



OPERATING ROOM TIME ANALYSIS IN A TERTIARY CARE HOSPITAL : TO FIND BOTTLENECKS FOR IMPROVEMENT

Management

Dr. Mede Charan Raj*

Senior Resident, Department Of Hospital Administration, AIIMS, Mangalagiri.
*Corresponding Author

Dr. Mohd. Aamir Osmani

Chief Executive Officer, Muslim maternity & Children's Hospital.

Dr. N. Lakshmi Bhaskar

Associate Professor, Nizams Institute Of Medical Sciences, Hyderabad.

ABSTRACT

BACKGROUND: Operating rooms (ORs) cost constitute a major investment of healthcare resources, approximating $1/3^{rd}$ of the total hospital budget and are among the most important areas of the hospital, contributing to both the workload and the revenue. *OR efficiency* is defined functionally in terms of underutilized and overutilized hours of OR time.

METHOD: A two part study containing a prospective analysis time motion study of the operating room (OR) database to retrieve only the cases involving five major operation theatres followed by a dichotomous open formal questionnaire with yes or no options to take the opinion of the operating room staff i.e., consultants, residents (both surgeons and anesthetists) and nurses

RESULTS: Based on the time motion study the delays were mostly identified in *T1-Wheel in time*, *T2-Anesthesia induction* *T6-cleaning of OR*. In part 2 of the study it was evident that 65 % of the staff were of an opinion that OR is currently underutilized, 45% of the staff opined that significant time is wasted between two surgeries and 75 % opined that they couldn't complete the scheduled list.

CONCLUSIONS : Proper scheduling of regular cases and clarity in preparation of OT list, augmenting the man power, establishment good supply chain by providing sub stores in operation operating room, arrangement of sterile supplies and other equipment for the OR adequately by nursing staff could possibly lead in effective utilization of the Operating room time.

KEYWORDS

Operating room, OR time utilization, Time motion study, Delays in OR time utilization

INTRODUCTION

Operating rooms (ORs) cost constitute a major investment of healthcare resources, approximating $1/3^{rd}$ of the total hospital budget and are among the most important areas of the hospital, contributing to both the workload and the revenue. *OR efficiency* is defined functionally in terms of underutilized and overutilized hours of OR time¹

Efficiency of use of OR time depends on scheduling of cases, allocation of staff, equipment, time required for preparation and induction of anesthesia, performance of surgery, recovery from anesthesia, preparation of the OR for the next patient and other resources. Delay in starting lists, under-scheduling, interruption due to emergency surgeries, administrative reasons, induction of anaesthesia and recovery policies are the main factors that account for inefficient use of operating facilities². It is difficult to set standards with regard to time utilization for all ORs as these can vary considerably depending on the type of hospital, type of ORs, type of surgery and anesthesia, patient's health profile etc. Several studies have shown organizational issues to be the cause of effective OR utilization such as lack of sufficient theatre time, overrunning of the lists and poor coordination of the staff³⁻⁵. Healthcare providers seek ways to reduce the cost of health care services and Hospital Operating rooms (ORs) were identified as potential areas for cost reduction efforts..

AIM OF THE STUDY

To perform a thorough and step-by-step assessment of operating room (OR) time utilization, with a view to identify the bottle necks, if any, in efficient OR time utilization and to identify areas of further improvement.

METHODOLOGY:

During a 4-month period, this Study was done in two parts : Part 1 includes a prospective analysis time motion study of the operating room (OR) database to retrieve only the cases involving five major operation theatres. For each individual, seven different time intervals were collected from the OR chart:

1. Wheel in of the patient(T1)- Time taken from ward to operation theatre,
2. Induction to anaesthesia (T2)- includes preparation of each patient, catheterization of peripheral or central vessels (veins and arteries), and finally tracheal intubation.

3. Preparation for surgery (T3) proper positioning of the patient, insertion of urinary bladder catheter, patient disinfection, and draping and other inter alia procedures.
4. Duration of surgical procedure (T4) time period between skin incision to closure of wound.
5. Recovery from anesthesia (T5)- includes, the time from the closure of the wound to the extubation of patient and slight recovery in OR,
6. Cleaning of the operating table (T6).
7. Transfer of next patient into OR (T7).

