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THERAPEUTIC EFFECTS OF GARDEN: PREFERENCE OF ILL CHILDREN TOWARDS GARDEN OVER WARD IN MALAYSIAN HOSPITAL ENVIRONMENT

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Abstract. Hospitalisation often erodes the feelings of toddlers and young children causing regressive behaviours and stress, which result in reduced cognitive performance, helplessness, restlessness, crying, anxiety, and elevated blood pressure. Having the ill children experience a garden setting at Batu Pahat Hospital and Segamat Hospital, they showed remarkable preferences and positive behaviours to the garden than the ward. The attributes of the garden that contribute to the positive responses include refreshing smell, fresh air, good-lighting, cheerful environment, pleasant sounds, scenic view, open space, freedom to play, at home feeling, and a variety of activities. These attributes are attained because the garden possesses three factors: (1) proper site planning with several play zones, (2) diversity of garden character, and (3) contact with microclimatic factors.

Key words: Therapeutic garden, ill children, psychological well being, recuperation, garden attributes

Abstrak. Rawatan dalam hospital kerap meluntur perasaan kanak-kanak dan menyebabkan kelakuan regresi dan tekanan emosi, seterusnya mengurangkan daya kognitif dan kekerapan keresahan, menangis, kebimbangan, dan tekanan darah tinggi. Apabila pesakit kanak-kanak berinteraksi di dalam laman terapi di Hospital Batu Pahat dan Hospital Segamat, kesan positif yang dihasilkan adalah pesakit lebih mengutamakan laman daripada wad. Ciri-ciri laman yang mendorong pesakit berkelakuan positif terhadap laman adalah bau yang nyaman, kesegaran udara, penuh dengan cahaya suria, alam lingkungan yang ceria, bunyi yang nyaman, pandangan yang ceria, kebebasan bermain, keadaan seperti di rumah, dan kepelbagaian aktiviti. Tiga aspek laman yang dapat mengujudkan ciri-ciri tersebut adalah: (1) tata atur laman yang sempurna dengan pelbagai zon untuk bermain, (2) laman mempunyai pelbagai rupa bentuk, dan (3) perkaitan dengan faktor-faktor iklim.

Kata kunci: Laman terapi, pesakit kanak-kanak, kesihatan psikologi, pemulihan, keminatan

1.0 INTRODUCTION

Since several centuries ago, Man has known to recognise the restorative power of nature including the healing benefits of plants such as in the civilisations of Mesopotamia, Persia, Greece, China, and India. The Greeks had established healing centres in temple complexes from the end of sixth century B.C. to the end of the fifth century A.D. (Venola, 1999). Monasteries in the Middle Ages treated the patients within their garden cloisters where the patients' rooms were offered with plenty of

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sunlight and fresh air, lawns, seasonal plants and places to sit or walk (Whitehouse *et al*., 2001). Although the advancement of modern medicine in hospitals of many western countries has subdued the nurturing properties of nature, some hospitals value the properties and integrate their buildings with gardens and courtyards (Cooper-Marcus and Barnes, 1999; Burnett, 1997). Hence, hospital outdoor spaces are made into various types of garden including roof garden, roof terraces, healing gardens, meditation gardens, viewing gardens, tucked-away gardens, and atrium gardens. Whenever possible the wards are planned to allow better view of scenic scenes of the surrounding landscapes including forests, parks and gardens. Such integration is done in Malaysian nucleus hospitals in Batu Pahat and Segamat which were constructed on 27 to 35 hectare grounds away from the town centres and surrounded by semi-rural landscapes (Ismail *et al*., 2002). The integration is based on the premise that experiencing with the landscape, either in a passive or an active mode, would reduce the stress that many patients experience during their recuperation in the hospitals (Ulrich, 1984). The introduction of such gardens in the hospital complexes suggests the recognition of the healing quality of nature towards sick people either in the physiological or psychological mode of recuperation. Several healthcare studies in the United States including Ulrich (1984), Francis (1997), and Cooper-Marcus and Barnes (1999) found reductions in stress levels and health-related complaints among patients and staff who were provided with windows overlooking gardens or access to gardens. Although the evidence on restorative qualities of gardens is small, there is a growing body of empirical research that supports the healing potential of gardens in hospital settings (Whitehouse *et al*., 2001).

