Reasons for cancellation of elective cardiac surgery at Prince Sultan Cardiac Centre, Saudi Arabia

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The cancellation of surgery is a significant drain on health resources. However, a persistent problem in most hospitals is short notice cancellation of scheduled operations, even upto the day of surgery. In some cases, patients have been prepared for surgery, and the staff is assembled and expecting to operate. In UK 8% of scheduled elective operations are cancelled within 24 hours of surgery. The reasons include cancellation by the patient, cancellation for poorly optimized medical conditions, or cancellations due to poor organization. Many of these are difficult to quantify. However, one relatively easily measured factor is the possibility that some operating lists were predictably over-booked. An operating list may over-run because of delayed starts, slow turnover, unanticipated surgical/anaesthetic problems or staff shortages. Many of these are difficult to quantify.

Background and objective: **Prince Sultan Cardiac center is one of the largest referral center in the Middle East and there is no published data on the reasons for cancellation of specifically cardiac procedures. However, an audit was performed to assess the reasons for the cancellation of the cases on the day of surgery in cardiac theatres. According to one of the studies published in an Australian journal the percentage of cancelled cardiothoracic cases was determined to be 15.8%.**

Results: **Total number of cardiac surgical patients including pediatric and adult during a period from June 2008 to May 2009 were 2191. Out of those, 1681 cases were done during the study period, 510 (23.27%) cases were cancelled during the study period. The operation theatre was functional for 331 days during the study period. Cancellations done by the surgeons were 34% while the patient's related cancellations were 32%. The administrative issues contributed to 34% in overall cancellation and anaesthetist-related cancellation were 0%.**

Conclusion: **We estimated 22% of the elective operations which were cancelled on the day of surgery were potentially avoidable. There is still a need to do further research to look for the identifiable reasons and strategic measures to eliminate the reasons for cancellation on the day of surgery.**

Keywords: Cancellations, Anaesthetic problems, Poor organization, Interventions, Cardiac theatres, Health resources, Operating suites, Over-run, Over-booked, Anaesthetic problems

The cancellation of surgery is a significant drain on health resources. Major hospitals invest considerable resources in maintaining operating suites and having surgeons and theatre staff available on a predictable schedule. However, a persistent problem in most hospitals is the short-notice cancellation of scheduled operations at the last minute, even up to the day of surgery. In some cases, patients have been prepared for surgery, and the staff is assembled and expecting to

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operate. In others, patients and staff may not be directly affected (e.g., when a surgeon has cancelled an operation, the patient has been informed, but the theatre booking has been retained).

The late cancellation of scheduled operations is a major cause of the inefficient use of operating-room time and is thus a waste of resources. It is also potentially stressful and costly to patients in terms of the working days lost and the disruption of daily life. There have been reports of depressive effect of cancellation on patients and of the high level of emotional involvement before surgery [1,2]. Repeated cancellations have implications for patient satisfaction, staff morale, hospital patient relationships and training. The under utilization of theatre time has self-evident repercussions for waiting lists. There is little literature available on the reasons for elective surgical cancellation, which is inevitably multifactorial [3].

In UK 8% of scheduled elective operations are cancelled nationally, within 24 hours of surgery [4]. In total 10 to 40% of booked elective operations are cancelled before the surgery takes place. The reasons include cancellation by the patient, cancellation for poorly optimized medical conditions, or cancellations due to poor organization, lack of co-ordination b/w the surgical team and the anaesthetist, bed managers and the surgical team or sometimes poor co-ordination between the patient and the hospital admission [5]. The most common cause of the remaining cancellations was lack of theatre time (i.e., over-booked operating lists). The audit commission has estimated that in about 5% of hospitals in the UK. The majority of operating lists were consistently over-booked.

An operating list may over-run because of delayed starts, slow turnover, unanticipated surgical/anaesthetic problems or staff shortages. Many of these are difficult to quantify. However, one relatively easily measured factor is the possibility that some operating lists are predictably over-booked.

In North America, the provision of surgical-anaesthetic services is virtually unlimited in time because of the way in which health care is financed. Theatres are often utilized for as long as needed for operations and cancellations due to over-running are rare. Instead, over-runs add to overall costs, which can pose different but equally important problems for the hospital [6–11].

