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A Systematic Review of Nurse Station Performance at Outpatient Room in Hospital

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Abstract

The outpatient area is important in the hospital because it provides care and services to patients with complex and high-standard operational flows. Medical personnel must be able to work according to professional, operational, and service standards. The factors considered are the accuracy and speed of service to patients. For this reason, the layout of the nurse station used by medical personnel plays an important role in the patient service process. This study uses a qualitative method with an inductive-descriptive discussion. Data were obtained through literature studies. The results of the literature study are variables that can be developed for further research, which are also the objectives of this study. The study's results explain the relationship between the effectiveness of the nurse station layout in the outpatient area and the performance of medical personnel. It can enrich existing theories and become recommendations for arranging the layout of nurse stations in hospitals.

Keywords: *hospital; layout; medical personnel; nurse station; outpatient*

Introduction

Nurse stations have an important role in hospital services. According to The Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2016 Concerning Technical Requirements for Hospital Buildings and Infrastructure, points related to nurse stations are required, namely, the location of the nurse station must allow for speed in providing services in several installations and accommodate the movement of health workers. The hospital room with high service and movement needs is the outpatient or polyclinic. The outpatient room accommodates preventive and curative services by operational and professional standards. In the service procedure in the polyclinic, health workers must be able to move flexibly and respond quickly to handle patients. Thus, good accessibility, efficient movement spaces, and safety and comfort are needed. The ease of access to information for patients and the reachability, visibility, and ease of access of the nurse station room in the polyclinic can fulfill medical services. The nurse station should be located in a location that makes it easy to observe patients (Hatmoko, 2010). Regulation of the Minister of Health of the Republic of Indonesia Number 24 of 2016 states that the minimum area of a nurse station is 8 m^2. This narrative is the basis for further examining the results of the nurse station's performance in supporting health service.

Fast accessibility between departments and medical staff, visibility between medical staff, the distance between medical staff and patients, and the location of equipment storage also determine the medical staff performance and the smoothness of the medical workflow (Zamani et al., 2024). A functional and efficient healthcare facility relies heavily on designing a good circulation area, which allows work processes to run optimally and integrates users smoothly (Pachilova & Sailer, 2020). A well-designed layout in the nurse station will help shorten staff's time on activities and communication, ultimately improving operational efficiency and daily workflow (Hendrich et al., 2008).

Researchers reviewed several kinds of literature closely related to the focus of research in the spatial realm of space in hospitals, especially in outpatient areas or polyclinics. Health facilities are the focus that needs to be developed in architecture, as well as design optimization to support the patient healing process and the activities of medical personnel. Literature studies on healthy architecture in health facilities propose to be a bridge of literacy easily understood by the general public, architects, and scientists. There is an effort to develop better health facility architecture (Yetti, 2021). Various patterns and approaches can be applied in design as long as they are in the applied corridor outside the standard room standards with infectious. User comfort is one of the indicators in design development (Pujiyanti et al., 2021). The need for digital simulation in the design process in health facilities is skyrocketing. The requirements for using simulation to support design analysis and exploration in health facilities are important. This is related to producing effective, efficient, and practical designs in health facility design (Yetti et al., 2022).

This study aims to explain the relationship between performance and nurse station layout affecting the performance of medical personnel in serving patients in outpatients. The outpatient room is one of the service centers in the hospital, and it has an infectious categorization in public spaces. This space is vulnerable to a high risk of spreading viruses and has a high user density and mobility level. Medical personnel are required to focus and be observant when carrying out activities. Finally, this study aims to understand and review the effectiveness of spatial integration in health facilities, significantly optimizing the layout of nurse stations in outpatient rooms. This study presents and bridges perspectives from existing theories to produce a research basis that needs to be developed for further research on effective and efficient nurse station layout design to support medical staff performance.

