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Healing Environment: Paediatric Wards – Status and Design Trend

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Abstract

Based on a pilot study, this paper attempted to chart the current status and design trend of paediatric wards in the Klang Valley. Post-Occupancy Evaluation (POE) studies were conducted in three hospital wards built five-years apart. Data collection involved NHS (2008) evaluation toolkits for healthcare buildings – the AEDET Evolution and ASPECT, interviews, and personal observations. Overall, a positive design trend towards healing environment was charted in the newer paediatric wards built. However, lacking were paediatric ergonomics considerations and the utilisation of audio therapies. Implications of the findings were discussed and several design best practices suggested.

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Keywords: Healing environment; paediatric ward; Post-Occupancy Evaluation; current status; design trend

1. Introduction

Interest in the creation of healing environment is increasing globally (Ananth, 2008). “Healing environment” can be simply described as the overall environment (physical and non-physical) created to

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aid the recovery or healing process. In contrast to curing, healing is a psychological and spiritual concept of health. As perception is also psychological, there is a likelihood of a relationship between healing and the physical environment. Also, as it is well established in the literatures that the physical environment influences human behaviour, there exist a high likelihood tendency that the relationship between healing and the physical environment would be more marked amongst the paediatric population, as they are more sensitive than adults in the perception of the environment (Ozcan, 2006).

Based on initial conversation with senior hospital staffs, it seemed that Post-Occupancy Evaluation (POE) studies had never been conducted upon existing pediatric wards in Malaysia. That triggered the intention of the present research, in particular for being the first. It aimed to establish the status and chart the trend in the design of the paediatric wards. The status involved identifying the degree of conduciveness towards healing in the environment of those existing wards. Significance of the study was in determining areas for improvement, so as to aid the healing process further. Thus, the research objectives:- to identify the trend which related to the quality status of the physical environment of the pediatric wards; to assess how far childrens' ergonomics were taken into consideration in the design; to identify whether there were differences in the provisions between wards located in urban and non-urban areas, and to identify problems encountered towards the creation of the healing environment. The goal being in the suggestion of best practices to be adopted in the design of new pediatric wards, or the upgrading of existing ones for the benefit of paediatrics. The strategy of the research design was case studies, while the methodology adopted included site visits, personal observations, interviews and the use of evaluation tools. Structure

2. Literature Review

The role played by the physical setting in the healing process and more importantly for improving patient outcomes and the well-being of families and caregivers had been stressed by several authors such as Moore (2000), Ozcan (2004) and Visentin (2006). Joseph (2006) concurred about the influence of the physical environment on the healing process and elaborated further that the physical environment also contributed towards a better quality of life not only for the patients, carers and staffs but also the visitors.

There also had been a certain richness and emphasis in defining and describing the healing environment. For example, Duncan (2000) and Oberlin (2008) opined that such environment could be created by consideration of factors such as colour, shape, lighting, smell, sound and feel. Berg (2005) emphasised more on the contribution of nature, daylight, fresh air and quietness to such environment. Moran (1993) suggested that creating a more homelike family environment would give benefit to the children as it encouraged children to feel like at home, active and playful.

The healing environment as described by Varni (2001) involved the "physical and cultural atmosphere created to support families through hospitalization, medical visits, healing and bereavement." (p.30). Proof that such environment might influence patients' and carers perception about their healthcare providers were based on responses about the patients' satisfaction levels, being loyal customers and in helping to promote the healthcare to others, and the quality evaluations made.

Inspired by the global interest and development of the healing environment, the Samueli Institute, a medical research organization with interest in investigating the healing processes has developed the concept of Optimal Healing Environment (OHE), which it defined as "one where the social, psychological, physical, spiritual, and behavioral components of healthcare support and stimulate the body's innate capacity to heal itself" (Ananth, 2008, p. 273). The wholesome approach towards the healing process comprised both the inner and outer environment. The inner environment involved developing healing intention, experiencing personal wholeness and cultivating healing relationship, while

the outer environment involved practicing healthy lifestyles, applying collaborative medicine, creating healing organization, and building healing spaces as shown in Figure 1.

