Factors Associated with Delayed On-Time Starts and Cancellations of Scheduled Non-Obstetric Surgeries

ALICIA E. HERSEY, MD; ELEANOR BRAKEWOOD, MD; LAUREN SCHILICHTING, PhD; CHRISTINE E. FOLEY, MD

ABSTRACT

OBJECTIVE: There is currently lacking research regarding patient and surgical factors contributing to in-hospital delays of gynecologic surgery, and the impact of the COVID-19 pandemic on such cases. The objective of this study was to determine if primary language was associated with delays or cancellations for patients presenting for scheduled non-obstetric surgery. The secondary objectives were to determine if this association changed after the COVID-19 pandemic, and identify other risk factors for delays or cancellations.

METHODS: This was a retrospective cross-sectional study at a single academic women's hospital. Eligible cases were those undergoing first-case non-obstetric surgeries between January 2019–January 2020 (pre-pandemic), and May 2020–May 2021 (post-pandemic). The primary outcome was delayed start time or same-day cancellation, defined as start time of greater than 10 minutes from scheduled time, or cancellation after arrival. Sample size calculation assumed a 9:1 ratio of English to non-English primary language study population for comparison of first case on-time starts averaging 55% to 75% based on recent hospital data. A sample size of 414 English-speaking and 46 non-English-speaking patients were needed to detect a 20% difference in proportion of on-time start with an alpha of 5% and power of 80%, for a total of 460 charts analyzed from each time point, and 920 charts total. Bivariate analysis and multivariate regression analysis was performed.

RESULTS: In our study population, 90% spoke primarily English. Approximately 74% were non-Hispanic White, 12% Hispanic or Latino, and 6% non-Hispanic Black. Twenty percent of cases were delayed/canceled overall. There was no difference in delays or cancellations by primary language overall, before, or after the COVID-19 pandemic. Factors associated with preoperative delays or cancellations included: non-Hispanic Black race (aOR 2.92, [95% CI 1.56–5.45]), having public or no insurance (aOR 1.45, [95% CI 1.01–2.07]), having diabetes (aOR 2.11 [95% CI 1.23–3.63]), requiring preoperative medications (aOR 1.68 [95% CI 1.08–2.64]), or urogynecologic procedure (aOR 1.89 [95% CI 1.10–2.62]).

CONCLUSIONS: Primary language was not associated with first-case delays or cancellations in our study populations. We identified populations at risk for first-case surgical delays. Future qualitative research is needed to identify modifiable causes of delays in perioperative units to guide cost-effective, equitable patient care.

KEYWORDS: Surgical delays; perioperative care; quality improvement

INTRODUCTION

At the outset of the COVID-19 pandemic in March 2020, the Centers for Disease Control and Prevention, United States Surgeon General, and the American College of Surgeons recommended that all elective surgeries be suspended.[1] Despite a universal mandate, there were observed differences in the outcome of this pause: non-English speaking patients, those uninsured, or living in lower incomes experienced delays in surgical scheduling due to backlog of elective procedures.[2] These disparities raise concern for inherent biases within perioperative care not attributable to surgeon or hospital factors alone.

We know that delays in surgery lead to worsened health inequities,[2] increased patient morbidity and mortality,[3] and increased institutional costs.[4,5] Patients with limited English proficiency also have worse access to perioperative care.[6] While prior research in gynecologic surgery has shown delays in time from diagnosis to surgical management,[7,8] less is known about patient and surgical factors contributing to in-hospital delays for gynecologic cases, and the impact of the COVID-19 pandemic on such cases. It is therefore important to identify factors associated with delayed on-time starts or cancellations to effectively design and change preoperative processes for equitable care.

The hypothesis for this study was that non-English primary language would be associated with increased odds of in-hospital first-case delays or cancellations. The primary aim of this study was therefore to identify if primary language was associated with delays in first-case on-time starts at a single large academic women's hospital. Our secondary aims were to determine if the association between primary language and delays were different between two time points:

before the COVID pandemic, and after scheduled non-obstetric surgeries were resumed, and if there were other patient or surgical characteristics associated with delays or cancellations.

