

An audit on surgery cancellation in a teaching hospital

ABSTRACT

Background: Operative procedure cancellations are a dilemma for the healthcare system as well as for the patients. It causes increased workload and cost to our system. For patients, it has major financial, psychological as well as medical consequences. We aim to self-identify the causes of cancellations for efficient operation room management.

Methods: We performed a retrospective chart review in a tertiary academic medical center for the last 66 months of operative records. Subsequently, we performed thematic coding to categorize causes into distinct categories.

Results: Our records showed 5153 cancellations which represent (7.3%) of the total booked procedures. Of these cancellations 91% were ordered before the day of surgery, compared to 9% for same-day cancellations. Cancellations were 58% female patients and 40% male patients. The number one reason for cancellations for both same-day and prior cancellations is the unavailability of the surgical consultant.

Conclusion: Surgical procedure cancellations profile is unique among our settings and has changed over time. Over the last 5 years, the number one reason is unavailability of the surgical consultant. Efforts should be made to identify and correct the underlying reasons to improve patient outcomes in our evolving healthcare system.

Key words: Booking, cancellations, efficiency, scheduling, surgery

Introduction

Operative procedures cancellations internationally range between 4.6% to 20% of booked procedures.^[1] It is of obvious reasons that cancellations are a dilemma for the healthcare system as well as for the patients. For the patient, delay of surgery might result in disease worsening, financial costs, and/or psychological distress. For our health systems, cancellations are a waste of time and resources and might result in prolonged admission which all cause increased costs to the system, not to mention increasing the worries of the staff about patients.^[1,2]

Same-day cancellations have more grievous effects on the healthcare system as well as the patients and are largely preventable.^[3] Monitoring cancellations might result in decreasing the number of cancellations as some literature showed that more than 50% of cancellations can be avoidable.^[4] Decreasing cancellations might result in improving the efficiency of our system and better patient outcomes.^[5]

The current literature lacks data about current surgical cancellation in the Middle East. Our hypothesis is to discover the unique profile of the cancellations in our region in an attempt to decrease them in the future.

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Materials and Methods

Ethics committee approval was obtained from the Unit of Biomedical Ethical Approval by King Abdulaziz University- Unit of Biomedical Ethics on Thursday, September 1, 2022 (Reference No 413-22). No patient-identifying data were collected and all data were secured on a password-protected electronic computer and database. No informed consent was required by the Ethics Unit since no identifying patient data was collected.

We performed a retrospective electronic database search at a tertiary academic medical center in Saudi Arabia in June 2022 for all causes of cancellation for the period January 2017 through mid-June 2022. We chose this time period to include the largest number of patients in our current medical records system which was scheduled to go into a new system. We had no exclusion criteria, and we included all cancellations happened at the hospital for that period.

Data were extracted into an Excel Sheet and analyzed accordingly. Afterward, we performed a 30% check of extracted data to ensure accuracy; and no inaccuracies were found. Subsequently, we performed thematic coding to categorize causes into distinct categories. Furthermore, we grouped categories with minimum entries (<5%) into a new category "Other".

Statistical analysis

Qualitative and quantitative data analysis was completed using Excel (Microsoft, Washington, United States) and GraphPad Prism 8 (GraphPad Software, San Diego, California, United States of America). We employed cross-tabulations, multiple measures of dispersion, and categorical variables as percentages or frequencies, as required.

Results

Our search resulted in a total of 5263 canceled records. After removing duplicates, we ended with 5153 canceled procedures over the study period. This represents (7.3%) of the total booked procedures. Table 1 Shows the number of cancellations per Gregorian year.

Cancellations were approximately 40% male patients and 58% female patients and 2% unknown. Even after removing OB/GYNE patients, Female patients are still slightly more commonly canceled with 42%. Inpatient procedures were the majority of cancellations with 73% compared to only 27% for same-day surgery patients. Similarly, most cancellations were ordered before the day of surgery 91% compared to 9% for same-day cancellations. Table 2 shows reasons and types of cancellations distributed between different specialties. Figure 1 shows Overall cancellations frequency, Figure 2: Prior cancellation reasons frequency and specialty, Figure 3: Same day cancellation reasons frequency and specialty, and Figure 4: Same day cancellation percentages Vs Prior cancellations per specialty.

