



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكرو فيلم

بسم الله الرحمن الرحيم



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التوثيق الإلكتروني والميكروفيلم



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جامعة عين شمس

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Studying Operating Room Utilization at Cardiothoracic Hospital, Ain Shams University

Thesis

Submitted for Partial Fulfillment of Doctoral Degree in
Public Health

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دراسة إستخدام غرف العمليات بمستشفى أمراض وجراحات القلب بجامعة عين شمس

رسالة

توطئة للحصول على درجة الدكتوراه في الصحة العامة

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List of Abbreviations

ASU	Ain-Shams University
CTH	Cardiothoracic Hospital
CMP	Case Mix Problem
DMAICS	Define, Measure, Analyse, Improve And Control
HIV	Human Immune Deficiency
HBsAg	Hepatitis B Surface Antigen
ICU	Intensive Care Unit
MSSP	Master Surgery Scheduling Problem
NHS	National Health System
OR	Operating Room
PDSA Cycle	Plan Do Study Act Cycle
PDCA Cycle	Plan Do Check Act Cycle
SSP	Surgery Scheduling Problem
TOT	Turn Over Time
TPOT	The Productive Operating Theatre
USA	United States of America

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Abstract

Background: Running an operating room is a very expensive process. Meanwhile, operating room revenue represent the biggest share in hospital revenue, hence comes the importance of proper operating room utilization. Cardiothoracic surgeries differ from other surgeries in that they are usually very long and expensive especially in a tertiary level facility. However, studies of time utilization in cardiothoracic services are scarce. **Objectives:** This study aims to calculate operating room utilization indices in Ain Shams Cardiothoracic surgery hospital and to identify factors affecting it as well as to plan to improve operating room utilization in the hospital. **Methods:** This is a cross-sectional study that surveyed 286 operations in Ain Shams University Cardiothoracic hospital in Egypt. **Results:** Total mean adjusted utilization percentage for the five operating rooms was 68.1 ± 21.9 . Underutilization was the most frequent pattern representing 69% of 142 operating room days. Only 15.5% of operating room days reached optimum utilization levels and 9.9% exceeded to overutilization levels. 72.9% of surgeries in our sample had a delayed start with median delay time of 30 minutes. The vital few causes for operation delay were “awaiting surgeon” (34.2%) and “awaiting anesthetist” (17.7%). Total cancellation rate is 21.3% while the vital few causes are “patient prepared as stand by” “previous long operation” “change in Patient’s clinical status”, “equipment failure” and “intensive care unit bed unavailable”. Different remedies for delay and cancellation vital few causes were identified. **Conclusion:** All Operating rooms of the cardiothoracic hospital are underutilized with an opportunity for improvement. Pediatric cardiosurgery shows the best utilization. Cancellation frequency as well as sub-specialty are independent factor affecting adjusted time utilization at the studied hospital. **Recommendations:** It is recommended to prepare an action plan for the proposed remedies. Also, to establish a monitoring and feedback system for time utilization, elective operation cancellation and delay. Establishment of a surgery booking system based on predicted case duration is also highly recommended.



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Protocol of Thesis
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Introduction:

Healthcare costs are expensive and represent an economic burden worldwide on individual, organizational and national levels. In Egypt, healthcare costs per capita increased from 37\$ in 1995 to 178\$ in 2014 (World Bank, 2016). Logically, as the technology use in healthcare as well as complexity of cases and care level increase, the costs also increase. Wasting of resources adds to the problem. Running an operating room (OR) is a very expensive process. In hospitals of the united states it is estimated that one minute of operating room time costs 62\$ (Shippert, 2005). Meanwhile, OR revenue represents the biggest share in hospital revenue, hence come the importance of proper OR management (Marjamaa et al., 2008).

One of the goals of OR management is proper OR utilization which is classically defined as “the ratio of the total OR time used to the total OR time allocated or budgeted” (Strum et al., 1999). The previous definition represents the raw utilization. Strum et al. also defined both concepts of “overutilization” and “underutilization”. Each of under- and overutilization affect the economic efficiency of OR, and thus utilization is targeted to be 85%. However, in complex OR it may be less (Tyler et al., 2003).

Utilization can be applied to measure the whole use of available hours for operations “prime time utilization” or the use of time blocked by a certain surgeon or service “block time utilization”. Moreover, there are different forms of utilization; raw utilization counts only the time that a patient

is in the OR when calculating room use, and it does not consider the necessity of the turnover time that is the time from previous patient out of the OR to next patient in the OR including setup and cleanup. This is corrected by Adjusted Utilization whose calculations considers the turnover time (Fixler & Wright, 2013).

Arcidiacono et al. 2015, identified seven important factors that affect OR utilization; 1) Workday of surgery: due to different schedule of each day. 2) Block utilization: it is expected that actual utilization is high if block utilization is found to be high. 3) First-case delay: which is the difference between the scheduled and the actual start time of the first case, it results in underutilization. 4) Cancellation hours; usually this result in underutilization, 5) Total same-day add-on case duration and number of add-ons: opposite to cancellation, this may result in overutilization. 6) Number of turnovers and turnover duration: long turnover increases adjusted utilization. 7) Number of completed cases: The more cases are scheduled, the more OR prime hours are filled.

Cardiothoracic hospital (CTH) is a new hospital of Ain Shams University as it was inaugurated in 2009, it has the capacity of 200 beds, of which 120 are functioning. It has 5 operating rooms with an average of 1500 surgeries being performed per year. The hospital is engaged in the process of accreditation as it achieved the basic level of Egyptian Accreditation Program in 2015. This will facilitate data collection and the commitment to process improvement. The Raw OR utilization of the hospital during august 2016 was roughly 46%. This figure represents a large gap to optimum