Literature Review

In hospital operations, using the Lean Hospital approach is not uncommon. The main principle of Lean Hospital is operational efficiency, which optimizes services and reduces the possibility of waste. Some of the applications carried out are. Firstly, Value Identification determines what patients consider valuable, such as short waiting times and quality care. Second is Value Stream Mapping, which analyses the entire service process to identify and eliminate waste—the third is Flow creation, which ensures that the workflow runs smoothly without obstacles or delays. Fourth is Pull, which provides services based on patient demand, not predictions. Fifth is Continuous Improvement, involving all staff in continuous process improvement efforts (Graban & Toussaint, 2018)

Previous research recommendations reinforce the need for architects to be more careful regarding design results that can be accounted for with a database, optimize circulation, improve infection control, and layout medical personnel workspaces to support patient care operations (Sari & Jabi, 2024). A study explains the relationship between floor configuration and room density that affects the distance traveled by health workers in surgical units with work efficiency in Korea. The typology and location of nurse stations affect the work efficiency of health workers. Nurse stations in triangular rooms in treatment room units have relatively shorter distances between units than in rectangular rooms (J. Lee et al., 2020). Visibility is important for health facilities. Visibility supports the performance of health services, especially in inpatient rooms. International visibility affects health worker services such as control, supervision, interaction, and communication between patients and health workers. So, of course, the configuration of space is essential (Johanes & Atmodiwirjo, 2015).

Wayfinding in healthcare facilities has been a topic of concern since the early 2000s. Wayfinding is vital in improving the patient experience, especially in large hospitals with complex layouts. Wayfinding challenges often cause additional stress for patients and visitors, increase travel time within the facility, and hinder staff operational efficiency. The wayfinding must be noted in the implementation. Not only for patient and user comfort but also for hospital efficiency. With the right design and technology, the navigation experience in healthcare facilities can be significantly improved (Deng & Romainoor, 2022).

Research shows that a well-designed work environment can improve collaboration and communication among medical staff, improving patient care quality (Zborowsky et al., 2010). One of the key factors in nurse station design is

ergonomics. Research shows that good ergonomic conditions at a nurse station can reduce health problems such as headaches and fatigue, which nurses often experience due to inadequate workspace design (Sami et al., 2024). In addition, ergonomic assessment tools such as the Nurse Station Ergonomics Assessment (NSEA) can help identify and improve suboptimal aspects of workspace design (Mokarami et al., 2021). By paying attention to ergonomics, the medical team can work more efficiently and comfortably, positively impacting their productivity.

With the increasing complexity of care in the polyclinic environment, nurses must have adequate knowledge to support patients and their families (Inumerables et al., 2024). Nurse station design that supports the accessibility of information and educational resources can help nurses provide better care (Kudlová & Kočvarová, 2024). Finally, nurse station design should consider the emotional and psychological needs of the medical team. This can increase performance and reduce stress levels among nurses (Sami et al., 2024).

Architectural and interior aspects are important in designing a polyclinic nurse station and creating an optimal space to support the medical team's performance. Research shows that good design can improve work efficiency, communication, and comfort for nurses and other medical staff (Eftekhari & Ghomeishi, 2023); (Fay et al., 2019); (Gum et al., 2012). Therefore, several key elements in the design of a nurse station need to be considered. Firstly, the nurse station space layout must allow good visibility of the patient area. Research shows that nurse stations directly viewing the patient care area can improve nurse supervision and responsiveness to patient needs (Rodríguez-Labajos et al., 2024); (Nermin & el–Aziz, 2013). It can be achieved by avoiding high barrier walls and designing an open area so that nurses can easily see and interact with patients (Nermin & el–Aziz, 2013); (Zborowsky et al., 2010). Additionally, designs that allow nurses to move quickly between nurse stations and patient areas can reduce time spent walking, thereby increasing work efficiency (Fay et al., 2019); (Zborowsky et al., 2010).

