**Measuring the efficiency of the Operating theatre at a tertiary care centre: where does the time go?**

**INTRODUCTION**

In the current healthcare environment, operating suites have become the center point of a hospital’s performance. Operating rooms incur high expenses, estimated to be up to 40% of a hospitals expenditure, and generate major revenue (1). Poor utilization of operating room time also leads to patient and provider dissatisfaction. Given the expanding need for surgical care, it is crucial for operating theatres to control processes and minimize inefficiency; delivering high-quality care at minimal cost, time and space (2).

Operating rooms are complex environments where multiple resources need to assimilate in a timely manner to provide surgical care which is itself unpredictable in nature. It is important to identify and measure key performance indicators for meaningful assessment of utilization and downtime. One metric frequently on the dashboard of OR management is the first case start time. In a large multicenter analysis done in Germany over 22 hospitals, the first case was delayed 40-70% of the time(3). Another study done at four operating rooms over a period of four months at a neurosurgical center in Bangalore India a total of 140 hours of operating room time was lost to late starts of first case (4). Another important indicator of operating room efficiency is off-hour surgery. Off-hour surgery are the percentage or volume of procedures performed outside the scheduled OR time. The Canadian pediatric surgical wait time project, a nation-wide endeavor to reduce waiting times for patients, includes off-hour surgery as one of the most critical indicator of OR performance (5). At our institution it has been observed that elective lists often over-run the scheduled time and end late into the night creating concerns for patient safety and increasing burden on staffing requirements.

A few years ago there has been a re-structuring of the operating rooms scheduling at our hospital and emphasis has been placed on decreasing downtime. After this change, Hasnat et al studied the turnover time of 7 operating rooms at AKUH and identified that there was a delay in the turnover time in one out of every four surgeries (6). There has been no other published assessment of the performance metrics of the operating suite. Recently, the economic slowdown throughout the country and the austerity measures adopted within the hospital provide an ideal opportunity to focus on improving efficiency within the operating suite. The investigators intend to measure the first case delays and off-hours surgery at the operating suite of our hospital as a baseline assessment in order to subsequently conduct a quality improvement project.

**OBJECTIVE**

To measure the frequency and duration of elective operating theatre first case delays at the operating rooms of AKUH.

To measure the percentage of off-hour surgery in the elective OR lists in the operating rooms of AKUH.

**OPERATIONAL DEFINITIONS:**

First case delay: is defined as the first patient wheel in time later than the scheduled start time of the elective operating room (7).

Off-hour surgery: is defined as the percentage of elective surgeries performed outside of the scheduled operating room time.

Operating Suite: For the purpose of this study we will analyze data from OR 1 to OR 17 excluding the cardiac surgery operating room i.e. OR 9 and 10

**MATERIALS AND METHODS**

a)      Study Design:

Retrospective Audit

b)      Setting :

The Aga Khan University Operating Suites.

c)      Sample

12 months data will be collected from Jan 1 2018 till Dec 31 2018 of the Operating Suites from the critical care management system of the hospital.

**DATA COLLECTION**

After approval from the Hospital ethical review committee data will be collected retrospectively from the operating theatre database named critical care management system. This data is collected daily by the operating room team and relayed to the operating room management where the assistant head nurse of the operating suite is responsible amalgamating and supervising its entry onto the electronic record. CCMS has details of each operating room times from start of day till finish of the last surgery including the time for patient transfer from ward to OR. Record of the type of patient admission, procedure name details of surgical and anesthesia teams is also available. The data will be extracted after permission, with the help of the IT department onto an excel file. This data will be cleaned for relevant information and analysis will be carried out as mentioned below. Patient specific information i.e. medical record number and will be omitted during cleaning of data and will not be part of the analysis.

**DATA ANALYSIS**

Data will be analyzed by Statistical packages for social science version 22 (SPSS Inc., Chicago, IL). Mean and standard deviation will be computed for the intervals defined in “Operational Definitions” i.e. anesthesia induction time, surgical preparation time, extubation and shifting time, turnover time, actual surgical time, turnaround time. Frequency and percentage will be computed for qualitative observations such as patient’s type, procedure performed, anesthesia type. These time intervals will be compared across different procedures. Independent t-test will be used at p≤ 0.05 level of significance to note any differences. Data will be visualised using box plots with error bars.

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