Sensory Design for Inpatient Psychiatric Wards: A Comparison between Theory and Expert Judgement

R Hasanah, B A Suryawinata, M I Djimantoro
Architecture Department, Faculty of Engineering, Bina Nusantara University, Jakarta, Indonesia, 11480
Corresponding author: michaeldj@binus.ac.id

Abstract. Mental disorders are symptoms or psychological behavior patterns that appear clinically that occur in a person. Various factors can cause the emergence of this disease, including the pressure from the environment. This mental illness has various levels, from mild to serious mental illness. One of the common healing methods used to overcome this problem is by using a sensory stimulus. This study aims to present what sensory aspects an adult patient can accept at each stage of treatment based on the patient's condition. The methodology used in this research is qualitative, where data is collected through observation of patient behavior and interviews with experts. The results of these studies are then discussed with the relevant literature study. The results showed that not all sensory aspects were accepted by the patient at every stage of treatment so that it did not affect the patient's recovery at that phase. This research can be used by architects and interior designers in designing psychiatric wards.

Keywords: psychiatric rehabilitation centers, sensory design, mental health facilities, inpatient psychiatric wards.

1. Introduction
Mental disorders are symptoms or psychological behavior patterns that appear clinically that occur in a person. These mental illnesses can cause distress (painful symptoms) or disability (impairment in one or more important areas of function) which increases the risk of death, pain, disability, or loss of important liberty [1]. Many factors can contribute to mental illness - some of which are inherited, and mostly due to environmental stressors. This mental disorder is often underestimated, even though conditions of environmental stress that result in mental disorders can be experienced by anyone. Therefore, patients with psychiatric disorders need a facility where they can recover their mental state by undergoing treatment at a Rehabilitation Center.

The Social Rehabilitation Center based on Law Number 18 of 2014 of the Republic of Indonesia concerning Mental Health is an institution/service unit that carries out social rehabilitation for more than one type of target to restore and develop the ability of a person with social dysfunction to carry out social functions properly. The provision of these facilities will increase resilience and sustainability in the community.

The initial hypothesis in this paper is that mental illness can be cured by the presence of environmental stimuli through senses received by the patient. Human behavior is part of the whole system which includes place and environment so that behavior and environment cannot be separated
empirically [2]. In other words, human behavior always occurs somewhere, and cannot be fully evaluated without considering environmental influences [2]. The design of the Rehabilitation Center must be able to attract problematic communities or not to come and consult without feeling judged for the disturbance they receive. That way it can increase public awareness and curiosity about psychological health and the emergence of a spirit to return to be a happy individual.

According to Pallasmaa in his book, the experience of space, sound, and smell of a place has the same weight as its visual quality [3]. Likewise, Japanese designers recognized the importance of introducing the term "sensory device" which can inspire our sensory perceptions. Humans are a collection of very fine receptor organs and at the same time, image-producing organs equipped with a powerful memory playback system [4]. The resulting image is a spectacle that is regulated through several sensory stimuli and the memory is revived [4]. Sense as a system of human perception that provides various information about objects in the world without an academic process [5].

Even though, the research on human senses is still developing today – both from a medical and psychological perspective. The number of human senses, which originally only five, is now steadily increasing – some experts classified up to 13 senses covering the internal senses of the human body itself. But in this study, it is limited to five senses which are stimuli from outside the human body: visual, auditory, olfactory, tactile, and smell.

The sensorial experience above is a variable in research where observations and interviews will be conducted regarding the sensitivity of patients to the five sensory stimuli to answer the research goals. A comparison of theory and practice regarding sensory design aspects in the design of a rehabilitation center is needed to test the effectiveness of theory based on its application in the lives of patients with psychiatric disorders. It also takes knowledge of its application through expert interviews (psychologists and psychiatrists) and theoretical comparisons. Therefore, this paper aims to study the sensorial design that can be applied in psychiatric ward design based on a comparison study between theory and practice.

