

Theatre start and turnover times in a developing country

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Abstract

Background: Enormous amounts of resources are spent to keep the operating suites running and approximately one-third of total hospital budget is devoted to it. Delays in start or turnover times (TOT) lead to needless cancellations of procedures. Our study seeks to evaluate the causes of delay and to proffer some solutions to these identified reasons.

Methods : A prospective observational study carried out to collect data of elective procedures using a proforma . The causes of delay in starting surgical procedures and turnover times were assessed and documented.

Results : Three hundred and ninety seven elective procedures were evaluated between 2nd January and 31st July, 2018 . All scheduled first procedures were delayed and a third (36%) of subsequent procedures was delayed for between 45-60 minutes. One hundred and forty six (27.2%) of procedures delayed were due to prolongation of time for washing of instruments by perioperative nurses after a procedure and cleaning of the theatre suite by attendants before a subsequent case was

brought in .Delays due to challenges with central sterile supply department (CSSD) had 16.0% (86). Other causes of delay included delay in porters transporting patients from ward to theatre (15.6%), and collection of anaesthetic drugs from pharmacy/non-availability which accounted for 10.4%

Conclusion: Multiple factors are responsible for delays in turnover times in the operating room. The commonest cause was washing of instruments and cleaning of theatre suites ; others were challenges with the central sterile supply department (CSSD and delay in obtaining drugs from the theatre pharmacy . A multidisciplinary approach where all parties involved in surgery target these specific areas would help improve efficiency and reduce turnover times .

Keywords: Theatre, delays, turnover time, developing country

Highland Med Res J 2020;20(1):51-55

Introduction

One of the highest revenue generating units in a hospital is the operating theatre¹. Enormous amounts of resources are also spent to keep the suites running and approximately one-third of total hospital budget is devoted to it.¹ Improving Start times and Turnover Time (TOT) is a great prospect to enhance the clinicians' personal productivity and optimize hospitals' revenue.² Surgery lists over-run due to delayed starts , slow turnover ,unanticipated surgical/anaesthetic problems or staff shortage.³ This could make theatre staff work beyond approved working hours leading to lower job satisfaction .Efforts to reduce turnover times should be targeted based on the staffing for each OR^{4,5}

Turnover Time usually means the time from one patient leaving the Operating Room to the next patient entering the operating room.^{6,7} There are other definitions of Turnover Time which could be from the time a patient is transported to Post Anaesthetic Care Unit to the next patient's anaesthetic induction or from the closure of one patient's surgical wound to the next patient's incision.⁸ Turnover time of 25 minutes is

categorized as high performance ; between 25 and 40 minutes - medium performance ; and above 40 minutes is deemed not good enough¹. Other studies considered 36 minutes as ideal.⁹⁻¹¹ Bottlenecks and other obstacles such as organizational culture, adverse hospital policies, paucity of staff and revenue allocation lead to inefficiency in the system ,which further leads to delays and sometimes outright cancellations of surgical procedures.¹²⁻¹⁴ This is perhaps a major source of waste of health resources ,stress to patients ,their families and the medical staff as well¹⁵. The aim of this prospective study was to evaluate the causes of delay in start/turnover time in the operating room of a tertiary hospital .

Methods

This was a prospective observational study carried out in a 550-bed tertiary hospital in North Central Nigeria. The modular theatre has 5 suites, reception and recovery areas, where all elective and some emergency procedures are carried out. There was also an additional theatre suit for maxillofacial and trauma procedures. The theatre staff included 28 perioperative nurses, eight porters and four theatre attendants. Each theatre should have 2 perioperative nurses (one scrubbed , the other for circulation) .The porters/attendants are both used for cleaning and transporting patients from the wards . Fridays were used to clean the theatre and so only emergencies were done. Packs containing anaesthetic drugs are obtained from the theatre pharmacy .Patients

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need to present the receipts of payment for anaesthetic drugs (separate from operation fee) before they are issued packs .

