

IMPACT OF VERNACULAR ARCHITECTURE ELEMENTS ON PATIENT WAITING EXPERIENCE IN RURAL GOVERNMENT HOSPITALS IN SRI LANKA

RATHNAYAKE S.D.^{1*} & GAMAGE W. O.²

^{1,2} Department of Architecture, University of Moratuwa, Sri Lanka

¹dhananjaliratnayake@gmail.com, ²wajishanig@uom.lk

Abstract: The role of architecture in hospitals is a sensitive topic; the prominence given to the programmatic requirements has led to disregard of the in-between function of waiting identified as the user experience in the recovery process. Healing, in other words cure means a state of physical & mental wellbeing that a patient experiences in a hospital. It's a waiting process between the time of treatment & recovery. The waiting experience in Sri Lankan public hospitals is critical because spaces are designed only prioritizing standards while little consideration is given to the impact of local contextual parameters that generate familiar user experiences. This research investigates the impact of design options derived through principles abstracted by vernacular architecture elements on the waiting experience of patients in healthcare facilities. Vernacular elements of identification of centre and openness, articulation of transition space & domestic scaled spaces was used to interpret design options that can be adapted to reorganize the waiting scenarios of hallway, outpatient, and inpatient waiting spaces. The research further investigate how they will help alleviate the user experience of waiting and increase wellbeing.

Keywords: *Adaptation, Hospital architecture, Vernacular architecture elements, User experience*

Abbreviations - VAE – Vernacular Architecture Elements

1. Impact of Built Environment on Healing and Waiting

Healing is a spiritual and psychological process which is long-term. Curing is physiological, a process that recovers an illness. Wellbeing can be considered as a combination of both mental & physical recovery (Sternberg and Spaces, 2009). Healing and curing involve a waiting process which we consider as the period taken to recover. This waiting involves experiences between time and space, it is an "In between Interval". In many scenarios and functional programs, the aspect of waiting is ignored. In medical facilities, waiting spaces and their impact on occupant wellbeing are given less consideration and even have created diverse re-generating issues including psychological and emotional rejection of the places.

In medical facilities emotional rejection of the place occurs within diverse user categories; those requiring medical attention and others as the patient's family or supportive staff. All occupants receive the same ill-fated waiting experience on the premises. Negative waiting experiences can occur in outpatient as well as inpatient waiting areas. In developing countries like Sri Lanka, the process of waiting in medical facilities is further affected by factors such as overcrowding as number of people who depend on free government healthcare has increased in the past decades. Lack of awareness of positive factors in context appropriate built environments (people and place) on user wellbeing has resulted in uninteresting and dull spatial experiences. However, contextual identity of built space which is authentic to the people can generate a positive outcome in the relationship between people and place and add value to the occupant experience (Dayaratne, 2018).

2. Impact of Vernacular Architecture on the Waiting Experience

Spaces are considered to be places with identity. Space is considered to be an in-between thing between place and people, it is an experience. Places have a presence but space invites life. It is in space where things can happen (Day, 2012). Places are also considered as an aesthetical or functional combination of spaces (Day, 2012).

Familiarity is a significant factor that can affect and supports the patients in breeding self-confidence (Boscherini, 2017). The desire to belong in the environment we live in runs deep within the mind of a person. A sense of belonging

*Corresponding author: Tel: +94 769916840 Email Address: dhananjaliratnayake@gmail.com

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is an unseen basic human need, sense of belonging is a powerful tool that creates both abilities to adjust and add value in life, further attaches several emotions (Day, 2017).

Vernacular is derived from adapting to contemporary situations and respecting the user and context. Vernacular architecture is derived from localized needs and construction materials that are influenced by climate and local culture over time, it can adapt from different functions of the users (Rapoport, 2005). Recently many researchers have investigated the importance of vernacular concepts to minimize the impact of unfamiliar living settings which are frequently seen in modern buildings (Foruzanmehr and Vellinga, 2011). Most contemporary program dominated buildings disregard the sense of vernacular and contextual features, they try to adopt the repetitive treading forms without acknowledging its impact.