In relation to Anath's (2008) OHE, of interest to the present research related to the building healing spaces part or physical environment, which enhanced sensory input. That involved nature, outdoor playground, architecture that naturally included the ergonomics considerations, colour, artwork, light, aroma and music. Those elements identified not only contributed towards the healing process but also helped the pediatric patients coped with pain and aggression as concluded by NACHR (2008).

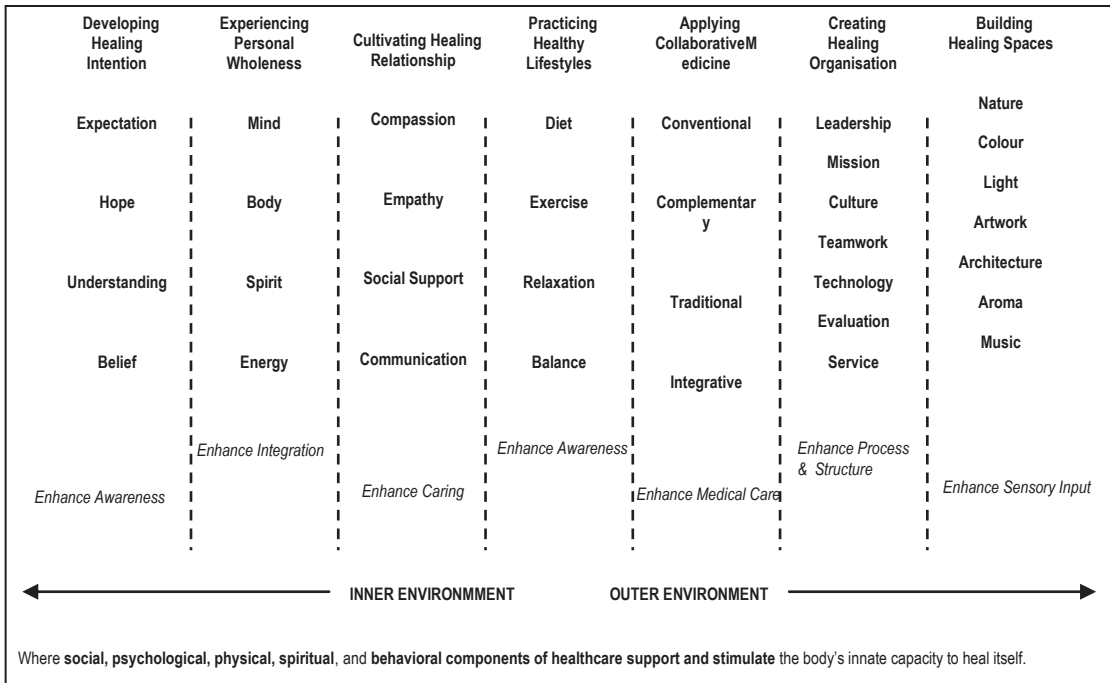


Fig. 1. The Optimal Healing Environment. Source: Sita Ananth (2008), *Healing Environments: the next natural step*, Explore, Vol. 4, No. 4, p. 274)

Outdoor environment that could contribute towards the healing environment involved nature and the outdoor children's playground. The role of nature or the creation of therapeutic gardens towards the healing process had been reported by several studies. For example, Whitehouse, et. al. (2001) revealed that garden features in order of users' preferences included the sound of running water, followed by the presence of bright colours, flowers, plants and greeneries, artwork, and the opportunity for multisensory stimulation. They also found that very young pediatric patients who were hospitalized for a longer duration or those with physical or developmental disabilities were responsive and appreciative to such gardens. They recommended in the creation of potential activities that could be done in the gardens by the different users, such as an outpatient or the patients' healthier siblings. Similarly, Sherman, et. al. (2005) observed the gardens were used differently according to the category of users or their age group. While the most used was the largest garden with direct patient access, children more than adults interacted with the garden features. They also found that emotional distress and pain

were lower for all groups when in the garden as compared to in the hospital. Similar findings were also reported locally by Said (2009). In addition, NACHR (2008) concluded that those gardens could help patients to reduce anxiety.