The clinical outcomes when patients experience the garden, either by viewing or physically interacting, would include (1) decreased length of stay, (2) increased psychological and physical peacefulness, and (3) increased psychological adjustment (Rubin, 1998). A study on children therapy garden by Ismail *et al*. in 2002 found that acute paediatric patients have shown some positive psychological peacefulness and adjustments when they are allowed to play and rest in the garden during their recuperating process in the nucleus hospitals. These outcomes are suggestive evidence that the garden would foster the healing process of ill children in hospital environment. Such intervention is resourceful to health services in Malaysia that incorporate the environment with the conventional clinical treatments to treat patients in more than 140 hospitals throughout the country. This paper explains the findings of our research that investigates the psychological impacts of the garden, as an environmental platform, in the healing process of hospitalised children. The discussion is based on an experiment conducted on paediatric patients at the wards of Batu Pahat Hospital and Segamat Hospital.

2.0 EFFECT OF HOSPITALISATION TO CHILDREN

Illness and hospitalisation are among the most profound stresses of human life. Hospitalisation often erodes patient's feelings of control due to the aspects of loss of privacy, loss of control over eating and sleeping times, loss of information, and way finding difficulties in complex and unfamiliar hospital buildings (Lindheim *et al.*, 1972). These aspects that cause stress to adult patients, lead to several negative impacts including depression, anxiety, helplessness, reduced cognitive performance, elevated blood pressure, higher levels of circulating stress hormones, and suppression of immune functioning (e.g. Ulrich, 1999). To young patients, the hospital environment is seen as an unfamiliar setting that inflicts pain and separation from their families. The sight of people on gurneys and the complicated apparatus required for treatment terrifies both the very young and the adolescent (Lindheim *et al.*, 1972). Prevailing odours of antiseptic such as iodine and povidone, detergents and tetraethyl spirit used in the paediatric ward scare toddlers and young children, especially for first-time patients (Lindheim *et al.*, 1972). They may associate the unfamiliar smell with pain and suffering. Staying in the ward with other patients whom they have never seen or met before also compounds the terrifying experience. Cries from another patient may be interpreted as a signal of a feeling of desertion or pain. Regular visits by doctors and nurses are seen as events when they are forced to take medicine or be inflicted with pain by injections.

The effects of hospitalisation have seen to cause regressive behaviours among toddlers and young children. Some of the behaviours include excessive night time fears, increased clinging and dependence on parents, loss of bowel and bladder control, or intensified thumb-sucking (Lindheim *et al.*, 1972). This threat may extend to a continuing fear of mutilation and anxiety produced by the strange and frightening aspects of the hospital environment. Such stresses can be ameliorated by allowing the patients to view or experience the nature settings such as garden. In their Attention Restoration Theory, Kaplan and Kaplan (1989) and Kaplan (2001) have come to a conclusion that viewing wilderness could offer restorative effect, emotional relief from overloaded informative environment that cause fatigue. Ulrich (1992) supported this theory and introduces Stress Coping and Restoration Theory that views nature as a positive distraction that improves the emotional state of a perceiver who viewed the natural features. To achieve the positive distraction, Lindheim *et al.* (1972) suggested that a hospital should provide the children with challenging and stimulating environment where they can develop and test their skills, develop physical coordination and strength, and engage in dramatic and imaginative ideas. Such environment is installed for the ill children treated in the paediatric wards of Batu Pahat Hospital and Segamat Hospital. Knowing the physical characteristics of the gardens would allow us to understand the involvement of these patients with them that have fostered their recuperation process.

3.0 THERAPEUTIC GARDENS

Gardens are exploratory platform for children to explore, to search, to test, to discover and to learn from feedback on their own actions. It is an open-plan outdoor facility for the children to get the exposure to natural elements and climatic factors that stimulate all their senses and provide them with information. It is a place for freedom of choice packed with accessories that stimulate children's sensory levels including tactile, visual, audio and taste. Being in the garden, a child's body is engaged and his mind is fascinated by natural features including plants, animals, water and the climatic factors, namely, sunlight, winds and temperature, and the garden accessories such as play equi pment and shelter. The garden offers variety of environmental cues that in their forms and movements provide solace and rejuvenation to the children (Olds, 1987).