Rappaport (Rapoport, 2005) identifies vernacular buildings as a result of the desires and aims of a unified group in a particular context rather than a result of any individual desires. It has symbolic values derived from the socio-cultural context and modified by its own contextual climatic conditions, site variables, choice, and availability of materials and construction techniques (Rapoport, 2005). The notion of Vernacular varies from time, context, and the user. As an example, with the evolution of time in the Sri Lankan context; vernacular materials have changed from Mud walls '*Warichchi*' to Brick or Concrete block walls, yet the elements and the essence remains the same. Although vernacular architecture itself is not equal, it may look alike due to the strong impact of significant elements produced as an aftereffect of the living standards (Dayaratne, 2012). It is observed that the golden emphasis on vernacular architecture relies on its principles abstracted from these elements.

Samarakoon (Samarakoon, 2003) identified fundamental VAE and principles which are based upon the culture and tradition of a place, shared visions, beliefs, values, and attitudes. The nature of these represented elements reflects the way of thinking and the way of adjusting to doing things in day-to-day life. These principles have been observed to arise as a result of domestic vernacular-built structures. The vernacular elements and principles identified by Samarakoon (Samarakoon, 2003) include the following;

- Identification of center and openness
- Vista and harmony between built form and setting
- Articulation of transition space
- The sense of human scale
- The level of permanence and sophistication

With updated technologies and techniques, spaces can still be designed to give a sense of familiarity to the users. Hospital building typology is functional and technical. Here the primary concern will be building function however if the waiting spaces is given a sense of familiarity/authenticity or belonging positive outcomes maybe expected in the healing process.

3. Research Gap

Recently many researchers have emphasized the importance of mental well-being in hospital atmospheres which creates a direct impact on the healing process of patients (Aripin, 2006). Many studies have proven that patients indicate a speedy recovery when they were satisfied with the immediate living context (Borrett, 2013).

The notion of vernacular can be considered as a way of responding to local contextual conditions. Some recent research has explored the impact of vernacular concepts to minimize unfamiliarity in built environments and in turn promote psychological wellbeing (Foruzanmehr and Vellinga, 2011). However only, a few studies have investigated the positive impacts of vernacular-built form on wellbeing of patients in medical facilities. However vernacular principles have been integrated in the design of few renowned medical facilities as a means to increase occupant's psychological wellbeing; such as design guide lines adapted in Maggie centers (free cancer support centers in the UK) (Borrett, 2013), Maternal Hospital in Malawi by MASS Architects and Butaro, Burera District Hospital, Rwanda (Murphy and Mansfield, 2017).

This research investigates impact of vernacular principles to provide a familiar waiting experience to the occupants in hospitals and possible positive outcomes for wellbeing through this integration. It explores existing concepts derived from literature on VAE and study how these local contextual parameters can be adapted to reorganize selected patient waiting spaces. Three types of waiting spaces commonly seen in Sri Lankan public hospitals are studied under this research; outpatient & visitor waiting spaces, inpatient waiting spaces and waiting hallways. The study proposes methods of rearranging these waiting spaces through integration of VAE which would increase user attachment to the space thus decrease the negative psychological outcomes of waiting.

4. Methodology

The research investigates the impact of three most commonly seen VAE in the Sri Lankan context on patient waiting experience in rural public hospitals (Table 1). In the first phase of the study three rural public hospitals are observed

to identify existing spatial conditions in waiting spaces. In the second phase international precedents are investigated to derive suitable vernacular principles and design options. In the third phase collected data from phase 01 and 02 were used to model spaces which was then used to investigate preferences of users by administering an online questionnaire survey. The main aim of the questionnaire is to measure impact of selected vernacular elements on waiting experience and identify its influence on wellbeing.

