

## Reasons For Cancellation Of Elective Neurosurgical Operations at a Referral Hospital In Malawi

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### ABSTRACT

**Introduction:** Unanticipated cancellations of scheduled elective operations may lead to dissatisfaction among patients, increase costs, and also reflect inefficiency in the management of the operating theatre. Knowing the reasons, appropriate steps can be implemented to reduce the rate of cancellations of elective operations. **Materials and methods:** This was a prospective observational study conducted at Kamuzu Central Hospital, Malawi. The aim was to determine the rate and causes of cancellation of elective neurosurgical procedures and to suggest changes that can reduce such cancellations. Scheduled elective neurosurgical procedures were reviewed from theatre records from October 2021 to October 2022. Operative cancellations were defined as those patients who were scheduled on the operative list but did not have the planned surgery on the intended date. The collected data were analyzed using descriptive statistics. **Results:** According to this audit, 21 % of the 295 elective surgical procedures were cancelled, with the three most frequent reasons for cancellation being insufficient theatre time (40%), uncontrolled medical disease (15%), and unavailability of ICU beds for postoperative care (15%). **Conclusion:** The cancellation rate in this study was high. Appropriate measures need to be taken to improve theatre utilization and efficiency at the referral hospital.

**Keywords:** elective, cancellation.

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### INTRODUCTION

An elective surgical procedure is said to be cancelled when a patient's name appears on the list for surgical operations but the operation is not done on the scheduled date. It prolongs the patient's stay in the hospital, leads to congestion in the wards, and causes time wastage and underutilization of the operating theatre (1).

It also causes emotional trauma for the patients and their families. A cancellation rate of 23.15% for elective surgical operations has been found in a study at a teaching hospital in Nigeria(3). The reported rate of cancellation of elective surgery in other hospitals has ranged from 11.9 to 34%(4-6).

The rate of surgical cancellation is one of the most important quality indicators of operation theatre facilities. Although there is no consensus on the acceptable rate of case cancellation, when analyzing the efficiency of theatre facilities, a cancellation rate of less than 5% is generally recommended(7)..

The efficiency of theatre facilities depends largely on the efficiency of the theatre management structure adopted by each individual institution. According to the Association of Anaesthetists of Great Britain and Ireland, there should be a single Director of Theatre Services with full budgetary authority, adequate sessional allowance, accountability, information systems, and administrative and secretarial support(8). The director should be a senior member of staff with a clear understanding and experience of working in operating theatres and the ability to take a broad view across various specialties. Where budgets are devolved to specialist services or departments, robust mechanisms must be in place to ensure accountability and the safe running of the theatres' services as a whole.

Like is the practice at some hospitals, the day-to-day running of theatres should be in the hands of a Theatre Manager, a senior nurse, or someone else who works within the theatre complex, has no conflict of duties, and is directly accountable to the Director of Theatre Services. The theatre manager should be responsible for maintaining communication with staff groups and ensuring competent staffing and suitable equipping of all theatres. There should be a system for planning theatre activity to allow the theatre manager to allocate staff efficiently and respond safely and flexibly to changes in routine. This will involve close cooperation with surgeons and anaesthetists. The theatre

manager should develop local policies to ensure that planned surgical activity in printed or electronic form is clearly posted well in advance and in all appropriate locations. It should include starting time, running order, the names of the operating surgeon and anaesthetist, and the consultant surgeon and anaesthetist in charge. Policies should be developed for effectively dealing with changes in published operating lists.

The departments of Anaesthesia and Surgery should have an identified consultant, usually the 'rota-maker', who is responsible for ensuring that all operating lists are staffed with a suitably trained clinician and that, where possible, medical staff are re-allocated to cover for absences.

Planned surgical operations that are cancelled reflect inefficiency in the management and utilisation of theatres(9). The reasons for cancellations can be patient-related, workup-related, surgeon related or administrative. This study was conducted to determine the rate and causes of cancellation of elective surgical operations in the neurosurgical unit at Kamuzu Central Hospital, Malawi. The aim was to suggest improvements that could reduce the rate of such cancellations and lead to a more efficient use of the operating theatres.

The hospital's main operating theatre has six operating rooms named simply as rooms 1 - 6. Room 6 is designated for both elective and emergency neurosurgery procedures.

Each of the surgical specialities in the surgery department using the theatres is usually required to submit a list of their elective surgical patients to the theatre before noon, at least one day prior to the intended date of the surgical operation. This is meant to help the theatre nurses and technicians make staff allocations accordingly and prepare equipment for the procedures well in advance.

It is also meant to enable the anaesthetist to visit the patients after their names have appeared on the operating room lists and evaluate their fitness for anaesthesia and surgery, at least one day prior to the date of the surgery. This pre-operative anaesthesia evaluation is, however, not usually done until the day of the surgery for various reasons, including a shortage of anaesthesia personnel. Neurosurgery patients are

admitted to the surgical wards many days before the day of surgery to facilitate their preoperative preparation.

