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RESEARCH ARTICLE

OPTIMIZATION OF CHANGEOVER TIME IN AN OPERATION THEATRE : ENSURING PATIENT SAFETY

***Dr. Manasvi Praveen Kumar, Dr. Shahaji Deshmukh and Dr. Erach Bharucha**

Bharati Vidyapeeth Deemed University Center for Health Management Studies and Research, India

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ABSTRACT

Introduction: The interval between two surgeries is one of the important determinants of efficiency of an operation theatre. While shortening the time between two surgeries is related to efficiency, undue haste can be counterproductive as it increases risks related to infection and accident. Thus this is an optimum inter surgery period that removes unnecessary waste of time but pays extra attention. This delay can be improved by using a protocol which can improve efficiency and reduce risks. This interval is called the operation theatre changeover time.

Aim: The aim of this paper is to explore the factors responsible for variations in change over time in the operation theatre related to general surgical procedures and to come up with the suggestion to optimize it.

Material and Methods: Thirty instances of changeover time were captured by following general surgery patient in a general surgery operation theatre of a teaching hospital of Maharashtra**.** Data was collected through direct observation with the help of a checklist.

Results: The average changeover time computed in general surgery operation theatre is 36.5 minutes, median 30 minutes. Whereas cleaning time is13 minutes, setup time is11 minutes and documentation time is 9 minute. Delay in clean up or set up of operation theatre for next procedure is an important factor which is one of the common reason for dissatisfaction among healthcare professionals in operation theatre.

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INTRODUCTION

The Operation Theatre (OT) in a hospital is one of the key management areas of concern as complex surgical procedures major or minor are performed on a daily basis. It requires an aseptic environment in which highly skilled healthcare professionals work. The interval between two surgeries is one of the important determinants of efficiency of an operation theatre. While shortening the time between two surgeries is related to efficiency, undue haste can be counterproductive as it increases risks related to infection and accident. Thus this is an optimum inter surgery period that removes unnecessary waste of time at the same time pays extra attention for important functions such as cleaning and setup for the next case. This delay can be improved by using a protocol which can improve efficiency and reduce risks. This interval is called the operation theatre changeover time which is a component of non operative time. Non operative time is a time interval between two surgery which is not directly committed to performing the operative procedure. It is the sum of anaesthesia-controlled time (ACT) and changeover time [also known as turnover time (TOT)]. ACT itself is the sum of two intervals that is OT anaesthesia time and OT emergence time. OT Anaesthesia time is the interval from the patient's arrival in the operation theatre to the point at which the patient is turned over to the surgeon while the other is related to the OT emergence time that deals with management of the OT itself. The changeover time is the interval begins when the surgical dressings are completed and ends when the patient leaves the OT, whether wake or not. (Krupka *et al*., 2008) In this paper change over time is defined as the time duration between departure of a preceding patient and arrival of the next patient (Dexter, 2003, Krupka *et al*., 2008). *Drew Stapleton & Nada Ghandour has described the changeover time as a very important time* because of it's direct impact on operation theatre efficiency**.** Optimization of change over time enhances the efficiency of operation theatre as well

Corresponding author: Dr. Manasvi Praveen,
Bharati Vidyapeeth University, India.

as the overall satisfaction of all its related stakeholders (viz: patient, surgeon, anaesthesiologist, nursing staff, ancillary staff etc. Optimization of this interval is one of the challenging activities for the hospital, without compromising the life or well being of patients.

Aim: This paper is a part of a research study which was conducted in a teaching hospital located at tier two city of Maharashtra (India) to explore the factors responsible for Sustainable Quality Management System in Operation Theatre. The aim of this paper is to explore the causes of variations in change over time in the operation theatre related to general surgical procedures and to come up with the suggestion to optimize the changeover time.

Objectives

1. To document the average changeover time between two surgical procedures performed in a general surgery operation theatre.
2. To identify the factors for variation in changeover time between two surgical procedures performed in a general surgery operation theatre.
3. To suggest the methods of optimization of changeover time by using zero risk protocol.