Table 1: Tested vernacular architecture elements (VAE)

VAE	Space	Expected positive attributes	If not incorporated negative design attributes
Identification of center and openness	Visitor waiting space with openness	<ul style="list-style-type: none"> • Connected with external environment • Good internal ventilation • Natural Lighting 	<ul style="list-style-type: none"> • Not connected with external environment • Artificial lighting
	Visitor waiting space with center	Seating focused towards the center. Connected with green Negative spaces (Courts)	Traditional Institutional arrangement
Articulation of transition spaces	Circulation corridors	<ul style="list-style-type: none"> • Connected with exterior natural environment • well ventilated • in between intervals 	<ul style="list-style-type: none"> • Dark no ventilation • Center of building
Sense of human scale	Inpatient wards	domestic scaled volumetric spaces	large scaled spaces

4.1 IDENTIFICATION OF CENTER AND OPENNESS

This is an element found in domestic buildings as well as in the formation of a common compound in Sri Lankan rural settlements *gamgoda*. *Gamgoda* is the center of a cluster of dwellings used as a communal space. In most domestic buildings and dwellings spaces and layouts have been arranged around open spaces as courtyards with the quality of openness. It is identified that these were the place of interaction linked with religious customs, rituals, beliefs, and myths. The center court of the house was named *Madamidula* which was the common meeting place consisting of a natural flow of light and ventilation and domestic activities including inward gardens. Also, this strong sense of the quality of openness leads dwellers and visitors to the court space as the focal point of the house and has added a sense of belonging as it was the common meeting space (Figure 1a).

4.2 ARTICULATION OF TRANSITION SPACE

Verandah is an element that was identified as a transitional space in the traditional house which combines the inner and outer spaces and have a fluid quality. This can be considered as a negative in-between breathing space that emotionally interacts with occupants, it reflects the expression of the sense of arrival and sense of welcoming. It is identified that verandahs are creating a strong spatial expression in one’s mind (Figure 1b).

4.3 THE SENSE OF HUMAN SCALE

Domestic scale is an interesting element found in vernacular architecture. Scale is to be considered as a relative term that is related to the dimensions and proportions of the human body. Scale is a factor that lies parallel with the human body it conveys sensitive feelings which wake the sense of belonging. It is identified that scale of traditional dwellings has provided the domestic harmonious proportions while considering the activity levels. Scale empowers a high impact on human feelings and emotions. The factor is clearly visible when observing the evolution of the vernacular Kandyan House (Figure 1c).

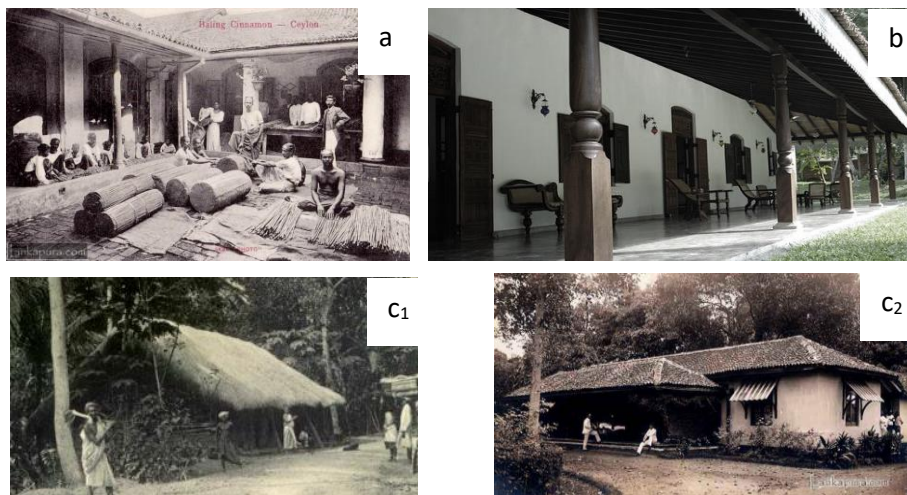














Figure 1, Adaptation of VAE in the local context (a) Courtyards providing openness and centre of activity gathering (b)Veranda (c) Relationship to human scale with the roof angles (Source: *lankapura.com*)

4.4 ONLINE GRAPHICAL QUESTIONNAIRE

The online graphical questionnaire was used to investigate the most preferable waiting experience and the impact of built space on wellbeing related to selected VAE. The selected spaces for the study are: outpatient & visitor waiting spaces, inpatient waiting spaces, and waiting hallway. Forty responses were collected and analyzed through the online survey. Spaces highlighting selected VAE were modeled using SketchUp software and extracted 2D images were used in the questionnaire (Table 2).

