

# Day of Surgery Cancellations in a Tertiary Care Hospital: A One Year Review

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## Abstract

**Objectives:** Day of surgery cancellations inconvenience patients and waste resources. Herein, we report the results of a one-year review of day of surgery cancellations. The primary outcome was percent same day cancellations. Secondary measures included avoidable versus unavoidable cancellations and patient versus hospital related cancellations.

**Patients and Methods:** Cancelled cases were recorded in real time and then retrospectively reviewed. Monthly and at the end of the study period, the authors reviewed all day of surgery cancelled cases to confirm the reason for cancellation and to judge the event as avoidable or unavoidable.

**Results:** 238/12176 (1.96%) were cancelled on the day of surgery. In six cases, no explanatory documentation could be found. Therefore, 232 cases were available for analysis.

One-hundred nine cases were judged to be avoidable cancellations versus 123 that were judged unavoidable. Of the avoidable cancellations, 85% were hospital related versus 15% that were patient related causes.

Of the avoidable, hospital related cancellations, the most common event were cases that were cancelled but not communicated.

The greatest numbers of cancellations were deemed unavoidable and patient related.

**Conclusions:** A cancellation rate of less than 2% is achievable. Advanced verification of complete surgical and medical evaluations may minimize this event.

**Keywords:** Perioperative care; Communication; Efficiency; organizational

## Introduction

Day of surgery (DOS) cancellations can increase healthcare costs and significantly inconvenience patients and families. [1,2] Patients may suffer psychological stress and financial hardships, while hospitals may lose opportunities to perform surgery, waste disposable equipment opened for cases that are never performed, and expend resources in the form of salaries and benefits for workers who remain idle. In an era of decreasing payment for surgical and anesthesia services, minimizing inefficiency is vital, including DOS cancellations.

Previous authors have reported DOS cancellation rates as high as 24%.[3-9] These findings were from a variety of practice settings, including international practices and government hospitals where surgical block time ends at a set time and cases that cannot be completed "in block" are rescheduled.

In our practice, surgical block time is expandable, i.e. surgeons are assigned block time which is expanded to meet their case loads. Surgeries are rarely cancelled if the day "runs over." Furthermore, in our integrated academic, physician led multi-specialty practice, the majority of surgical patients undergo evaluation in our preoperative medical evaluation (POE) clinic (a section of the anesthesiology department) or by their primary care provider. Our shared electronic medical record allows for convenient and timely communication between all physicians including anesthesiologists.

Herein, we report the results of a one-year review of DOS cancellations in an integrated health care system with a shared electronic medical record and expandable block time. Although this

practice model may be instructive regarding efficiencies to reduce costly cancellations, we also sought to identify areas for improvement. The primary outcome was percent DOS cancellations. Secondary measures include avoidable versus unavoidable DOS cancellations, patient versus hospital/provider related cancellations, and the most common reasons in each category.

## Material and Methods

After institutional review board approval, we reviewed 12 months (July 2009 – June 2010) of day of surgery cancellation data in our mixed in- and outpatient hospital surgical practice. Our suite consists of 18 operating rooms and a mix of general, urology, cardiac, ENT, plastic/reconstructive, gynecologic, transplant, orthopedic and neurosurgical cases. All of these services can and do book emergency cases. Our facility includes an emergency department, but pediatric surgery and obstetric services are not provided in our hospital.

The majority of our surgical patients come from the local area, although we care for regional and even national and international

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patients. Many of our patients (~ 46%) are evaluated before surgery in our Preoperative Evaluation (POE) clinic; the remaining surgical patients undergo evaluation in our department of medicine or family practice, or by their community primary care provider. Approximately 65% of our patients are eligible for Medicare benefits.

Our surgical scheduling is based upon assigned block time that is expandable, i.e. elective surgeries are very rarely cancelled due to operating room (OR) non-availability or schedule over-runs. Excluded in our study were cases performed out of the OR suite (cardiac catheterization lab, endoscopy, radiology) because these departments primarily manage their own schedules.

To capture DOS cancelled cases during the year, a database was created which was populated by the operating room desk attendant whenever a cancellation occurred. The database included common reasons for DOS cancellation for the desk attendant to select. Table 1. Further, the daily schedule was reviewed the next work day by the anesthesiology administrative staff; if there was no anesthesia billing sheet for a scheduled case, the staff added the case to the DOS cancellation database to ensure that the case was reviewed. In this way, we sought to minimize “missed cases.”