MATERIALS AND METHODS

Thirty instances of changeover time were captured by following general surgery patient in a general surgery operation theatre of a teaching hospital of Maharashtra**.** Data was collected through direct observation with the help of a checklist. Patient's departure time from operation theatre after surgery and arrival time of next patient to the same operation theatre was recorded. Analysis of data was done by using descriptive Statistics. Important activities that are carried out by various healthcare professionals during this changeover time are stated in Figure 1.

In current scenario only one nurse is assigned to operation theatre i.e. scrub nurse. Above mentioned table shows the details of the healthcare professionals involved in the activities related to change over time. Existing literature describe two main activities as components of the changeover time. The first one is operation theatre cleanup and second is the set up time (Mathais, 2000; Dexter *et al*., 2003; Mowbray, 2003). In the current scenario there is one more important activity that takes place during changeover time is documentation related to the patient who has undergone surgery. The scrub nurse is a key person who is involved in this documentation.

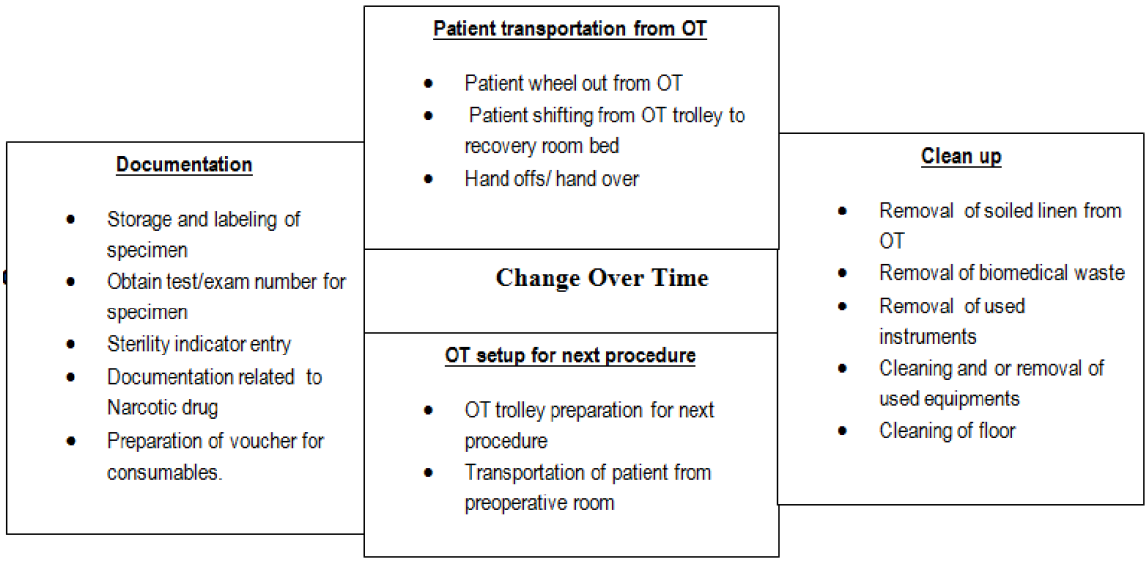


Figure 1. Change over time activities

Table 1. Healthcare professionals invovled in changeover time related activites

Process	Changeover Activities	Involved Healthcare professionals
Patient transportation	Transportation of patient from OT to recovery room	Surgery team (Including Operating Surgeon or Lecturer and residents) Anaesthesiateam (Anaesthesiologist and residents)
Documentation	CSSD supply sterility validation entry	Scrub nurse
	Storage and labeling of sample for histopathological examination(HPE) and obtaining exam number for booking of HPE of tissue specimen	Scrub nurse
	Voucher preparation for indenting of consumed pharmaceutical and disposables	Scrub nurse
	Narcotic drug consumption entry	Scrub nurse
Operation Theatre Clean up	Clearance of soiled linen and equipments	Ancillary staff (Multipurpose healthcare worker)
	Clearance of used instruments	Scrub nurse
	Disposal of biomedical waste	Ancillary staff (Multipurpose healthcare worker)
	Cleaning of floor and surfaces	Ancillary staff (Multipurpose healthcare worker)
	Operation theatre Set up for next surgical procedure	Scrub nurse and Anaesthesia team
	Patient transportation from preoperative room to Operation Theatre	Preoperative Nurse and Surgery residents or Anaesthesia residents, Ancillary staff (Multipurpose healthcare worker) or all of them