In a survey, which involved hospital staff, parents and visitors, about perceptions and their experience of a playgarden, an integration of playgrounds and healing gardens located in a pediatric hospital, Turner (2009) revealed that children's experience during their play in the playground strongly benefited the children's health. He recommended that the physical environment between indoor and outdoor activity be accessible at all times. Also, the playgarden should not only provide space for patients and their families, but also for staff to interact with each other in a park. He also suggested that the playgarden should include a variety of approaches. Annunziato (2002) emphasised on features like a river that flows along the window wall which included trees, native plants, and whimsical animal sculptures could help ease the fear of children and provide a space for siblings to play, as well. The evidence by Annunziato is to ensure that a sense of welcoming and playful environment appeared in the children's hospital somehow would reduce patients and staff stress, improve patient safety and improved overall healthcare quality.

The importance in ergonomic considerations for the pediatric patients and the related implications had concerned many because the requirements of the children were not the same as the adults. For example, Lueder (2003) detailed out the many differences of the physical built of children as compared to adults. Luder and Rice (2007) elaborated further that children were in continuous development - physically, perceptually, cognitively and socially. Also, Scanlon et. al., (2006) stressed that due to their nature, children during the pediatric age range were more dynamic than adults and hence characterised many different features which resulted in more potential risks for harm amongst pediatric patients during medical care.

According to Hourcade (1997), during the course of development, children's physical maturation affected and limited their capabilities in accomplishing tasks at different age levels. However, he argued that maturation did not guarantee that development would occur. As such, rather than the reliance on maturation he suggested that it would be better to ensure technologies (or facilities) being appropriately sized which not only provided better ergonomics but motivated the children to complete their tasks more comfortably. Also, better ergonomics were the outcome in the design details of the facilities provided which empowered patients in taking responsibility for their own health. Such offer of independence is "the power of the healing environment" (Leibrock, 2000). In addition, France, et. al. (2005) opined that the creation of a patient-centred setting facilitated safe and efficient care and as such human factors expertise were needed to be involved early in the design process.

Safety, a very important factor to be considered especially when involving the pediatric patients should be one of the outcomes of the ergonomically-designed paediatric setting. Concerned for a much safer environment and products for the pediatric patients had been raised by many. For example, in view of the large number of hazardous products that were designed for or within the reach of the children, Smith-Jackson (2002) stressed the need for more product safety research which involved the children. Also, Croasmun (2004) argued that often products or services might have been designed without sufficient knowledge of the end users. As such, improved ergonomics by designing out potential flaws before the occurrence would make a safer setting for the pediatric patients and a better environment for the medical carers. In addition, Miller and Zhan (2004) revealed that the prevalence of patient safety events frequently involved the very young with a substantial increase in duration of stay and ultimately increased excess charges for the children alone in the US which incurred billions of dollars in 2000. Similarly, Woods, et. al. (2005) cautioned that patient-specific setting increased vulnerabilities and as such patient safety risks must be accounted for in the design and improvement interventions.

Associated with the risk factors were the many common pediatric conditions such as obesity, asthma and injuries but had little attention from researchers (Cummins and Jackson, 2001). The lack of such research was similarly echoed by Crev and Calhoun (2004) in relation to a wheelchair and seating configuration specifically for children. Coupled with the lack of research on ergonomics which concerned the pediatric patients were the limited literatures available. While improving safety in patient-specific setting, such as in pediatric hospitals increased the complexity further to a setting which is already complex and challenging due to the variation inherent in the patient in relation to their ever continuous and dynamic physical and intellectual development, the lack of available knowledge on human factors and ergonomics for the pediatric population only worsened the situation (Scanlon, 2007). Due to the biases of such studies which mainly concerned the adult population and in work / educational environments, he encouraged the need for more future research on ergonomic needs of children so that systems of health care can be redesigned to optimize the safety of children and the performance of their care providers. Within the constraints of the unavailability of the appropriate literatures, Scanlon suggested the critical areas for child-focussed considerations identified by Wickens, et al (1998) together with Vanderheiden's (1997) concept of Universal Design be used as the basis in the study of ergonomics which affected the pediatric population. While Wickens and colleagues considered the cognition, size and shape variants, issues of biomechanics and work (or play) physiology, Vanderheiden's Universal Design emphasised on products, which could be used effectively and conveniently by all regardless of their age and capabilities. Scanlon's proposed framework of human factors and pediatrics is as shown in Table 1.