MATERIAL AND METHODS

Data source and study population

This cross-sectional study analyzed first-case scheduled non-obstetric surgeries between January 2019 and January 2020, as well as May 2020 and May 2021 at a single academic women's hospital with surgical subspecialties including benign and oncologic gynecology, plastics, breast, and gastroenterology for female sex patients. First-cases were selected to avoid confounding delays in operating room turnover and readiness. These two time points represent before and after elective surgeries were "paused" during the COVID-19 pandemic (designated "pre-pandemic" and "post-pandemic"). These two time periods were of interest to reflect the recent history and understand if and how a national pandemic impacted certain patient populations. All eligible cases in the two time periods were identified. There were 1,748 unique eligible cases in the pre-pandemic population, and 1,704 in the post-pandemic population. Eligible cases were numerically randomized with unique study ID numbers, and then data was extracted from charts sequentially until the sample size of complete charts was met. Cases were excluded if charts were incomplete for study variables below.

Study variables

The outcome was a composite outcome of first-case delay or cancellation. A delay was defined as an in-room time of greater than 10 minutes from scheduled surgery time. Ten minutes is the threshold at which cases are flagged as delayed at our institution, which falls within the mean for first-case delays of approximately 8 to 15 minutes.[5,9,10] First-case scheduled start times and in-room times were extracted from the electronic medical record. Cases were designated as canceled if the patient arrived to the hospital, but their case was canceled before transfer to the operating room. Patient and surgery demographics were extracted, including patient's primary language, race and ethnicity—which are self-reported characteristics through the hospital registration process—age, type of insurance, and past medical history. The need for preoperative labs or non-Enhanced Recovery After Surgery (ERAS) medications upon admission was also extracted. Preoperative labs are routinely performed on an outpatient basis, but included in our study were inpatient COVID-19 testing (in post-pandemic cohort), complete blood count (CBC), type and screen, or potassium level for appropriate patients. We also included same-day preoperative labs such as blood glucose level and urine pregnancy tests, both of which are routinely done at our hospital on admission for appropriate patients. The gender of the primary surgeon was extracted through the National Plan and Provider Enumeration System National Provider Identification (NPPES NPI) Registry, as well as surgeon specialty through hospital designation. Cases were classified based on primary surgical team: resident service versus private practice.

Statistical analysis

Sample size calculation assumed a 9:1 ratio of English to non-English primary language study population for comparison of first case on-time starts averaging 55% to 75% based on recent study hospital data. A sample size of 414 English-speaking and 46 non-English-speaking patients were needed to detect a 20% difference in proportion of on-time start with an alpha of 5% and power of 80%, for a total of 460 charts analyzed from each time point, and 920 charts total. Bivariate analysis and multivariate regression analysis was performed.

We compared bivariate associations for patient demographics and surgical characteristics. We also compared bivariate associations between surgeries that were not delayed and delayed/canceled overall and by time period. Fisher exact tests (when participant counts were <20) and Chi square tests were used for categorical variables. Multivariable logistic regression was used to determine the odds of preoperative delays or cancellation after adjusting for potential confounders. Confounders were considered for inclusion in the multivariable model if any bivariable Chi square *P* values were <.05, or if there was biologic plausibility: patient age, history of hypertension or cardiac event. We also compared the average time delay for each variable overall and by time period in a **Supplemental Table** (please email the corresponding author for this table). Analyses were conducted using SAS statistical software version 9.4 (SAS Institute, Cary, NC).

