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Original Research Paper

Nursing

FACTORS THAT INFLUENCES OPERATING ROOM UTILIZATION AND EFFICIENCY IN TERTIARY HOSPITAL

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ABSTRACT Operating room (OR) utilization and efficiency has a direct impact toward OR performances, clinical outcomes, safety cultures, revenue generation and patient satisfaction. This study was conducted to explore the factors that influences OR utilization and efficiency in tertiary hospital, Kingdom of Saudi Arabia. A retrospective study was conducted from January 2019 to April 2019. Quantitative and descriptive data analysis method was used. A purposive sampling method composed of elective surgical procedures performed during OR Block Time (BT). The results showed total of 80.9% elective case were operated and 19.1% were cancelled. There were delays on 322 days (63%) in first case start-time during OR BT scheduled. The total OR raw utilization was 164,687 minutes (59.7%), total OR turnover time was 33,928 minutes (12.3%) and total OR procedure time was 198,615 minutes (72%). Patient preparation and related issue are among most common causes for case delay and cancellation. Study of OR time utilization and factors contributing to case cancellation, delay of first case star-time and OR turnover are important in examining an optimal OR utilization during BT schedule in OR.

KEYWORDS : OR utilization, OR turnover time, Case cancellation, OR performance

INTRODUCTION

An efficient OR management of OR time is important to enhance high OR utilization, improve quality of surgical outcome, decrease high turnover time, reduced surgical complication and surgical waiting lists as well as promote greater patient satisfaction. There are few important factors in OR and perioperative setting that have direct impact and influence towards OR utilization and efficiency which includes accuracy of OR scheduling, OR start-time, OR turnover time, intraoperative delay time, extending of surgical procedure time, overbooking, bed management, availability of resources, hospital system and patient related issue (Lyons, 2014). Most of hospitals aimed to increase OR efficiency and patient safety through develop data recording system to measuring OR performance and established best practices with the intent of continuous performance improvement (Fizler *et al.*, 2013; Agnoletti *et al.*, 2013).

AORN define OR utilization as a percentage of time a service utilize its Block Time (BT) during Resources Hours (RH) (AORN, 2014, p.654). It is the quotient of hours of OT time actually used during elective resource hours and the total number of elective resource hours available (Stepaniak, 2013). An appropriate method to measure how well or efficient OR functions in general because it is highly resource intensives which contributes to both clinical surgical outcome and high consumption of hospital resources, workload and revenue (Portal *et al.*, 2013). OR efficiency can be described and measurable by the length of OR Turnover Time (TOT) and patient cancelation (Lyons, 2014). TOT involves various element such as time required for preparation of surgical equipment, time required for cleaning and disinfectant the OR for the next surgical procedure within the organization recommended standard time frame setting for each case interval.

Cancellation of surgical case is defined as an elective surgical procedure that was schedule during OR allocated time is not performed on the day of surgery (Desta *et al.*, 2018). Besides, Yu *et al.* (2017) it found that cancellation of elective surgical case has significant impact on OR efficiency and utilization is avoidable by taking preventive and corrective measures. The significance of the study is important to determine the influencing factors and provide future recommendation, develop effective strategic planning to improve efficiency and optimal time utilization of available resource hours in OR department. Furthermore, the finding enables perioperative leadership to identify non-random variability in their OR schedule and prospectively redesign their system to accommodate additional demand (Ranganathan et al., 2013). The aim of this study is to determine the factors that influences OR utilization and efficiency follow by recommendation for improvement include identifying gaps, determine factors that influences OR utilization and its efficiency through the unit operative process (Talati *et al.*, 2015).

MATERIALS AND METHODS

A cross-sectional study design was used to identify factors that affect OR utilization and efficiency in tertiary hospital, KSA. A descriptive study - inferential statistics were planned and purposive criterion sampling method been used to select all elective surgical procedure operated within 7 units OR which including major and minor procedure during OR Block Time (BT) in tertiary hospital, KSA from 1st Jan to 30th April 2019. Total of 2019 samples were collected from Jan – April 2019 which consist of 1634 elective surgery cases performed and 385 elective case cancellations were collected. Power calculation formulated by Raosoft (2004) sample size calculation is 323 confidence level of 95%. The time spent on raw utilization and adjusted utilization (mean) were compared by using T-test, was significant different among OR for P-value of <0.001. OR performance and efficiency, element such as first cases start-time, cancelation rate and turnover time which is important factors influencing OR Time, affecting OR operational process and efficiency during allocate OR hours would be analyzed using efficiency scoring system adapted from Macario (2006).

RESULTS

Data were obtained for 1634 surgeries cases carried out during 4599 hours of OR Block Time (BT) of 7 units main OR. The total of OR raw utilization was 164,687 minutes (59.7%), total of OR turnover time was 33,928 minutes (12.3%) and total of OR procedure time (adjusted percentage of utilization) was 198,615 minutes (72%). The result of the study for raw utilization and procedure time was significantly different among OR rooms ($P<0.001$), whereas the OR turnover time was not significant different among the various OR room ($P=0.081$). The characteristic was statistically significant different ($P<0.001$).