Table 1. Human Factors and Pediatrics: Possible Design Implications. Source: Scanlon, M. (2007) Human Factors and Ergonomics in Pediatrics in Pascale Carayon (Ed) Handbook of Human Factors and Ergonomics in Health Care and Patient Safety, Lawrence Erlbaum Associates, Publisher, London, p. 876).

Human Factors Considerations	Pediatric Specific Issues	Design Implications for Children*
Sensory changes	Development of sight and hearing in young children	Use existing knowledge of imperfect senses
Variation in size and shape	Small size can circumvent safety features. Limit use of interface	Consider smaller extremes of size for design
Variation in biomechanics	Limited strength, leverage can limit use	Consider consequences of users with developmentally impaired strength
Work (play) physiology	Developmentally varied vital signs and energy stores limit endurance	Consider broader range of users and endurance (strength / patience)
Cognitive considerations	Magical vs Concrete vs Abstract thinking, innate curiosity	Consider consequences of misuse due to cognitive factors
Language considerations	Varied ability to read, comprehend, and express self	Consider limited abilities in design of interface, directions and safety labelling

* Design considerations predicated on desired use of device / process by children. Alternatively consider safety issues to prohibit use/misuse by children.

In relation to colour as another important component for the OHE, Park (2007) more recently investigated the value of color in real contexts by measuring color preferences amongst healthy children, pediatric patients and design professionals. He found that the use of more color eventually created better environments for children and their families.

Artwork in children's hospital also did provided more cheerful environment and hence contributed towards the pediatric patients' healing process as revealed by several studies such as by Daley (1998), Mallay (2002) and Eisen (2006). The art therapy by Mallay proved to be an effective intervention in coping with ongoing physical, social, cognitive, emotional and psychological sequel of the accident / trauma.

It should be noted about an interesting study by Coakley (2009) who revealed that pet therapy as a low-tech, low-cost therapy improved mood and was meaningful to hospitalized patients. The study also found that patients had significant decrease in pain, respiratory rate, negative mood state, tension / anxiety and fatigue / inertia and a significant increase in perceived energy level with improved overall mood. Thus, pet therapy interventions improved physiological, behavioural and mood outcomes and experiences of hospitalized patients

3. Research Design

3.1. Strategy

The strategy of the research design chosen was Post-Occupancy Evaluation (POE) upon existing paediatric wards both in urban and non-urban locations within the Klang Valley region in Malaysia.

3.2. Methodology

Three hospitals built five-years apart within the Klang Valley and located in urban and non-urban areas were strategically identified as the setting. It was envisaged that samples for such purposeful selection could depict the design trend of such building type.

The methodology for data collection involved site visits, personal observations and photograph documentation, interviews with the clinical staffs and the use of NHS (2008) evaluation toolkits for healthcare buildings – the AEDET (Achieving Excellence Design Evaluation Toolkit) (NHS, 2008a) and ASPECT (A Staff and Patient Environment Calibration Toolkit) (NHS, 2008b). Both the tools were developed by the NHS, UK to assess the healthcare buildings.

The AEDET Evolution, part of a benchmarking tool assisted in measuring and managing the design quality in the healthcare facilities. It evaluated a design through a series of statements which encompassed the three areas of Impact, Build Quality and Functionality. The Impact area dealt with the degree to which the building created a sense of place and contributed positively to the lives of users and its neighbours. It involved four sections - character and innovation, form and materials, staff and patient environment and urban and social integration. The Build Quality area dealt with the Physical components of the building rather than the spaces and involved two sections – performance and engineering (the third section which concerned construction was not applicable for the study). The Functionality area dealt with issues on the primary purpose of the building and involved three sections - use, access, and space.

The ASPECT measured the manner the healthcare environment can impact both on the satisfaction levels amongst staff and patients and the health outcomes of patients and performance of staff. It involved eight sections – privacy controlled by users, extent of outside views, extent of contact with the natural world, extent users can control their comfort levels, extent of understandability of the

building to users, interior appearances, provision of facilities to patients, and provision of facilities to staffs.