Secondly, research shows that designs that pay attention to ergonomic aspects, such as the height of tables and chairs and the placement of frequently used equipment, can reduce fatigue and improve nurses' work comfort (Mokarami et al., 2021) (Mokarami et al., 2021); (Feiler & Stichler, 2011). Thirdly, the design of the nurse station must consider social and collaborative aspects. Spaces that support interaction between members of the medical team can improve communication and collaboration, which are essential in providing quality care (Zhang et al., 2024); (Eftekhari & Ghomeishi, 2023); (Gum et al., 2012). Designs that integrate areas for group discussions and more private spaces for sensitive conversations can help create a better work environment (Rodríguez-Labajos et al., 2024); (Shattell et al., 2015).

Fourthly, lighting and acoustics are also important factors in the design of the nurse station. Good lighting can improve the working atmosphere and reduce visual fatigue, while good acoustics can reduce distractions and improve nurses' focus (Eftekhari & Ghomeishi, 2023); (Kelly et al., 2019). Research shows that a quiet and bright environment can increase nurses' job satisfaction and productivity (Kelly et al., 2019); (Gum et al., 2012).

Methodology

This study uses a qualitative approach with a literature study method to explain the optimization of the position of nurse stations in outpatient waiting rooms. The qualitative research literature study method emphasizes analyzing accountable written sources such as books, journals, research reports, and other academic documents (See Figure 1) (Bowen, 2009).

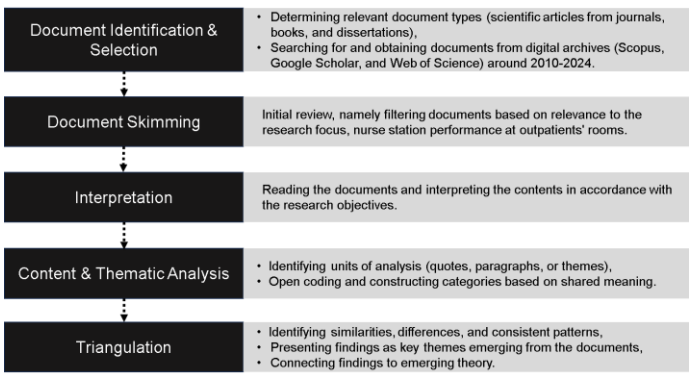

Figure 1. Literature Study Method by Bowen, 2009
Source: processed by Yetti, 2025

The systematic stages in conducting a literature study are identifying the research problem to be studied and determining the focus and relevance of the study (Creswell & Creswell, 2017). Secondly, the criteria and sources of literature must be determined. Researchers must consider the source's relevance, recency, and credibility (Boote & Beile, 2005).

Thirdly, academic literature should be collected from databases such as Scopus, Google Scholar, Web of Science, and others. Fourthly, literature analysis. The literature is analyzed using qualitative methods. In this study, researchers deepened content analysis. Content analysis is used to understand the main concepts in various studies (White & Marsh, 2006). Fifthly, findings will be synthesized to build arguments or conceptual models used in the study. This synthesis aims to show the relationship between existing theories and research contributions to a particular field of science (Webster & Watson, 2002). Sixthly, compile and report on literature studies in the form of scientific article research reports.

The qualitative method was chosen because IT considered the right approach to explore the relationship between the design of the nurse station space, the needs of users (medical teams and patients), and their impact on the comfort and effectiveness of health services in the outpatient room. The literature study method comprehensively analyzes relevant academic literature to explore and understand the research topic. Hospital architecture involves many disciplines (health, psychology, ergonomics, engineering, and others), and literature review helps to review various perspectives. This literature study can help researchers map trends and themes based on previous studies on nurse station optimization.

The literature study method comprehensively analyses relevant academic literature to explore and understand the research topic. This method was chosen because this research is part of the primary research process with the ultimate goal of producing applied recommendations. Thus, to achieve these results, researchers need in-depth literature research to be the foundation for further research.

For this reason, this study examines related literature from regulations, views, and previous studies conducted by other researchers on good design practices in hospitals, especially in polyclinics, to sharpen the final results and produce strong research novelty. This approach allows researchers to synthesize existing knowledge, identify gaps, and develop a deep understanding of the studied topic. Researchers begin the study by identifying phenomena and research questions; in this case, researchers ask, How is the optimal position of the nurse station to support the medical team in the patient's medical service process?