RESULTS

Study population characteristics

Approximately 20% of cases were delayed/canceled overall: 21% of cases in the pre-pandemic group, and 18% in the post-pandemic group [**Table 1**]. There were significant differences in the proportion of non-English-speaking patients in the cohort when stratified by time period: approximately 7% of patients in the pre-pandemic cohort were non-English-speaking, vs. 13% in the post-pandemic cohort (*P*<.01); the most common non-English language was Spanish. Approximately 74% of study population being non-Hispanic White, 12% Hispanic or Latino, and 6% non-Hispanic Black. Approximately 75% of patients required preoperative labs on admission. Approximately 5% of patients required COVID testing upon admission. 18% of patients required preoperative medications on admission, and the most common was heparin followed by phenazopyridine.

Table 1. Patient and surgery demographics

	Overall N=920 N, %	Pre-Pandemic N=460 N, %	Post-Pandemic N=460 N, %	P
Delayed/Canceled	181 (19.67)	98 (21.30)	83 (18.04)	.21
Patient Demographics				
Primary language				<.01
English	824 (89.8)	425 (92.6)	399 (86.9)	
Non-English	94 (10.2)	34 (7.4)	60 (13.1)	
Age, Years, Median (IQR)	47.0 (38.0–59.0)	48.0 (38.0–60.0)	46.5 (37.5–58.0)	.24
Race/Ethnicity				.28
Non-Hispanic White	688 (74.8)	355 (77.2)	333 (72.4)	
Hispanic or Latino	112 (12.2)	51 (11.1)	61 (13.3)	
Non-Hispanic Other	64 (7.0)	26 (5.7)	38 (8.3)	
Non-Hispanic Black	56 (6.1)	28 (6.1)	28 (6.1)	
Type of Insurance				.48
Private	501 (54.5)	258 (56.1)	243 (52.8)	
Public	406 (44.1)	197 (42.8)	209 (45.4)	
Uninsured/Charity Care	13 (1.4)	5 (1.1)	8 (1.7)	
Past Medical History				
Hypertension	266 (28.9)	134 (29.1)	132 (28.7)	.88
Diabetes	98 (10.7)	43 (9.4)	55 (12.0)	.20
Cardiac event	31 (3.4)	14 (3.0)	17 (3.7)	.72
Asthma	183 (19.9)	87 (18.9)	96 (20.9)	.46
Smoking	209 (22.7)	113 (24.6)	96 (20.9)	.18
Surgery Demographics				
Pre-op Labs				.01
Yes	690 (75.0)	329 (71.5)	361 (78.5)	
No	230 (25.0)	131 (28.5)	99 (21.5)	
Pre-op Meds				.35
Yes	169 (18.4)	90 (19.6)	79 (17.2)	
No	751 (81.6)	370 (80.4)	381 (82.8)	
Surgeon specialty				.03
Benign GYN	483 (52.6)	234 (51.0)	249 (54.3)	
Oncology	211 (23.0)	123 (26.8)	88 (19.2)	
Urogynecology	134 (14.6)	65 (14.2)	69 (15.0)	
Non-GYN	90 (9.8)	37 (8.1)	53 (11.6)	
Gender of Primary Surgeon				.59
Female	568 (61.7)	288 (62.6)	280 (60.9)	
Male	352 (38.3)	172 (37.4)	180 (39.1)	
Resident Service Case				.84
No	894 (97.2)	446 (97.0)	448 (97.4)	
Yes	26 (2.8)	14 (3.0)	12 (2.6)	
Delay				.21
Yes	181 (19.7)	98 (21.3)	83 (18.0)	
No	739 (80.3)	362 (78.7)	377 (82.0)	

Difference in primary language across time periods

In bivariate analysis, there was no difference in delays/cancellations by language overall or when comparing pre- or post-pandemic. Overall, non-English-speaking patients rep-resented 10% of the cohort and proportionally 10% of delayed/canceled cases. Pre-pandemic, they represented 7% of the cohort and 6% of delayed/canceled cases. Post-pandemic, they repre-sented 13% of the cohort but 16% of delayed/canceled cases [**Table 2**].

