

**PERFORMANCE ANALYSIS OF OPERATING ROOM: EXPERIENCE OF MOULAY
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ABSTRACT

The operating room is the financial hub of any hospital, maximizing operating room efficiency has an important implication for cost savings, patient satisfaction, and medical team morale. Like any other hospital, the operating room of Moulay Youssef hospital is the seat of several dysfunctions that will be analyzed in our work through a qualitative study over a period of three months based on a semi-directive interview of the Moulay Youssef operating room staff. Twenty one interviews were conducted including surgeons, anesthesiologists, nurses and members of the management committee. The analysis of the results according to the EGIPSS model allowed to define the main operating room dysfunctions. More studies are needed to improve the performance and the quality analysis of the operating room and to fill the drawbacks of this study.

KEYWORDS: Operating room, operating process, performance analysis.**INTRODUCTION**

The operating room is a place dedicated to invasive procedures performed by a specialized medical and paramedical staff in an aseptic environment, using an appropriate equipment to ensure patient safety.^[1]

Operating process will be defined as a set of tasks performed by different actors, in the same place and around the same patient started since the patient arrival to the operating theatre.^[1]

To measure operating room performance, hospitals need scorecards or dashboards displaying and tracking core performance indicators.^[2-3]

Scorecards should be monitored on an ongoing basis and benchmarked both internally against performance over time and externally against established best practices with the intent of continuous performance improvement.

Our challenges in this work is to measure and monitor the performance of Moulay Youssef operating room trying to fill the weaknesses of previous studies by using:

* A specific model of health care systems including both internal and external processes.

* A semi-directive interview and a descriptive analysis of the operating room components.

MATERIALS

This exploratory and descriptive study was conducted in the operating room of the Regional hospital of Moulay Youssef in Casablanca over a period of three months.

A structured semi-directive interview was developed to record information from medical and paramedical staff including surgeons, anesthesiologists, nurses and members of the management committee.

Data collection was only initiated after formal authorization was obtained from the institution and the nursing manager of the Surgical Center Unit by following the Gantt chart.

Figure 1: Gantt chart.

| Month | Année 2019 | | | | | | | | | | | | | | | |
|-------------------------------------------------|------------|---|---|---|-----|---|---|---|------|---|---|---|---------|---|---|---|
| | Avril | | | | Mai | | | | Juin | | | | Juillet | | | |
| Function/ week | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| 1- Bibliographic research and protocol drafting | | | | | | | | | | | | | | | | |
| 2- Synthesis of the bibliographic research | | | | | | | | | | | | | | | | |
| 3- Development of materials and methods used | | | | | | | | | | | | | | | | |
| 4- Writing study materials | | | | | | | | | | | | | | | | |
| 5- Field data collection | | | | | | | | | | | | | | | | |
| 6- Data processing and analysis | | | | | | | | | | | | | | | | |
| 7- Discussion of results | | | | | | | | | | | | | | | | |
| 8- Article writing | | | | | | | | | | | | | | | | |

The analysis of the results was made according to the EGIPSS model allowing to define the main operating room dysfunctions.

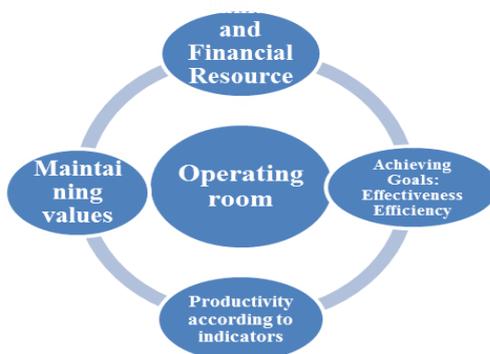


Figure 2: Conceptual framework of the operating theater according to EGIPSS.

RESULTS

The operating room of Moulay Youssef hospital is located in a limited access area, it includes six operating rooms divided into four rooms for programmed surgery and two rooms for obstetric and visceral emergencies.

The number of surgeons assigned to the hospital is 23 surgeons. Nurses, caregivers and stretcher bearers number is 20, 05, and 01 staff respectively.

Efficiency of the operating block has dropped slightly without having any impact on the hospital's own revenues.