2. Methodology
The method used is qualitative research by interviewing psychologists and psychiatrists and compared with the literature study. The interviewing with experts tried to find the stimulus of the sense that related to a psychiatric patient. Not all senses are being studied, but focuses on senses that accordance with environmental - visual, auditory, smells, and tactile.

3. Result and Discussion
3.1. Result
Results of interviews about sensory aspects for adults and elderly patients with psychologists, psychiatrist, and literature review are shown in Table 1, 2, and 3, respectively.

| Sensory Aspect | PHCU | Rehabilitation | Elderly |
|----------------|------|----------------|---------|
| Visual         | The visuals created will not be important for patients because they are at a stage that cannot even recognize themselves and visual stimuli themselves may not be important. | For patients who have entered rehab rooms, it can be helped by the introduction of the external environment through visuals so that they can interact socially later. The focus for the rehab patient's room is of restore the patient's social factors. | For elderly patients, the view of the park can be its entertainment. |
**Sensory Aspect** | **Adult** | **Rehabilitation** | **Elderly**
--- | --- | --- | ---
**Auditory** | Patients at this stage need a quiet atmosphere so that they are calmer and not instead become agitated. | Repeated soft sound stimuli are good for making patients feel more relaxed. | Elderly patients do not need audio stimulation because their hearing level has also decreased.

**Offactory** | Choose odors that will not stimulate patient trauma, but you should not have to smell anything. But the smell of flowers which gives a calm effect is also good. | Patients at this stage are no longer disturbed by their olfactory stimulus so if they want to use aromatherapy it is not a problem. | The use of good smells also especially for elderly patients can make their preparation better.

**Tactile** | There are no specific studies on this, as long as the use of the material does not endanger the patient such as rough walls and floors that are too slippery. | There are no specific studies on this, as long as the use of the material does not endanger the patient such as rough walls and floors that are too slippery. | Pay attention to safety factors for patients when they walk and move.

**Sensory Design Recommendation** | Give a picture of a calm atmosphere and does not intimidate the patient. | Family atmosphere must be applied to patients. | Give a picture of a calm atmosphere and does not intimidate

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**Table 2. Interview with psychiatrist**

| Sensory Aspect | **Adult** | **Rehabilitation** | **Elderly** |
|---|---|---|---|
| **Visual** | The orientation of rowdy patients fidgets more into the room and focus so that they can calm down first, for the view is not crucial. | In the rehabilitation area, patients are familiar with the reality around them so they can be more interactive. | Many elderly patients also experience dementia so visual training needs to be done. |

| **Auditory** | This must be considered if in terms of psychiatric this patient is traumatized with water then you should not. | Patients in the calm stage will not be disturbed by auditory stimulus so it is worth trying. | There is no need, maybe if you want to use the pool only as a view. |

| **Offactory** | This is good because aromatherapy can provide an additional relaxing effect on patients. | There is no problem in adding scents to the patient at this stage. | This is good because aromatherapy can provide an additional relaxing effect on patients. |

| **Tactile** | So far there is no tactile stimulation that can affect the patient's healing. | So far there is no tactile stimulation that can affect the patient's healing. | The patient's touch can be used in therapy and safety sessions. |

| **Sensory Design Recommendation** | The patient's focus is to feel calm and comfortable. | Give an atmosphere that evokes the level of socialization of the patient. | The patient's focus is to feel calm and comfortable. |
Table 3. Literature review

