

Analysis of Operating Room Design Accordance of Hospital Accreditation Standards in Jakarta in 2020

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Abstract. Patient safety protection from receiving services in the operating room is one of the goals in improving the quality of patient services as stated in the Indonesia's Ministry of Health Regulation No. 12 of 2020 which aims to improve hospitals' patient safety and increase protection for patients, the community, human resources of the hospitals, and hospitals as institutions. The existence of an operating room installation at the Muhammadiyah Hospital that has been accredited is interesting to be studied because there are similarities in the management of activities in the operating room considering that Muhammadiyah Hospital is owned by one organization. The purpose of the study is to analyze the design of the hospital operating room against regulations and the achievement of accreditation for the improvement of planning for the surgical installation at the Muhammadiyah Hospital. The study was conducted in August until September 2020. This research used a checklist form as written in accreditation elements of Surgical Anaesthesia Services and Facility Hospital Management to comply with the fulfilment of the Ministry of Health Regulation No. 24 of 2016. The results show that the compliance of Muhammadiyah Hospitals in Jakarta to the regulation, especially on the requirements of the operating room installation air conditioning system requirements are still under scoring, particularly for Health Facility Management 7 and Surgical Anaesthesia Service 8. Suggestions for the safe use of operating room installations for both staff and patients at Muhammadiyah Hospital's air conditioning system can be immediately adjusted to the applicable regulations to better the fulfilment of accreditation assessment point.

Keywords: Design of Operation Theatre; Hospital; Accreditation

1 Introduction

Health facility design is a complex process that brings together diverse stakeholders and ideally aligns operational, environmental, experiential, clinical, and organizational objectives. The challenges inherent in facility design arise from the dynamic and complex nature of healthcare itself, and the quadrupling of accountability aimed at improving the patient experience, improving population health, reducing costs, and improving the working lives of staff. Many health care systems and design practitioners adopt an evidence-based approach to facility design, defined broadly as basing decisions about the built environment on credible and rigorous research and linking facility design to quality outcomes (Halawa, 2020). An estimated 234 million major surgeries (see box 1) are performed worldwide each year, corresponding to one operation for every 25 people living.

However, surgical services are uneven with 30% of the world's population receiving 75% of major surgeries. Lack of access to high quality surgical care remains a significant problem in much of the world despite the fact that surgical intervention can be cost-effective in terms of saving lives and avoiding disability. Surgery is often the only therapy that can alleviate disability and reduce the risk of death from certain common conditions. Each year an estimated 63 million people undergo surgical treatment for traumatic injuries and another 10 million operations are performed for pregnancy-related complications. In the meantime, 31 million more are performed to treat malignancies (WHO, 2009).

Nearly seven million patients experience major complications, including one million who die during or after surgery per year. The rate of surgical complications in developing countries is estimated to be much higher. The mortality rate of patients due to surgery in developing countries is around 5 to 10% and the complication rate is around 3 to 16% (Ministry of Health, 2017).

According to WHO, evaluation is a systematic way of learning based on experiences and using lessons learned to improve current activities, as well as to promote better planning with careful selection of all future activities. Evaluation is a process carried out in order to determine policies. The operating room in a hospital is a room that has a unique environment and has strict medical and technical requirements to prevent surgical site infection (SSI) and to protect patients and hospital staff from the risk of cross-infection.

The global incidence of SSI varies between 0.9% of SSI rates in America (NHSN 2014), 2.6% in Italy, 2.8% in Australia (2002-13, VICNISS), 2.1% in the Republic of Korea (2010-2011), to 6.1% in Low Middle Income Countries (LMICs) (WHO, 1995-2015), and 7.8% in Southeast Asia (SEA) & Singapore (combined incidence between 2000 to 2012). This confirms the very high difference in incidence rates in LMICs and SEA compared to America, Europe, and Australia. The incidents of SSI occurred in the pre-surgery stage. Pre-surgery is a stage in the surgical process that starts from preoperative, surgery (intraoperative), and post-operative. Risk factors at the post-operation stage related to space facilities include inadequate movement and exchange or ventilation of air, as well as increased traffic in the operating room.

