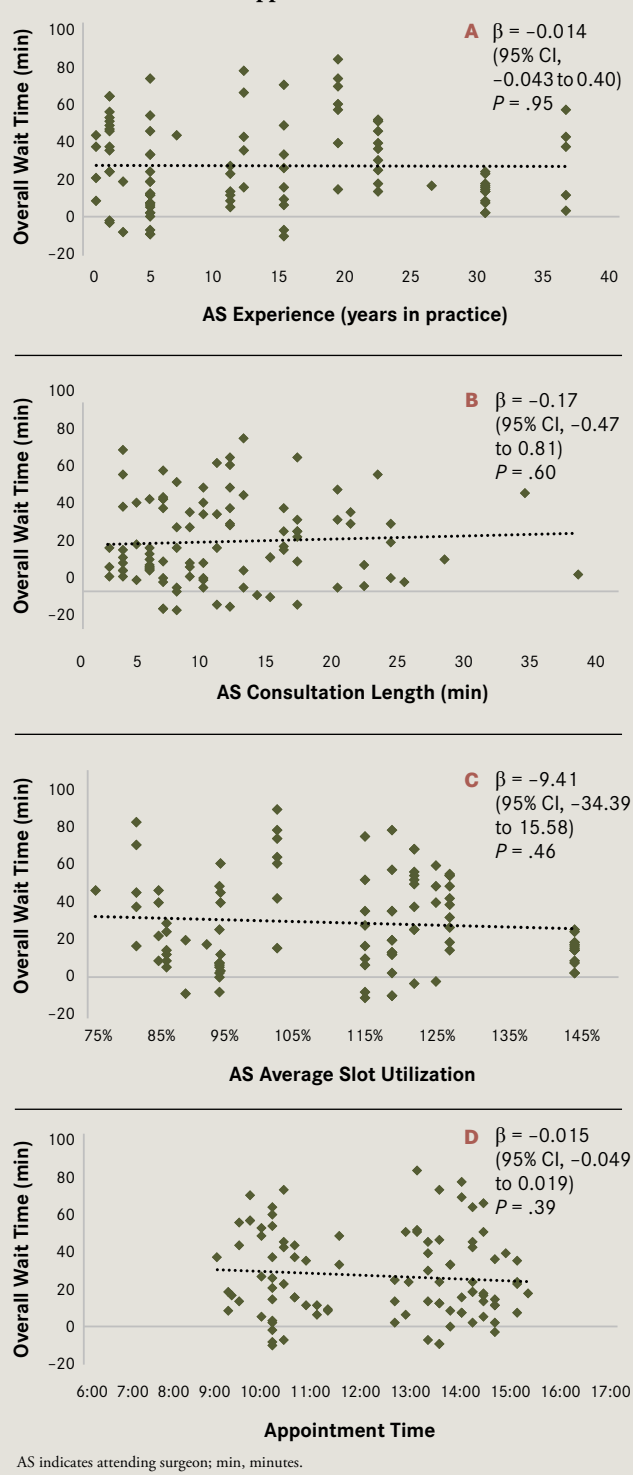
AS indicates attending surgeon; min, minutes; OWT, overall wait time.

(25.91 minutes [95% CI, 17.12-34.70] vs 26.37 [95% CI, 21.28-31.45];  $P = .92$ ) (Table 2). The on-call status of the AS also failed to show a statistically significant relationship with timeliness (23.42 minutes [95% CI, 17.25-29.59] vs 27.97 [95% CI, 21.77-34.17];  $P = .32$ ).

Univariate analysis did reveal, however, that the involvement of an IP was associated with significantly higher patient wait time. Appointments utilizing a fellow surgeon (51.50 minutes [95% CI, 26.34-76.66]) or PA (25.67 [95% CI, 11.69-39.65]) were associated with a significantly higher OWT than appointments without an IP (17.40 [95% CI, 11.96-22.84];  $P < .001$ ) (Table 2). The participation of a resident surgeon was also associated with increased wait time (30.46 minutes [95% CI, 23.93-36.99]) compared with appointments without an IP, and there were no significant differences among resident experience levels with respect to timeliness ( $P = .09$ ).

Continuous variables associated with provider and appointment factors, including physician experience and appointment time, were entered into univariate linear regression. This revealed that the AS' years in practice and average time spent counseling each patient were not associated with OWT ( $\beta = -0.014$  [95% CI,  $-0.043$  to  $0.40$ ] and  $\beta = 0.17$  [95% CI,  $-0.47$  to  $0.81$ ], respectively) (Figure). The provider's average rate of overbooking during the study period was also not associated with timeliness ( $\beta = -9.41$  [95% CI,  $-34.39$  to  $15.58$ ]). Additionally, the scheduled start time for the appointment was unrelated to OWT ( $\beta = -0.015$  [95% CI,  $-0.049$  to  $0.019$ ]).

**Figure. Univariate Linear Regression for Overall Wait Time Using A) AS Experience, B) AS Consultation Length, C) AS Average Slot Utilization, and D) Appointment's Scheduled Start Time**



**Table 3. Multivariate Analysis of Overall Wait Time**

	$\beta$	95% CI	P
<b>Intercept</b>	3.54	-26.43 to 33.52	.82
<b>Intermediate Provider</b>			.001
Fellow	40.42	20.80-60.04	
Resident	15.78	5.80-25.76	
Physician assistant	7.82	-4.91 to 20.54	
<b>Section Leader</b>	6.33	-15.58 to 2.91	.18
<b>On Call</b>	7.42	-16.69 to 1.85	.12
<b>Average Slot Utilization</b>	24.81	-4.97 to 54.59	.10
<b>Appointment Time</b>	0.03	-0.07 to 0.01	.09

Multivariate linear regression was used to further assess variables potentially associated with OWT. This analysis confirmed that the AS' personal factors, including administrative or on-call status, were not significantly associated with OWT (Table 3). The provider's average rate of overbooking and the appointment start time were also not associated with timeliness. The involvement of an IP remained significantly associated with increased OWT ( $P < .001$ ) in this multivariate model.