Monthly and at the end of the study period, a primary reviewer (CD or SF) looked at all cases identified by the OR desk attendant and the anesthesia administrative staff to confirm that the each case was indeed cancelled, to confirm the reason for cancellation and to judge the event as avoidable or unavoidable. “Avoidable” was defined as a cancellation due to circumstances or information that existed prior to the day of surgery and could have been avoided with adequate review or communication by the medical staff before the DOS. In a few cases where it was unclear if the cancellation was avoidable or unavoidable, the final decision was made after agreement by the primary reviewer and one other author (TLT). Further, the reasons for cancellation were divided into hospital versus patient related causes. Descriptive statistics were used to summarize the data.

## Results

During the study period, 12,176 cases were scheduled of which 2.8% were emergencies. Of the elective surgery performed during the study period (including elective cases added on the day of surgery), 10% of the cases finished after 4 PM, and 6% of the elective cases finished after 5 PM. Of the total cases, 1.96% (238/12176) were cancelled on the day of surgery. In six cases, no explanatory documentation could be found. Therefore, 232 cases were available for analysis (Table 2).

One-hundred nine cases (47%) were judged to be avoidable DOS cancellations versus 123 that were judged unavoidable. Of the

Test results - incomplete follow-up of pre-op
Medical Evaluation - Incomplete Pre-op
Antibodies discovered on day of surgery
Equipment failure
Required implants not available
Financial authorization incomplete
Outside records/reports not available
No transportation post procedure
No beds available
No show
Patient arrived ill to MCH
Patient cancelled (self)
Patient's medical condition changed
Patient's surgical condition changed
Further work-up required
Other

Table 1: Database Indicators for Day of Surgery Cancellations.

avoidable DOS cancellations, 93 (85%) were hospital related versus 16 (15%) that were patient related causes.

Of the avoidable, hospital related cancellations (upper left quadrant, Table 2), the most common event were cases that were cancelled but not communicated to the scheduler (n = 27), i.e. the patient and the surgeon knew that the case was cancelled and the patient did not appear for surgery, but the case still appeared on the schedule. An additional 6 cases were cancelled due to various miscommunications between providers and patients. Incomplete surgical and medical evaluation together represented 44 of 93 cases in this subset. Of the 12,176 cases scheduled, only five were cancelled DOS because the OR was behind schedule.

The greatest numbers of DOS cancellations were deemed unavoidable and patient related (lower right quadrant, Table 2). Of the 111 cases in this category, 85 (77%) were due to patient medical status change, e.g. the patient presented to surgery with an upper respiratory or urinary tract infection or a new cardiac dysrhythmia. Abnormal lab values (e.g. prothrombin time or post-dialysis potassium drawn the day of surgery) resulted in only 9 of the 232 cancellations (3.9%). One could argue that these lab abnormalities could have been identified before the day of surgery if they had been drawn sooner; but as a practical matter, it is often difficult to get labs drawn earlier because it requires extra travel for the patient. There were no cancellations due to patient nonappearance.

Family related issues or refusal on the day of surgery accounted for 10 of the cancellations. Examples of these cases include family members who became ill, unexpectedly couldn't travel to be with the patient, or at that last minute decided to cancel surgery on an intensive care unit or do not resuscitate (DNR) patient.

## Discussion

The primary finding of this study is that day of surgery cancellations can be decreased to less than 2%. Although our study was not designed to specifically test methods to decrease DOS cancellations, our low cancellation rate may be due to a combination of factors. These may include an expandable block schedule and thorough pre-operative evaluation of surgical patients, a shared medical record, and timely communication. Regardless of the healthcare system, some DOS cancellations will always occur. However, practice leadership should strive to minimize avoidable, hospital related cancellations. In our study, inadequate communication resulted in a large portion of this type of DOS cancellation.

Based on our data, potential process improvements include advance verification of complete surgical and medical evaluations. Ideally this review would occur a day or more before surgery, in addition to confirming that plans for surgery remain unchanged. These simple confirmatory steps would help minimize the unnecessary and expensive use of resources for surgeries that are subsequently cancelled.

A number of studies have sought to document the impact and improve the performance of preoperative evaluation clinics on DOS cancellations.[5,8,10-12] van Klei et al. found that a preoperative clinic could significantly reduce DOS cancellations for potential inpatients and their associated length of stay,[8] and Correll et al. showed that a tertiary care preoperative evaluation clinic can effectively identify patient medical issues that can result in day of surgery delays or cancellations.[10] Ferschl et al. studied the impact of preoperative clinic visits on day of surgery cancellations. They