A variety of studies have examined the reasons for late cancellations based on the retrospective analysis of hospital records [2,12–20], including some studies which have used limited interventions to reduce cancellations [21–23]. The National Health Service (NHS) in the United Kingdom has developed software to monitor and report theatre cancellations, including day of surgery cancellations [24,25]. These studies and the NHS software rely on records maintained by theatre staff. Although useful for the day-to-day monitoring of surgery, such records may not provide enough information for the design of policies to reduce late cancellations.

Prince Sultan Cardiac Centre is one of the largest referral centres in the Middle East and there is no published data on the causes of cancellation of specifically cardiac operations. However, an audit was performed to assess the causes for the cancellation of cases on the day of surgery in cardiac theatres. According to one of the studies published in an Australian journal the percentage of cancelled cardiothoracic cases was determined to be 15.8% [26].

Design/Methodology

Prospective and retrospective data was collected for a period of one year from June 2008 until May 2009 to identify cancelled operations on the day of surgery.

The reasons for cancellation were grouped into the following:

(a) Cancelled by whom: surgeon, anaesthetist, or other.
(b) Reason for cancellation: anaesthetist related, surgeon related, administrative issues, or patient related.
(c) Whether cancellation was justifiable or not.

Cancellations and reasons

A cancellation on the day of intended surgery was defined as any operation that was either scheduled on the final theatre list for that day (generated at 15:00 on the previous day) or subsequently added to the list, and that was not performed on that day. During each day of surgery, theatre staff compiled a list of cancellations. The form for this included a column for ''classification and comment'', where theatre staff recorded a reason for the cancellation. Sometimes this information was limited to by whom cancelled (e.g., ''by doctor''). We obtained copies of these lists each day.

Data analysis

Cancellation reasons were entered into a Microsoft Excel spread-sheet. Cancellation reasons were classified as follows:

(a) Anaesthetist related. (Anaesthetist not available and need consultation).
(b) Surgeon related are classified as follows:
    1. The patient needs further evaluation.
    2. No time for surgery.
    3. Surgery not indicated.
    4. Anticoagulants were not stopped before surgery.
    5. The patient was discharged.
    6. The surgery was already done.
    7. The surgeon was sick
    8. The surgeon was not available.
    9. Another surgeon was requested to operate.
    10. Unknown reason.
(c) Administrative issues:
    1. No ICU bed.
    2. No blood for the patient.
    3. Wrong booking.
    4. No electricity in lab.
(d) Patient-related issues:
    1. The patient has an infection.
    2. The family requested to postpone surgery.
    3. The patient refused the surgery.
    4. The patient had a burn.
    5. The patient was not admitted.
    6. The patient had deranged coagulation
    7. The patient was not prepared.

Results

The total number of scheduled cardiac surgical procedures, including paediatric and adult populations, from June 2008 to May 2009 was 2191. Of those, 1681 operations were performed. While 510 (23.27%) cases were cancelled during the study period. The operation theatre was functional for 331 days during this period. Surgeon related and patient-related cancellations accounted for 34% and 32% of total cancellations, respectively. Administrative issues caused 34% of overall cancellations, and anaesthetist related cancellations were 0.11%. We estimated that 22% of the elective operations cancellations on the day of surgery were potentially avoidable.

Discussion

We found three common classes of causes for the day of cancellation of cardiac surgery including the following:

(A) Patient-related issues.
(B) Administrative issues.
(C) Surgeon-related issues.

We found that 23.3% of the scheduled operations were cancelled on the day of surgery. Investigations revealed four major reasons for these cancellations; they are, in descending order of frequency, as follows: surgeon related, administrative issues, patient's related, and anaesthetist related. Inconsistencies were found in the reasons given for the cancellations, because there was no proper way of registering the reasons for the cancellation of the cases. A standardized form was designed and then reasons were taken from the operation theatre source in which the reasons for the cancellation were entered by the theatre manager.

High cancellation rates leads to financial, logistical, and psychological hardships for the patients and their relatives who plan their working and family lives around postponed dates of operations. Most operations are cancelled at on 24 hour notice. The patients and their relatives feel disappointed, frustrated, and anxious [27,28].

Our results showed a much higher rate of day of cancellation (23.3%) in elective cardiac surgery than the previously reported 15.8%. Improvement in late starts can be achieved by co-operation from anaesthetists and surgeons to arrive on time. The time interval between two surgical interventions can be longer when the patient takes a long time to recover from anaesthesia, but this is usually not a case in cardiac surgery. The diversity of staff members who work in an operating theatre can cause conflicts and lead to inefficiency; therefore, a team approach including a good administrator can improve operating theatre management. A good administrator can improve scheduling, reduce time spent preparing and cleaning and better handle resources.