In each of the sections evaluated in both the AEDET and ASPECT forms, apart from the evaluated score between 0 (lowest) and 6 (maximum), options were available in putting a double weight for factors considered to be of utmost importance

3.3. Procedure

Prior to the site visits for data collection, consents were first obtained from the directors of the hospitals identified through formal applications. Preceded by initial briefings about the setup of the hospitals, representatives from the hospitals accompanied the authors and provided responses to the spontaneous enquiries throughout the site visits, in addition to the personal observations made with notations and photographs documented. Security was noticeably tight with security personals in all the wards visited. The visits were concluded with a post occupancy evaluation assessment which involved filling up the AEDET Evolution and ASPECT forms.

4. Findings and Discussions

The pediatric wards identified for the study involved hospitals KG (built in 1985) and PA (built in 1999) both, located in the urban area and SG (built in 2005), located in a non-urban area. Based on the analysis of both the AEDET Evolution and ASPECT tools, the quality of the physical environment conducted upon the three pediatric wards of hospitals KG, PA and SG seemed to reveal a positive trend in the design of such wards. Contribution of the physical environment in the healing process were recognised and improved in the newer hospitals built. Details about the findings are as summarised below. In relation to the AEDET Evolution analysis, based on the mid-point score of 3 amongst the nine categories analysed, the oldest hospital KG incorporated only seven categories above the mid-point, PA incorporated eight, while the newest hospital SG incorporated all the nine categories. In fact only SG scored above the 3.5 points in all the nine categories while the oldest hospital KG scored below 3.5 points in four categories as shown in Figure 2. Similar trend seemed to be found in the ASPECT analysis, based on the eight categories analysed. The newest hospital SG incorporated all eight categories for points above the mid-point score of 3, while both PA and KG both incorporated six categories each. SG again incorporated all eight categories for points above the 3.5 mark, while PA incorporated six categories and the oldest hospital KG incorporated five categories as shown in Figure 3. Similar trend seemed to be found in the ASPECT analysis, based on the eight categories analysed. The newest hospital SG incorporated all eight categories for points above the mid-point score of 3, while both PA and KG both incorporated six categories each. SG again incorporated all eight categories for points above the 3.5 mark, while PA incorporated six categories and the oldest hospital KG incorporated five categories as shown in Figure 3.

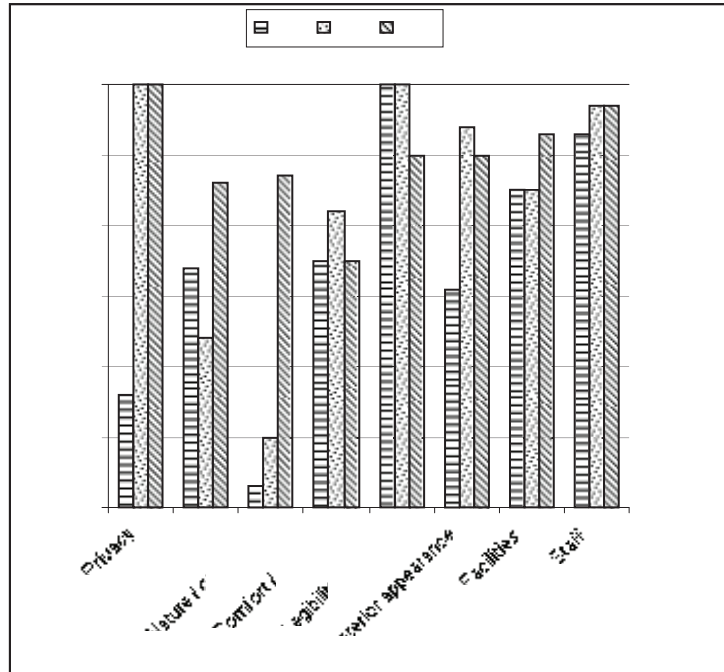


Fig. 2. Summary of the AEDET analysis amongst the three pediatric wards of KG, PA and SG

