Evaluation of the reasons for cancellations and delays of surgical procedures in a developing country

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SUMMARY
Data on all patients scheduled to have elective and emergency surgeries during the period of 6 weeks from September 1999 to October 1999 were prospectively collected to determine scheduled starting times, actual starting times, completion times, causes for delays and cancellations. Of 840 procedures scheduled during the study period, 594 (71%) were available for analysis. Eighty-nine per cent of cancellations occurred in patients undergoing elective surgery. The common causes of cancellations were non-availability of beds in recovery room (RR) (15%), patients not showing up (9%), improper pre-operative patient preparation (13%), unavailability of nurses (11%) and anaesthetists (8%). Twenty-three per cent of the cancellations were day cases. Public patients were cancelled more frequently than private patients. Surgical procedures started on time in only 7% of patients. The most common cause of delay was due to delayed transport of patients to the operating theatre (17%). Optimal utilisation of operating theatres in our situation may be effected by increasing the bed-strength of ICUs to free the RR, proper pre-operative work up, adequate counselling of day-care surgery patients and efficient floor management of the operating theatre.

Keywords: Delays; cancellations; surgical procedures

INTRODUCTION
Cancellations and delays of surgical procedures are not uncommon occurrences throughout the world. There have been many reports to show that this results in wastage of operating room time, prolongs the duration of hospitalisation of patients and causes inconvenience to patients and their families (1–3). Also, this leads to additional expenses for the hospital as well as the patients (4). The delays and postponements specifically lower the morale among the staff, patients and relatives and may reflect as a decreased productivity in their workplaces. Therefore, a systematic and critical analysis of the utilisation of operating theatre time is essential in every setting and thus diminishes the consequential effect on productivity both within the hospital and without. The volume of surgical workload in developing countries is more, if not equal, than the developed countries. We evaluated the situation in Barbados by collecting data over a period of 6 weeks.

Hospital Setting
Barbados is a small island of the English-speaking Caribbean, with a population of 280,000 and a tourism-based economy.

The Queen Elizabeth Hospital, Barbados is a 650-bed tertiary care centre, affiliated to the University of West Indies and a referral centre for several Caribbean countries. The operating theatre suite in the Queen Elizabeth Hospital consists of six operating rooms, undertaking procedures in both public and private patients belonging to cardio-thoracic surgery, neurosurgery, general surgery, otolaryngology, orthopaedic surgery and urology. The obstetrics & gynaecology suite has another two operating rooms in a separate location. The operating theatres are supported by an eight-bed recovery room (RR) and a six-bed surgical intensive care unit (ICU). The operating theatre floor is managed by a senior 'sister-in-charge'.

METHODS
Approval of the Hospital Ethics Committee was obtained prior to the study. All the patients scheduled for surgeries consecutively over a period of 6 weeks from 15th September 1999 through 31st October 1999 were included for collection of data. An audit form was devised initially, and a pilot study was conducted over a 2-week period to familiarise the surgeons participating the study regarding the audit form, the definitions pertaining to the study and the criteria to determine scheduled starting times, completion times and the causes for delays and cancellations. Audit forms were devised separately for delays and cancellations. An elective procedure was defined as one scheduled in the daily-published operating theatre list. A day case was defined as an outpatient procedure where a patient was instructed to attend the operating theatre on the day of surgery and was discharged on the same day.
Participants were asked to fill the forms immediately after every surgery. Demographic data such as the age and gender of the patients, the diagnosis, surgical procedure undertaken, category of surgery and service offering the procedure were recorded for all patients. Scheduled starting time of the procedure, patient’s arrival time in the operating theatre, actual starting time of the surgery, completion time and the next patient’s scheduled starting time and the reasons for delay and cancellations, if any, in each patient were recorded. Incompletely filled forms were excluded from the study. Data were entered into and analysed using the SPSS version-7.5 software.

RESULTS

During the 6-week period of study, a total of 840 surgical procedures were scheduled in four operating locations. Of these, 594 (71%) audit forms were filled in and returned by various surgical services. Among these, 98 were incompletely filled in and hence were excluded. The remaining 496 (59% of scheduled procedures) completed audit forms were available for analysis. Most of the departments completed about 90% of their audit forms except neurosurgery and obstetrics & gynaecology services, which completed only 30% each of the data sheets. The details of the returned forms according to various specialities are given in Figure 1. Overall, there were 118 cancellations (24%) and 350 delays (71%) of the scheduled procedures. The incidence of delays and cancellations was higher in public patients (68%) when compared to private patients (63%). In 93% of patients, there was delay in starting the surgical procedure at the scheduled starting time.