Discussion

Surgical procedure cancellations have an enormous weight on our healthcare system and patients. These cancellations are highly avoidable. and reasons can be unique to the different areas globally due to financial and cultural differences. For example, in our study the number one reason for cancellations was the unavailability of surgical consultants where in India was shortage of operating time^[3] and in Ethiopia was patient-related reasons.^[6] It is of high importance to understand the causes of cancellations to be able to find solutions to reduce the rate of cancellations.^[2]

It is also of critical importance to complete periodic analysis of cancellations. The reason can change with time, for example, a similar study^[1] in our region from around a decade ago showed that the number one reason for same-day cancellations were due to medical reasons and since then a preoperative clinic anesthesia clinic was started and this resulted in our study to show decrease in the percentage of cancellations as well as change of the number one reason to be surgical consultant unavailability. Similarly,^[7] another study studied cancellations in Saudi hospitals and showed the number one reason for cancellations was patients failing to attend, in contrast to our data where it comes third. This can be explained either by correction plans since then, cultural changes or

Table 1: Number of cancellations per year

Year	Number of booked cases	Overall cancellations	Overall cancellations (%)	Same-day cancellations	Same-day cancellations (%)	Prior cancellations	Prior cancellations (%)
2017	13865	774	5.6%	128	0.9%	646	4.6%
2018	14503	968	6.7%	104	0.7%	864	5.9%
2019	14585	1167	8%	80	0.5%	1087	7.4%
2020	9416	866	9.1%	72	0.8%	794	8.4%
2021	11849	989	8.3%	49	0.4%	940	7.9%
2022 (1/1-19/6)	5714	389	6.8%	21	0.4%	368	6.4%
Total	69932	5153	7.3%	454	0.6%	4699	6.7%

Table 2. Reasons and types of cancellation distributed between different specialties

	All	Cardiac	Dental	Endoscopy	ENT	General surgery	Hematology	Neurosurgery	Obstetrics and gynecology	Ophthalmology
Surgical Consultant not available	1095	16	20	6	128	268	7	56	169	24
Not mentioned	663	0	1	1	19	58	18	9	39	28
Patient refused/ no consent/ no show	551	5	9	0	70	218	9	21	62	27
Procedure was done earlier	397	20	10	0	18	99	0	15	177	2
Rescheduled/ rebooked	327	1	1	0	25	130	4	24	45	3
Cancelled by surgeon	315	5	4	1	36	75	40	13	46	8
Booking error	334	1	4	0	49	107	10	10	85	4
Anesthesia not available	241	2	0	0	78	43	1	31	23	8
Change in patient clinical status	208	1	2	0	54	44	5	3	54	0
Patient not ready (needs more work up)	202	2	3	0	20	77	2	10	18	14
Patient not eligible due to acute illness	138	2	2	1	14	33	19	8	7	8
No time - list overbooked	123	0	0	0	23	48	1	4	13	2
Equipment/medication out of order/ OR staff not available	98	0	2	1	15	15	2	4	9	15
Emergency case took priority	93	1	1	0	13	19	1	3	31	0
Sedation/ anesthesia not needed	67	0	0	0	1	0	16	0	0	2
No bed available in ward/ICU	61	0	0	0	18	16	1	1	1	3
Other	55	0	0	1	16	10	4	0	13	0
Blood not ready/ no donation	54	6	1	0	2	7	0	3	22	1
Patient not following doctor orders	33	1	0	0	4	8	0	1	0	2
Covid 19	25	0	0	0	4	9	0	0	1	0
Hospital internal disaster	25	0	0	0	0	9	0	0	12	0
Change surgical attending	26	0	0	0	3	6	1	0	11	0
Do Not Resuscitate	22	0	0	0	0	0	0	0	0	0
Total	5153	63	60	11	610	1299	141	216	838	151
Male	2104	33	36	6	274	511	69	92	0	75
Female	2989	27	24	5	331	764	69	122	838	76
Not mentioned	60	3	0	0	5	24	3	2	0	0
Total	5153	63	60	11	610	1299	141	216	838	151
Same Day cancellation	454	11	0	3	66	92	34	24	91	1
Prior Cancellation	4699	52	60	8	544	1207	107	192	747	150
Not mentioned	0	0	0	0	0	0	0	0	0	0
Total	5153	63	60	11	610	1299	141	216	838	151
Same-Day admission	1364	1	38	7	206	248	60	16	14	117
Inpatient admission	3785	61	22	4	403	1051	80	200	824	34
Not mentioned	4	1	0	0	1	0	1	0	0	0
Total	5153	63	60	11	610	1299	141	216	838	151
Oral and maxillofacial	12	83	1	13	93	38	6	0	4	18
Surgical Consultant not available										

Contd...