Researchers compile slices of findings from previous studies. Data is then collected through a literature review related to the research topic. The analysis uses identification of the literature to build the themes. Then, researchers dialogue theories from previous studies. Through this analysis, researchers can explore findings and produce research results that can be developed for further research related to the relationship between the location of nurse stations and hospital patient service performance.

Result and Discussion

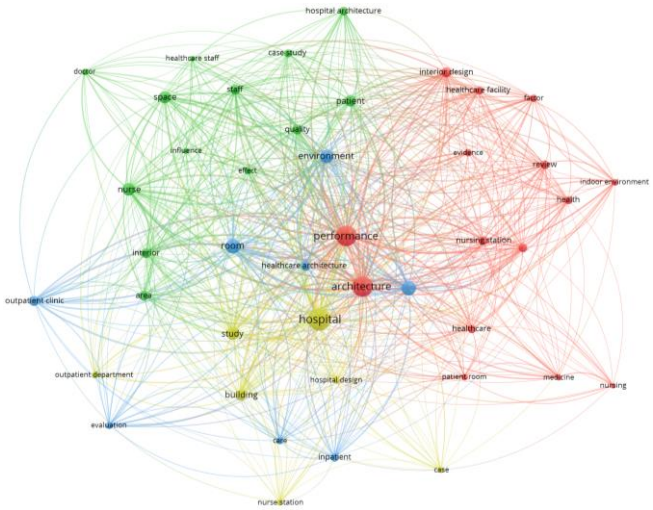

Figure 2. Research Mapping about Optimizing Nurse Station Positions in Healthcare Facilities with VOS Viewer
Source: processed by Yetti, 2025

With the rapid growth of healthcare facilities, designing and optimizing the position of nurse stations in hospitals has become crucial in improving operational efficiency and the quality of patient care. Extensive research has been conducted on the ideal position of nurse stations and interactions between medical staff to create an environment responsive to patient needs.

Figure 2 shows the results of a research mapping on optimizing nurse station positions. The mapping encompasses various aspects, including their relationship to the indoor environment, architecture, patient comfort, evaluation needs as a basis for future design, and building comfort. Utilizing bibliometric data helps researchers identify gaps or areas that need further exploration to generate innovations in hospital facility design. Data from this mapping is a foundation for thematic analysis and theory triangulation.

Operational Efficiency: Space Flexibility

Research on strategies and location of nurse stations has been widely conducted, especially in inpatient rooms. Optimal integration of patient-to-room and nurse-to-patient services can improve hospital operational efficiency (Brandt et al., 2025) in line with efforts to work efficiently and optimally, which are part of the Lean Hospital principle. Hospital management operations apply the Lean Hospital approach to optimize operational efficiency and service quality by identifying and eliminating activities that do not provide added value. It is different from the careful location of nurse stations in inpatient care.