The gardens at Batu Pahat Hospital and Segamat Hospital are platforms to investigate the restorative power of healing process of ill children. Both hospitals administer acutely ill patients whose average length of stay is 3.1 days. The patients are allowed to go to the gardens for about 4.5 hours during the day accompanied by their parents or ward staff. Both gardens are located beside the paediatric wards, surrounded on three sides by two-storey buildings and overlooking the surrounding landscapes. Hence, large areas of both gardens are shadowed by the building except at noon. Prevailing winds often blow through the gardens providing tolerable and favourable temperatures even on a sunny day.

Plants and garden structures including play equipment define the spatial zoning of the gardens. The zones are multi purpose lawn area, play structure area, sand play area, gardening area, and resting area with timber pavilion. Figure 1 illustrates a garden plan at paediatric ward of the Batu Pahat Hospital.

Plant selection is based on the effect of stimulation of children senses including (i) foliage shrubs as background for colourful shrubs, (ii) fragrance and bright flowering shrubs for olfactory stimulation and as accent vegetative features, (iii) lawn as flat, soft textural surface for tactile recuperative effect, (v) matured trees and tall palms as features to provide shade or indicate boundary and landmark, (vi) small fruit trees such as banana to supply edible fruits, and (vii) climbers with large flowers laden with nectar to attract insects and birds. Furthermore, common house garden species are selected to give the feeling or impression of a home-like environment to the patients.

The gardens are platforms for the children to apply five types of playing and learning styles, namely, deductive, inductive, visual and auditory, impulsive, and reflective. When they are brought into the garden they will recognise the different forms and colours of the plants and the garden structures as shown in Figure 2.

Thus, they can deduce that the garden is made up of plants and man-made elements for which they can play with and thus would forget their boredom or pain. This is a form of fascination identified by Kaplan and Kaplan (1989) as one of the four properties of restorative setting. When the children pick flowers from low shrubs such as periwinkle and jasmine but not from a tree, they will understand that the shrubs are shorter than