Elective surgical operations are expected to commence (cutting time) by 8:00 hours on Monday, Tuesday, and Thursday and end by about 16:00 hours each day. There are no elective cases scheduled on Saturdays, Sundays, or public holidays.

## MATERIALS AND METHODS

This is a prospective observational study that was conducted in the neurosurgical unit at Kamuzu Central Hospital, Malawi, which is a referral hospital in Southern Africa. Scheduled elective neurosurgical procedures were reviewed from the theatre records over a one-year period from October 1, 2021, to September 31, 2022. All patients who were posted for elective neurosurgery were included, whether they had obtained pre-anaesthesia checkup (PAC) clearance or not. Procedures that did not necessarily require a neurosurgeon, such as epidural injections, were excluded, as were those patients undergoing emergency procedures.

Cancellation was defined as the patient's name is on the published operating room list

but the patient is not undergoing surgery on the scheduled day.

A data collection form was designed for the study. Information collected with this data form included the patient's age, gender, surgical diagnosis, surgical procedure proposed, and reasons for cancellation. Information on the cutting and ending times for each list for the day was also recorded. The authors compiled the theatre lists for each month of the study period to record the cancelled surgical procedures and the reasons for cancellation as documented by the nurse in charge of the neurosurgery theatre on the day of the procedure's cancellation. The data was entered in the data collection form and was analysed using descriptive statistics.

## RESULTS

A total of about 113 elective neurosurgery lists were made between October and September, with an average of 9 elective lists per month (range of 7 to 14). Of the 113 elective lists, only 66 (58.4%) were completed on the scheduled day, where completion is defined as the performance of all the scheduled operations on the list.

An average of 25 elective procedures were done every month in the neurosurgical unit between October 2021 and September 2022, representing an average of about 6 elective surgeries per week.

During the study period, a total of 295 patients were scheduled for elective

surgery; 66.6% of these were male. The median age of all scheduled patients was 1 year old, with an age range of 10 days old to 74 years old.

Of the 295 patients who were scheduled for elective surgery during the study period, 59 (21%) had their surgery cancelled on the scheduled date for various reasons. The reasons for cancellation are summarized in (Table 1). The three most frequent reasons for cancellation were insufficient time (40%), booked patients with uncontrolled medical conditions (15%), and the unavailability of an ICU bed for postoperative care (15%).

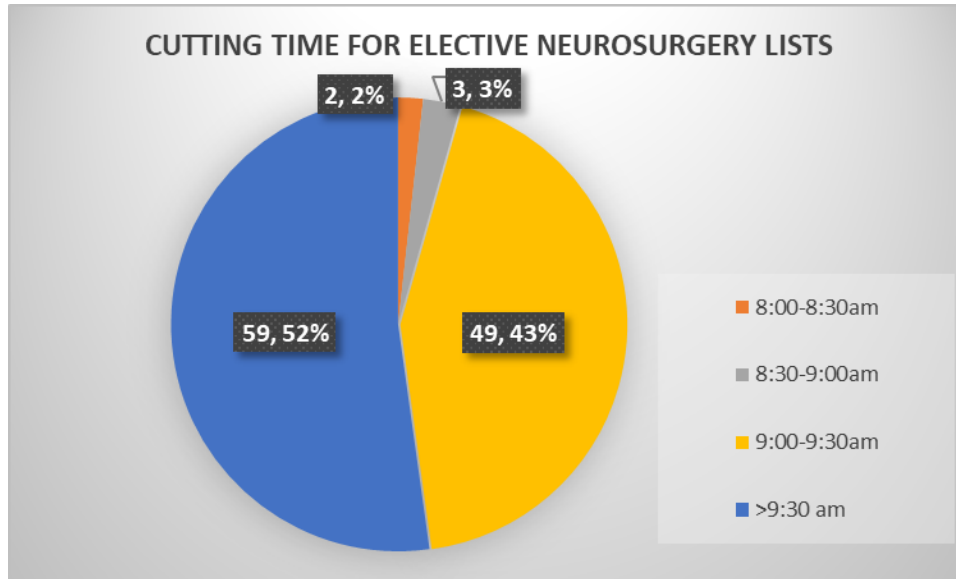
Other causes of cancellation in this audit were the unavailability of an anaesthetist, incomplete patient preparation, and the unavailability of required equipment for the procedure. It was found that no elective neurosurgery operation was started at 8:00 a.m. during the 1-year period under review. The cutting time for about 60 percent of all the neurosurgery lists was 9:30 hours or later, as shown in Figure 1. Of the cancelled procedures, craniotomy for tumour extirpation had the highest cancellation rate, followed by laminectomy for discectomy or tumour removal, as illustrated in Table 2.