Data on elective procedures performed by different surgical and gynaecological subspecialties from 8:00am to 4:00pm Mondays to Thursdays done between 2nd January and 31st July, 2018 were collected on a data collection form based on documented activities and personal observation by the researchers . Emergency surgeries and those performed under local anaesthesia were excluded .Cancelled surgeries as well as those with incomplete data were excluded.

Causes of delay in starting procedures were assessed and documented .These included the workings of the theatre- number of available staff, availability of packs and anaesthetic drugs and the challenges with these. In addition, the turnover time (from the exit of one patient from a surgical suite until the entrance of the subsequent patient into the same surgical suite) was evaluated and recorded .For the purpose of this study ,30 minutes was adopted as the acceptable turnover time and anything above that was considered as a delay.⁴

We described the data collected in frequencies and proportions and presented the results in tables and charts .Charts and tables were generated using Microsoft excel .

Results

Theatre staff and work flow

During the study period, the theatre staff included 28 perioperative nurses, eight porters and four theatre attendants. Each theatre should have 2 perioperative nurses (one scrubbed, the other for circulation). However, only one nurse was often available per suite as others were either on night off or leave.

Out of the 12 porters/attendants, only one was chosen per shift to bring patients to theatre and frequently , only three were available per shift for cleaning the six suites .

The central sterile supply department (CSSD) had 2 autoclave machines but only one was functional during the period of the study. The CSSD had only 6 staff that had to run shifts and so most times there was no staff on afternoon duty .

Packs containing anaesthetic drugs were usually obtained from the theatre pharmacy .Sometimes some drugs were out of stock or the pharmacist was not available at his post and hence drugs had to be procured from elsewhere .

Characteristics of patients and surgical specialties

During the study period 842 patients were scheduled for surgery out of which data on 397 patients were included in the study. The age range of the patients was from 1 week to 85 years. There were 245 males and 351 females

with a male: female ratio of 1:1.5. The distribution of the surgical specialties that performed surgeries in the theatre during the study period revealed obstetrics and gynaecology accounted for the highest proportions of surgeries (26%), followed by general surgery (23%), neurosurgery (11%) respectively . Specialties of maxillofacial surgery (1%) and trauma surgeries (1%) had the least proportion of surgeries (Figure 1) .

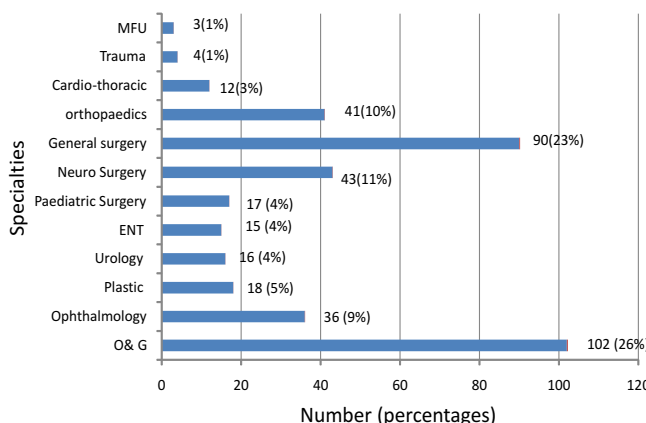


Fig 1: Distribution of cases according to Specialties

Surgery turnover time

One hundred and eighty two patients were scheduled as first on the lists in the various suites ; all these first procedures (100%) were delayed for between one to two hours. Some procedures were delayed by multiple factors.

Thirty six percent of subsequent procedures were delayed for between 45-60 minutes. (Table I). The average turnover time was 49.97 minutes ;an average of two major procedures only was performed daily .

Table 1: Turnover Time for surgeries

Time (minutes)	Frequency	Percentage
5-15	18	4.5
16-30	72	18.1
31-45	76	19.1
46-60	142	35.8
61-75	21	5.3
76-90	38	9.6
91-105	18	4.5
106-120	7	1.8
>120	5	1.3
	397	100

One hundred and forty six (27.2%) of procedures delayed was due to prolongation of time for washing of

instruments by perioperative nurses after a procedure and cleaning of the theatre suite by attendants before a subsequent case was brought in. Delays due to challenges with central sterile supply department(CSSD) accounted for 16.0% (86). Other causes of delay included delay from porters transporting patients from ward to theatre (15.6%), and collection of anaesthetic packs from pharmacy/non-availability which accounted for 10.4% delays (Fig 2).