	Avoidable (109)	Unavoidable (123)
Hospital related (105)	Cancelled but not communicated (27) Incomplete surgical evaluation (24) Incomplete medical evaluation (20) Miscommunication (6) No insurance authorization (6) OR behind schedule (5) Representative/implants not available (3) Scheduling error (2)	Surgeon unavailable/emergency (10) Organ unusable for transplant (2)
Patient related (127)	Patient changed mind (11) Inconvenient scheduling (5)	Medical status change (85) Abnormal lab values (9) Family issues (6) Family refused surgery (4) NPO status (3) Difficult/unobtainable airway (2) Pt stopped cardiac meds AMA (1) Difficult/unobtainable IV access (1)
n=232		

OR = operating room; NPO = non per os; AMA = against medical advice; IV = intravenous

**Table 2:** Day of Surgery Cancellations.

found a significant reduction in day of surgery cancellations among both in- and outpatients that were evaluated in their preoperative clinic compared to those who were not [11]. In terms of the timing of the pre-operative evaluation, Pollard and Olson found that the DOS cancellation rate for outpatients was the same for patients evaluated within 24 hours of surgery versus those evaluated 2-30 days in advance [5]. Although noncompliance with preoperative appointments has been shown to predict nonappearance for surgery,[13] sequencing of OR cases based on cancellation probability has not been shown to be an effective strategy to limit the negative productivity impact of cancellations [14].

Previous studies have also examined reasons for day of surgery cancellations [4,6,7,15,16]. Argo et al. reported on nearly 41,000 canceled surgical cases in the Veterans Health Administration system during 2006 [15]. They defined cancellation as an elective surgery "...that was cancelled after 2 PM on the day before the scheduled date." Their overall cancellation rate was 12.4%, with patient factors accounting for 35% of the cancellations. We found that patient factors contributed to 127/232 = 55% of cancellations. However, whereas we had no cases of patient no-show, Argo found that nonappearance was the most common single reason for cancellation.

At an Australian pediatric hospital, Haana et al. divided into 14 groups the causes of DOS cancellations [4]. Over one year, they found 7.2% of cases were cancelled on the DOS, with the top 4 reasons (patient medically unfit, operation not necessary, postponement due to patient condition, patient late or no-show) accounting for 65% of all cancellations. Their analysis included emergency cases which accounted for 60% of the DOS cancellations, although in their system "emergency" surgery could be booked up to 6 weeks in advance.

Lau et al. reviewed surgical cases cancelled in the operating room over a 5-year period at a Taiwanese hospital [16]. Of 45,663 surgeries, 67 (0.15%) were cancelled after entrance into the operating room. The majority of these (70.2%) were cancelled due to changes in the patient's medical condition with an additional 13.4% cancelled in OR due to progression of the patient's surgical condition, insufficient work-up, inoperability or no further surgery necessary.

A commonly reported reason for DOS cancellation is lack of OR block time due to over-running previous surgeries or emergency surgery. Schofield et al. reported a 11.9% DOS cancellation rate, with 18.7% of these cancellations due to over-run of previous surgery.[6] In contrast, with our "expandable" block scheduling, we found only 5 of 232 DOS cancellations (2%) were due to over-running surgery.

In a comparison of a major U.S. teaching hospital and a major Norwegian teaching hospital, Seim et al. found a lack of a meaningful explanation for the DOS cancellation in up to 36.6% of cases at the US hospital [7]. Because of the wide variety of health care systems delivering surgical care in the U.S. and around the world, each operating room suite must have quality DOS cancellation data before effective action plans can be instituted. As Seim et al. demonstrated, even large teaching hospitals may not have reliable data to help guide DOS cancellation reduction strategies. In our institution, a database was specifically created and personnel trained to "catch" these cases in real time for later analysis, resulting in only 6 of 238 cases without sufficient data for analysis. Without such a system, many cancelled cases will be missed and the magnitude of the problem underestimated.

Weaknesses of our study include its retrospective nature; however, the cases were identified in real-time throughout the year and a system was in place to minimize missed cases. Our conclusions may not be widely applicable because all members of our closed staff have access to an integrated medical record and we do not perform pediatric surgery. Also, we did not calculate the financial impact of our DOS cancellations in terms of salaries, wasted disposable equipment that was opened unnecessarily, or lost opportunities to perform other surgery. Obtaining actual financial impact data was beyond the scope of this study. Finally, there was an element of subjectivity in designating some cancellations as avoidable versus unavoidable. Although we believe subjectivity was a factor in only a small number of the decisions, it is a limitation of this retrospective study.

In summary, our study demonstrates that a DOS cancellation rate less than 2% is achievable; flexible block scheduling and a shared electronic medical record may be drivers of this low cancellation rate. Not all surgical suites will have this flexibility. Despite the wide variation in patient populations and practice settings, DOS cancellations can likely be reduced by timely communication between all providers and a final review of medical and surgical evaluations the day before scheduled surgery.

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