DESIGN CONSIDERATION AND CONSTRUCTION PROCESS OF CHILDREN THERAPEUTIC GARDEN

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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 experiencing a garden setting, either in a passive or an active mode, can arouse their senses that nurture their inductive and deductive, motor-impulses development and reflective thinking capabilities. These interactions have resulted in psychological peacefulness and adjustment by the children including being more cooperative toward medication, less crying, more active and cheerful, and more obedient to caregivers. The outcomes are discovered in an experimental research done in year 2002 involving 360 paediatric patients experiencing the therapeutic gardens at two nucleus hospitals in Malaysia. Six design factors are considered to construct the garden: (1) spatial organisation and circulation, (2) garden setting, (3) sensory stimulation, (4) interaction of activities, (5) planting layout and composition, and (6) garden accessories. The garden is constructed in four steps including (1) demolition of existing garden, (2) preparation of base ground, (3) installation of garden accessories, and (4) planting work. The basis of constructing an effective garden for psychological well-being of ill children is relating the physical characters of the garden to the sensory stimulation of the children.

1.0 EFFECTS OF HOSPITALISATION TO CHILDREN

The effects of hospitalisation have seen to cause regressive behaviours among toddlers and young children. To young patients, the hospital environment is seen as an unfamiliar setting that may inflict pain and segregation from their families. The sight of people on gurneys and the complicated apparatus required for treatment terrify 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 the first time patients. They may associate the alien smell with pain and suffering. Staying in the ward with other patients whom they have never seen or met before also compounds to the terrifying experience. A cry 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 the injection.

Some of the regressive behaviours include excessive night time fears, increased clinging to 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 unknown and frightening aspects of the hospital environment (Lindheim et al., 1972). Such stress can be ameliorate by allowing the patients to view or experience the nature settings such as garden (Whitehouse et al., 2001; Moore, 1999; Olds, 1987).

2.0 EXPERIENCING WITH THE GARDEN

Garden is an 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 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 sensual 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 equipment and shelter. The garden offers variety of environmental cues that their forms and movements bring solace and rejuvenation to the children (Olds, 1987).

According to the Attention Restorative Theory by Kaplan and Kaplan (1989) the garden as outdoor space bring restoration to people when it has four properties: being away, extent, fascination, and compatibility. Experiencing with the garden in a hospital environment, either in a passive or an active mode, is a mode of being away from the confined ward environment. Varieties of living and non-living features in the garden are sufficiently rich and coherent in form and colour that they can engage the children's mind and promote exploration (Herzog et al., 1997). Moreover, the environmental cues help the children to navigate and understand the spaces in the garden, and thus fascinate with the garden content. The cues varies in forms, colours, textures and sounds that engage the cognitive behaviours of the children, maintain optimal levels of mental and physical alertness and foster feelings of comfort and playful attitudes toward events and materials (Olds, 1987). Many cues may be compatible to their home surroundings, thus allowing feeling of familiar conditions. They may see flowers and insects in the hospital garden similar to the ones at their house gardens. The visual interpretation is enriched by the abundance of sunlight in the garden that stimulates the children's sight by changing continuously. The light enables them to experience the passage of time and to enjoy an implicit form of variety as their perception of objects and spaces changes under different

conditions of illumination (Olds, 1987). It provides motion, difference within sameness, variety, information, and orientation.

The evidence of the garden fostering the recovery process of the children has been discovered by the author in an experiment study done in year 2002 involving 360 paediatric patients experiencing therapeutic gardens at two Malaysia hospitals, Batu Pahat Hospital (BPH) and Segamat Hospital (SH). These are 314-bed hospital types, each serving a district population of 50,000 to 380,000 people since 1996 (Ismail et al., 2002). Both hospitals have similar building layout and form of which the wards are surrounded by open spaces. For the purpose of the experimental study, a garden was constructed beside the paediatric ward of each hospitals, size of garden is 308m^2 for BPH and 740m^2 for SH. Both hospitals administered acutely ill patients suffering from diseases including acute abdomen, febrile fits, acute gastro enteritis and infectious diseases of respiratory tract. The average length of stay for the paediatric patients in the hospital wards is 3.1 days for year 2001. They are allowed to participate in the garden activities for two to four and half hours per day and are supervised by their caregivers, either parents or ward nurses.