The allocation of patient time with respect to examination room wait and provider consultation is summarized in Table 4. This analysis revealed that although the involvement of an IP was associated with increased OWT ( $P < .001$ ), IP involvement did not decrease the AS' consultation length ( $P = .50$ ).

## DISCUSSION

To our knowledge, this prospective observational study is the first to objectively quantify the patient flow of outpatient general surgery clinics and to identify specific factors that are associated with timeliness in these clinics. In the present study, provider- and appointment-specific factors, including clinician experience and appointment overbooking, were not associated with timeliness. The involvement of an IP, however, was an independent contributor to longer OWT without reducing AS consultation length.

**Table 4. Allocation of Patient Time**

	Appointments (n)	Appointments (%)	Wait for IP Mean $\pm$ SD (min)	IP Consultation Mean $\pm$ SD (min)	Wait for AS Mean $\pm$ SD (min)	AS Consultation Mean $\pm$ SD (min)	OWT Mean $\pm$ SD (min)
With IP	57	58.2	9.7 $\pm$ 7.8	11.4 $\pm$ 7.3	9.1 $\pm$ 8.8	10.8 $\pm$ 6.7 <sup>a</sup>	29.0 $\pm$ 22.8 <sup>b</sup>
Without IP	35	35.7	-	-	8.9 $\pm$ 8.9	11.1 $\pm$ 8.1 <sup>a</sup>	17.4 $\pm$ 15.8 <sup>b</sup>

AS indicates attending surgeon; IP, intermediate provider; min, minutes; OWT, overall wait time.

<sup>a</sup> $P = .50$ .

<sup>b</sup> $P < .001$ .

The mean (SD) OWT for appointments observed in this study was 26.2 (22.1) minutes, which is considerably shorter than that in the only other published report describing wait time in a similar setting examining patient satisfaction (41.9 [25.5] minutes).<sup>2</sup> This paucity of literature regarding timeliness in surgical clinics reflects the fact that most investigations into patient wait time and sources of clinic delay have mainly evolved within the primary care setting. Primary care literature has suggested that physician arrival time and overbooking are significant predictors of clinic efficiency.<sup>3</sup> In the present investigation of surgical clinics, no provider arrived to the clinic session later than the scheduled session start time, which precluded an analysis of physician arrival behavior. Additionally, provider overbooking was not found to be a significant contributor to OWT. This suggests that primary care and surgery clinics are not inherently influenced by the same set of factors, which highlights the need for additional research into efficiency in surgical clinics because the primary care literature may not be generalizable.

Additionally, these primary care investigations are often conducted in clinics that do not utilize residents, which may make it difficult to relate the findings to an academic environment. Hospitals and clinics with residency programs face a unique challenge: they must provide high-quality and efficient patient care while also allowing trainees to learn and gain experience. In the context of outpatient clinics for general surgery, the present study found that the involvement of IPs, including residents, significantly increased patient wait time. This finding is intuitive as patients must wait and converse with an additional provider; however, this is the first study to quantify this effect. This finding raises the question of whether the IP may contribute to clinic efficiency by reducing the duration of the AS consultation; however, the present results indicate that they do not significantly shorten the consultation. Thus, the present study finds that IPs increase patient wait time without enhancing the efficiency of the consultation.

However, it should be noted that this study does not conclude that IPs should be removed from the surgical clinic. First, IPs contribute to clinic efficiency in many ways that were not quantified in this analysis, including pre- and post appointment documentation. Secondly, training in the clinic continues to be essential for surgical residents to graduate with the complete skillset necessary to run a surgical practice. Thirdly, previous investigations have found

that patient satisfaction is not adversely affected by the involvement of these providers, particularly residents, and patients credit the involvement with increased interaction and enhanced education in the ambulatory setting.<sup>4,5</sup> Additionally, AS consultation length has been consistently identified as a contributor to patient satisfaction across a wide spectrum of surgical and medical specialties in the outpatient clinic setting.<sup>2,6-8</sup> Thus, although IP involvement was not associated with a decrease in the AS consultation length, patient satisfaction may in fact benefit from the increased provider interaction (IP and AS consultations) without a shortened consultation with the AS. In fact, one study found that time spent with the AS is a stronger predictor of satisfaction than examination room wait time.<sup>7</sup> This reflects the multifactorial nature of patient satisfaction and the complex relationship between efficiency and satisfaction.

### Limitations

This study is not without limitations. First, the infrequent participation of fellow surgeons makes generalizations regarding the effect of this particular population difficult. Secondly, clinic providers were not blinded to the observer's presence, and it is possible that clinic staff altered their behavior during observation. To mitigate this potential effect, members of the study team assured all staff members that there were no incentives or penalties associated with performance. Nonetheless, to minimize this potential bias, future studies would need to have the start time of the AS consultation electronically captured in the health record. This prudent data capture would facilitate an objective measure of patient wait time for every clinic appointment, which would enable a more comprehensive view of OWT.

### CONCLUSIONS

Using time-flow observation, this prospective study found that provider- and appointment-specific factors, including clinician experience and appointment overbooking, were not associated with timeliness in outpatient surgery clinics. The involvement of an IP, however, was an independent contributor to longer OWT without reducing AS consultation length.

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