Variation in time utilization

OR utilization mean time spent on different parameters among the OR room [Table 4.3]. Total OR raw utilization was 164,687 minutes [Mean: 113.47 (67.40)], total of OR turnover time was 33,928 minutes [Mean: 20.40 (28.46)] and total of OR procedure time (adjusted percentage of utilization) was 198,615 minutes [Mean: 136.18 (70.28)]. Both result of the study of raw utilization and procedure time was statistically significant different among OR rooms (P<0.001), whereas the OR turnover time had no statistically significant different among the various OR room (P=0.081).

Case Cancellations

Generally, a target of < 2% is set as benchmark for the overall proportion of case cancellations on the day of surgery. A total of 2019 elective surgeries were scheduled on the 7 OR room under observation during the study period. 19.1% (385 out of 2019) cases were cancelled due to various reasons [Figure 1]. Overall, OR efficiency on case cancellation shown poor performance which is exceeding > 10% according to the OR efficiency scoring scale.

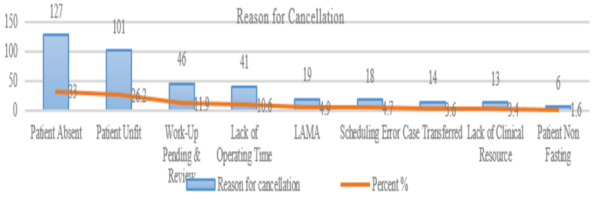

Figure 1: Stated reasons for case cancellations (n=385)

Delay in first case start-time

OR room efficiency related to first case start-time on various OR room [Table 4.6] and reason of the delay [Figure 4.2] were presented. There were 322 (63%) days delays in starting the OR at the BT scheduled time at 08:00 hours during the study period. The results shown that only 37% (n=189) surgeries started on time according to scheduled time. Overall OR room efficiency on first case start on time was under performance which is exceeding>15 minutes according to the OR efficiency scoring scale except for OR room no.3 (47/84 = 56%) compared to other OR room.

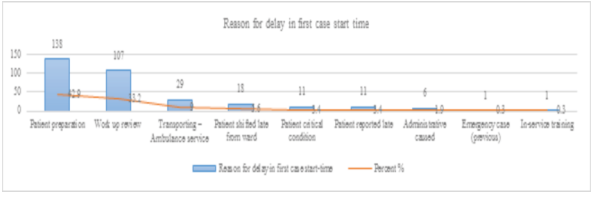

Figure 2: Reason and number of delays in starting time (n=511)

DISCUSSION

Variation in OR Time Utilization

Overall result shows raw utilization of 59.7% was below hospital KPI target (benchmarks > 80%) compared to other findings of the other's study. An audit of OR turnover time done by Ranganathan *et al.* (2013) and Vinukondaiah *et al.* (2000) reported a percentage mean of 3% to 4% which is much less than other studies and showed that 91% to 96% rate of total procedure time, which could be considered high level OR performance in achieving OR efficiency and OR utilization. This including efficiency of clinical setting, clinical environment as well as medical equipment can be easily setup allocated and fixed permanently inside the OR room without shifting out form the room in between or after the case to minimize equipment movement for one to another, preparing the procedure with familiar procedure setting require same skill and competency would help to reduce the turnover time in OR. It also indicated that time spent maximum of 5 minutes (mean of 3 minutes) was taken as maximum permissible OR interval during turnover case which used for transferring the patient from OR to PACU, cleaning and preparing the OR as well as shifting the next patient onto the OR table.

Case Cancellations

Surgical case cancellation significance to poor OR utilization and wastage of healthcare resources. According to Australia department of health (NSW Health, 2007), the benchmark of < 2% for rate of surgical case cancellation established in 2012 which concluded patient related medical illness was set at < 1% and patient failure to attend was < 0.5%. Nevertheless, Lew *et al.*, (2018) reported that 50% of first case cancellation and case delay was related to inadequate pre-operative preparation, incomplete documentation included informed consent, pre-operative assessment, patient medical history information and laboratory result which caused inefficient of OR utilization, frustration of the patient and perioperative staff as well as impact on the hospital revenue.

Delay in first case start-time

Delay in first case start-time is one of the contributing factors affecting efficiency and time utilization in OR. Delay of OR start-time implicated as a significant component of underutilization of OR time in several studies. Penasales *et al.* (2017) revealed that competency identified the gap between nurse's knowledge and practice. Competency reflect an ability to of the nurse to perform required tasks as safe practitioners to render high quality perioperative nursing care with an adequate clinical knowledge, skills and attitude especially in-patient preparation should be completed before transferring the patient to the OR.

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