PATIENT CARE AS THE PRIORITY ASIDE FROM INDOOR ENVIRONMENT COMFORT NEEDS

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ABSTRACT

Introduction. The main purpose of Hospital building is to deliver quality care. WHO has safety, health, and environment (SHE), moreover a building should provide thermal comfort, visual comfort, acoustic comfort, and indoor air quality for the person living inside it. This study sought factors influenced in designing building monitoring systems from the perspectives of hospital management.

Design of the study. This was a case study exploring the real-life experience of nurses, midwives, and building managers at a private Islamic hospital. The researchers selected 8 participants (nurse and midwife) and one building manager and conducted a semi-structured interview using the prepared guidelines of the interview.

Result. There are four themes that emerged from the data: (1) prioritizing responsibility, (2) supporting building facilities, (3) physical environmental factors, and (4) temporary interruption. Health workers always prioritize their responsibility to deliver a good quality of care and could ignore the uncomfortable of the environment.

Conclusion. A healthcare professional always focus on patients and ignore the discomfort that resulted from the environment. The findings of this research give insight into building that suitable for the health worker comfort.

I. INTRODUCTION

PKU Muhammadiyah Gamping Yogyakarta Hospital, as a public facility providing health services, must meet the minimum standards for building performance in its operations and management. The standards used in this study refer to the Indonesian Ministry of Health and the World Health Organization (WHO) to meet the quality of the living environment and quality aspects of safety, health, and environment (SHE)[1,2]. The living environment's quality is measured by the Indoor Environmental Quality (IEQ), including thermal comfort, visual comfort, acoustic comfort, and indoor air quality (IAQ)[3]. As a profit-oriented building, a hospital needs an effective and optimal management system with effective operational costs. Changes like services normally occur every four years and the increase in the number of patients and their reach require physical adjustment of the hospital building and environment[4]. Every effort to adjust service capacity can accidentally change the quality of the living environment. Efforts are required on the part of management to monitor the quality so that it remains standardized but still produces economic benefits.

The Building Management System (BMS) is a system capable of measuring, recording, and displaying environmental quality data (occupant comfort and physical environmental parameters) used by hospital managers as a reference for building operations and maintenance[5]. As a building with the risk of exposure to dangerous particles and disease contamination through the utility network (waste, sanitation, and ventilation networks), information on the quality of the living space and the environment is crucial[6]. A complex hospital management system requires the support of tools capable of measuring, recording, providing real-time and continuous data on the building's performance when it is operated. Several managerial decisions require this information precisely
and accurately, given the building's nature, which is never empty or even stops operating. Therefore, the aim of this study is to build a BMS design process that is suitable for the PKU Muhammadiyah Gamping Hospital's needs from the health workers perspectives.

II. METHOD

Research Design

This study used a case study design that explored contemporary phenomena in real-life contexts [7]. This qualitative study investigated the comfort of health workers in the physical environment of the hospital.

Sample

The researchers conducted the study at the Muhammadiyah PKU Gamping Hospital in October 2020, involving health workers, namely nurses and midwives, and a building manager as triangulation data. Participants who were willing to be included in the study were recruited through purposive sampling. The inclusion criteria for health workers were as follows: nurse or midwife, working in inpatient wards.

Ethical consideration

Approval of ethical research was obtained from the Institutional Review Board of Aisyiah University (No. 1658 / Kep-Unisa / VII / 2020) and hospital management. The researchers provided a detailed explanation of the study and explained each prospective participant's procedure before conducting the research. Prospective participants would fill in their identity on the Google Form sheet sent by researchers via online message. The researcher maintained the ethical principles of participant autonomy, volunteerism, anonymity, and confidentiality throughout the study.

Data Collection

After the prospective participants sent their identity via Google Form, which had been prepared as a sign of agreement to become a participant, the researchers conducted an in-depth interview by telephone personally according to the participants' time preferences. Interviews were conducted in Indonesian and used interview guidelines with several questions. The questions asked to explore participant perspectives and experiences were related to work comfortably in the hospital environment. The interview duration was 25-60 minutes, with an average of 40 minutes. The researchers listened and checked every recording to maintain audio credibility after the interview.