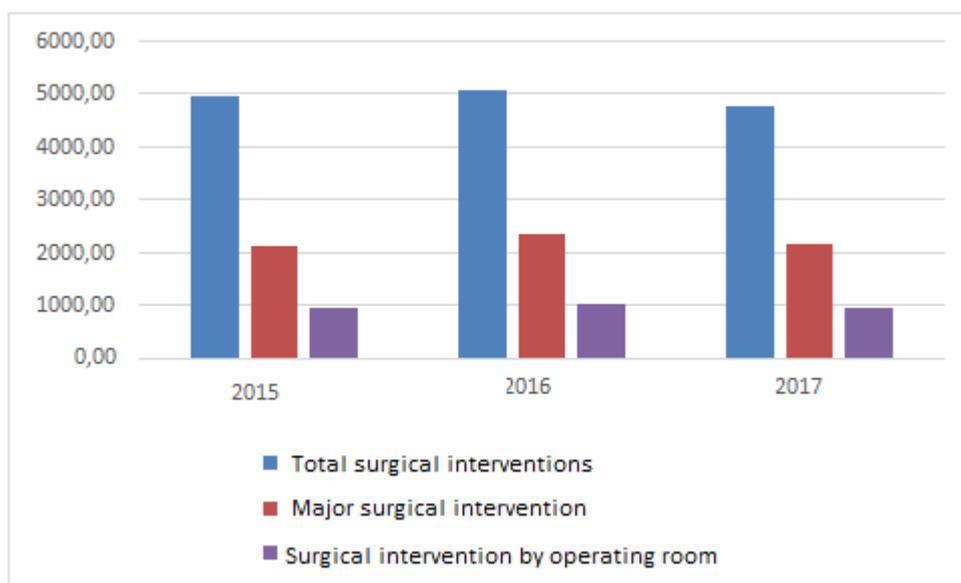


Figure 3: Number of surgical interventions by intervention type and operating room.

Table 1: Comparison of the block's performance indicators between the second half of 2017 and 2018.

| Indicators | seconde semestre 2017 | seconde semestre 2018 | Variation rate |
|-------------------------------|-----------------------|-----------------------|----------------|
| ICM | 890 | 1013 | + 12% |
| ICM/Surgeon/ week | 1,55 | 1,77 | + 12,4% |
| ICM/Operating room | 178 | 202 | + 12% |
| Total number of interventions | 2196 | 2670 | + 19% |
| IC/Operating room | 439 | 534 | + 18% |

Different factors explain the low activity of the Moulay Youssef operating theater compared to the regional level.

The 6 operating rooms available are not all functional, shortage of medical staff and qualified nurses, long delays between interventions and frequent cancellations of programmed surgeries.

Table 2: Comparison of block performance indicators between Moulay Youssef hospital and regional data.

| Indicator | Moulay Youssef Hospital | Regional |
|--------------------|-------------------------|----------|
| ICM /surgeon/week | 1.4 | 02 |
| ICM/operating room | 436 | 406 |

The semi-directive interview with the medical and paramedical staff allowed us to identify the various

causes of dysfunction within the operating block (Figure 4).

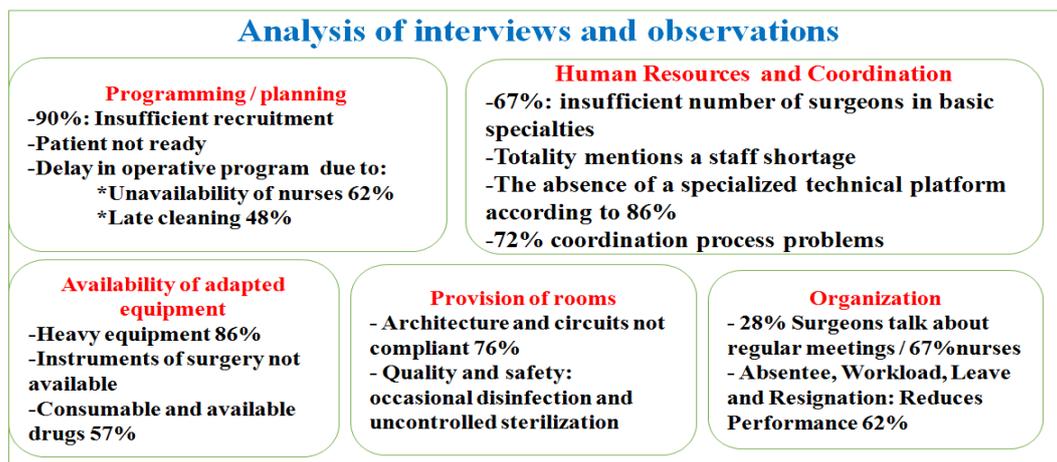


Figure 4: Interviews results.