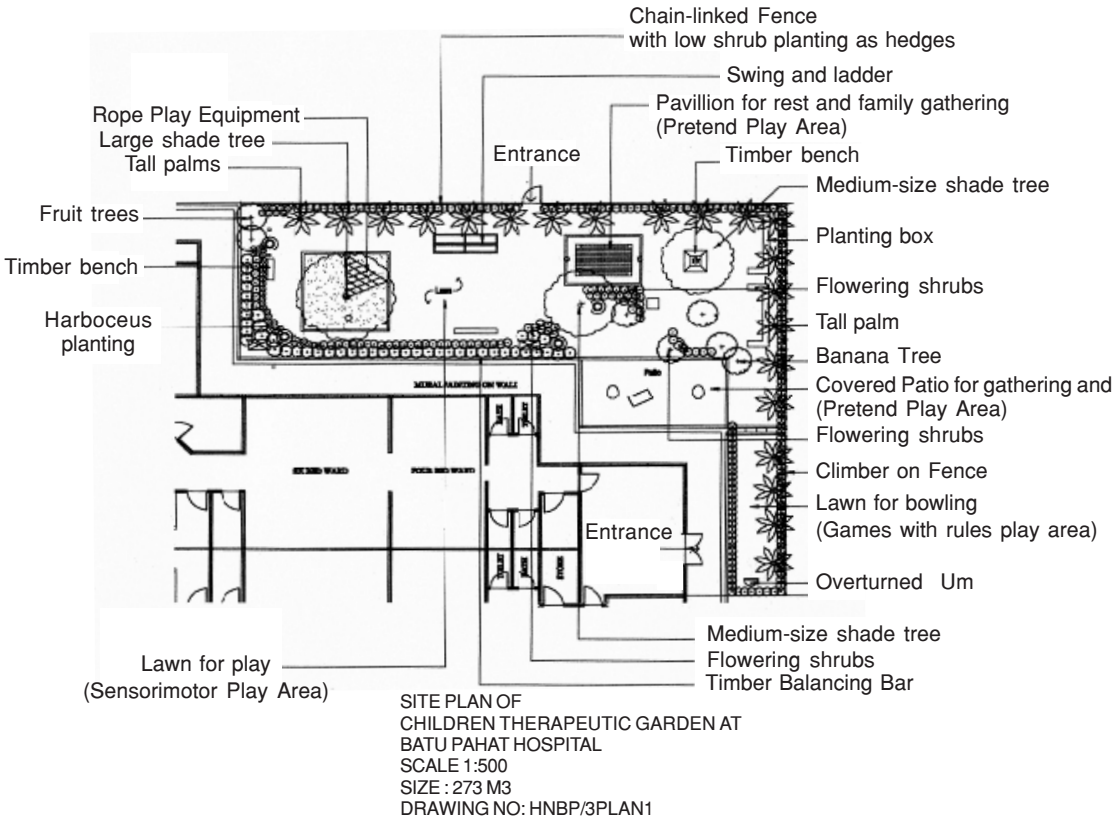

Figure 1 Garden plan of paediatric ward at Batu Pahat Hospital

Figure 2 Children can generalise that a shrub bears flowers and leaves and thus form as an element in a garden

the tree. This inductive behaviour would make the children enjoy themselves playing in the gardens. The various forms, colours and aroma of the plants and play equipment supply plenty of information to the children to learn through their five senses particularly the sight and auditory. The gardens also allow the children to run and roll on the lawn areas. These are active plays involving plenty of movements that may exhaust the children and give them satisfaction. Such activities would improve the motor skills and muscle development impaired by their diseases. The activities are compatible to the interest or inclination of the children. Compatibility of the garden as a play space is another property of restorative setting (Herzog, *et al.*, 2002). The garden is also equipped with familiar plants such as banana and hibiscus, and animals such as bees and birds that the children would recall their memories upon things that associate with their homes. The thinking of a home-like environment would relief the children from feeling departed from their familiar settings (Olds, 1987; Rubin *et al.*, 1998). Hence, the garden is an extension of sufficient, well-planned outdoor setting that engages the children's minds.

Several play equipment are installed in the garden such as rope play equipment, slide, swing, spring riders, hopping urns, treasure chests, balancing bench, mural and giant checkers (See Figure 3). With the vegetations, the children could participate in all three types of play, sensorimotor play, pretend play, and games-with-rules play. Here the children are free to select which garden features to play and thus allowing them to move from one play zone to another at their own pace. Their movements are not restricted by any footpath, instead, they are free to walk on the lawns. The sensorimotor play is the most common and active type of play for children of all ages

Figure 3 Playing giant checker is a form of games with rules play that allows children to socialise in the garden

that allow them to experiment with bodily sensation and motor movements. Preschool patients, aged four to five, would be engrossed in pretend play such as picking flowers and sand from the sand pit and by bringing them to the timber pavilions. Here they carry out actions plans, take on roles, and transform the plant and earth materials to symbolic things, for example, food. This play becomes socio-dramatic where objects begin to influence the roles those that the children assume. The games with rules play is least seen in the gardens since older children are afraid or shy to mix with others.

4.0 METHOD OF EVALUATION

The measurement on the effect of the garden at Batu Pahat Hospital and Segamat Hospital towards the well-being of the ill children (patients) whom are administered in the paediatric ward, begins by allowing them to participate in the garden activities for at least 2.5 hours per day. The patients include toddlers aged 2 to 5 years and young children aged 6 to 12 years. The survey was conducted in a period of eight weeks, from March to April 2002, which was after the completion of the garden. In this research, we measured the psychological peacefulness and the adjustment of the children by investigating their responses and perceptions toward the garden and the ward. The main respondents were the patients who have been in the garden and were supervised by either their caregivers, the parents or the ward nurses. The caregivers were considered as surrogate respondents when the children could not participate in data collection method (Holmbeck *et al*., 2002). The collection of the information on the patients' response towards the garden was conducted through questionnaires. The patients were assisted by their caregivers to answer seven questions including preference towards the garden or the ward and the attributes of the garden and the ward. Twelve attributes were asked upon the patient including refreshing smell, fresh air, good-lighting, cheerful environment, pleasant sound, scenic view, open space, freedom to play, not crowded, home feeling, and a variety of activities. The data was analysed using T-test.