Table 2. Contd...

	Oral and maxillofacial	Orthopedic	Other	Pain	Pediatric surgery	Plastic Surgery	Radiology	Radiotherapy	Special procedure	Thoracic	Urology	Vascular
Not mentioned	1	26	1	1	4	9	4	13	2	1	426	2
Patient refused/ no consent/ no show	10	54	0	1	8	9	0	3	3	2	33	7
Procedure was done earlier	3	7	0	1	12	4	1	3	0	2	16	7
Rescheduled/ rebooked	5	9	0	10	7	9	4	16	4	0	11	19
Cancelled by surgeon	2	24	1	1	10	5	0	2	0	7	29	6
Booking error	1	23	2	0	13	4	0	6	2	1	10	2
Anesthesia not available	7	8	0	8	5	0	0	1	0	3	22	1
Change in patient clinical status	3	11	0	1	8	5	3	2	0	4	7	1
Patient not ready (needs more work up)	0	14	0	0	5	8	2	6	1	1	13	6
Patient not eligible due to acute illness	4	7	1	0	8	3	2	6	0	0	10	3
No time - list overbooked	1	10	0	0	2	5	0	0	0	2	11	1
Equipment/medication out of order/ OR staff not available	4	10	0	0	2	2	1	4	0	0	11	1
Emergency case took priority	5	5	0	0	4	2	0	1	1	0	3	3
Sedation/ anesthesia not needed	0	0	0	0	0	0	0	47	1	0	0	0
No bed available in ward/ICU	3	2	0	0	4	1	0	3	4	0	3	1
Other	0	1	1	0	1	2	0	3	0	0	3	0
Blood not ready/ no donation	1	3	0	0	0	0	0	0	0	0	8	0
Patient not following doctor orders	0	5	0	0	5	1	0	0	1	0	5	0
Covid 19	0	2	0	9	0	0	0	0	0	0	0	0
Hospital internal disaster	0	1	1	0	1	1	0	0	0	0	0	0
Change surgical attending	0	2	0	1	0	0	0	0	1	0	1	0
Do Not Resuscitate	0	0	0	0	0	0	0	22	0	0	0	0
Total	62	307	8	46	192	108	23	138	24	27	751	78
Male	25	162	3	16	131	35	9	51	8	14	509	45
Female	36	141	5	30	56	73	13	86	16	11	234	32
Not mentioned	1	4	0	0	5	0	1	1	0	2	8	1
Total	62	307	8	46	192	108	23	138	24	27	751	78
Same Day cancellation	5	23	1	6	24	4	3	9	6	6	36	9
Prior Cancellation	57	284	7	40	168	104	20	129	18	21	715	69
Not mentioned	0	0	0	0	0	0	0	0	0	0	0	0
Total	62	307	8	46	192	108	23	138	24	27	751	78
Same-Day admission	12	76	2	37	64	38	7	127	9	1	273	11
Inpatient admission	50	231	6	8	128	70	16	11	15	26	478	67
Not mentioned	0	0	0	1	0	0	0	0	0	0	0	0
Total	62	307	8	46	192	108	23	138	24	27	751	78