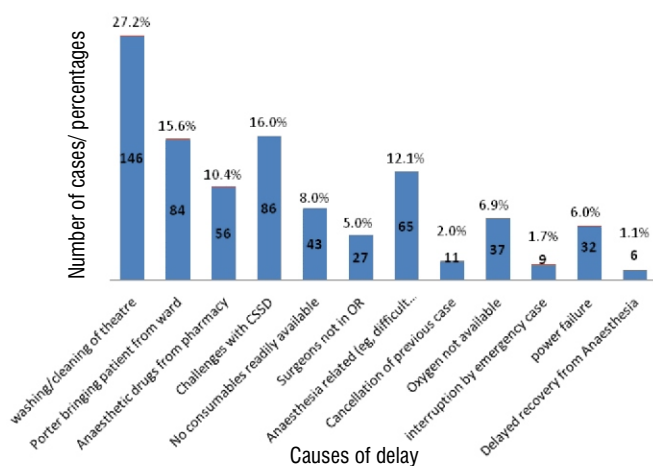


Fig 2: Reasons for delay of cases for surgery

Discussion

As one of the core revenue generating areas of the hospital ,the operating suite should be managed in an efficient manner.¹ A poorly managed theatre setting will impact negatively on patient outcome and satisfaction with prolonged hospital admissions and an increased financial burden on the patients.

Studies have shown a high incidence of delay in the start time of the first case on the list with incidences of delays ranging between 50-94%.¹⁶⁻¹⁸ In our study, all first procedures were delayed and it is a similar finding by Oluwadiya et al¹⁸ in Osogbo ,Njgeria in which average delay in start time was also 1 to 1 hour 30 minutes .A study by Does and colleagues¹⁹ in The Netherlands found a delay in start times to range from 35-55 minutes . These same authors quoted a similar collaborative work they did with 9 Belgium hospitals and the delay in start times was between 25 to 103 minutes.¹⁹ Delays in starting the first surgery of the list often affect the rest of the operation lists and sometimes lead to conflicts among the physicians and nurses as well.²⁰ In our centre, the night nurses on shift usually send for the first procedures for the day making sure that the patients are in the operating rooms early enough .Any delay in this part reflects logistic and coordination problem of the multi-professional and support areas such as patient transport , nursing staff and the part of the physicians .If the first

surgery is delayed, it becomes difficult to correct as all the other surgeries of the day will invariably be delayed. But if the activities of the theatre were well planned, more procedures would have been done and more revenue generated for the hospital and the patients would go home better satisfied. Tyler et al²¹ suggested that procedures should be allowed to start up to 30 min before their scheduled start time , the effect was to increase utilization .

In our study we observed that more than a third (36%) of procedures were delayed for between 40-60 minutes . The more the time spent in initiating the activities for the day or transiting from one procedure to the next ,the more adverse is the effect on the smooth operation of the theatre .In addition ,the longer the delay ,the fewer the number of procedures done per day per theatre suite and the greater the cancellation rates. This could indicate a fundamental problem with that sector of the hospital which could lead to losses in revenue . This contributes to underutilization of the theatre and worsens the burden on the patients by further increasing the waiting time of those that are on the waiting list for surgical treatment . When such procedures are cancelled ,the effect on the family is enormous both emotionally and financially ³.

Most of the reasons for these delays were due to human factors such as delay in cleaning operating suite after surgery (24%) .This is due to shortage of cleaning manpower, and the few cleaning staff available were overwhelmed with their duties. The perioperative nurses were also few as most of the time there was no circulating nurse to assist, thus cleaning/packaging instruments also delayed the start of the subsequent procedures.