5.0 FINDINGS

From the field survey, 360 (n) respondents, mostly mothers, participated and completed the questionnaires. These samplings represented 8% of the patient population (N=4491) administered in the paediatric wards of Batu Pahat Hospital and Segamat Hospital for year 2001, and 48% from the population of the survey period (Nm=745).

From the 360 respondents, 337 (94%) of them preferred to be and play in the garden because the garden offered many similar activities to what they do at home. Hence, the patients can recall the play settings and experiences that they are familiar with. This result suggests that the garden enhanced the condition of recuperating in the ward and that the patients could lead a normal life at these hospitals with the presence of the garden.

The preference of the patients towards the garden over the ward are ranked in an ordinal scale of 1 to 5 from *'totally disagree'*, *'disagree'*, *'do not know'*, *'agree'* and *'totally agree'*. The category *'do not know'* is interpreted as being neutral which leads us to believe that those who have chosen it do not object the attributes of the garden or the ward. As can be seen from Table 1 that 11 out of the 12 attributes having p-value less than 0.05 indicating that the patients prefer most of the attributes of the garden more than the ward. The preferred attributes are including refreshing smell, fresh air, full with light, cheerful environment, pleasant sound, scenic view, open space, free to play, home feeling, and a variety of activities.

Table 1 Correlation on attributes of the garden and ward and the t-test results. (Numbers in parentheses are the standard deviations)

Attributes	Mean Score of Garden	Mean Score of Ward	Number of Respondents	p-value	Conclusion
Refreshing smell	4.23 (0.68)	3.91 (0.90)	350	0.000	Garden is better
Fresh Air	4.35 (0.52)	4.08 (0.71)	350	0.000	Garden is better
Good-lighting	4.37 (0.48)	4.24 (0.47)	353	0.000	Garden is better
Cheerful environment	4.34 (0.59)	4.04 (0.83)	351	0.000	Garden is better
Pleasant sound	4.07 (0.88)	3.75 (1.03)	349	0.000	Garden is better
Interesting scenic view	4.34 (0.56)	4.15 (0.62)	352	0.000	Garden is better
Open space	4.34 (0.54)	4.16 (0.67)	352	0.000	Garden is better
Freedom to Play	4.33 (0.58)	4.07 (0.77)	350	0.000	Garden is better
Not Crowded	4.26 (0.67)	4.25 (0.59)	350	0.825	No difference
Home Feeling	4.18 (0.81)	3.93 (0.90)	347	0.000	Garden is better
Not Confined	4.28 (0.68)	4.17 (0.62)	349	0.001	Garden is better
Various activities	4.32 (0.58)	4.14 (0.68)	351	0.000	Garden is better

6.0 DISCUSSION

The preference of the patients to the garden over the ward at the paediatric wards of Batu Pahat Hospital and Segamat Hospital is viewed as a clinical outcome that increased in psychological peacefulness and adjustment (Rubin *et al*., 1998). This outcome is possible because the garden possesses three factors: (1) garden spatial quality and zoning, (2) diversity of garden character, and (3) contact with microclimatic factors.

In spatial perspective, the garden, as an outdoor space, provides more space for the patients and their caregivers to move around and do various types of activities including playing, resting, sightseeing, strolling or simply watching others. This condition is more significant in the garden of Segamat Hospital than the Batu Pahat Hospital because the former (740 m^2) is more than two times larger than the latter (308 m^2). Both gardens offer the patients and their caregivers the feeling of spaciousness with extrovert views towards the surroundings. The result on two attributes, namely, open space and not confined are both having p-value<0.05 which indicates that the patients felt that the garden is a better place for them than the ward. The openness offered by the lawn becomes the base for the planting of trees and shrubs and also placement for garden structures including play equipment. In comparison, the ward and the playroom offered limited space for them and their parents to move freely since much of the space is occupied by beds, cabinets, and other furniture for the administrative purpose of the ward. Hence, there is no secluded or semi-private space for the patients and their parents to enjoy privacy in the ward. This restriction may affect their feelings and cause them to prefer the garden, where they can move around more freely to play or rest in the pavilion with more privacy.