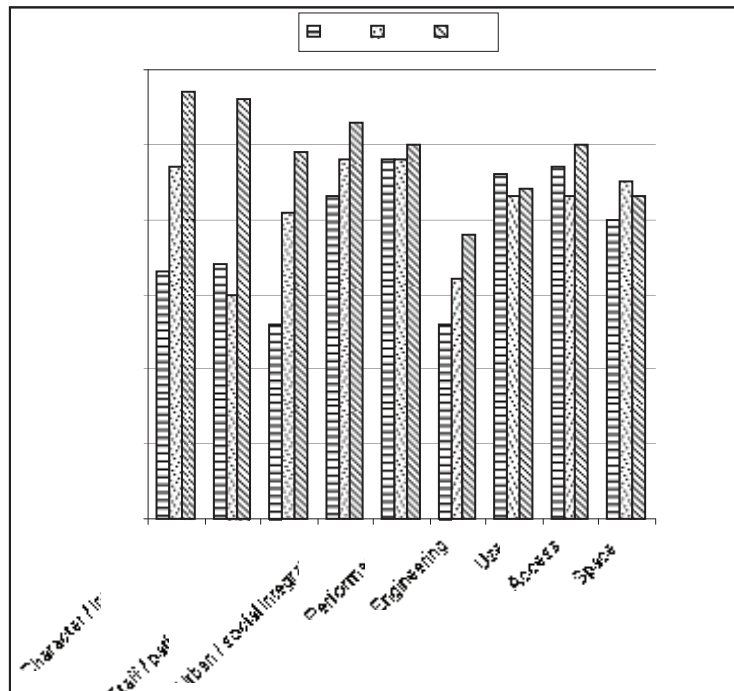


Fig. 3. Summary of the ASPECT analysis amongst the three pediatric wards of KG, PA and SG

Based on the literatures reviewed, earlier studies had revealed that the healing process was influenced by the physical environment. The implication of the findings revealed that despite the location of the newest hospital SG being in a non-urban area, the trend in the design of newer pediatric wards built showed positively in the creation of the physical environment that supported the healing environment.

Ergonomic considerations for the pediatric population were observed in all the three hospitals, in the provisions of beds, chairs and tables in the mini library, and counter top at the registration section. However, surprisingly those were not considered markedly in the facilities provided in the bathrooms which suited only the adults. Another surprise was that the staffs opined those to be not an important provision as most of the patients were in diapers and that the bathrooms were mainly used by the patient's parents or carers. While that might be the case, perhaps a near perfect environment could have been achieved if provisions in the bathrooms were ergonomically designed for the pediatric population, particularly for the older age group of 12-year old and older.

The intended investigation at the outset of this study in linking the influence of the physical environment in the healing process did not materialise. The investigation revealed that it would not be correct to base just on the recovery rate of patients at the three different hospitals and deduce the hypothesis about the influence of the physical environment with the recovery duration. The reason being each patient's body resistance was not the same. Hence, if one's body resistance is high, one would recover or heal in a much shorter duration as compared to one with lesser body resistance despite the condition of the physical environment. One possibility might be to identify a perfect match amongst the pediatric population at the three different hospitals, identical in many ways which include age, gender, type of sickness, social background, level of body resistance etc. and then determine and compare the recovery duration. Though not impossible, it would certainly be a daunting and time-consuming process in finding the perfect match of subjects to be investigated, which necessitated a much longer study and beyond the scope of the present pilot study.

5. Conclusion and Recommendations

In conclusion, there seemed to be a positive design trend towards the creation of healing environment in the newer paediatric wards built as compared to the older. However, there seemed to be a startling lack in consideration on ergonomics for the paediatric population and the absent in the utilisation of audio therapeutics in both the older and newer wards. While the ergonomics of the paediatric patients were taken into consideration in the bedroom area, however, those were not considered in the bathroom areas. Pertaining to audio therapeutics, absent were soft background music soothing to the ears, or even the trickling sound of water from landscaped garden.

Best practices that were still lacking in the creation of the healing environment in the paediatric wards include the following:-

- Provide ergonomically-designed bathroom facilities for the pediatric patients
- Provide maximum accessibility to mini-libraries and play areas provided
- Utilise audio therapeutics
- Maximize view of nature or the therapeutic gardens from the patients' beds
- Provide maximum accessibility to outdoor / therapeutic gardens
- Provide opportunities for activities to be conducted in the therapeutic gardens by the different users (pediatric patients, pediatric patients' siblings, medical staffs and visitors)

Those best practices should be seriously considered not only in the design of newer paediatric wards, but also be considered in upgrading the older wards for the benefit of the paediatric population

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