**Table 1:** Reasons for cancellation of elective neurosurgery cases

REASON FOR CANCELLATION	NUMBER OF CASES	PERCENTAGE
Insufficient time	23	40.0
Unresolved medical condition	9	15.0
No ICU bed	9	15.0
No anaesthetist available	6	10.0
Incomplete patient preparation	5	9.0
No required equipment	2	3.0
Others	6	8.5

**Table 2:** Distribution of cancelled neurosurgery cases by type of procedure

PROCEDURE	NUMBER SCHEDULED	CANCELLED	CANCELLATION RATE
Craniotomy	35	14	40 %
Laminectomy	15	5	33%
Pedicle screw fixation	4	1	25%
ETV	18	4	22%
NTD repair	77	15	19%
VPS insertion	103	13	13%
Miscellaneous	43	7	16%



**Figure 1:** Cutting time for elective neurosurgery lists at a referral hospital in Southern Africa, 2021-2022

## DISCUSSION

This study showed that about 21% of elective neurosurgery cases were cancelled in the years 2021 - 2022. The most frequent reason for the cancellation of these elective surgical cases was insufficient theatre time, similar to findings in other studies done elsewhere (3-5, 10,11). Although there is no consensus on the acceptable rate of case cancellation, when analyzing the efficiency of theatre facilities, a cancellation rate of less than 5% is generally recommended (7).

Other studies have found upper respiratory tract infections in children (1,12), non-availability of patient recovery beds (13, 14), and patients not showing up (15) as the most common reasons for cancellation of elective surgery.

A study found that surgeons underestimated the time needed for all elective surgical

operations on their list, leading to cancellations owing to a lack of theatre time (11). Starting surgical operations late in the day may be the main reason for the insufficient time at the referral hospital, as shown in other studies (19). No elective neurosurgical operation lists were begun at 8:00 a.m. Over the study period, 60% of lists started after 9:00 hours, with the earliest starting time being 8:25 hours and the latest cutting time being 11:45 hours. The latest elective surgery list conclusion time was 19:15 hours; however, the average conclusion time was 15:00 hours. This indicates that on an ordinary day, commencing operations late costs at least 90 minutes, and finishing operations early costs even more minutes. To maximise operating room use, surgical teams, including anaesthetists and nurses, should be punctual.

To ensure that surgery is started at 8:00 a.m., a member of each of the anaesthetists, surgeons, and nursing teams could be dispatched as early as 7:15 a.m. to start preparing the operating room. So that when the rest of the team members have completed their morning or handover meetings, as little time as possible is wasted before cutting time.

Furthermore, surgery began late because paediatric patients sometimes came into the operating room without IV access. This meant that the anaesthetic and nursing teams had to gain IV access before giving anaesthesia, which caused delays and sometimes patient cancellations owing to time constraints. Equipping ward nurses and clinicians with skills and equipment such as infrared vein finders for IV access in paediatric patients may lower the number of patients referred to the operating room without a cannula. A pre-operative anaesthetic examination a day before surgery may help identify difficult patients and fix the issues quickly.

Prolongation of the intervals between the surgical procedures may also contribute to the inability to operate on all of the patients listed for surgery on any particular day. Commencing the operation list early and shortening the interval between surgical procedures on a particular operating day may be achieved by increasing the number of support staff, e.g., porters who convey patients to and from the operating theatres, cleaners who prepare the operating room. Prolonged breaks between surgeries may also prevent surgeons from operating on all patients on a given day. By adding more support staff, such as porters who transport patients to and from the operating rooms, cleaners who prepare the operating room floors in between surgical procedures, and

well-trained anaesthetist technicians to ensure safe and prompt induction of anaesthesia, it may be possible to start the operation list earlier and reduce the time between surgical procedures on a given operating day. In addition, theatre nurses can also help make better use of time by making sure that sterile surgical linens and tool trays are promptly available before surgery.

Surgeons occasionally underestimate the time needed to conduct their theatre list surgeries. A retrospective examination of 56,000 cases indicates 31% of surgical lists are overbooked (4). Surgeons often increase their theatre lists to accommodate unexpected cancellations and reduce waiting times (11). This, however, was not noticed throughout the audit period, as most of the time the surgeons produced short lists of 3 or 4 patients with procedures of different complexity to fit the time. Making unrealistic surgical lists could be reduced, if possible, by applying some of the recommendations presented in this audit report.