The existence of an operating room at a fully accredited hospital in terms of function and technique is in line with the safety of the patient. It is in accordance with the Ministry of Health Regulation No. 24 of 2016 concerning the Technical Requirements for Hospital Buildings and Infrastructure in Chapter Part No. G about Technical Requirements for Room in Hospital Building, Sub-Chapter No. 4 Operating Room, as well as Sub-Category No. 9 Operating Room.

Research in three operating rooms in hospitals that have been accredited is interesting to be studied in terms of uniformity in design, which will greatly help policy makers to provide procurement strategies when it comes to cost efficiency and effectiveness used to manage operating rooms.

The use of a standard assessment of accreditation elements in operating room installations that carry out a post-occupancy evaluation of surgical installations against the standards listed in the Ministry of Health Regulation No. 24 of 2016 regarding Technical Requirements for Hospital Buildings and Infrastructure will be evaluated using a checklist according to standards in Chapter Part No. G Technical Requirements for Space in Hospital Buildings, Sub-Chapter No. 4 Operating Room, and Sub-Category No. 9 Operating Room.

2 Research Method

The research design used was descriptive observation analysis using a checklist aimed at understanding the condition of the Muhammadiyah Hospital's operating room design. This study aims to see the suitability of operating room standards at Muhammadiyah Hospital in Jakarta with the fulfillment of Ministry of Health Regulation No. 24 of 2016 seen from the results of the operating room checklist as well as the National Hospital Accreditation Standard Instrument from the elements of Surgical Care Services 8 (PAB 8) and Health Facility Management 7 (MFK 7).

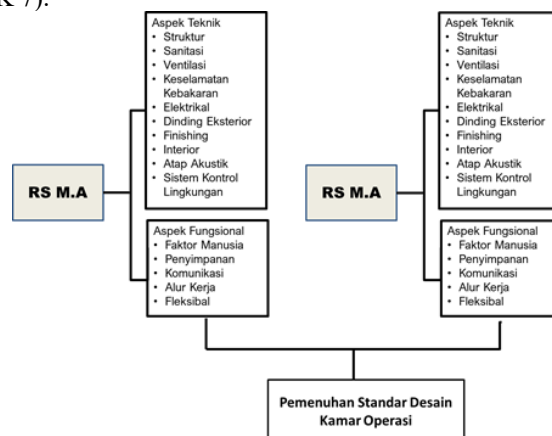


Fig 1. Research Concept Framework

Research Criteria

The criteria for this study were two Muhammadiyah General Hospitals, located in the city of Jakarta, accredited and included in class C. In each hospital, we looked at 3 operating rooms.

3 Results and Discussion

The Ministry of Health Regulation No. 24 of 2016 concerning Technical Requirements for Hospital Buildings and Infrastructure is a measuring tool for improving the quality of the service sector according to the standards in operating room installations. Meanwhile, to develop an operating room that meets service standards in accordance with quality, security, and safety standards, a third-party assessment is required which is given in an acknowledgment in the form of accreditation based on Law No. 36 of 2009 on Health, Law No. 44 of 2009 concerning Hospitals, and Ministry of Health Regulation No. 12 of 2020 concerning Hospital Accreditation.

In accordance with the Ministry of Health Regulation No. 24 of 2016 regarding the Technical Requirements for Hospital Buildings and Infrastructure, non-conformance results are obtained in the operating room section. The result is also compared with the checklist provided in the applicable standards in addition to being cross-examined with the International ANSI/ASHRAE/ASHE standard 170-2017 (Supersedes ANSI/ASHRAE/ASHE Standard 170-2013) on Ventilation of Health Care Facilities.

Assessments that do not meet the standards in this criterion were divided per room for both hospitals, both Muhammadiyah Hospital A and Muhammadiyah Hospital B (Steven Parshall and Sofia Fonesca, 2018).