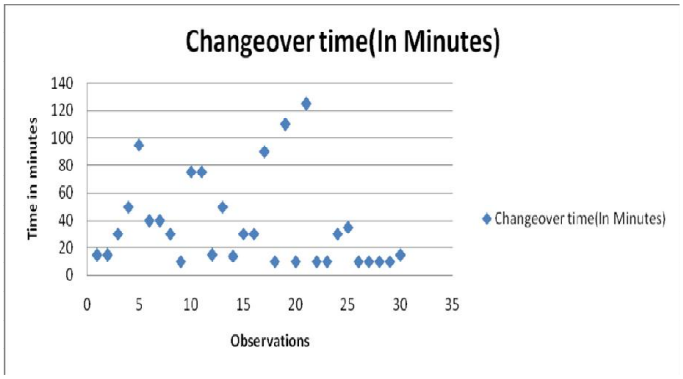
RESULTS

The average changeover time computed in general surgery operation theatre is 36.5 minutes, median is 30 minutes. Whereas average cleaning time is 13 minutes, theatre setup time was 11minutes and documentation time is 9 minutes which is computed separately for 30 surgical procedures. It should be noted here that there are certain activities which is dependent on preceding activities and some are independent and may also require involvement of the same healthcare professionals. Changeover time starts when patient leaves the operation theatre Krupka *et al*. (2008). Then patient is transported to the post anaesthesia recovery room by the multipurpose healthcare workers (MPW) assigned to general surgery operation theatre. As per the hospital protocol this patient should be accompanied by the surgical team including personnel from the surgery department, anaesthesia department and scrub nurse, so surgical team shifts the patient to the post operative recovery room. The scrub nurse completes the documentation related to the procedure after giving the handover of patient to the post anaesthesia recovery nurse. After the completion of documentation and handover she comes back to the same OT for setting up of OT for next patient.

Table 2. Sequential & Parallel Changeover activities

Sequential activities	**Parallel Activities** (carried out by different healthcare professionals)
Transportation of patient from OT to recovery room, OT clean up and OT setup for next patient	Documentation and OT clean up (Waste disposal, floor and surface cleaning)

Fig.2. Time spent for changeover of OT for next surgical procedure



Changeover time Categories	Frequency	Frequency Percentage (%)
< 20 minutes	14	47%
20-40 minutes	8	26.5%
> 40minutes	8	26.5%
Total	30	100%

DISCUSSION

This study does not calculate the financial gain or loss by the optimization of change over time but ensures patient safety and will have a positive relationship with multiple stake holder satisfaction by preventing delays due to change over time. Median value of changeover time calculated for orthopedic surgery by a management firm in 42 hospitals and 24 ambulatory surgery center (Patterson, 1999) was 26 minutes where as Dexter *et al*. (2003) has computed average turnover time 34-66 minutes. A study conducted in a university hospital of Brazil shows the average changeover time between two surgery is 35.6minutes (Marli de Carvalho Jericó *et al*., 2008) similar to the average change over time of current study that is 36.5 minutes. Average cleaning time calculated separately for general surgery operation theatre in this study is 13 minutes and it is similar to the changeover time calculated by Drew Stapleton *et al* that is 10 to 15 minutes. However the study of Marli de Carvalho Jericó *et al*. (2008) which was conducted in the University hospital of Brazil shows the average time taken for post-surgery cleaning of operation theatre is 7.1 minutes. A study conducted in the teaching Hospital of interior of São Paulo (Marla Andréia *et al*., 2011) shows linear relationship with cleaning time and duration of surgery, and advocates that long duration of surgery has long duration of cleaning time. In the contrary of this, a study of Marli de Carvalho Jericó *et al*. (2008) reports no relationship between duration of surgery and duration of cleaning of OT. Delay in clean up or set up of operation theatre for next procedure is an important factor which is satisfaction among healthcare professionals operation theatre. As per the American scoring system for changeover time high performance surgical facilities changeover (turnover time) is less than 25 minutes, medium performance facilities is between 25-40 minutes and low performance facilities' turnover time is more than 40 minutes (Journal of ASA 2006). According to this classification in the present setting, OT falls into medium performance surgical facility. It should be noted that this classification is for American surgical facilities, so there may be other determinants responsible for changeover /turnover time of operation theatre in Indian setting. Majority of the studies shows that the optimum time duration between two surgeries should not be more than 20 minutes. Observation data shows that there is not much variation in the changeover time in the first half of the day (before lunch hours). In 47% cases, changeover 20 min, in such cases, scrub nurse prepares the operation theatre instrument trolley under the directives of surgeon for all the surgical cases assigned to that particular OT before the starting of the first surgery. However in some cases surgeons insist the scrub nurse to prepare instrument trolley after their arrival in the operation theatre. Non availability of multipurpose healthcare workers (MPW) and circulating nurse due to inadequacy of human resource is also one of the common reasons for delayed changeover time. Documentation is an additional activity for the scrub nurse which increases the changeover time. The changeover can be optimized as per the standards set by the hospitals of developed country by delegating the few responsibilities to circulating nurse of e.g. documentation related activities and shifting of the patient to post anaesthesia recovery room.