Other differences in patient and surgical characteristics

There were significant differences in the proportion of delayed/canceled cases across race and ethnicity groups overall and pre-pandemic [**Table 2**]. Proportions were not different in the post-pandemic group. Overall, there were also significant differences in the proportion of delayed/canceled cases among insurance type (P<.01), patients with diabetes (P<.01), patients requiring preoperative medications (P<.01), and surgeon specialty (P<.01). These differences remained significant when analyzed in the pre- and post-pandemic cohorts.

Patients with a history of hypertension (29% of overall cases) or asthma (20% of overall cases) were overrepresented in overall delayed/canceled cases (35%, P=.05, and 25%, P=.04, respectively), but no differences were seen when aggregated into pre- and post-pandemic cohorts. There were no differences in the proportion of delayed/canceled cases among patients requiring preoperative labs, with history of cardiac event, smoking status, or surgeon gender.

Multivariate analysis

In multivariate analysis, non-English-speaking patients did not have higher odds of delays/cancellations overall, pre-pandemic, or post-pandemic [**Table 3**]. When compared to non-Hispanic White patients, non-Hispanic Black patients had higher odds of delays/cancellations overall (aOR 2.92, 95% CI 1.56–5.45), pre-pandemic (aOR 5.15, 95% CI 2.13–12.46), but not in the post-pandemic cohort. Non-Hispanic other patients had higher odds of delays/cancellations in the pre-pandemic cohort (aOR 3.01, 95% CI 1.17–7.78).

When compared with private insurance, patients with public or no insurance had higher odds of delays/cancellations overall (aOR 1.45, 95% CI 1.01–2.07), but not when stratified by time period.

Patients with diabetes had higher odds of delays/cancellations overall (aOR 2.11, 95% CI 1.23–3.63) and post-pandemic (aOR 2.33, 95% CI 1.09–4.99), but not pre-pandemic.

Requiring preoperative medication administration was also associated with higher odds of delays/cancellations overall (aOR 1.68, 95% CI 1.08–2.64)

Table 2. Bivariate analysis of proportion of delayed/canceled cases by patient and surgical factors overall, pre-pandemic and post-pandemic.