Table 2: Main questionnaire items related to VAE

VEA	Design choices	
<p>Identification of center and openness- From above options selected the most preferred waiting experience in hospital outpatient and visitor waiting area</p>	<p>Choice A- Connected patient and visitor waiting space with the quality of openness</p>	<p>Choice B- Connected deviation of Patient & Visitor Waiting Space with the quality of opens.</p>
		
	<p>Choice C- Connected deviation of Patient & Visitor Waiting Space with the quality of Center and opens.</p>	<p>Choice D- Inter-connection of Both patient and visitor Waiting Space with the Quality of Center.</p>
		
<p>Articulation of transition spaces- From above options selected the most preferred waiting experience in hospital hallways and corridor</p>	<p>Choice A - Waiting benches designed as a Continuous Building element facing toward outside.</p>	<p>Choice B- Waiting Spaces designed with in-between intervals facing toward outside</p>
		
	<p>Choice C- Waiting benches as a continuous building element, facing inside with a covered seating</p>	<p>Choice D Waiting benches as a continuous building element, facing inside with open seating</p>
		

Sense of human scale- From above options selected the most preferred waiting experience in hospital inpatient ward	Choice A – Standard Patient-centric ward	Choice B- Standard Patient Centric hallway ward with two bed deviation.
		
	Choice C- Standard Dormitory ward with two bed deviation.	Choice D Domestic scaled four bed unit
		

After Respondents selected the most preferred choice, they were also requested to provide the rank order for all four choices offered in the questionnaire. Follow-up questions listed in Table 3 and 4 were used to evaluate the impact on wellbeing on the most preferred choice selected for the outpatient and visitor waiting area and inpatient wards. No follow-up questions were included for most preferred option in hallway and corridor.

Table 3: Follow up questions for most preferred choice in outpatient and visitor waiting space

No.	Follow-up question	Interpretations
1	I may feel optimistic & good when I’m in this space	Level of attachment to the space
2	I may not get bored when I’m in this space	Level of satisfaction of the space
3	I may able to forget the experience of waiting if I’m in this space	Impact from built environment to the sense of waiting
4	I may able to forget the feeling unwell at times while I’m in this space	Impact of space on wellbeing
5	I may able to forget the feeling of waiting in a hospital when I’m in this space	Satisfaction with the surrounding atmosphere
6	Did you notice open spaces more than the colors of floors and walls	Emphasis on the quality of opens & center.

Table 4: Follow up questions related to experience in the inpatient wards

Variable	Question	Interpretation
Expected Level of Privacy in the ward	I prefer to stay alone in a room	Expected privacy level
	I'm prefer sharing a room with one other person	Expected privacy level, preference for sharing
	I like share the space with a large group of people, more than 20	Preference for large dormitory style spaces
	I prefer to share the space with 4 to 6 people rather than large dormitory type of 20 or more	Preference for small group arrangement spaces.
The impact of scale and openness	I prefer to be in a large dormitory style wards which is not connected with nature	Preference for large scaled spaces not connected with nature
	I prefer to be in a small space which connect with nature	Preference for domesestic scaled spaces connected with nature.
	I like it if I could engage with outside activities more than staying in the bed	Diversity of actions expected from ward atmosphere

Activity and level of engagement with nature	I prefer a short distance walk near the ward	Preferences engage in some activity rather than being confined to bed
	I prefer if there are places that I could sit and engage with my preferred activities near to my ward	Preference for easy access to ward as well as other activity
	I prefer if the ward has access to views of nature	Quality of connection with outside- nature views
	In the day time, I prefer having sunlight in the interior rather than artificial lights	Quality of connection with outside- daylighting
	I like always being observed by medical staff and they should be easily accessible	Preference for easy access to medical staff

5. Results

5.1 SPATIAL CONDITIONS OF WAITING SPACES IN SELECTED RURAL GOVERNMENT HOSPITALS

Three hospitals located in Kandy were observed to identifying & critically analyze existing spatial conditions and characters in waiting spaces of rural government hospitals. Narampanawa divisional hospital, Delthota divisional hospital and Teldeniya divisional hospital. Walk in observations were conducted at Naranpanawa divisional hospital. Due to COVID 19 travel restrictions other two hospitals were analyzed using architectural drawings collected from the Ceylon Engineering Department in Kandy. Similar layout arrangement and design limitations were observed in all three hospitals.