The patients have four to seven play zones to choose from, for sensorimotor play, pretend play and game-with-rule play. The zones include family space with pavilion, gathering space with a timber bench, lawn and play equipment, horticulture area, active play space with variety of play equipment, and lawn with overturned urns. Thus the patients are offered with a variety of play space for them to choose and participate in the activities as individual or group either with their parents or peers. The family space offers some privacy for the patients to gather with their parents, siblings or relatives. They are free to select the play space or equipment without any schedule or procedure. The feeling of satisfaction and fascination while in the garden is noted in attribute free to play with $p < 0.05$.

Being a greenery, the garden are composed of 13 species of trees and palms, and more than 20 species of flowering or foliage shrubs, climbers and groundcovers. The diversity of the garden space is further enriched by garden accessories such as play equi pment (6 to 10 types), pavilions and timber benches. The plants provide screens that demarcate or articulate space for social play or privacy, produce fragrance and colored flowers, and arrays of green foliage in many shapes and textures. Thus the garden is a highly diversified outdoor landscape with plants as natural elements whose quality attracts children to experience it (Prescott, 1987). Scenting the flowers of shrubs

such as Jasminum sambac and Canagium odoratum located near the pavilions would stimulate the olfactory senses of the ill children. Fragrances often trigger memories of particular times, events, places or feelings (Hass and McCartney, 1996). This stimulating feeling would further enhance by the fragrance of betel palm (Areca catechu) inflorescences when they bloom. Hence, the patients could detach temporarily from the indoor condition, which is more confined or crowded than the garden. Here they could attain privacy and relaxation while enjoying the beauty of nature and man-made elements.

Flowers of Thundbergia grandifolia attract bees, ants and bumblebees to collect nectar especially in the morning hours, sometimes from 9:00 am to 11:00 am. This is when the day is still cool for the patients to be in the garden. This phenomenon adds to the attractiveness of the garden scene which makes the patients to prefer to be in the garden more than staying in the ward. In contrast, the smell of antiseptics, medicine and other aromatic substances dominate the atmosphere in the ward. These smells are stranger to the sick children and may result to negative responses such as fear of being alone and fear towards the medical procedures (Lindheim *et al*., 1972). The contrasting atmosphere has triggered the children to prefer the garden over the ward.

The introduction of plants into the garden directly attracts animals particularly birds to find food and shelter. During the survey period we found more than three species of birds including bulbuls, sunbirds and spotted doves came to the garden to feed upon the grains placed at the two birdfeeders. Their songs are stimulatingly pleasant that can cheer up the environment of the garden. When a breeze blows into the garden, the sounds from four wind chimes would resonate the garden atmosphere. Hence, the garden can also be viewed as a place where the patients could maintain a balance between familiarity and change (Olds, 1987). Seeing some of the plants and animals such as birds and insects similar to the ones available around their homes would link to familiar conditions and would lower their anxiety to go home. Cheerful environment and hearing pleasant sounds are among of the attributes that the patients perceive the garden is a significantly better environment to experience than the ward. In contrast, the atmosphere of the ward is dominated by many sounds from mechanical instrument, toilet faucets, cries from other patients that may create an uncomfortable or scary condition for the patients.

The plant and animal communities of the garden gradually contributed to natural outlook that the children would perceive them being less made by man and could sense the impression of timelessness. None of the natural elements exist in the ward; a distinctive difference between the garden and the ward. These perceptions are among the influencing factors to why the children are attracted to the nature (Fjortoft, 2000) and thus would prefer to stay outdoors.

Diversity of the garden character is amplified by the presence of several garden accessories including the play equipment and garden structures such as pavilions, benches and birdhouses. There are six types of play equipment in the Batu Pahat

Hospital's garden and 10 types in the Segamat Hospital's garden distributed in different play zones. Therefore, the patients have a variety of options to play and experience with the equipment; engaging into all three types of play including sensorimotor, pretend play, and games with rules. For example, in Batu Pahat Hospital, the children may first play with the rope play equipment under the Tabebuia's canopy. This is an active play that demands three contact points on the flexible rope web. The loose sand bed on which the equipment is laid will cushion any fall. Then they may run on the 8.0m wide lawns for another active play equipment, either the swing with ladder or the balancing bar. They can practice sensorimotor play, strengthen their muscles and temporary escape from their worries and boredom. The sensorimotor play can be further exercised at the horticulture area. Here, the children are supervised by caregivers to sow seeds such as soybeans into the soil contained in the timber planting boxes. Then the children water the seeds using small watering can and leave the seeds to germinate. Patients who stayed for more than three days would be able to see the seeds producing the first leaves and come out from the soil. This is an accomplishing act that helps to improve the self-esteem of the ill children (Relf, 1998).