To model the main dysfunctions in the operating room, We have chosen a cause and effect diagram (Ishikawa diagram).

The main objective is to explain the low activity of the operating Theater.

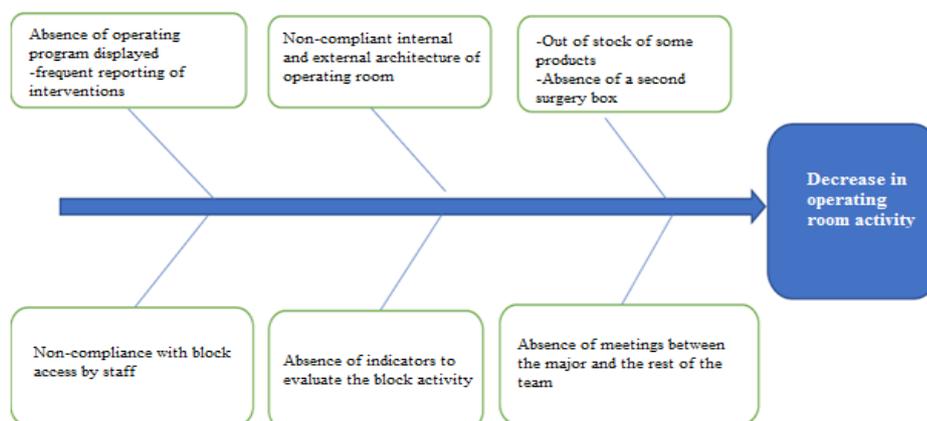


Figure 5: Modeling the factors impacting the activity according to a cause and effect diagram.

DISCUSSION

Hospitals should strive for both operational efficiency and quality patient care and should not rely on just one of these metrics or dimensions to assess the performance of its operating rooms.^[4]

From the perspective of hospital management, the choice of operating room performance measure to track is critical.

In an effort to promote consensus within the healthcare community and stimulate debate on what metrics would be appropriate for different settings, many performance metrics may be employed for the evaluation of operating rooms depending on hospital type.^[4]

Among these different performance metrics, we have adopted the EGIPSS model following a four step approach to analyze various dysfunctions of the operating theater.

This model allowed us to analyze internal aspects of organizational performance while taking into account external aspects that admit different actors of the health system and following different steps of the operational process.

Thus, the analysis of the interviews content with the managers allowed us to identify the sources of dysfunction by following a multipolar framework that rallies different dimensions of performance.

According to the EGIPSS model, to be efficient, an organization must balance four dimensions:

* **Adaptation:** the operating room of Moulay Youssef hospital suffers from a lack of human, financial and material resources especially litter capacity.

However, the theoretical litter capacity of the hospital is only 183 beds and the actual functional capacity does not exceed 135 beds which hinders the satisfaction of the needs of the population.

But these lacks does not explain the low activity of 1.76 interventions per surgeon per week divided between emergencies and programmed surgery.

* **Achievement of goals:** It is reflected by the level of satisfaction of the population. The operating room meet issues in terms of improving the quality of care and activity development.

Thus, as had emerged from the interview results, both medical and paramedical personnel complain about some logistical problems that affect customer satisfaction :

- A lack of coordination between the block and other services
- An important departure delay in the morning, in most rooms:

- Waiting time exceeding 20 minutes, even for simple cases;
- Frequent delay in leaving the rooms;
- Engorgement in the recovery room by delay of the stretcher;

***Production:** Surgeries number has dropped slightly without having an impact on the hospital's own revenues due to staff shortages and / or technical problems.

* **Maintaining organizational values:** Almost all of the interviewees have confirmed a shortage of nursing staff in the operating room, which affects the staff's quality of life, motivation and work performance.

Performance analysis according to this model led us to define the main dysfunctions noted which allowed us to answer to our research question and validate the hypotheses. suggested in the study.

The need for management indicators of a surgical theater is widespread in the literature and justified by the authors for a wide variety of perspectives.