Through survey questionnaires and interviews on the patients or their caregivers, it is found that interactions with the garden have resulted in psychological peacefulness and adjustment of the children including being more cooperative toward medication, less crying, more active and cheerful, and more obedient to caregivers. From a descriptive analysis, it is found that 94% of the patients (n=360) preferred to be and play in the garden, 95% (n=349) like going to the hospital or do not mind going to the hospital after the inception of the garden. The attributes of the garden that result to the positive responses toward the gardens, with $p<0.001$, are refreshing scent, fresh air, full with light, cheerful environment, scenic views, home feeling and place for variety of play activities.

3.0 DESIGN AND CONSTRUCTION PROCESS OF THE GARDEN

3.1 Types of Therapy Garden

The design of gardens at the BPH and SH emphasized on three types of therapy, in order of importance: (1) play, (2) nature, and (3) horticulture. Obviously, play therapy is the prime theme since the patients are children whom view the garden as a place for social and physical play (Moore, 1999). Through play the patients would develop their self-confidence and self-competence and help them relate to themselves, their caregivers and possibly to other patients. Three types of play are considered for the children participation in the garden: sensorimotor play, pretend play, and games with rules play. This classification of play is based on studies of Piaget (1962) and White and Stoecklin (1997). A sensorimotor play is a gross-motor play where a child experiments with his bodily sensation and motor movements either alone or with objects or with other people. Thus, for the toddler patients, climbing a balancing bar is a sensorimotor play that may excite them to test their balance as they walk on the structure. Young patients, age 7 to

12, would pick flowers and sand from the sand pit and bring them to the timber pavilion. As can be seen in Figure 1.0, they practice a more complex play, the pretend play, where they carry out action 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 these children assume. The game with rules play is a competitive play where children require to organise, to negotiate and to agree on playing criteria with the garden equipment. For example, playing hop scotch called *galah panjang* would require more than two young children to play and set and recognize the rule of the game. *Police-and-thief* is another game that demands organisation and cooperation among the children and the garden can offer them to play and thus socialise.

Figure 1.0 Young paediatric patients exercising a pretend play in a pavilion

As a greenery, the garden is predominantly composed by vegetation supplying food and providing shelter to some animals especially insects and birds. It is partially surrounded by the ward and equipped with accessories to facilitate the active or passive play for the children and also serve the caregivers to supervise the patients. It is sustained by the sunlight, wind and precipitation of the tropical climate and by soil as base for the plants to grow. Hence, the garden is a natural therapy place where children's senses are continuously stimulated by the plants, animals, play equipment, garden structures, and climatic factors.

The garden is also a place for gardening, an activity that make the children engage with plants and get fascinated. Planting seeds such as soybeans in pots or planting boxes would engage the children's imagination and make them excited to see the outcome of their effort. But this therapy is least considered in these hospital gardens because it demands more commitment from the ward management.

3.2 Design Considerations

Being an exploratory space, the therapeutic garden offers boundless way to stimulate the body, mind and spirit of the hospitalised children (Moore, 1999). The therapeutic quality of the garden is magnified through design and programming. The design of the hospital therapeutic gardens was based on six considerations: (1) spatial organisation and circulation, (2) garden setting, (3) sensory stimulation, (4) interaction of activities, (5) planting layout and composition, and (6) garden accessories.