Data Analysis

First, the researchers transcribed the interview results verbatim and then used thematic analysis with Colaizzi's protocol. This method consists of seven steps[8]. Figure 1 and Table 1 shows the details of Colaizzi's seven-step data analysis. The transcript and analysis process was carried out in Indonesian. Indonesian eased the researchers to understand these words' correct meaning by considering language usage and the context. Researchers did regular and ongoing discussions to verify conformity and derive an equivalence of conceptual meanings and terminology. This process also allowed clarification of information from the data and ensured the transcripts' accurate meaning.
**Figure 1. Data analysis process**

**Table 1. Data analysis process**

<table>
<thead>
<tr>
<th>Statements</th>
<th>Coding</th>
<th>Categories</th>
<th>Themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;I once had an uncomfortable situation when the patients were full, and the work had not finished, not to mention the doctors' visit schedule altogether, and patients' families kept asking when he/she was going home. Then, some new patients also must be operated on at the same time, and suddenly the operation room called that it would be started earlier.&quot;</td>
<td>Crowded situations affecting comfort</td>
<td>Workload</td>
<td>Prioritizing responsibilities</td>
</tr>
<tr>
<td>&quot;When we are assessing older patients or giving injections, then the weather gets hotter, we can smell their body odor. It is fine. We still can continue our actions even though we do not feel comfortable.&quot;</td>
<td>Ignoring smells out of responsibility</td>
<td>Accepting the situation out of responsibility</td>
<td>Prioritizing responsibilities</td>
</tr>
<tr>
<td>&quot;The wind from the north is pretty strong as PKU is near the rice fields. Sometimes, the doors close by themselves due to the wind, and it bothers the patients.&quot;</td>
<td>Essential natural factors</td>
<td>Supportive natural factors</td>
<td>Natural factors</td>
</tr>
<tr>
<td>&quot;... the uncomfortable atmosphere, for example, we hear a noise ... the sound of someone drilling to put a hand rub washcloth then the person cleaning the ac continues to make noises. It makes us less focused and a little bit mad.&quot;</td>
<td>Noise disturbing concentration</td>
<td>Situational noise</td>
<td>Temporary interruption</td>
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</table>

**Research Credibility**

This qualitative research's strength cannot be separated from how the researchers ensure the research process's quality itself[9,10]. Strategies to increase research strength are trustworthiness, such as credibility, transferability,
dependability, and conformability. In this case, the researchers spent a lot of time collecting and analyzing data, recording interviews to maintain audio quality, and transcribing verbatim. The analysis process and data were written systematically to minimize lost interpretations. Dependency was enhanced by maintaining an audit trail to allow it to show thematic source evidence. All researchers reviewed the descriptions and experiences and agreed with the research findings to ascertain data transfer capabilities.

III. RESULT

8 participants consist of seven health workers and one building manager. Table 2 shows the demographic characteristics. The average participants' age was 31-40 years old and has worked for 5-10 years.

<table>
<thead>
<tr>
<th>No.</th>
<th>Characteristics</th>
<th>Informants</th>
<th>Frequency (N)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>21-30 years old</td>
<td>3</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>31-40 years old</td>
<td>4</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>&gt;40 years old</td>
<td>2</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>9</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Working period</td>
<td>1-5 years</td>
<td>1</td>
<td>11</td>
<td>11</td>
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<tr>
<td></td>
<td>5-10 years</td>
<td>6</td>
<td>67</td>
<td>67</td>
</tr>
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<td></td>
<td>&gt;10 years</td>
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<td></td>
<td>Total</td>
<td>8</td>
<td>100</td>
<td>100</td>
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</tbody>
</table>

Four themes were identified in the research about the health workers' comfort in the hospital's physical environment: (1) prioritizing responsibility, (2) supporting building facilities, (3) physical environmental factors, and (4) temporary interruption.

Prioritizing Responsibilities

This theme describes health workers' role in their work to serve patients. Whatever discomfort in a physical hospital environment is not an obstacle.

The responsibility of health workers is to provide services to patients. The health workers in this study mentioned that the patient's condition and the number of patients affected comfort. As told by two participants below, the patient's condition needed more supervision or attention:

"... we feel better when there is not much patient supervision. When there is, it is when we start to worry ..." (Participant 2, Health Worker)

"... well, when there are no patients who need supervision, we will continue our work routine... Unless when a patient suddenly passes away, it is something unexpected. ..."(Participant 6, Health Worker)

Besides that, health workers stated that workload would affect their comfort, such as in a crowded situation, as stated by Participant 2 and 8 below:

"I once had an uncomfortable situation when the patients were full, and the work had not finished, not to mention the doctors' visit schedule altogether, and patients' families kept asking when he/she was going home. Then, some new patients also must be operated on simultaneously, and suddenly the operation room called that it would be started earlier. All that only added the discomfort."