	Overall			Pre-Pandemic			Post-Pandemic		
	Total	Delay/ Canceled (N, %)	P	Total	Delay/ Canceled (N, %)	P	Total	Delay/ Canceled (N, %)	P
N (%)	920	181 (19.7)		460	98 (21.30)		460	83 (18.04)	
Patient Demographics									
Primary language			.89			.67			.47
English	824 (89.8)	162 (89.5)		425 (92.6)	92 (93.9)		399 (86.9)	70 (84.3)	
Non-English	94 (10.2)	19 (10.5)		34 (7.4)	6 (6.1)		60 (13.1)	13 (15.7)	
Age, Years, Mean (SD)	48.3 (14.9)	50.3 (16.7)	**.04**	49.0 (15.4)	51.2 (18.1)	.12	47.6 (14.4)	49.3 (15.0)	.22
Race/Ethnicity			**.01**			**<.01**			.47
Non-Hispanic White	688 (74.8)	127 (70.2)		355 (77.2)	65 (66.3)		333 (72.4)	62 (74.7)	
Hispanic or Latino	112 (12.2)	20 (11.1)		51 (11.1)	10 (10.2)		61 (13.3)	10 (12.1)	
Non-Hispanic Other	64 (7.0)	13 (7.2)		26 (5.7)	9 (9.2)		38 (8.3)	4 (4.8)	
Non-Hispanic Black	56 (6.1)	21 (11.6)		28 (6.1)	14 (14.3)		28 (6.1)	7 (8.4)	
Type of Insurance			**<.01**			**.05**			**<.01**
Private	501 (54.5)	77 (42.5)		258 (56.1)	45 (45.9)		243 (52.8)	32 (38.6)	
Public	406 (44.1)	102 (56.4)		197 (42.8)	52 (53.1)		209 (45.4)	50 (60.2)	
Uninsured/Charity Care	13 (1.4)	2 (1.1)		5 (1.1)	1 (1.0)		8 (1.7)	1 (1.2)	
Past Medical History									
Hypertension	266 (28.9)	63 (34.8)	.05	134 (29.1)	36 (36.7)	.06	132 (28.7)	27 (32.5)	.39
Diabetes	98 (10.7)	34 (18.8)	**<.01**	43 (9.4)	16 (16.3)	**.01**	55 (12.0)	18 (21.7)	**<.01**
Cardiac event	31 (3.4)	10 (5.5)	.10	14 (3.0)	5 (5.1)	.19	17 (3.7)	5 (6.0)	.21
Asthma	183 (19.9)	46 (25.4)	.04	87 (18.9)	25 (25.5)	.06	96 (20.9)	21 (25.3)	.27
Smoking	209 (22.7)	38 (21.0)	.54	113 (24.6)	19 (19.4)	.19	96 (20.9)	19 (22.9)	.65
Surgery Demographics									
Pre-op Labs			.81			.78			.46
Yes	690 (75.0)	137 (75.7)		329 (71.5)	69 (70.4)		361 (78.5)	68 (81.9)	
No	230 (25.0)	44 (24.3)		131 (28.5)	29 (29.6)		99 (21.5)	15 (18.1)	
Pre-op Meds			**<.01**			**<.01**			**<.01**
Yes	169 (18.4)	53 (29.3)		90 (19.6)	30 (30.6)		79 (17.2)	23 (27.7)	
No	751 (81.6)	128 (70.7)		370 (80.4)	68 (69.4)		381 (82.8)	60 (72.3)	
Surgeon Specialty			**<.01**			**.03**			**.02**
Benign GYN	483 (52.6)	73 (40.3)		234 (51.0)	38 (39.2)		249 (54.3)	35 (42.2)	
Oncology	211 (23.0)	52 (28.7)		123 (26.8)	28 (28.9)		88 (19.2)	24 (28.9)	
Urogynecology	134 (14.6)	37 (20.4)		65 (14.2)	20 (20.6)		69 (15.0)	17 (20.5)	
Non-GYN	90 (9.8)	18 (9.9)		37 (8.1)	11 (11.3)		53 (11.5)	7 (8.4)	
Gender of Primary Surgeon			.70			.70			.91
Female	568 (61.7)	114 (63.0)		288 (62.6)	63 (64.3)		280 (60.9)	51 (61.5)	
Male	352 (38.3)	67 (37.0)		172 (37.4)	35 (35.7)		180 (39.1)	32 (38.5)	
Resident Service Case			**.02**			.51			**.01**
No	894 (97.2)	171 (94.5)		446 (97.0)	94 (95.9)		448 (97.4)	77 (92.8)	
Yes	26 (2.8)	10 (5.5)		14 (3.0)	4 (4.1)		12 (2.6)	6 (7.2)	

Table 3. Multiple logistic regression analysis—Odds of preoperative delay or cancellation based on patient and surgical demographics