The outpatient and visitor waiting spaces are arranged in a closed space covered with walls and windows and chairs arranged facing one direction with very poor connection between inside and outside (Figure 2a). The openings are covered with a steel mesh for pest control. The Chairs in the waiting area are arranged facing the clinic rooms (Figure 3).

Inpatient waiting spaces (wards) are arranged in the typical dormitory style layout. The patient beds are arranged facing each other with very little connection to the outside natural environment. However, the domestic scale maintain can be considered as a positive attribute (Figure 2b).

In Narampanawa divisional hospital the hallways, connecting corridors in inpatient wards are placed on the edge of the building which give more integration of inside and outside. However, the hallways are narrow resulting in less space for articulation (Figure 2c).



Figure 2, Waiting spaces at Naranpanawa divisional hospital (a) Outpatient waiting (b) Inpatient wards (c) hallways corridor (Source: Author)

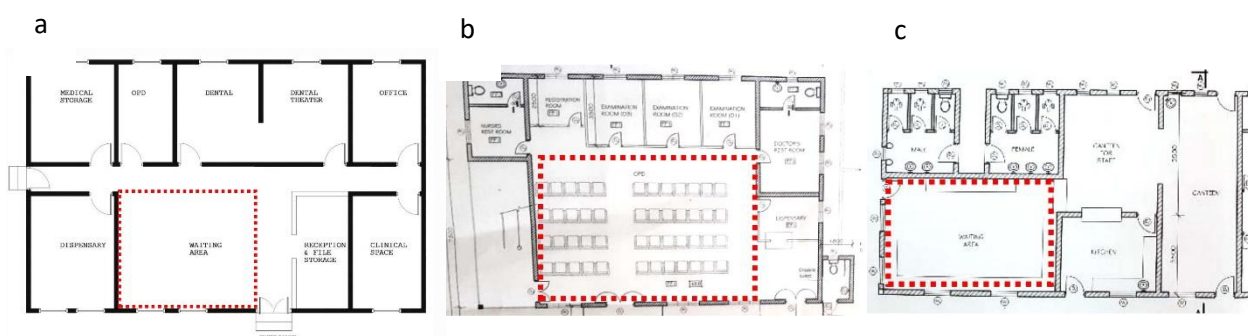






Figure 3, Outpatient waiting space and seating arrangement at (a) Naranpanawa (b) Delthota and (c) Teldeniya divisional hospitals (Source: Ceylon Engineering Department Kandy)

5.2 ADAPTATION OF VAE TO IMPROVE WAITING EXPERIENCE; INTERNATIONAL PRECEDENTS.

5.2.1 *The Kasungu, Malawi Maternity Waiting Village*

This facility was designed to accommodate expecting mothers who have to travel long distances for their confinement. Typically, they would spend 4 weeks prior to confinement in these villages. The facility was designed by MASS design group with the intent to improve the mothers’ waiting experience. Table 5 summarize the adaption of VAE in the design of The Kasungu, Malawi Maternity waiting village.


Table 5: Adaption of VAE, Kasungu, Malawi Maternity waiting village




<p>Openness and center in-between courtyards</p>	<p>Familiarity was increased by incorporating a number of courtyards to increase interaction and gathering</p>	
<p>Articulation of transition space in-between waiting verandah</p>	<p>Verandah like waiting corridors which connect the sleeping units incorporate benches for resting, sitting and interaction for mothers and visitors.</p>	
	<p>Temporary storage is also provided underneath these waiting benches for visitors.</p>	
<p>Use of human scale in sleeping units</p>	<p>Domestic scale and familiar gable roof were used in sleeping units to increase familiarity</p>	

5.2.2 *Butaro, Burera District Hospital, Rwanda*

This hospital was designed by Mass design group in collaboration with the government of Rwanda. The main design intent was to reduce the spread of airborne illness through increase of ventilation. Although the visual representation of VAE is low compared to The Kasungu, Malawi Maternity waiting village, the spaces capture the essence of VAE. This building is an example of how VAE can be used to adapt when designing contemporary functional layouts. Table 6 summarize the adaption of VAE in the design of Butaro, Burera District Hospital