"... I felt uncomfortable because back then there were a lot of patients, the nurses were only a few. But now, we have a lot of patients and the nurses are also a lot too. ..."(Participant 8, Health Worker)

Other inconveniences found in this study were body odor, either from the patients or from coworkers. Body odor in the patient's room was stronger in class III because the rooms did not have air conditioners and contained five patients.
"… It is bothering because in one room there are five patients. If someone smells like that or is defecating, the people next to him will also smell it... "(informant 1, Health Worker)

The health workers said to have solutions to minimize the smell, such as putting coffee scents in the patient's room and taking the right approach to get mutual comfort.

"We overcome the smell by motivating the family to bring coffee powder and put it under the bed. It works well to reduce the smell of ulcers, anyway ..." (Participant 5, Health Worker)

"Hehehe (long laughs) if the smells come from our friends, we will warn them directly by telling them to apply some deodorant. There used to be some close coworkers, and I told her that she did not smell good, and she would immediately get it. ...") (Participant 2, Health Worker)

Also, health workers said that the clothes worn would also affect comfort. The double model clothes would make them hotter, as conveyed by the participant below:

"We are wearing protecting clothing with lots of layers and face shield, and it is really hot. Once we take it off, we are usually drenched in sweats. But then, we cool down in the medicine room where there are air conditioners. ..." (Participant 3, Health Worker)

Of all the statements conveyed by health workers, an essential element in this study is that all forms of discomfort in a work environment will not neglect the duties and responsibilities in providing services to patients. The next sub-theme is to accept the situation due to responsibility. The sub-theme previously explained that room temperature would not prevent them from fulfilling their responsibilities as described by Participants 7 and 1 below:

"…. The smell is not the biggest issue because we are treating patients here and unable to choose as long as they smell good"(Participant 1, Health Worker)

"... We hold the smell as hard as we can because the most important thing is that the patient served. All patient's needs are the priority. Once we leave the patient's room, it is scorching. We can chill later..." (Participant 7, Health Worker)

**Supporting Building Facilities**

Building facilities that support health workers' comfort are bathrooms, soundproof rooms, and supporting facilities such as air conditioners in every room. Most of the participants mentioned that the availability of air conditioners would affect the comfort in working, as stated by the following participant:

"... The room temperature also affects. In class III, we take a lot of actions as there are lots of patients and there is no air conditioner. It affects our performance..." (Participant 2, Health Worker)

The room temperature will affect the activities in the room, as mentioned by Participant 3 below:

"... It does affect the activity. While treating the patients and the room is hot, and the wound smells so bad, it is just the worst. Then, when we should have moved to another room, we will take a break or have a drink in the medicine room as the room is cold..."

However, several participants also mentioned that the facilities were not completed equally in each unit, and the participants hoped for additional air conditioners to support their comfort.

"…. Aroyan ward has air conditioners, but Attin only has fans. So it is hotter there ...") (Participant 5, Health Worker)

Soundproofing is vital in a room to facilitate education from doctors, and the patient's privacy is safe, as explained by Participant 3 below:

"... Here is not soundproof when it should have been. The problem here is that there is no consultation room to educate a patient's family. When the doctor wants to explain something, they do it in the medicine room, not soundproof. I hope that there is a soundproof consultation room built soon.” (Informant 3, Health Worker)
In line with the participant's statement above regarding the non-uniformity of supporting facilities in the same unit, interviews conducted with the building manager stated that:

"The class III ward is set not to be provided with air conditioners, but there are more and more requests from health workers for the unit to be installed with air conditioners. We are following up with the procurement, but the budget still constraints us…” (Participant 10, Building Manager)

**Physical Environmental Factors**

Natural factors in this study describe the outside of the unit, such as the windows or doors facing the outside of the building, as conveyed by the health worker below:

"... So Alkautsar is facing the outside directly ... The benefit is that every morning between 8-10, the unit will get air circulation. The morning air is still good, and the door will be closed in the afternoon … "(Participant 3, Health Worker)

The second sub-theme is the supporting physical environmental factors in a building. The participant explained that the room layout affected lighting, as mentioned below:

"... Attin ward is located on the 3rd floor, and there are trees behind it, so it is quite bright, and the lights can be turned off. But in Arroyan, it's located right behind the tree on the second floor, so this unit needs lighting even in the afternoon ... “ (Participant 2, Health Worker)

Another participant mentioned that often strong winds made the door close tightly, as conveyed by the participant below:

"... The north wind is pretty annoying. PKU hospital is near the rice fields where the winds are strong, sometimes shocks the patients ... "(Participant 1, Health Worker)

**Temporary Interruption**

The theme of transient distraction describes situational noise and other problems. The health worker stated that the situational noise was both from outside and inside the unit, which disturbed the patients' comfort. He added that the noise from renovations in the building would affect their concentration and emotions as conveyed below:

"... the uncomfortable atmosphere, for example, we hear a noise ... the sound of someone drilling to put a hand rub washcloth then the person cleaning the ac continues to make noises. It makes us less focused and a little bit mad.”