	Overall (Unadjusted) (N=916)	Overall (Adjusted) (N=916)	Pre-Pandemic (N=458)	Post-Pandemic (N=458)
Non-English Primary Language	1.04 (0.61–1.76)	0.91 (0.48–1.75)	0.66 (0.2321.95)	1.71 (0.69–4.25)
Race/Ethnicity				
Non-Hispanic White	Reference	Reference	Reference	Reference
Hispanic or Latino	0.96 (0.57–1.62)	1.07 (0.58–1.98)	1.71 (0.70–4.14)	0.62 (0.25–1.52)
Non-Hispanic Other	1.13 (0.60–2.13)	1.06 (0.52–2.15)	3.01 (1.17–7.78)	0.32 (0.09–1.09)
Non-Hispanic Black	2.65 (1.49– 4.71)	2.92 (1.56–5.45)	5.15 (2.13–12.46)	1.32 (0.48–3.63)
Age	1.01 (1.00–1.02)	0.99 (0.98–1.01)	1.00 (0.33–1.02)	0.99 (0.97–1.02)
Hypertension	1.41 (0.998–1.99)	0.96 (0.21–1.49)	1.13 (0.62–2.05)	0.81 (0.41–1.61)
Cardiac Event	1.99 (0.93–4.32)	1.43 (0.63–3.26)	1.13 (0.33–3.86)	1.40 (0.44–4.45)
Diabetes	2.44 (1.55–3.84)	2.11 (1.23–3.63)	2.13 (0.94–4.780)	2.33 (1.09–4.99)
Asthma	1.50 (1.02–2.20)	1.53 (1.02–2.29)	1.72 (0.96–3.07)	1.40 (0.76–2.57)
Pre-op Labs	1.05 (0.72–1.53)	0.99 (0.63–1.54)	0.85 (0.46–1.58)	1.35 (0.67–2.73)
Pre-op Meds	2.22 (1.53–3.24)	1.68 (1.08–2.64)	2.11 (1.12–3.99)	1.54 (0.78–3.04)
Public/Uninsured	1.82 (1.31–2.53)	1.45 (1.01–2.07)	1.28 (0.77–2.14)	1.69 (0.99–2.90)
Surgeon Specialty				
Benign GYN	Reference	Reference	Reference	Reference
Oncology	1.84 (1.23–2.74)	1.62 (1.00–2.62)	1.18 (0.59–2.34)	2.07 (1.03–4.15)
Urogynecology	2.14 (1.36–3.37)	1.89 (1.10–2.62)	2.07 (0.95–4.54)	1.64 (0.75–3.55)
Non-GYN	1.40 (0.79–2.49)	1.53 (0.85–2.76)	2.45 (1.05–5.71)	0.96 (0.39–2.37)

and pre-pandemic (OR 2.11, 95% CI 1.12–3.99) but not post-pandemic.

Urogynecologic procedures had increased odds of delays/cancellations overall (aOR 1.89, 95% CI 1.10–2.62), although not when stratified by time period. Non-gynecologic cases had higher odds of delays only pre-pandemic, and oncologic cases had higher odds of delays only post-pandemic.

Characteristics among delayed cases

The average time delay was 33 minutes overall, which was similar to the averages pre- and post-pandemic [**Supplemental Table**]. In analysis of delayed cases, there was no difference in the average time delay across primary language, race and ethnicity, type of insurance, requiring preoperative labs or medications, specialty or gender of primary surgeon, or resident service case.

DISCUSSION

This cross-sectional study investigating factors associated with delays in first-case on-time starts and cancellations of non-obstetric scheduled surgeries demonstrated disparities across patient and surgical characteristics. Our study did not detect a difference in the proportion of delayed cases based on patient's primary language. Our study is the first to demonstrate disparities for in-hospital delays by race and ethnicity, with non-Hispanic Black patients disproportionately represented in delayed or canceled first cases. Other factors associated with overall delays or cancellations included having public or no insurance, having diabetes, requiring preoperative medications, and urogynecologic procedures.

This study adds to prior research identifying reasons for in-hospital delays, including patient age,[4] comorbidities,[11] and need for preoperative testing or imaging.[12,13] Our data further contributes specific, targetable areas for improvement. For example, diabetes was a significant factor in delayed cases. This may be due to added time needed to check blood sugars upon arrival, review home medications and administrations, or intervene on hyper- or hypoglycemia. Diabetes may also be a marker for other health comorbidities not captured in this study. Possible interventions to minimize delays may include presurgical screening interviews to review medications and administrations, earlier arrival time for high-risk patients, designated staff to simultaneously perform testing separate for perioperative nursing workflow, and set protocols to expedite intervention. Requiring preoperative medications was also a significant factor in delayed cases, and heparin was the most common medication given. While addressing such comorbidities is important for safe preoperative care, our study suggests areas for improvement in perioperative workflow to minimize delays, such as adjusting patient arrival times to account for anticipated delays. However, further quantitative and qualitative data is needed to address specific reasons for delays in these population.