Simulation has been a very useful tool for healthcare systems. Different objectives have been reached for the improvement of healthcare systems using simulation. Several studies reported the organizational benefits and cost savings of applying simulation to hospital planning and scheduling. Other applied simulation effort focused on the operational process flow of specific healthcare delivery units.^[5]

The main capability of simulation is to analyze what-if scenarios, which allows significant exploration of multiple options, without spending enormous amounts of expense on staffing, training, and equipment.^[6]

Macario have proposed a scoring system using 8 performance indicators to assess the performance. These performance indicators, which consist of both hospital-centric and patient-centric measures, are excess staffing costs, start-time tardiness, case cancellation rate, recovery room admission delays, contribution margin per operating room hour, turnover times, prediction error and percentage of prolonged turnovers.^[7]

The review by Cardoen, Demeulemeester, and Beliën,^[8] already demonstrates that much scientific progress has been made at various of the aforementioned planning levels to improve operating room performance.

Moreover, further recent research to better cope with uncertainty is provided by Tang and Wang who consider the tactical planning problem of robustly allocating limited operating room capacity to subspecialties so as to provide timely and accessible treatment.^[9]

Another tactical problem is considered by Dellaert, Cayiroglu, and Jeunet,^[10] who strive to balance waiting time and resource utilisation.

Jebali and Diabat,^[11] consider a problem of a more operational nature, namely to select elective surgeries, while considering uncertainties related to surgery duration as well as patient length of stay in the ICU and the ward.

To conclude, the results of this bibliographical synthesis are consistent with the results of our analysis: the problems within the operating room are multiple and very varied, their identification facilitates the design of a global action plan allowing to correct these dysfunctions at different levels.

Despite the analysis difficulties of this unit, our study represents an innovative methodology intended to reduce the existing deficiencies in terms of assessment of the hospital performance, particularly in the operating room.

It differs from other studies by the analysis of dysfunctions in the operating room using the EGIPSS methodology inspired by other models and filling their failures.

CONCLUSION

In their current environment, hospitals must develop performance assessment metrics, especially in hot areas such as operating theaters.

In our study, we have tried to reflect the possibility of improving the performance of Moulay Youssef operating theater by correcting the dysfunctions related to human, material and logistical resources.

These results may be studied by the Hospital Human Resources Department to assist in decision-making and action plans.

However, the feasibility and validation of our literature review was not easy in front of:

- The frequency of studies analyzing the evaluation of the performance of the hospital system as a whole rather than the operating environment specifically.
- Most models are not specific to the operative areas.
- Some interesting articles on the same subject are not accessible

REFERENCES

1. BONVOISIN, F. Evaluation of the performance of the operating theaters: from the model to the indicators. the University of Valenciennes and Hainault Cambresis. Healthcare, 2011.
2. Financial Management Association; McKesson Information Solutions. Comprehensive performance management in the operating room. Healthc Financ Manage, 2002; 56: 1-7 following 80.

3. Spath P. Practical guide for improving performance. OR Manager, 2004; 20: 20-3.
4. Hong Choon Oh, MEng, PhD, Tien Beng Phu, Shao Chuen Tong, Jeremy Fung Yen Lim. Assessing the Performance of Operating Rooms: What to Measure and Why? Proceedings of Singapore Healthcare, 2011; 20(2).
5. C. D. Barnes, J. L. Quiason, C. Benson, and D. McGuiness, "Success Stories in Simulation in Health Care", Proceedings of the Winter Simulation Conference, 1997; 1280-1285.
6. C. D. Barnes, J. L. Quiason, C. Benson, and D. McGuiness, "Success Stories in Simulation in Health Care", Proceedings of the Winter Simulation Conference, 1997; 1280-1285.
7. Macario A. Are your hospital operating rooms "efficient"? A scoring system with eight performance indicators. Anesthesiology, 2006; 105(2): 237-40.
8. Cardoen, B., E. Demeulemeester, and J. Beliën. "Operating Room Planning and Scheduling: A Literature Review." *European Journal of Operational Research*, 2010; 201(3): 921-932.
9. Tang, J., and Y. Wang. "An Adjustable Robust Optimisation Method for Elective and Emergency Surgery Capacity Allocation with Demand Uncertainty." *International Journal of Production Research*, 2015; 53(24): 7317-7328.
10. Dellaert, N., E. Cayiroglu, and J. Jeunet. "Assessing and Controlling the Impact of Hospital Capacity Planning on the Waiting Time." *International Journal of Production Research*, 2016; 54(8): 2203-2214.
11. Jebali, A., and A. Diabat. "A Stochastic Model for Operating Room Planning under Capacity Constraints." *International Journal of Production Research*, 2015; 53(24): 7252-7270.