Assigning extra operating rooms to surgical units with extensive operation lists and high cancellation rates due to limited theatre time can also help. Utilising two operating rooms per list simultaneously reduces the time between cases (cleaning and commencing anaesthesia), allowing surgical units to perform more cases per day. Most hospitals, including the Kamuzu Central Hospital, Malawi, might not be able to do this since it requires more staff and operating rooms. Alternatively, the number of working hours for elective cases per day could be expanded by instituting evening lists where adequately compensated workers could continue with cases that would otherwise have been cancelled. Another option to reduce cancellations and enhance theatre utilisation is to expand the number of operating days

per week to include Saturday for elective procedures, as is done with other specialities at this referral hospital, such as orthopaedics. This must be executed in a way that keeps employees engaged through allowances while minimising burnout.

In this study, the second most common reason for elective surgical cancellation was uncontrolled medical conditions. These instances were mostly in children with upper respiratory tract infections and pneumonia. A study by El-Dawlatly identified uncontrolled medical conditions as the leading cause of elective surgery cancellation (15). This can be improved by scheduling only well-prepared patients for surgery and completing pre-operative anaesthetic and medical evaluations.

Elective cases were cancelled in other audits due to patient non-payment of surgery fees (3). No patient was cancelled owing to non-payment of surgical fees in this audit, largely because most of our patients at the Kamuzu Central Hospital, Malawi, receive free surgery at the source. Only a minority choose private services, which are extensively subsidised and affordable.

The lack of sterile garments was responsible for the cancellation of 1.7% of cases. This was attributable to machine breakdown, which caused delays in sterilising the equipment on time.

Surgery may be postponed or cancelled as a result of faulty or insufficient equipment, such as patient monitoring, suction machines, and even the electrical lighting and air conditioning systems in the operating rooms (11). In this audit, we did not find many instances when defective equipment resulted in case cancellation. This is because Kamuzu Central Hospital has a new operation theatre complex with contemporary

equipment and regular maintenance and repairs. Surgery for one patient was cancelled because she had advanced acromegaly and needed special airway equipment (a glidoscope) that the hospital didn't have. Another case was cancelled because the VPS shunt introducer (tunneler) had not been sterilised and was thus unavailable. These and other challenges can be reduced by surgeons, nurses, and anesthesiologists communicating about each procedure's requirements before operation.

Two surgeries (3%) were cancelled due to abnormal test results. One patient had anaemia and the other thrombocytopenia. Such cancellations can be prevented if only appropriately prepared patients are listed for elective surgeries. Pre-anaesthetic evaluations were performed the morning of surgery for the majority of the surgical patients in this audit, which is not optimal. Assessing patients three days before elective surgery allows for greater opportunity to address incorrect lab findings and ameliorate uncontrolled medical conditions, minimising cancellations owing to these factors (18). Unlike in other countries, Kamuzu Central Hospital does not have an outpatient pre-anaesthetic and pre-surgical medical clinic aimed at ironing out all prevailing medical problems, but it may be needed to find ways of improving their effectiveness. Pre-admission anaesthetic consults at clinics can enhance theatre efficiency, shorten hospital stays, and lower costs (17).

In this prospective analysis, it was not identified how many cancellations were caused by the surgeon or anaesthetist. While there was always a surgical and nursing team, 10% of cases were cancelled due to a lack of an anesthesiologist. This was due to a hospital anesthesiologist shortage and

poor duty roster administration. When there were morning grand rounds or other general hospital meetings, theatre lists were delayed and some cases were cancelled, mostly because anaesthetists attended these important meetings first. Ensuring that all theatre staff prioritise the operating list over other hospital activities can reduce these and other issues. Most significantly, more anaesthetists need to be trained and motivated to ensure safe and smooth procedures.

Craniotomy for tumour removal was the most-cancelled neurosurgical surgery. This could be because craniotomies require extra time, cross-matched blood, which is typically scarce, and an ICU or HDU bed for post-operative care. The 1000-bed Kamuzu Central Hospital has five ICU beds. This is

far from ideal for a hospital that serves 43% of the country's population(21). Emergency trauma and acutely ill patients occupy most of these beds, making elective cases less of a priority. Expanding ICU bed capacity and creating a neurosurgical ICU and HDU would reduce elective case cancellations owing to ICU bed shortages.

In addition to thorough patient preparation, the cancellation rate for craniotomy surgeries can also be improved by the use of modern technology such as operating microscopes and electric drills, which may reduce the time taken to complete one craniotomy as compared to using manual hand drills (as is the current situation at Kamuzu Central Hospital), thereby increasing the chances of completing a list of craniotomy cases on the list.

## CONCLUSION

The elective neurosurgery cancellation rate of 21% in this audit was significant but within the typical range reported in other studies. Most elective neurosurgery surgeries were cancelled due to insufficient theatre time and uncontrolled medical conditions. Early preoperative patient evaluation and listing of only appropriately prepared elective surgery patients can reduce the case cancellation rate. Improving

operating room time management with punctuality might also help. Awareness of these and other major reasons for elective surgery cancellation can help administrators and medical teams increase operating theatre utilisation by identifying the main causes so they can be addressed.

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