In a similar study done in Oshogbo ,Nigeria ,the commonest cause of delay was delay in transporting patient between theatre and the ward and it accounted for 37.3% of the procedures.¹⁸ However, in our study, delay in transporting patients from the ward constituted 14% of delays. There were 8 porters and only one was responsible for transport of patients at any given time. Better communication between the ward and the theatre via intercom or hospital mobile phones would improve transport of patients and assist in reducing delay.

Tyler et al,²¹ ran simulations with turnover times of 10, 20 and 30 minutes, within the working hours of 8am to 4pm. The results showed that with a 10 minutes turnover time ,9 procedures could be performed ;with a 20 minutes turnover time ,8 procedures could be done and with a 30 minutes turnover ,only 7 seven procedures be performed ²¹ When 3-hour procedures were included, and with a 30-minute turnover time, only 2 of these procedures could be carried out. In our study, with an average turnover time of 49 minutes only two major (3-hour) procedures could be performed daily . It is

therefore obvious that when turnover time is shortened, more cases can be performed within scheduled working hours .

Another study done in Brazil reported an interval of 119 minutes which was 4 times greater than the ideal quoted in the literature.¹ They deduced that prolonged turnover times they found was due to the Public Health System in that country being overburdened as the number of patients far outweighed the number of staff/availability of theatre space .This and other studies also found laxity/inefficiencies in the system especially in public hospitals which they blamed on the fact that staff remuneration was independent of hospital internally generated revenue .^{1,22} This may mean that the motivation to generate revenue for the hospitals may not be there .The same study reported that a private hospital that had a 30 minutes delays incurred a loss of 150 million US dollars in revenue per year ¹.

In our study we found that issues related to CSSD was also a major cause of delay in turnover time. The hospital had only 1 functional autoclave machine which sometimes broke down from overuse because of insufficient number of gowns and instrument packs that had to be autoclaved in between surgeries .Al-Saffar²³ in his dissertation in Dublin suggested that a check list for the content of each surgical set would go a long way to reduce the challenges associated with the delays from CSSD. He also recommended having the signature of the staff who packed the set in the CSSD and that of the staff that checked the set in the theatre .He further proposed that staff on night shifts should autoclave packs in order to help early starts of surgeries in the mornings. New staff posted to the unit should also be adequately trained . Use of disposable drapes, scrubs and instruments including automated cleaning equipment would help reduce TOT and manpower requirements.²⁴

Power failure occurring sometimes at induction has been reported in some of the theatre suites during the course of the research and is a major source of concern as it affected 32 procedures .This occurs several times during a theatre session and could last up to an hour. This has significant effect on the TOT and on the mental status of the operating team and most importantly the life of the patient .The theatre should have its own alternate power supply independent of the general hospital supply . Use of solar energy would help augment the power supply as well.

The absence of the lead surgeon in the OR at the beginning of procedures accounted for 5% delays .This has implication on hospital income generation and patient waiting list .The issue of laxity in the public health sector could also be a contributory factor here.^{1,22} Thus ,an overhaul of the laid down procedures should be carried out to improve the overall efficiency ;this

could include empowering the theatre users 'committee of the hospital to install a log-in-log-out system to monitor movement of staff in the theatre .Though this study did not consider the number of cancellations that resulted from delays a previous study from the same institution showed a high cancellation rate for surgeries of up to 25% of scheduled procedures.¹²

Great efforts should be aimed at reducing the turnover time as the potential benefits will be increase in theatre efficiency, staff productivity and number of procedures carried out. Better communication between the ward and theatre via the intercom or hospital mobile phones would improve transport of patients.

Conclusion

We found multiple factors responsible for delays in turnover time in our theatre the most prominent of which are delay in cleaning of operating suites, CSSD related, anaesthesia related and delay in patients transport from the wards. A multidisciplinary approach where all parties involved in surgery improve on their efficiency may help reduce turnover time. In addition, improvement in the number of perioperative nurses, theatre attendants and trained personnel would allow more surgeries to be scheduled per day and thus result in shortened waiting lists reducing stress on patients.

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