Conclusion

Optimization of change over time will help management to balance both the efficiency and the patient safety. Extra time taken between the surgeries reduce the efficiency of operation theatre and also creates the dissatisfaction among the multifunctional team members**.** Unavailability or inadequacy of multipurpose healthcare workers is one of the main causes of delay in cleaning process time. However reduction in

changeover time cannot be compromised on the essential activities that are related in either direct or indirect ways that may compromise patient safety.

Future Research

This study gives a broader view related to change over time in general surgery OT and in the future a comparative study for OTs for different specialties can be done. This study does not reveal any relationship between duration of surgery and turnover time and setting up time. After the implementation of suggested changes in process and responsibility redesigning a study can be conducted to measure the post implementation effect in changeover time.

REFERENCES

Adams, R., Warner, P., Hubbard, B., Goulding, T. 2004. Decreasing Turnaround Time Between General Surgery Cases: A Six Sigma Initiative. *Journal of Nursing Administration*, 34(3), 140-148.

Dan C Krupka &Warren Sandberg international Journal of Healthcare Technology And Management, Reducing Non-Operative Time: Methods And Impact On Operating Room Economics (July 2008)

Dexter, F. Why Try To Reduce Turnover Time? Or Manager, (2003)16 (1).

Fischman, D. 2010. Applying lean six sigma methodologies to improve efficiency, timeliness of care and quality of care in an internal medicine residency clinic. *Quality management in health care Journal*, 19: 201-210.

Henderson, D., Dempsey, C., Appleby, D. A Case Study of Successful Patient Flow Methods: St. John's Hospital, Frontiers of Health Services Management. 20(4), 25-31.

Marla Andréia Garcia De Avilaa, Suzimar De Fátima Benato Fuscob, Ivana Regina Gonçalvesc, Sílvia Maria Caldeirad, Carlos Roberto Padovanie, Hugo Hyung Bok YoofTime 2011. For Cleaning And Room Preparation: Connection Between Surgery Size And Professional Perspectives.

May, E. 2004. Optimizing Patient Flow. Healthcare Executive, 19(6), 32-34.

Operating rooms efficiency project. Six sigma black belt report: operating room process improvement. University of Michigan, College of engineering. Starting the first surgical case on time to cut delays (2009).

Patrick Garner Proceedings Of The Industrial And Systems Engineering Research Conference G. Lim And J.W. Herrmann, Eds. Complexities In The Operating Room (2012)

Sanjeev Singh, Remya T.1,Shijo T. M.1, Dinesh Nair2, Prem Nair The Journal of National Accreditation Board for Hospitals & Healthcare Providers, Lean six sigma application in reducing nonproductive time in operation theaters. (Jan-Jun 2014) Vol 1

Wiljeana J. Glover and Eileen M. Van Aken, Kevin Creehan, John Skevington Expo II, Proceedings of the Society for Health Systems Conference and: Case Study on Using Lean Principles to Improve Turnaround Time and First (2009)

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