3.2.1 Spatial Organisation and Circulation

The BPH's garden is bounded on three sides by the two-storey ward and overlooking a distant hill whereas the SH's garden is located on a hill and thus having vantage views toward surrounding landscape. They are located beside the paediatric wards on flat terrains, stretching about half to full length of the ward. Hence, patients can easily view the gardens through glass-louvered windows or have an access to them through the ward's playroom. The proximity also encourages the caregivers, parents or ward nurses, to bring the children into the garden and facilitate the ward staff to control non-patients from entering the garden. This site planning strategy is consistent with the healing garden design guidelines recommended by Moore (1999). At BPH, the primary access to the garden is through a playroom whereas at SH the access is a double-leaf door beside the toilet of the ward. Each garden is attached with covered patios, making it as a transition space from the playroom before entering into the garden. It is equipped with a mural on its wall, a rattan bucket swing, and a rubber-mat floor that serve the patients and their caregivers to rest outside the ward especially in mid afternoon or when it rains. Here the patients can feel being away from the indoor environment and their mind can engage with the variety of garden features and thus promote exploration (Herzog et al., 1997).

There are four spatial zones for playing and resting in BPH's garden and seven zones in SH's garden. The zones include multipurpose lawn area, play structure area, sand play area, gardening area, and resting area with timber pavilion. The lawn is the denominator (base) that allows the children to move freely, to select own space and features to play, to assume different body postures, to create their own boundaries, to manifest power, and fulfil their potentials (Moore, 1987). The longest span of open lawn for the patients to run is 8.5m in BPH garden and more than 12.0m in SH garden. Such open-plan facility allows the children to perform multi-types of sensorimotor play including running, walking, rolling, hopping, sitting, and sprawling which are not possible to do in the ward or along the hospital walkway or corridor. These are physical exercises that improve the gross-motor skill of the children and consequently would reduce stress (Ulrich, 1999). The open planning character allows the children to freely choose their play spaces and equipment without regulated sequence of play system. This condition promotes the children to feel being away from the confined and regulated ward environment. Therefore, the condition may result in reduction in stress on the patients due to hospitalisation.

3.2.2 Garden setting

To attract the children into the garden, its setting should be formed by a diversity of natural elements such as vegetations, animals and water (Ulrich, 1999). It is a place with a few play equipment and furniture, and pavilions to provide comfort and safety to the patients and caregivers. All the garden features, natural and man-made, and the climatic factors contribute to the fascination of the patients and thus attract them to play in it.

Subdivision of the spaces in the gardens is defined by the ward wall, trees and shrubs, and garden features such as pavilions and fences. For example, in BPH's garden, a large existing tree, *Tabebuia rosea* (crown diameter 7-8 m), becomes the landmark that provides shade for a rope-play equipment area with a sand pit. Conservation of natural features such as the tree has provided identity to the garden (Moore, 1999) and orients the perception of the users, patients and caregivers, to move freely and select their space. A secluded lawn area with foliage and seats offers opportunity for a patient to be alone with his parents, while a variety of shrubs with different foliage and flowers become nook that give pleasure for exploration. The spaces in the garden should be designed for multifunction to correspond to the children's behaviour and towards their play activities. The lawn is the major area that relates all the subspaces in the garden and become the denominator for all active and passive activities that the garden can provide.

3.2.3 Sensory stimulation

The garden is a platform for the children to apply five types of playing and learning styles, namely: deductive, inductive, visual and auditory, impulsive, and reflective (Thomson et al., 1994). When they are brought into the garden they may recognise the different forms and colours of the plants and other garden features. Hence, they can deduce that the garden is made up of plants and man-made elements for which they can play with and forget about the boredom or pain that they are experiencing. When they pick flowers from low shrubs such as periwinkle and jasmine but not from a tree, they will understand that the shrubs are smaller than the tree (see Figure 2.0). 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. Watching insects such as honeybees, bumblebees and butterflies collecting nectar from flowers in the morning would initiate the children to recognise the insects and flowers. The gardens also offer 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 garden is equipped with familiar plants such as banana and hibiscus, and animals such as bees and birds that the children could 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. This may reduce the stress upon the children since they would enjoy playing in the somewhat similar environment as their homes.