Table 6: Adaption of VAE, Butaro, Burera District Hospital

<p>Openness adapted in outpatient and visitor waiting spaces</p>	<p>Framing connections with nature: Maximum sense of connection to the outside creates a sense of familiarity</p>	
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	Large in between courtyards between inpatient and outpatient wards which can be used for waiting	
Articulation of transition space adapted in hallways	Hallways located at the edge of the building with good connection to outside Incorporation of built-in benches to create an in-between experiential space which is healing and stimulating	
Use of human scale in inpatient waiting spaces	Arrangement of spaces with sense of privacy reduce the sense of waiting typically experienced in dormitory layouts Patient beds orientated to frame outside views	

5.3 ONLINE GRAPHICAL QUESTIONNAIRE

5.3.1 Identification of center and openness in outpatient waiting spaces

The most preferable outpatient visitor waiting option was selected from a choice of four options, choice A and B represented varying degree of openness with and without the use of floor level differences between visitor waiting and patient waiting. Options C and D included openness and center with visitor waiting connected to central courtyard from single side (option C) and both sides (option D). The most preferred waiting experience preferred by 58% of the respondent was option D (Figure 4a). From forty responses 75% always preferred inclusion of both center and openness (option C and D) rather than just openness (Figure 4b).

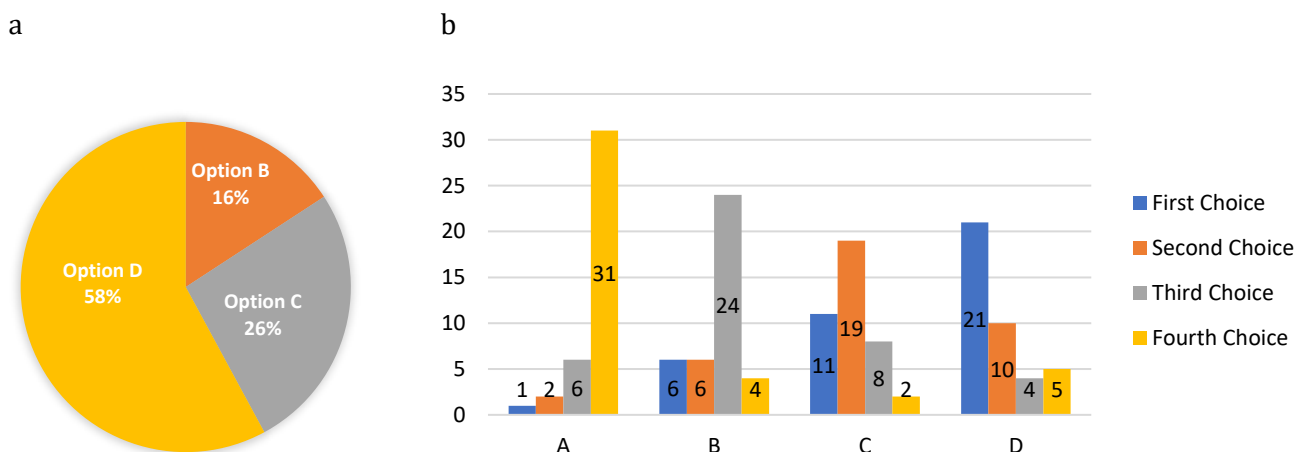


Figure 4, Survey results for centre and openness in outpatient waiting spaces (a) most preferred design option (b) rank order preference (Source: Author)

Table 7 summarize the findings for follow up questions related to most preferred waiting experience in outpatient and visitor waiting spaces. Most proffered options D, C and B was also linked to positive feelings of wellbeing.

Table 7: Results of follow up questions related to most preferred waiting experience in outpatient and visitor waiting spaces

Strongly Agree/ Agree Strongly Disagree/ Disagree

Question	Response
I may feel optimistic & good when I'm in this space	
I may not get bored when I'm in this space	
I may able to forget the experience of waiting if I'm in this space	
I may able to forget the feeling unwell while I'm in this space	
I may able to forget the feeling of waiting in a hospital when I'm in this space	
Did you notice open spaces more than the colors of floors and walls	

5.3.2 Articulation of transition spaces in corridors and hallways

Four options offered for the most preferable hallway corridor waiting experience included varying methods of articulation of the hallway experience using seating methods and in-between intervals. Choice A and B the seating was oriented to the outside with choice B also incorporating in-between intervals. Choice C and D the seating was

orientated to the inside with two different levels of exposure to the outside. Most preferred waiting experience was option B where the seating was both orientated to the outside with in-between intervals (Figure 5a). From forty responses 67% preferred option B as their first or second preference (Figure 5b). Choice D received the lowest rank order first and second preference of 15%. Follow up questions were not included in this section.