Interviews conducted with the hospital building manager stated that the renovations had estimated the disturbances or effects that would be caused, as he stated below:

"... before doing the renovation, we will consider the possibilities that will occur, such as whether it will disturb the comfort, especially the patient's comfort ... “ (Participant 10, Building Manager)

The building manager has made efforts to keep the hospital facilities running well. Facility improvements follow the existing SOPs at PKU hospitals. The following informant explained:

"… The monitoring lasted about 3 to 4 months. If there is damage, we will soon repair it like the air conditioner. ... “

This theme also raises other temporary problems such as less effective fans and triggers other problems. The following participant explained:

".... In my opinion, fans are not sufficient and causing the papers floating. It won't happen if we have air conditioner ... "(Participant 2, Health Worker)

**IV. DISCUSSION**

This study describes that health workers will prioritize their responsibility. Most of them said that buildings with supporting facilities would affect comfort. Four themes emerged in this study: prioritizing responsibility, supporting building facilities, physical environmental factors, and temporary interruptions. In this study, health...
workers believed that responsibility was the main issue in a job, even though they have other workloads, heat, patients' body odor of patients, and work partners.

In terms of architecture related to the building, most participants said that they felt comfortable with the hospital environment in general. In this study, health workers agreed that supportive building facilities were expected in every hospital unit, such as soundproof rooms, bathrooms in each ward, and air conditioners' availability in each room. The soundproof room can later be used to provide education or counseling to patients or their families. The results of this study indicate that air conditioners have an impact on the comfort of health workers. Hot room temperature causes delayed work and distracts concentration. However, this situation does not significantly interfere with comfort. So, it can be concluded that the activities in the unit are not too disturbed.

The stifling feeling experienced by health workers is that they wear layered clothes, creating discomfort. It occurs due to wetness or stickiness and a burning sensation on the skin's surface based on thermal comfort theory. Thick clothes will reduce the possibility of sweat evaporating and transfer heat from the skin surface to the surrounding air [11].

Besides paying attention to supporting building facilities, a proper building design is necessary to physical environmental factors [12]. Physical environmental factors can affect residents’ comfort in the rainy, cold, and hot seasons. Besides, it is necessary to consider the wind conditions in the building environment related to natural ventilation. The wind that is too strong can interfere with activities in the building.

Layout and physical environmental factors need to be considered. The right layout can increase the natural lighting in the building to minimize the lighting from the lights [13]. One of the participants opened the door in the morning in the early morning to get fresh air because CO2 levels in the air confined indoors at night will be released through open doors or windows. High CO2 levels are a frequent parameter of discomfort. This situation indicates low air quality. The participants turned on the lights during the day in the unit with low lighting due to the shadowing of the surrounding environment, which had large trees and been surrounded by other buildings. The sunlight is sufficient to illuminate the room upstairs but not so for the lower floor. The weather factor is essential when designing a building to maximize sunlight [14].

Noise can also cause inconvenience for people in a building [15]. In this study, the health workers said that the hospital unit's noise could disturb patients and other health workers. Conditionally noise occurs when renovating a building or a room. Room acoustic isolation is essential.

Participants' complaint about noise from outside the patient's room is an essential issue in the hospital. Their comfort can be achieved by keeping the privacy between health workers and patients or patients' families. This plan can be done by making the room material more impermeable [16]. The noise inside the hospital can also be overcome by imposing an appeal against hospital residents. Disruption of health personnel and patients is a matter to consider if the hospital is building renovation.

Disturbance of comfort from temporary disturbance comes from the fan, whilst the fan is considered less effective. There are several conditions when a fan is unwanted. For example, the strong wind makes the paper on the table fly. However, there is a need for more careful planning in fan installation. Installation of the right fan will provide a sense of comfort for residents [17].

V. CONCLUSION

This study provides a manager with an understanding of the comfortable environment that affects the nurses and midwives during the working hour. Participants always focus on the well-being of the patients. This study provides insight that non-AC room could affect their performance and moreover, the layers of the uniform could adding more discomfort. Further study should examine the building design preferences from the perspective of health workers.

REFERENCES