The highest number of delays occurred in the General Surgical service (82%) and the least (33%) occurred in neurosurgery. Figure 2 shows the delays and cancellations of surgeries with respect to specialities. The delays ranged from less than half-hour to almost 9 h, while there was a 1-hour delay in the majority (67%) of the procedures. Figure 3 shows the details of the duration of delays.

Only 4% of the procedures started punctually at the scheduled time of 8.00 in the morning, which is the normal starting time for an elective operation. The most common cause of inability to start the operation on time was the delay in transporting the patient from the admitting ward to the operating theatre on time (17%). The next common causes of delay were due to the anaesthetists, nurses and the surgeon not being available on time (Table 1).

Seven per cent of the delays were attributed to unavailability of equipment and/or linen. 11% of delays were due to miscellaneous reasons such as waiting for consent forms to be signed, delay in arranging blood, inclement weather due to hurricane season, etc. In 24% of cases, there was an apparent delay, however, without any recorded specific reason.

![Figure 1](https://example.com/image1.png)  
**Figure 1** Completed data forms by specialty services

![Figure 2](https://example.com/image2.png)  
**Figure 2** Delays and cancellations with respect to specialities

![Figure 3](https://example.com/image3.png)  
**Figure 3** Duration of delays for scheduled surgical procedures
The majority of cancellations occurred in elective procedures (n = 105,89%). The incidence of cancellations varied from 0% in neurosurgery to 26% in obstetrics & gynaecology. There were many reasons recorded for cancellation of surgeries, the most common was due to unavailability of a bed in the RR (15%). 11% of patients were cancelled due to unavailability of nurses. Unavailability of linen and/or equipment failure resulted in 14% of cancellations. 10% of procedures were cancelled due to improper and inadequate pre-operative preparation of the patient. Nine per cent of day-case patients did not show up for their surgery. No reason was recorded in 15% of the cancellations. Cancellations were more common in the day-case category of patients amounting to 23% (n = 27).

**DISCUSSION**

Delays in surgical procedures may have profound impact on the outcome of patients in terms of morbidity and mortality, especially in emergency and urgent cases. A recent study has reported the increased morbidity in patients who wait longer duration for elective laparoscopic cholecystectomy (5). Cancellations and delays of elective procedures have been reported by many authors especially in ambulatory (day-care) surgeries (1–3). Every hospital is unique in terms of its service, staff pattern, demographics of the region and also the work-ethics and culture. Hence, we attempted to assess the situation in a tertiary-care teaching public-sector hospital in a developing country in which the surgical departments cater services to both public patients (who are offered service free of cost) and also private patients (who pay fee for the services offered).

If operating theatre time is not effectively utilised, these hospital resources are largely wasted, and it significantly impacts on the patient care (1–3). Inefficient or inaccurate scheduling of operating theatre time often results in delays of surgery or cancellations of procedures, which are costly to the patient and the hospital, and it is better to analyse the root cause of these problems (6).

Our data shows a clearly high incidence of delays and cancellations of the surgical procedures in our hospital. Many avoidable causes for delays can be attended to and minimised for the effective utilisation of operating theatre time (7,8). Delays were reported in 93% of cases, and only 4% of the 'first-in-the-list' procedures could start at the normal scheduled time of 8.00 AM. The most common cause of delay was due to the late arrival of the patient from the admitting ward to the operating theatre for the scheduled surgery. This could have been avoided by early preparation of the patients in the wards and allowing sufficient lead time for the theatre orderlies to transport the patient to the operating theatre. The high incidence of unavailability of theatre staff such as the surgeons, anaesthetists and nurses ‘on-time’ may be perhaps, in part, due to poor commitment among the staff.

The overall cancellation incidence in our study was 24%, which was higher than the reported incidence in other studies (2,3). Cancellations were higher among the urology, orthopaedics and obstetrics & gynaecology services than in general surgery, which is similar to other reports (2,3). About 23% of cancellations occurred in outpatient procedures, which were mainly due to either the patients not showing up or their late arrival to the operating theatre. Some centres try to overcome this problem by charging a scheduling fee to patients who do not show up for surgery, which may motivate the patients to come for the procedures promptly (3).