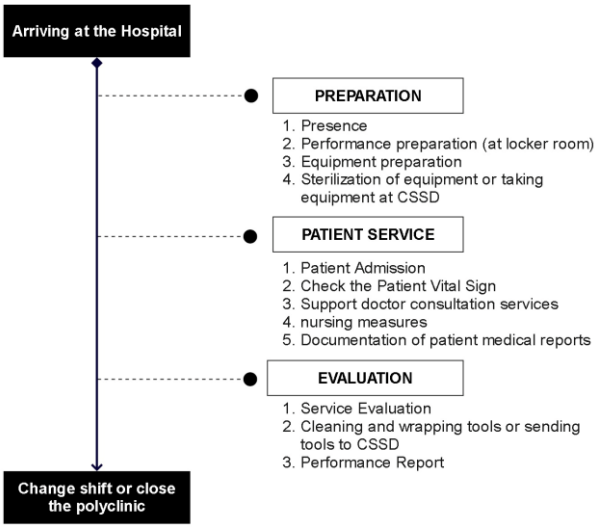

Figure 3. Workflow of Medical Staff In The Polyclinic
Source: Yetti, 2024

Figure 3 shows the workflow of medical personnel in the outpatient polyclinic. Of course, the flow and needs are adjusted to the policies and facilities in each hospital. The workflow shows that most medical personnel's service activities, especially nurses and midwives in the polyclinic and outpatient facilities, are at the nurse station. This study describes the design of a nurse station that allows direct visibility to the waiting room, can improve the monitoring of patient conditions, and makes it easier for nurses and patients to interact while waiting for action by the doctor. In addition, easy access to medical equipment and documentation around the nurse station can speed up the care process and clinical decision-making in an emergency.

The centralization of nurse stations within patient care areas encourages face-to-face interactions, fostering a collaborative environment among healthcare providers (Gharaveis et al., 2018). Environments that conduct teamwork can lead to improved patient care outcomes. Features such as shared workspaces and communal areas within nurse stations can enhance communication and foster a collaborative culture among staff in the Emergency Department (Gharaveis et al., 2018).

To optimize the nurse station that supports nurse coordination, the architectural design should prioritize an open layout that minimizes physical barriers and supports visual ease, visibility, and audio between medical team members. Facilitates the adaptation of the space to gather to facilitate quick discussions. In addition, the nurse station space must integrate technology to support coordination (S. Lee et al., 2012). Proper and optimal lighting has a positive impact; it can

increase concentration and reduce stress and fatigue. Attention must also be paid to the color scheme chosen to support concentration and comfort. The materials used must also be chosen for cleanliness and durability, while furniture must be flexible to adapt to various tasks (Cetin et al., 2018).

Patient Comfort

The Value Identification and Flow creation principle in Lean Hospital prioritizes speed of handling and precise service flow to create performance efficiency. This principle leads to efficient design choices that accommodate patient movement flow, reduce crowding and delays in patient handling, and improve service quality. Implementing lean strategies in outpatient settings can lead to more efficient layouts and processes, ultimately increasing patient satisfaction and reducing waiting times at healthcare facilities (Hassan Siddiqui, 2023).

The Ministry of Health of the Republic of Indonesia and the Joint Commission International (JCI) have set various regulations and standards to improve the comfort of hospital. The primary focus of these regulations includes ergonomics, creating a calm and comfortable environment, and operational efficiency of hospitals (Joint Commission International (JCI), 2025). Regulation of the Minister of Health Number 7 of 2019 Concerning Hospital Environmental Health, 2019 emphasizes realizing a healthy environmental quality in hospitals, both in terms of buildings, facilities, infrastructure, and the surrounding environment, in order to support the comfort and safety of patients, companions, visitors, and human resources of the hospital. In addition, The Regulation of the Minister of Health Number 66 of 2016 Concerning Hospital Occupational Safety and Health, 2016 emphasizes the importance of creating a healthy, safe, secure, and comfortable workplace and protecting hospital human resources, patients, patient companions, visitors, and the hospital environment from various potential hazards, including those related to ergonomics and other environmental factors.

JCI is an international accreditation that sets international standards to improve the quality and safety of patients in hospitals. Although no specific standards directly address patient comfort, several International Patient Safety Goals (IPSGs) established by JCI contribute to creating a safe and comfortable care environment. These goals include (1) Ensuring that each patient is identified correctly to avoid misidentification that could impact patient safety and comfort and (2) Ensuring clear communication between healthcare providers and patients, which can increase patient comfort and confidence in the care provided.

More frequent and quality interactions between nurses and patients and patients' accessibility to communication with nurses create a sense of security and comfort in the polyclinic environment. It certainly provides a positive and memorable experience for patients and companions. Good interaction between nurses and patients can be supported by the design of a nurse station with good ergonomics, thus contributing to patient comfort. Its application can be done by adjusting the height of the table to suit all patient conditions (disabled, elderly, children, pregnant women, and the general public) and an ergonomic chair. Ergonomic design can reduce nurses' discomfort, ultimately positively impacting patient care (Mokarami et al., 2021); (Feiler & Stichler, 2011).