Surgeon related cancellations were identified as 34% of the cancelled operations (Fig. 1). The most common reason given by surgeons for the cancellation of the cases (19.7%) was the need for further patient evaluation. The impact of effective preoperative preparation on subsequent patient well being postoperatively was demonstrated by a finding that thorough pre operative assessment was associated with a 0.92 day decrease in the length of hospital stay. Before the advent of managed care, even healthy patients were admitted at least 1 day before their scheduled surgery date so that appropriate testing (and perhaps excessive testing) could be performed, and so the resulting data reviewed [29].

Cancellations of operations because of the inadequate workup of comorbid medical conditions are also avoidable (Fig. 2). Infections accounted

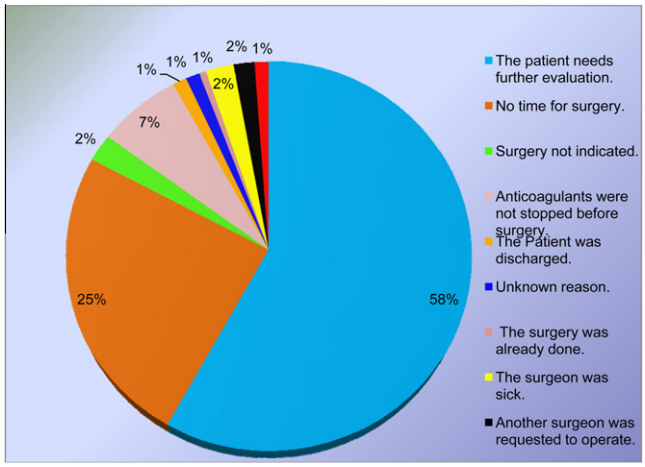

Figure 1. The surgeon-related causes for cancellation.

for 24% of the cancellations in our hospital. The earlier identification of this and other medical problems could have facilitated surgical scheduling and cancellations via the establishment of formal liaisons with the physicians. While unfortunately we do not have the pre-operative anaesthesia clinic, all of the patients were assessed a day before surgery by their anaesthetists. However, studies have shown that a pre-operative anaesthesia assessment in pre-anaesthesia clinics significantly reduces operating room delays and cancellations.

Out of the total 1681 cases, only 2 cases were cancelled by the anaesthetist (Fig. 4). The first case was cancelled because of the non availability of the anaesthetist, and the second one was cancelled due to a consultation called by the anaesthetist. However, there seems to be no significant role of the anaesthetists in surgical cancellations.

Administration-related issues caused 34% of the cancellations overall, and the majority (26.5%) of these were due to the non-availability of a bed (Fig. 3), it contributed solely to about 26.52% of the cancelled operations. Ross et al. found that the percentage of the total cancellations due to the lack of an available bed increased from 31% to 62.5% in one hospital in Ireland over a five year study window. Moreover, more than one procedure was cancelled in the final period due to lack of beds for every 10 general surgical procedures performed. It is important to recognize that the total operations performed in any time interval is affected by many other factors, such as staff shortages, rotational theatre closure and the average length of the procedures performed. However, the first two causes were not applicable in our study [30].

Another study reported that a shortage of beds resulted in cancellation of 16.2% of the general surgical procedures in a tertiary general hospital in Pakistan, which is a lower figure than what we have found in this study. This difference is likely due to their inclusion of all general surgical

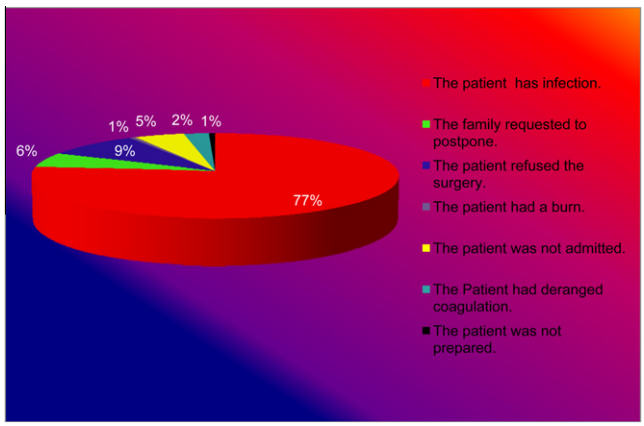

Figure 2. The patient-related causes for cancellation.

patients, as compared to this study's exclusive focus on cardiac patients.