After conducting research on two operating room installations at Muhammadiyah Hospitals in Jakarta, it was concluded that:

- 1) Functional Aspects

- a. Administration Room. A minimum of 6 air exchanges per hour. The functions of these rooms can be combined.
- b. Safe changing room at Muhammadiyah Hospital A does not meet the standards. Here the material of the entrance door must be resistant to the impact of the stretcher, and the direction of the door opening is inward.
- c. Patient preparation room at Muhammadiyah Hospital B. The door material is appropriate and the oxygen outlet is provided.
- d. Nurse Monitoring Stations for the two hospitals are still not available because they have not yet optimized the available light.
- e. Intermediate Room (Airlock). This room can be used as an induction room even though both hospitals do not meet the existing standards.
- f. Scrub station. This room is a room with a prefilter (medium risk level), which has a maximum number of dust particles of its size (0.5 m per m³, which is 3,520,000 particles (ISO 8 - ISO 14644-1 clean room standards, 1999) at the time of inspection which was still not in accordance with the standards. However, the macro zoning principle already met the Ministry of Health Regulation standard.
- g. The principle of the circulation pattern in the operating room area, the circulation flow of patients, staff, clean/sterile items and dirty items have been arranged according to the standard aspect of function.
- h. There is a pattern of crisscrossing circulation paths.
- i. There are rooms that are not in accordance with the sizing standard.
- j. There is a need for spaces that have not been fulfilled in number and are not yet available.
- k. Operating rooms' air conditioning functions are unfulfilled.

2) Technical Aspects

- a. The use of floor finishing materials, wall to floor meeting, wall to ceiling meeting, operating room wall elbow, wall, and ceiling meet technical standards
- b. The placing of the waiting room, which is located outside and is connected to the outside air, meets technical standards.
- c. The use of door types that are not resistant to impact does not meet technical standards.
- d. The non-use of a self-closing door system does not meet technical standards.
- e. The use of equipment attached to the wall that is not embedded in the wall, does not meet the technical standards.
- f. There is a hospital that does not provide oxygen outlets in the preparation/pre-op room.
- g. There is no fire warning system in the operating room area.
- h. The use of split type air conditioners in operating rooms and operating room support areas without air exchange and air filtration systems does not meet the technical standards.

4 Conclusion

- a. The functional aspects of the operating rooms of two Muhammadiyah Hospitals in Jakarta still do not meet the requirements set by the Ministry of Health Regulation No. 24 of 2016. However, it has met the assessment elements of PAB 8, SNARS edition 1 of 2018.

- b. The technical aspects of the operating rooms of two Muhammadiyah Hospitals in Jakarta still do not meet the requirements set by the Ministry of Health Regulation No. 24 of 2016. However, it has fulfilled the Elements of MFK 7 assessment, SNARS edition 1 of 2018.
- c. There is a deviation between what is operationalized and the existing regulations.
- d. There is a need for standardization of operating room installations among Muhammadiyah hospitals.
- e. Adjustment of this data condition to regulations will have an impact on investment requirements and the increase of physical operational costs.

5 Recommendations

Based on the results of the research on the operating rooms of two Muhammadiyah Hospitals in Jakarta, some suggestions are given as follows:

- 1) Based on the opinion issued by WHO regarding the use of air conditioning during the COVID-19 pandemic that:
 - a. Heating, Ventilation, and Air Conditioning (HVAC) systems are used to maintain indoor air temperature and humidity at a healthy and comfortable level. A well maintained and operated system can reduce the spread of COVID-19 virus by increasing the rate of air change, reducing recirculating air, and increasing the use of outdoor air. The recirculation mode (which re-circulates air) should not be used. The HVAC system should be checked, maintained, and cleaned regularly.
 - b. The use of air conditioners whose mechanism does not use/intake outside air (split wall AC, floor standing AC) must be sought for exchange with outside air to reduce recirculation of air in the room, for example by opening windows.
- 2) It is highly recommended to replace the air conditioning system at the operating room installation of two Muhammadiyah Hospitals in Jakarta
- 3) It is recommended to the Muhammadiyah General Health Board of Trustees to standardize the installation of operating rooms for hospitals under the guidance of the Council.
- 4) It is recommended that the elements of SNARS accreditation be aligned with the applicable regulations.
- 5) In general, it is advisable to research other hospitals apart from Muhammadiyah so in an effort to repair all operating rooms according to standards.

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