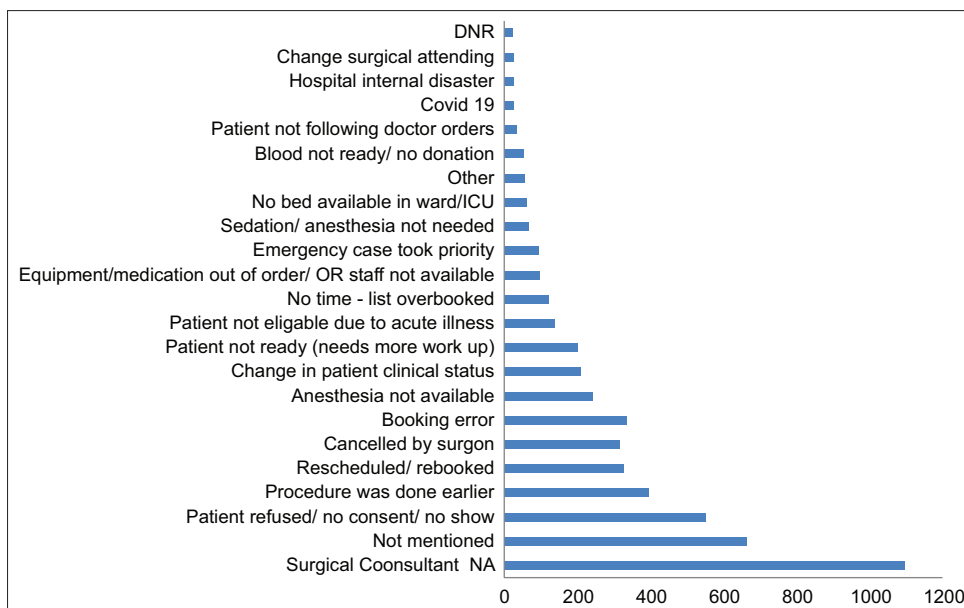


Figure 1: Overall cancellations frequency

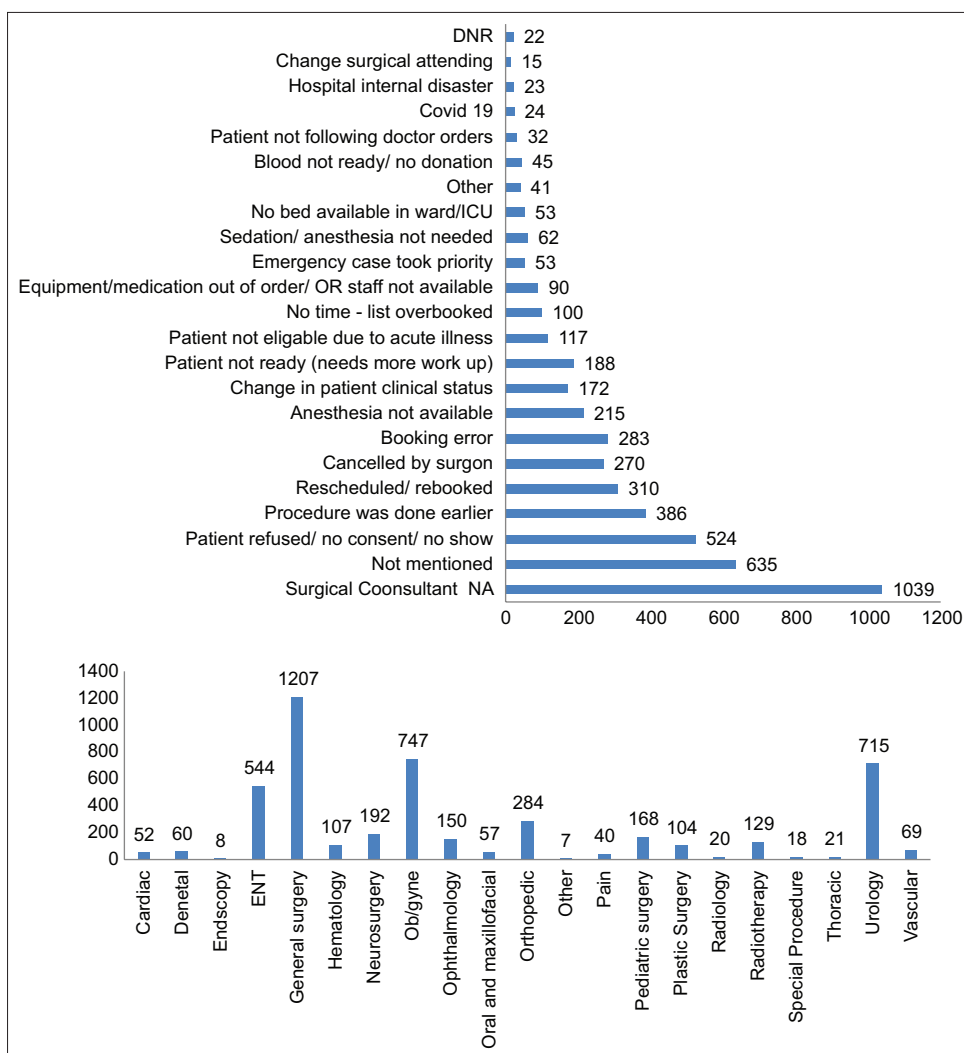


Figure 2: Prior cancellation reasons frequency and specialty

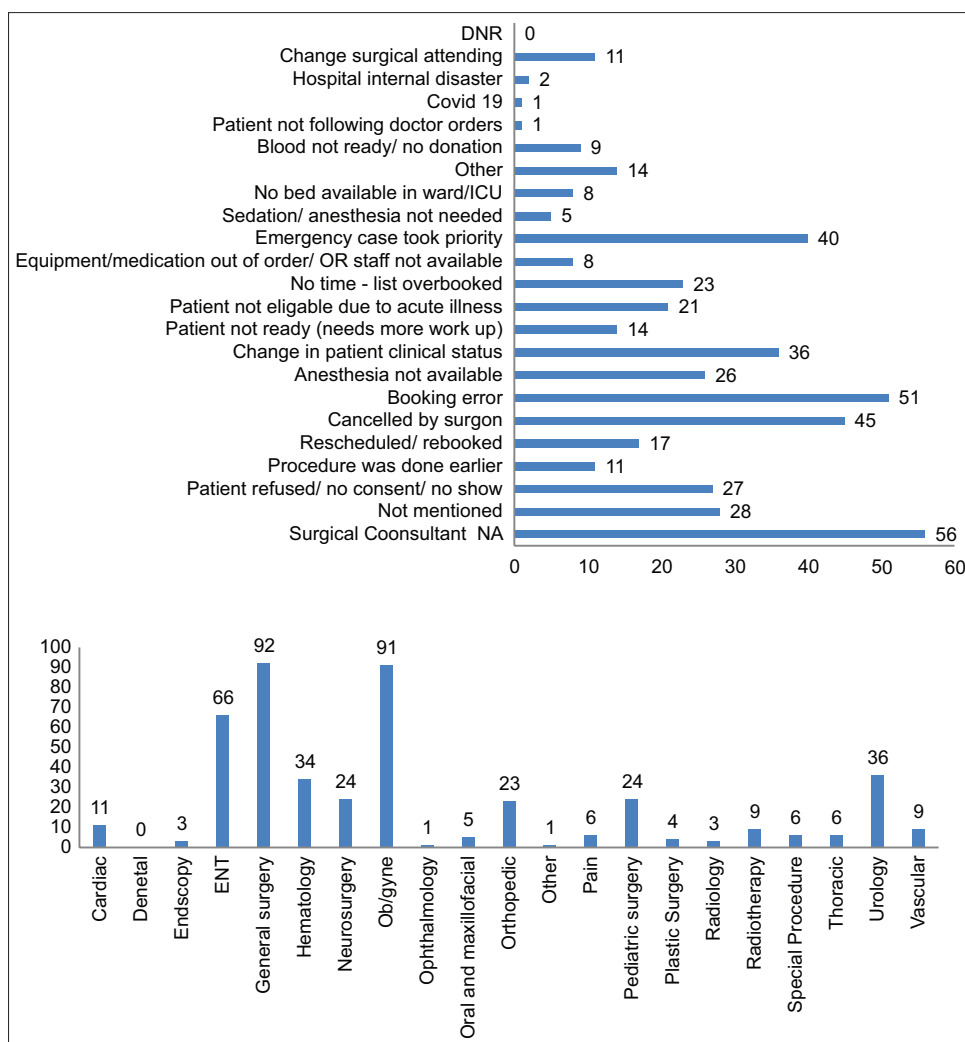


Figure 3: Same-day cancellation reasons frequency and specialty

the larger number in our study has improved the accuracy of the results.

In a unique approach, we subdivided data to same-day cancellation vs cancellation before the surgical day which is rarely attempted due to the need of a high number of sample patients. Our data shows that cancellations are by far mostly before surgical day which despite its effects are less harmful and can be partially amended by booking a different procedure for that time slot.

The number one reason for procedure cancellation in overall, before and same-day cancellation is unavailability of surgical consultants. This is unexpected, especially for the same day cancellations when it is usually due to patients' reasons, medical causes or not following anesthesia orders.^[8,9] Surgical consultant availability needs to be further looked into, sub-analyzed and discussed with surgeons to be able to find the root causes whether it is related

to inadequate staffing, increased demand outside the operating rooms like research and teaching, and/or simply personal reasons. Surgeon shortage is known globally, and we suggest strategic national planning to solve and avoid worsening of the situation.^[10]

The number two reason for cancellation for overall and prior cancellations is patient refusal while for same-day cancellation it is still related to cancellation by surgeons. Usually, patients refuse intervention due to fear and/or knowledge gap about the procedure^[11] and addressing these two reasons with better patient education and communication will help in reducing patient refusal.