Cancellations due to shortage of anaesthetists can be avoided by the proper staffing of anaesthetists and appropriate logistical arrangements for internal cover of annual leave or study leave; however, this does not seems to be a problem in our hospital. Cancellations of operations due to inappropriately prepared patients could be avoided by improving communication between patients, doctors and nurses.

Another 8.5% of the cardiac cases were cancelled because of the lack of theatre time in our hospital. We found that cancellations due to lack of theatre time (i.e., earlier operations over-ran estimated time) were not a scheduling or booking problem but were caused by surgeons underestimating the time needed for operations. For some procedures, there was consistent underestimation, and we found that surgeons who consistently underestimated the time needed experienced significantly more cancellations than those who did not. Consistent underestimation biases the system against shorter procedures of known and stable duration, and this could explain why ear, nose and throat surgery had the highest proportion of cancellations. However, surgeons may experience pressure from managers to reduce waiting lists by adding more patients to an already full list. Surgeons who book fewer patients on their lists (albeit appropriately) may fear criticism (e.g., not 'working hard') from their clinical colleagues [30]. We assumed that all surgeons book their own lists; it may be that in some other hospitals, non-clinical managers are now more directly involved in planning surgical lists, and in those cases the manager's estimates may be more relevant.

Our results imply that hospitals will not succeed in reducing the rate of day of surgery cancellations unless they systematically address each problem individually, beginning with the initial booking and patient notification. Providing more beds or reserving beds for surgical patients is one component of an improved system, but will be insufficient unless all sources of problems receive

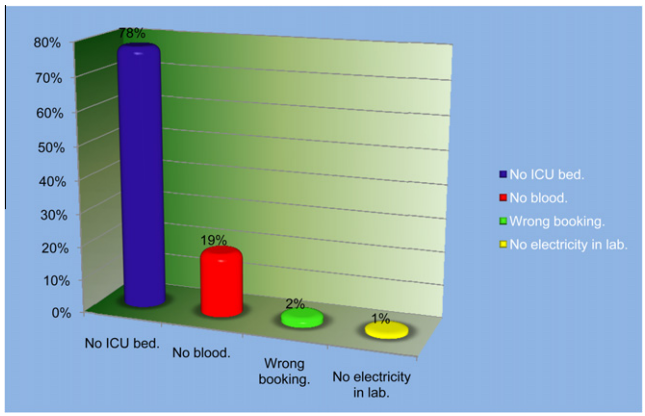

Figure 3. The administrative issues responsible for cancellations.

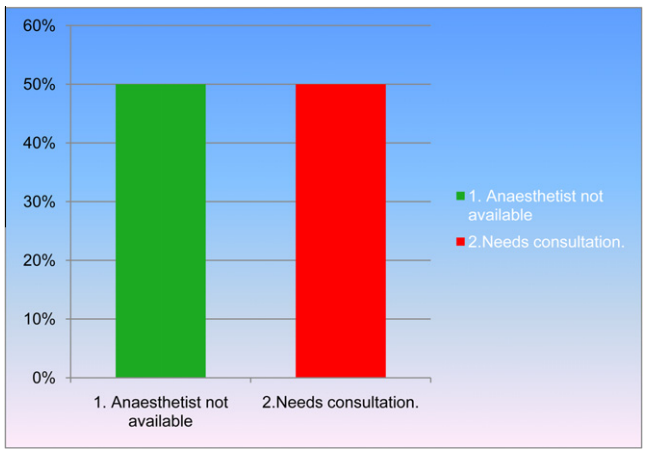

Figure 4. The anaesthetist contribution to the cancellation of surgeries.

attention. Similarly, establishing a pre-operative clinic for the assessment of the patients and proper work up before hospital admission may alleviate some problems, as would improve communications between the anaesthetists and the surgeons. Improved methods of booking and allocating theatre time, and an operational research approach to patient flow, can only have practical value when linked in an overall quality improvement strategy. We believe that up to 60% of day of cancellations of elective surgery may be prevented using quality improvement techniques.

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