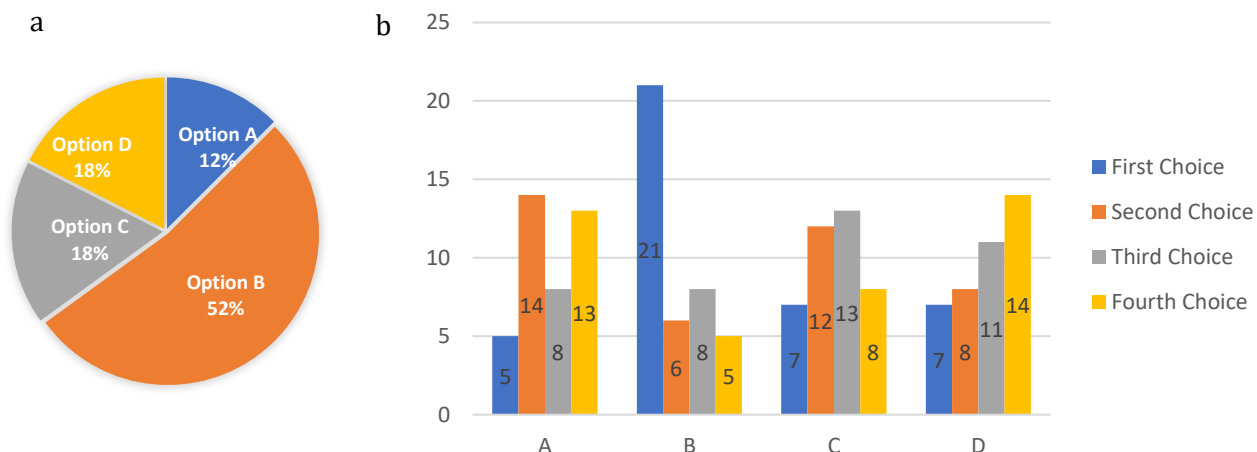


Figure 5, Survey results for Articulation of transition spaces hallways and corridors (a) most preferred design option (b) rank order preference (Source: Author)

5.3.3 Sense of human scale, openness and level privacy in inpatient wards

Since inpatient wards are where patients spend the most amount of time, the developed design options tested three factors: sense human scale, identification of openness, and level of privacy. The created design options included changes in bed orientation and varying layout options of dormitory layout to more private four bed units, varying degree of privacy was also tested in this method. The most preferred waiting experience was option C and B (Figure 6a). Option B the beds are oriented to the outside with half partitions forming two bed units and Option C the beds are oriented towards inside with half partitioned two bed units. Least preferred option was standard dormitory layout (option A). From forty responses 67% preferred option B and C as their first or second preference (Figure 6b). Choice A received the lowest rank order first and second preference of 22%.

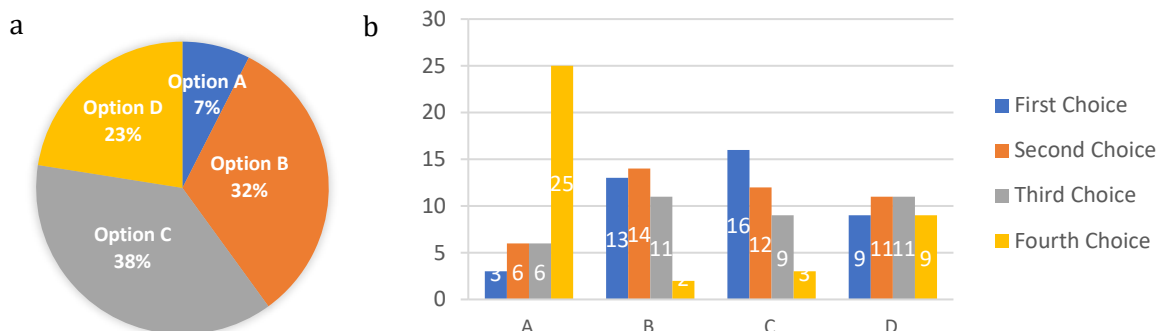


Figure 6, Survey results for sense of human scale, openness and level privacy in inpatient wards (a) most preferred design option (b) rank order preference (Source: Author)