| Sensory Aspect | Adult | PHCU | Rehabilitation | Elderly |
|----------------|-------|------|----------------|---------|
|                |       |      | PHCU           |         |
| Visual         | Patients need adequate lighting and there should be no blind spots / dark areas in corridors or other spaces that the patient may visit [6]. | The exit view is necessary for the patient so that they can maintain a space-time connection and contact with the outside world [7]. | Geriatric patients need more light as their vision deteriorates. Visual and physical access to open spaces to reduce stress[6]. |
| Auditory       | A quiet atmosphere should be created since the patient is easily distracted by sound stimulation [6]. | Acoustic control is applied to patients because they are sensitive to sound[6]. | Sound has the potential to increase the anxiety and fear of some patients[6]. |
| Olfactory      | The walls, floor and ceiling area must be clearly distinguished by the use of colors and materials. Mirrors, glass, very smooth floors, and other reflective surfaces should be avoided, especially in settings where social interaction is frequent. Reflections can create multiple images and distortions [7]. | Minimalist design encourage patients to do more activities outside the room. The use of non-fixed furniture has greater flexibility, namely to accommodate the number of occupants and to move the layout according to the preferences of the patients themselves for the level of security they feel [7]. | Geriatric patients need assistance with walking or a handrail to help them get up[6]. |
| Tactile        | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area [7]. | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area[7]. | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area[6]. |
| Sensory Design Recommendation | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area [7]. | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area[7]. | The design in the room area must be hard but comfortable so that patients will spend more time to socialize at the common area[6]. |

3.2. Discussion

Sensory aspects that can be accepted by patients at the Psychiatric High Care Unit stage are shown in Table 4. In terms of visual stimulus, PHCU doesn’t need an open view to the outside, because the patient’s need to focus is on treatment. A calm atmosphere must be created internally so that the patient is able to recognize himself first and not go berserk. The use of soft color paint in the room such as white, blue, or green to give the impression of calmness and peaceful. Access to sunlight are important, so that patients can return to reality. A 2004 University of Pittsburgh study showed that patients with access to sunlight requires 20% less pain medication, so it leads to lower medical costs[8]. The auditory stimulus for PHCU patient needs to be quite as possible. The olfactory stimulus for PHCU needs a relaxing odor for anxious of patients such as rose, lavender and rosemary. The aroma of orange and chamomile is good for passive patients because it gives a fresh and uplifting effect. Meanwhile the tactile stimulus can shape the furniture and corner in the room to use curved corners, so as not to endanger the patient. There floor must be plain without a step, so that patients do not fall or hit sharp corners. Wall should cover with smooth plaster. The floor recommends using vinyl because it has high durability and is not slippery.
Table 4. Sensorial aspects analysis for PHCU

|                  | Visual | Auditory | Olfactory | Tactile |
|------------------|--------|----------|-----------|---------|
| Psychologist     | ●      |          | ●         | ●       |
| Psychiatrist     | ●      | ●        |           |         |
| Literature       | ●      | ●        |           | ●       |
| Conclusion       | ●      | ●        | ●         | ●       |

Sensory design recommendation for PHCU wards is using of wood floors to provide a warm effect on the room. The color of the paint that is used dwell on neutral colors like white, beige, blue, and green because it can give a calming effect. The room must not be hot and stuffy, therefore the natural air ventilation must be able to enter the room, and use a higher color temperature of the light to give the impression of coolness. Based on the regulations of the health department the room temperature is 24-27 °C.

Sensory aspects that can be accepted by patients at the rehabilitation stage are shown in Table 5. The visual stimulus for rehabilitation patient should offer an open view of nature, which is good for patients at this stage. Park with an interactive design where patients can do activities should be provided. The use of colors is more varied besides neutral colors like magenta (physical, spiritual, emotional and mental balance), orange & yellow (warmth, comfort, cheerfulness, energetic, optimistic, and happy), blue (self-confidence) and purple (intimate feeling). Meanwhile, the auditory stimulus can give the use of fishponds with repeated gurgling of water so that the patient gets a relaxation stimulus from the sound of water. The olfactory stimulus in this stage can use a aroma of orange and chamomile, which can give a positive effect for passive patients due its freshness and uplifting effect. Tactile stimulus are same with previous where the furniture and corner of the room should be curved.