Improper pre-operative preparation has been quoted as a major reason for cancellations (9). This issue can partly be minimised by maintaining good communication between the anaesthetist and the surgeon (10). The establishment of a pre-anaesthetic clinic for the pre-anaesthetic evaluation of the patients by anaesthetists has been proved to address these situations (11–13). Our hospital does not have such a clinic, and many a times, patients are seen by anaesthetists only in the operating theatres before the surgical procedures. A recent study has affirmed the value of a nurse-led pre-operative assessment to minimise cancellations (14). Although there

| Reasons                                      | Cancellations (%) | Delays (%) |
|----------------------------------------------|-------------------|------------|
| "No show"/late arrival of patient to operating theatre | 9                 | 17         |
| Unavailability of anaesthetists               | 8                 | 12         |
| Unavailability of nurses                      | 11                | 8          |
| Unavailability of surgeons                    | 6                 | 4          |
| Unavailability of recovery room bed           | 15                | 4          |
| Unavailability of linen                       | 7                 | 3          |
| Equipment failure                             | 7                 | 5          |
| Other emergency surgeries                     | –                 | 3          |
| Improper preoperative preparation of patient  | –                 | 1          |
| Improper scheduling                           | 4                 | –          |
| Miscellaneous*                                | 8                 | 19         |
| No recorded reason                            | 15                | 24         |

*Waiting for consent forms to be signed, delay in arranging blood, inclement weather due to hurricane season, etc.
were delays because of inadequate pre-operative preparation, there was no cancellation because of this reason (Table 1). Only 2.5% of patients were cancelled for the reason of unavailability of blood, despite the frequent shortage of blood in our hospital. Unavailability of anaesthetists was one of the important reasons for the cancellations in the present study (8%), which was due to acute staff shortages in the Department of Anaesthesia.

However, the highest number of cancellations was due to unavailability of beds in the RR. Our medical and surgical ICUs are often filled with patients, and the RR, which is the only high-dependency unit in our hospital, serves as a temporary additional ICU for accommodating both surgical and medical intensive care patients (15). When majority of the nurses in the RR are engaged in caring these critically ill patients, there are few nurses available who can take care of post-operative patients, which invariably results in cancellation of the elective procedures. Cancellations due to non-availability of ICU beds have been one of the main reasons for elective major surgery (16).

Other reasons such as failure of services like air-conditioning units and unavailability of linen, although not shown to have very high incidence in the present study, still have a significant impact and could have been solved by more efficient management of the support services. There have been reports of similar difficulties with schedule, planning and administration, operating room management, nursing staffing and expertise, anaesthesiology support, surgeon behaviour, material resources, housekeeping support services, ambulatory surgery process and post anaesthesia care unit (4). Another major factor in our institution is the absence of a dedicated emergency operating room for emergency surgeries, which would have largely averted disruption of elective procedures by emergency surgical cases.

Appreciation of the common reasons for cancellations of surgeries will improve operating theatre utilisation by the fact that the administrators and the providers anticipate these problems and pay additional attention to them (17). Others have found that cancelled surgery is expensive for the institution, and notwithstanding the inconvenience for the patient (18). The average cost of operating time has been estimated to be around 350 Barbados dollars (175 US dollars) per hour at our hospital. (unpublished data) This, in fact, is the greatest concern to the hospital administration, wherein proper reallocation of budgetary resources for improving the working conditions and recruiting more staff may alleviate the major part of our problems.

There have been some pitfalls in our study. Even though a 2-week pilot study was conducted to familiarise the staff of the surgical services who volunteered to participate in the study, many audit forms (41%) were not properly filled out. There were wide variations amongst different services to return the completed forms (30–90%). Similar difficulties have been encountered and reported in other centres also in conducting audits where large amounts of data were needed to be recorded (19). It has been suggested that a minimum of eight staff are required to conduct a systematic and critical analysis of the quality of patient care, which will allow health care professionals to measure their performance and make improvements in hospital care where necessary (20).

CONCLUSIONS

In summary, we report the reasons for the delays and cancellations of surgical procedures from a tertiary-care teaching hospital in a developing country. The main constraints in our situation have been lack of emergency operating room, lack of a high-dependency unit and extra beds in the intensive care units, lack of proper co-ordination of different departments involved in the functioning of operating room, lack of counseling and instructions for day-care surgery patients and lack of efficient management of operating theatre floor. The central issue for most of these constraints is shortage of both medical and nursing staff. We are in the process of conducting such audits at regular intervals and trying to mitigate these problems.

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