Twelve follow-up questions and were used to test the expected inpatient experience related to level of privacy, scale and openness activity and engagement with nature. The results are summarized in Table 7. High preference was identified for increased level of privacy, small scale spaces connected with nature, day lighting and access to other activities from ward spaces.

Table 7: Results of follow-up questions related to level of privacy, scale and openness activity and engagement with nature

	Question	Scale			
		Most Likely	Likely	Very unlikely	Not at all
Expected Level of Privacy in the ward	I prefer to stay alone in a room	63%	28%	0	0
	I'm prefer sharing a room with one other person	2%	42%	7%	14%
	I like share the space with a large group of people, more than 20	5%	19%	12%	16%
	I prefer to share the space with 4 to 6 people rather than large dormitory type of 20 or more	14%	25%	9%	12%
The impact of	I prefer to be in a large dormitory style wards which is not connected with nature	14%	23%	9%	5%

scale and openness	I prefer to be in a small space which connect with nature	53%	33%	0	0
Activity and level of engagement with nature	I like it if I could engage with outside activities more than staying in the bed	32%	42%	7%	0
	I prefer a short distance walk near the ward	35%	51%	5%	0
	I prefer if there are places that I could sit and engage with my preferred activities near to my ward	46%	35%	0	0
	I prefer if the ward has access to views of nature	70%	25%	0	0
	In the day time, I prefer having sunlight in the interior rather than artificial lights	58%	37%	0	0
	I like always being observed by medical staff and they should be easily accessible	79%	30%	19%	2%

6. Conclusion

The built environment has a direct impact on our wellbeing. Many contemporary programs dominated buildings such as medical facilities may disregard the impact of built environment on emotional and psychological wellbeing of those receiving treatment. Nevertheless, many research has proven that patients’ recovery process is affected by built environment attributes; positive attributes resulted in faster recovery rates. The impact of vernacular architecture elements on psychological wellbeing of patients in healthcare buildings have been hardly investigated. However, design research has revealed positive psychological impacts related to vernacular architecture attributes in health care buildings. Vernacular built form may be associated with positive psychological wellbeing due to its ability to minimize unfamiliarity in the context. Familiarity is a significant factor that can support development of self-confidence, we have an innate need to belong in the environment around us. This research explored the potential of vernacular-built form to provide familiarity to the context and alleviate the negative effect of waiting in the patient recovery process in hospital settings.

Three vernacular architecture elements were investigated. The quality of center and openness observed in Sri Lankan domestic architecture was a preferred vernacular-built environment attribute in outpatient waiting spaces. Such built form increases the level of interaction and connectivity, further provides familiarity of volumes of space. Connection to nature and domestication of large volumes by in-between intervals was most preferred in hallways and corridor spaces. Rearranging these spaces as a space of experience between outside and inside stimulates the waiting experience for patients and visitors.

In-patient wards are the spaces in which a person spent most amount of time. However minimum attention is given to the impact of built environment attributes on psychological wellbeing in these spaces. These spaces are typically artificially lit and ventilated. They are also arranged in dormitory style layouts with beds facing inwards and small gaps between beds. Such arrangement is selected due to ease of circulation during ward rounds and observations. These spaces can adapt features of VAE to ease the patient waiting experience ultimately positively affect the recovery process. The typical dormitory layout seen in government sector hospitals was the least preferred. Increased levels of privacy through subdivision of spaces, inclusion and access to other activities during the hospital stay, domestic scale of spaces and connection to nature was preferred as well as linked to positive psychological outcomes. These research findings indicate the importance of user centric approach to design of healthcare facilities and the impact of VAE on positive outcomes related to the waiting experience of patients.

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