Part 2 contains a dichotomous open format questionnaire with yes or no options to take the opinion of the operating room staff i.e., consultants, residents (both surgeons and anesthetists) and nurses. A total sample of 60, 20 consultants, 20 residents and 20 nurses were taken from the five major operating rooms using opportunity sampling technique for the study

RESULTS

Detailed data regarding the mean total time that the patient remained in the OR in the different group of operations are presented in Table 2. With the exception of duration of surgery, the remaining time intervals in each study group were comparable.

Opinions were taken regarding delay in start of OR and the reasons for delay

- OR starts on time?
- Delay in the arrival of surgeons and anesthetist?
- Delay is due to staff nurses?
- Delay is due to supporting staff?
- Delay is due to lack of sterile supplies?
- Delay is in the readiness of other equipment?

DISCUSSION :

During the time of our study a total number of 60 surgeries times were studied randomly in five major operation theatres out of 135 scheduled cases. Our data showed that in our tertiary care hospital the time intervals of seven typical stages of OR time utilization concerning in various surgeries the overall mean times were calculated for T1=33 minutes, T2 58 minutes, T3 19 minutes T4 130 minutes T5 18 minutes T6 31 minutes T7 12 minutes respectively. Based on the time motion study the delays were mostly identified in *T1-Wheel in time*, *T2-Anesthesia induction* *T6-cleaning of OR* which has an indirect effect

on the delays of the further posted surgeries leading to the underutilization of Operation rooms. In part 2 of the study it was evident that 65 % of the staff were of an opinion that OR is currently underutilized, 45% of the staff opined that significant time is wasted between two surgeries and 75 % opined that they couldn't complete the scheduled list and the major reasons were sorted out to be the delay is due to lack of sterile supplies, readiness of the OT equipment and delay is due to nursing issues. Subsequently the following recommendations were given Proper scheduling of regular cases and clarity in preparation of OT list, augmenting the man power, establishment good supply chain by providing sub stores in operation operating room, providing anesthesia recovery room for anesthetic preparation, arrangement of sterile supplies and other equipment for the OR adequately by nursing staff could possibly lead in effective utilization of the Operating room time. Various other approaches were suggested for improving the efficiency of Operating room time utilization i.e. computerized scheduling of the cases, implementation for Operating room management system through Hospital management information system, utilization monitoring and refinement of scheduling policies and procedures. The most important step to maximizing OR efficiency is to allocate OR time appropriately⁽¹⁾. Then, only rarely should services encounter the situation wherein their allocated OR time is full and, yet, they have another case to schedule^(1,).

Table 1: Mean times in various Operation rooms

OPERATIONS	T1	T2	T3	T4	T5	T6	T7
NSOT	41	75	20	110	20	40	12
ORTHO OT	29	62	30	90	20	20	8
CT OT	38	78	15	290	15	40	18
UROLOGY	29	23	20	95	15	25	15
SGE	28	52	10	65	20	30	7

Table 2: Opinions of Healthcare workers

	CONSULTANTS (n=20)		RESIDENTS (n = 20)		NURSES (n=20)	
	YES	NO	YES	NO	YES	NO
Ot starts on time	3 (15%)	17(85%)	8 (40%)	12(60%)	7 (35%)	13(65%)
Delay in the arrival of surgeons and anesthetists	6 (30%)	14(70%)	7 (35%)	13(65%)	10 (50%)	10(50%)
Delay is due to staff nurses	2 (10%)	18(90%)	10(50%)	10(50%)	6(30%)	14(70%)
Delay is due to LACK OF supporting staff	12 (60%)	8(40%)	14(70%)	6(30%)	9 (45%)	11(55%)
Delay is due to lack of sterile supplies	4 (20%)	16(80%)	6 (30%)	14(70%)	11 (55%)	9(45%)
Delay is in the readiness of OT equipment	16(80%)	4(20%)	13 (65%)	7(35%)	14(70%)	6(30%)
Delay in shifting of patients	17 (85%)	3(15%)	18 (90%)	2(10%)	12 (60%)	8(40%)

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