The third reason for all, same day and prior cancellations is the procedure was performed earlier than booked. This is either as an emergency or in an outside hospital with better availability. Our sample hospital is a tertiary academic medical center which means the delay might be worse in rural

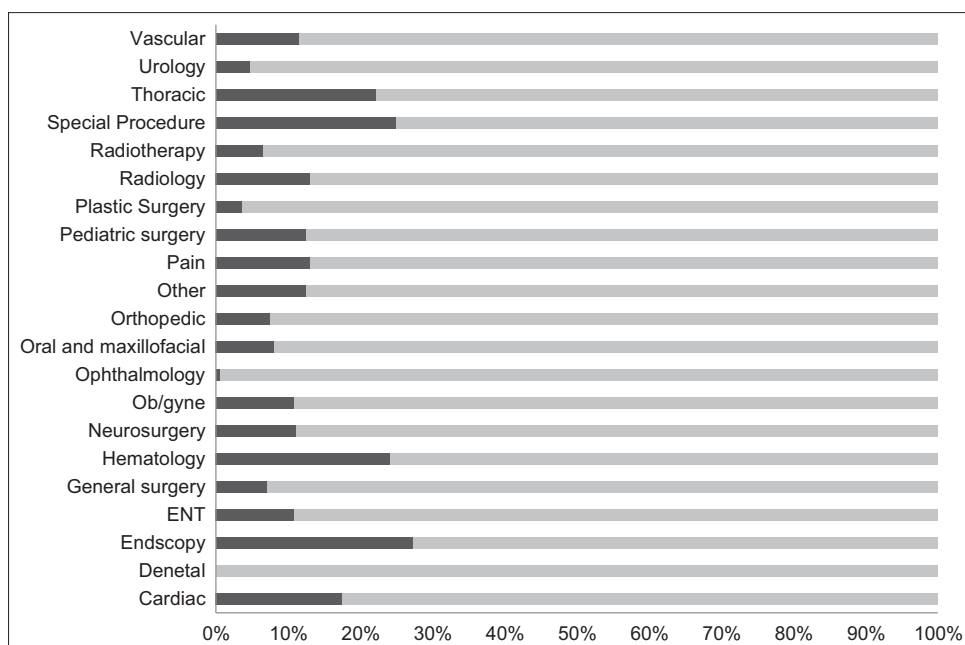


Figure 4: Same-day cancellation percentages (dark gray) Vs Prior cancellations (light gray) per specialty

under-occupied hospitals and again strategic planning.^[12] To prevent such occurrence we have to collect more data regarding the reason leading to this.

Other reasons for cancellations include Rescheduled/rebooked, Booking error, Anesthesia not available, Change in patient clinical status, and Patient not ready (needs more work up).

All efforts should be done to minimize rescheduling patients. Booking errors could be due to human or computer errors. While availability of anesthesia around the clock in tertiary systems is a standard of care, changes of patient clinical status are out of our hands while patients needing more preparation can be resolved before booking and occupying a space that can be used for a different patient.

Less common reasons that should be taken into consideration for future planning include Patient not eligible due to acute illness, No time - list overbooked, Equipment/medication out of order/OR staff not available, Emergency case took priority, Sedation/anesthesia not needed, No bed available in ward/ICU, Other, Blood not ready/no donation, Patient not following doctor orders, Covid 19, Hospital internal disaster, Change surgical attending and Do Not Resuscitate DNR status.

Finally, it is of interest that female patients are more commonly canceled than male patients even after excluding OB/GYNE patients. Studying this phenomenon by social scientists in addition to medical professionals might show us important cultural and religious reasons in addition to medical reasons that can be addressed in the future.

Limitations to our study include that 12.8% of cancellation reasons are not mentioned; however, 71% of these patients are urology patients so its effects on the other specialties is minimal. Another limitation is the retrospective data collection approach limited further data analysis and availability but allowed us to include a large number of patients.

Future efforts should be focused on minimizing cancellation by addressing our causes of cancellation and enhancing our healthcare system for the benefit of our patients.

Conclusion

Surgical procedure cancellations profile is unique among our region and has changed over time. Over the last 5 years, the number one reason is unavailability of the surgical consultant. Efforts should be made to identify and correct the underlying reasons to improve patient outcomes in our evolving health system.

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Conflicts of interest

There are no conflicts of interest.

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