In addition, the acoustic effect of the room is also an important factor in patient comfort. A case often found in nurse stations is patient discomfort during vital sign checks due to hearing problems disturbed by ambient noise. Therefore, the design should consider sound control, such as using sound-absorbing materials, to increase comfort at the nurse station (Xie et al., 2020). According to the World Health Organization (WHO), the noise level in hospitals should be between 30 dB(A) and 35 dB(A) (de Lima Andrade et al., 2021).

Navigation and Accessibility

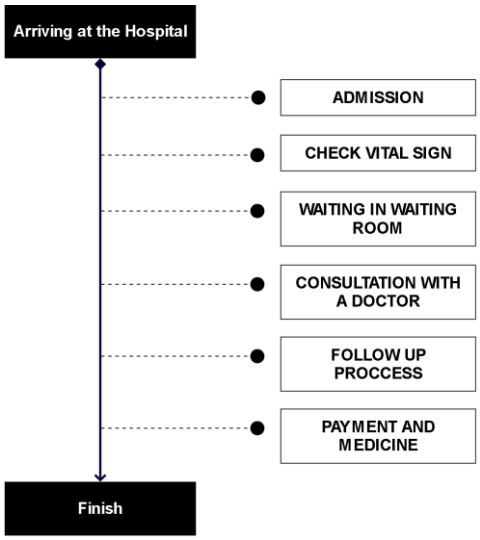

Figure 4. Flow of Patient Admission And Handling In The Polyclinic
Source: Yetti, 2024

Figure 4 illustrates the patient movement pattern in the polyclinic. Patients start from the admission process and then need to confirm with the nurse station for the vital sign check process and confirmation of attendance. Based on empirical studies in the hospital, architects are often not careful when placing the position of the nurse station. Patients and families who come to the clinic for the first time often look confused about finding the nurse station's location because they are unfamiliar with their environment. Several applications need to be implemented in the design to support the operational performance of medical personnel toward patients. Convenience is one of the keys; good architectural features to support disabled patients and the general public, such as easy accessibility, clear signage, and touch guidance systems, improve navigation in health facilities (Mirza et al., 2023).

The previous explanation emphasizes that the outpatient room of a hospital polyclinic is very closely related to the comfort of access, navigation, and convenience, which are very important to improving patient experience and operational efficiency. JCI sets standards that focus on patient safety and quality of care. Although not explicitly regulating the design of waiting rooms, some relevant JCI standards are that hospitals must ensure that patients have easy access to the care services they need and that there is continuity in the care provided.

Architects can also emphasize the position of the nurse station by using lighting and materials. The nurse station is the center of activity and needs good lighting to help patients and visitors find its location easily. The use of accent lighting also serves to highlight architectural elements or specific areas, such as the reception desk or signs. It makes it easier to orient the position. The lighting is usually brighter than the lighting around creating an eye-catching contrast (focal point) (Mehrotra et al., 2015). The color temperature of light also affects the perception and atmosphere of the room. Light with a color temperature of around 3000K (warm white) is often used to create a friendly and calming atmosphere, while light with a higher color temperature (cooler) can be used for areas that require more attention (Zhang et al., 2024).

Conclusion

Based on the discussion and discussion results, the researcher concluded the points that must be considered in the design and placement of the nurse station in the outpatient room of the polyclinic. First, the architect can consider the central position in the placement of the nurse station to facilitate the medical team in patient control and service actions. Second, the position of the nurse station is the focal point so that it can be easily found by patients, especially for new patients. Furthermore, the design of the nurse station needs to consider an ergonomic workspace for the comfort of the medical team and prepare an adaptive space to support the medical team in communicating and having quick discussions in handling patients. The design of the nurse station also needs to prioritize aspects of convenience and functionality so that it can be accessed by all groups of patients (disabled, elderly, children, pregnant women, and the general public). The limitation of this study is the author's limitation in obtaining sharper

literature, so the researcher recommends developing this study to sharpen the research related to the correlation between the performance of medical team services.

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