Other at-risk populations included urogynecologic and oncologic patients. One potential reason for this is an older patient population with more medical comorbidities requiring a longer preoperative process or preoperative medication administration. This highlights the need for further investigation into more efficient preoperative workflow for patients at high risk of delay. Current research on improving first case on-time start times focuses on (1) improving the patient arrival process, (2) improving multidisciplinary operative team communication, and (3) debriefing that reviewed and improved performance on a daily basis.[14] Our study provides specific patient populations of focus for out-of-hospital

preoperative outreach and targeted in-hospital preoperative processes to optimize throughput.

Our results also add to the literature regarding surgical disparities among Black patients and publicly insured or uninsured patients. Black patients made up 6% of the overall population, but 12% of delayed/canceled cases. Patients with public insurance represented 44% of the study population, and 56% of delayed/canceled cases overall. While prior studies demonstrate disparities in the time to surgery or surgical management of both benign and oncologic conditions (fibroids,[15,16] breast cancer,[17] or endometrial cancer[18,19]), our study is the first to examine in-hospital delays based on patient and surgical characteristics. A prior study by Hicks et al. highlights that nearly 50% of preoperative delays are attributed to surgeon or patient reasons—human factors and interactions where implicit or explicit bias may play a role.[5] When controlling for other patient or surgical characteristics that may impact on-time starts in our study, such as medical comorbidities or surgical specialties, racial and ethnic disparities are still apparent.

Our findings suggest an unmeasured role of systemic racism in contributing to surgical health inequities. In considering implications of this work, it is important to emphasize that race is a social construct, and genetics do not account for differences seen between groups. Differences in race, such as those demonstrated in our study, represent structural racism in healthcare systems; to address these disparities, equality will not guarantee equity. Therefore, clinical efforts should focus on addressing biases in care processes to specifically improve the experience of historically marginalized, high-risk groups.

This study has numerous strengths. Race and ethnicity were self-reported variables extracted from the electronic medical record at the time of patient registration, minimizing bias in data analysis. Our study only included first cases; therefore, operating room availability and turnover time were not confounding factors. A limitation of this study is that the reason for preoperative delay was not a required documentation in the medical record. Prior studies have demonstrated specifics such as preoperative assessment and patient-related factors to be significant and modifiable through Lean interventions.[20] Such data is necessary to hone efforts for quality improvement endeavors. Furthermore, qualitative research is essential to understanding patient experience within the healthcare system, and future research should focus on describing these experiences. Another limitation in this study is that most cases were gynecologic and findings may not be generalizable to other areas of surgery. Our study results also do not capture patients who are unable to arrive to the hospital, or whose cases are canceled before arrival. Such individuals are at the highest risk for poor health outcomes, worsened by delays and disruptions to care during the COVID-19 pandemic.[21]

In conclusion, this cross-sectional study found that patient language was not associated with delayed starts and cancellations of scheduled non-obstetric surgeries. Differences were seen based on race, insurance, having diabetes, requiring preoperative medications, or undergoing urogynecologic procedure. Future research is needed to elucidate the impact of delays in preoperative units to focus quality improvement efforts and outcome measures.

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Authors

Alicia E. Hersey, MD, Department of Obstetrics and Gynecology, Southcoast Health, New Bedford, MA.

Eleanor Brakewood, MD, Department of Obstetrics and Gynecology, Hospital of the University of Pennsylvania, Perelman School of Medicine, Philadelphia, PA.

Lauren Schilichting, PhD, Hassenfeld Child Health Innovation Institute, Warren Alpert Medical School of Brown University, Providence, RI.

Christine E. Foley, MD, Department of Obstetrics and Gynecology, Women & Infants Hospital, Warren Alpert Medical School of Brown University, Providence, RI.

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Correspondence

Alicia E. Hersey, MD
543 North Street
New Bedford, MA 02704
alicia.hersey@gmail.com