Table 5. Sensorial aspects analysis for patients at rehabilitation stage

|                  | Visual | Auditory | Olfactory | Tactile |
|------------------|--------|----------|-----------|---------|
| Psychologist     | ●      | ●        | ●         | ●       |
| Psychiatrist     | ●      | ●        | ●         | ●       |
| Literature       | ●      | ●        | ●         | ●       |
| Conclusion       | ●      | ●        | ●         | ●       |

Sensory design recommendation for rehabilitation ward can provide parquetted to provide a warm effect on the room. The paint colors used are more varied, namely neutral colors and colors that give the impression of confidence, and social at some points. The design of the gathering area is made without angles so that patients do not isolate themselves in the corner of the room. The room must not be hot and stuffy therefore the outside air must be able to enter the room and use a higher color temperature of the light to give the impression of coolness.

Sensory aspects that can be accepted by elderly patients are shown in Table 6. The visual stimulus for elderly can provide a view to the garden area for eye refreshment. Lighting to help the patient's vision (natural & artificial). The use of color for the guidelines of elderly patients such as pink for guide to the shared area because this color gives the impression of affection and togetherness, red for areas that patients should not enter (giving a threatened effect), and brown for the nurse's area because of this color gives the impression of security and trust. The auditory stimulus is less important, where the hearing function of the elderly has started to decrease. The olfactory stimulus for elderly ward should give a relaxing odor for anxious patients such as rose, lavender and rosemary. On the other hand, the tactile stimulus is the same with the other wards.
Table 6. Sensorial aspects analysis for elderly patients

|                  | Visual | Auditory | Olfactory | Tactile |
|------------------|--------|----------|-----------|---------|
| Psychologist     | ●      |          |           | ●       |
| Psychiatrist     | ●      | ●        | ●         | ●       |
| Literature       | ●      | ●        | ●         |         |
| Conclusion       | ●      | ●        | ●         | ●       |

Sensory design recommends using a parquetted floor to provide a warm effect on the room. The color of paint used in the area of the room is a neutral color, and the color with a memorable impression for patients for other areas of hospitalization. The design of the gathering area is made without angles so that patients do not isolate themselves in the corner of the room. The room must not be hot and stuffy therefore the outside air must be able to enter the room and use a higher color temperature of the light to give the impression of cool.

4. Concluding Remarks

The study of sensorial aspect that is acceptable to adults and elderly patient based on their treatment stage. An adult patient at the high care unit stage and the elderly can feel sensory stimulation in terms of visual, olfactory, tactile, and spatial atmosphere. Even though they have similarities to sensory stimuli that are acceptable but have different functions and goals in their application. Visual stimulation and feeling of space are the most important parts in influencing the mood of patients to undergo a better treatment process. These guidelines can help an architect to design the psychiatric ward with sensory design.

5. References

1] A. P. Association, Diagnostic and statistical manual of mental disorders, Washington: DC: Author, 1994.
2] D. P. Duerk, Architectural Programming : Information management fo, New York : Van Nostrand Reinhold, 1993.
3] J. Pallasmaa, The Eyes of the Skin: Architecture of the Senses, Cornwall, Great Britain: TJ International Ltd. Padstow, 2012.
4] K. Hara, Designing Design, Baden: Lars Müller Publishers, 2011.
5] J. Gibson, The senses considered as perceptual Systems, Boston: Houghton Mifflin Company, 1966.
6] Mental Health Facilities Design Guide, Departements of Veteran Affairs : Office of Contraction and Facility Management, 2010.
7] V. J. Willis, “Design Considerations for Mental Health Facilities,” Psychiatric Services, vol. 31(7), pp. 483-490, 1980.
8] Katz, A. (2011, July). Healthy and green with LEED For healthcare. FacilitiesNet. Retrieved from http://www. facilitiesnet.com/green/article/Healthy-And-Green-With-LEED-For-Healthcare-Facilities-Management-BOMFeature--12542