With the plants, the garden accessories formed an attractive composition that allows the patients to play as well as learn about the outdoors. In the garden, they can apply the five types of learning style including deductive, inductive, visual and auditory, impulsive and reflective (Thomson *et al*., 1994). Hence the garden is a diverse landscape with features that meet the childrens needs for a varied and stimulating play environment where the composition and structures of the landscape are conducive to different play functions (Fjortoft, 2000).

The findings from the analysis also suggested that the positive responses of the patients to the garden are influenced by micro-climatic factors, namely, wind and sunlight. Most patients found the garden as a place with fresh air and plenty of light that changes in intensity throughout the day. The garden offers beauty, variety and comfort and a place where they can see the sky. The reaction from smelling the refreshing atmosphere is due to the breeze that comes from the surroundings, particularly at Segamat Hospital's garden since the hospital complex is located on a hilltop and thus is exposed to surrounding winds. The sense of fresh air is enhanced by the abundance of foliage plants and some variety of fragrant shrubs. The patients and caregivers can easily distinguish the refreshing ambience of the garden over the ward. This is because the atmosphere of the ward is dominated by smells of antiseptics and other detergents to keep the ward clean. The smells are unfamiliar to the patients and thus the garden is preferred since it is naturally refreshing similar to the outdoor spaces at their homes.

The garden received direct sunlight only in the midday which makes the condition too hot for patients and visitors to feel comfortable. But it is a favourable place to visit in the morning and in the late afternoon when most part of the garden is shaded by a few large trees and palms or shadowed by the surrounding buildings. Thus the gardens

are flooded with reflected and diffused light that create conducive condition for play and rest. This is a factor that results to the preference of the patients to the garden over the ward. Light gives sense of openness for the children to perceive the garden as a stimulating environment where the composition and structures are conducive to different play functions (Fjortoft, 2000). Through frequent visits to the garden, the patients and caregivers can notice the changing of shadow patterns and feel the difference of light intensity from morning to late afternoon. This phenomenon provides opportunities for the children to sense motion, variety, orientation and discovery (Moore, 1996). On the other hand, the artificial lighting in the ward creates a static condition is less effective to change the mood or arouse the patients while being treated in the ward. Hence the conditions in the garden with natural lighting is a factor that makes the patients to prefer the garden over the ward.

7.0 CONCLUDING REMARKS

The garden can be an effective environmental intervention to healthcare in Malaysia hospitals through proper planning and management of the garden as well as the patient. The year-round favourable climate allows the patients to continuously gain psychological benefits by viewing or physically participating in the garden. Our preliminary findings on the positive responses of the ill children toward experiencing the garden as a green space with play activities are suggestive evidence on the effectiveness of the garden to foster the healing process of the children. This research opens a wide avenue for further study on the power of natural environment to restore psychological and physiological well being of hospitalised patients. The findings are suggestive evidence for Malaysian hospitals to develop their open spaces beside or near the wards for recuperative purposes. The design scheme of garden types could follow the idea of Robin Moore (1999) who categorized the garden into play, horticulture, natural, and animal of recuperative garden would include play therapy.

These findings may result in big savings in medical expenses of the government. Such impact can be seen in the nucleus-hospital scenario; 12 units are distributed throughout the nation providing medical services to more than 22,000 children as in-patients per year. If the garden could reduce 1.0 day per patient in the recuperation period, this would mean a saving of 22,000 days of treatment in the nucleus hospital system.

Finally, it is important to do collaborative research on the planning and design of environment dealing with health services, pertaining to both psychological and physiological well-beings of patients, caregivers and even visitors to the hospital environment. The collaboration would include professionals from the built environment sector such as landscape architects and architects, and the health service sector such as psychiatrists, paediatricians, therapists, and hospital managers.

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