Figure 2.0: By picking flowers from a shrub, the children would deduce that it is smaller than a tree

Hence, the garden affords the children to move and learn and stimulates a full range of movements for body control, object control, and control of self in space: sitting, swaying, crawling, bouncing, running, climbing, jumping, grasping, bending, and turning (Olds, 1987).

The warm, humid tropical climate allows the garden to be used throughout the year. Since most of the area of the gardens are shaded by one to two trees or shadowed by the hospital buildings, the microclimate is favourable for the patients and caregivers to be in the garden throughout the day. Prevailing winds often blow to the gardens providing tolerable temperature even in mid-sunny day. The diurnal temperature change is small, 27^{o}C in the morning and rises to 33^{o}C in the afternoon and drop slightly to below 30^{o}C in the evening. The changing of daylight luminance, air movement, arrival of rain, and humidity can be felt by the patients not only in the garden but also from the ward. These conditions are in contrast with the confined ward environment with unfamiliar odours and constant artificial lighting and little air movement. Hence, being a more natural environment than the ward, the garden is ready to stimulate the hospitalised children and their caregivers through participation.

3.2.4 Interaction of activities

The garden offers a variety of active and passive plays for the ill children as well as allowing the caregivers to rest while supervising them. Active plays such as running, jumping, climbing and throwing are among 20 activities that motivate the gross-motor and development skills of the patients. These are activities involved in sensorimotor play and game with rule play. Besides the active ones, the patients can practice passive play such as sitting, talking, and reading at various garden accessories such as pavilion and timber benches. These are the pretend play activities that promote the children to carry

out action plans such as reading books with other patients or siblings at the patio or the pavilion.

As an outdoor play space, the selection of play depends on the patients. For example, a young patient (6-12 years old) may begin playing with a swing and later climbing the timber ladder and then move to climb the rope play equipment. Later, he may take rest on the timber bench and continue to play with the giant checker with a fellow patient or his sibling. This is a game with rule play that fosters the children to interact with others. All of the activities involve different body postures and allow to create his own boundary (Olds, 1987).

3.2.5 Planting layout and composition

The garden is a respite dominated by vegetation of various types including matured trees, young palms and a variety of foliage and flowering shrubs and climbers. Its character is formed by planting arrangement and composition of the vegetation textures, forms, massing and colours (Robinson, 1994). The vegetation holds the patient's attention and interest without the experience of being stressful. They defined the garden space by framing, subdividing, screening or enclosing the space with their foliage mass or height (see Figure 3.0). Flowering shrubs are planted to become accent elements surrounded by low foliage shrubs and groundcovers. A flowering climber, *Thundbergia grandiflora*, covers the chain-linked fence surrounding open sides of the garden. It attracts many insects and birds to collect nectar and pollen or building nests on them. In summary, the garden is a green niche where plants and animals with microclimatic factors provide meaningful and variable stimuli to the ill children whom experiencing them through visual and physical modes.

Figure 3.0: Plants composed in cluster or solitary define the garden space

3.2.6 Garden accessories

Several play equipment are installed and distributed throughout the garden such as rope play equipment, slide, swing, spring rider, hopping urns, treasure chests, and balancing bar. The equipment is generally for sensorimotor play and game with rule play that allows the children to experiment with bodily sensation and motor movements. Dispersal layout of the equipment allows the children to venture the whole garden and thus get plenty of opportunities to be stimulated by the garden features and by the sunlight and wind. To facilitate the supervision of the children, two to three timber benches and two pavilions are placed in the garden for the caregivers. These facilities also allow privacy for the patients and their parents.

An example of the garden plan is shown in Figure 4.0, which is themaster plan of the paediatric ward garden at Segamat Hospital.

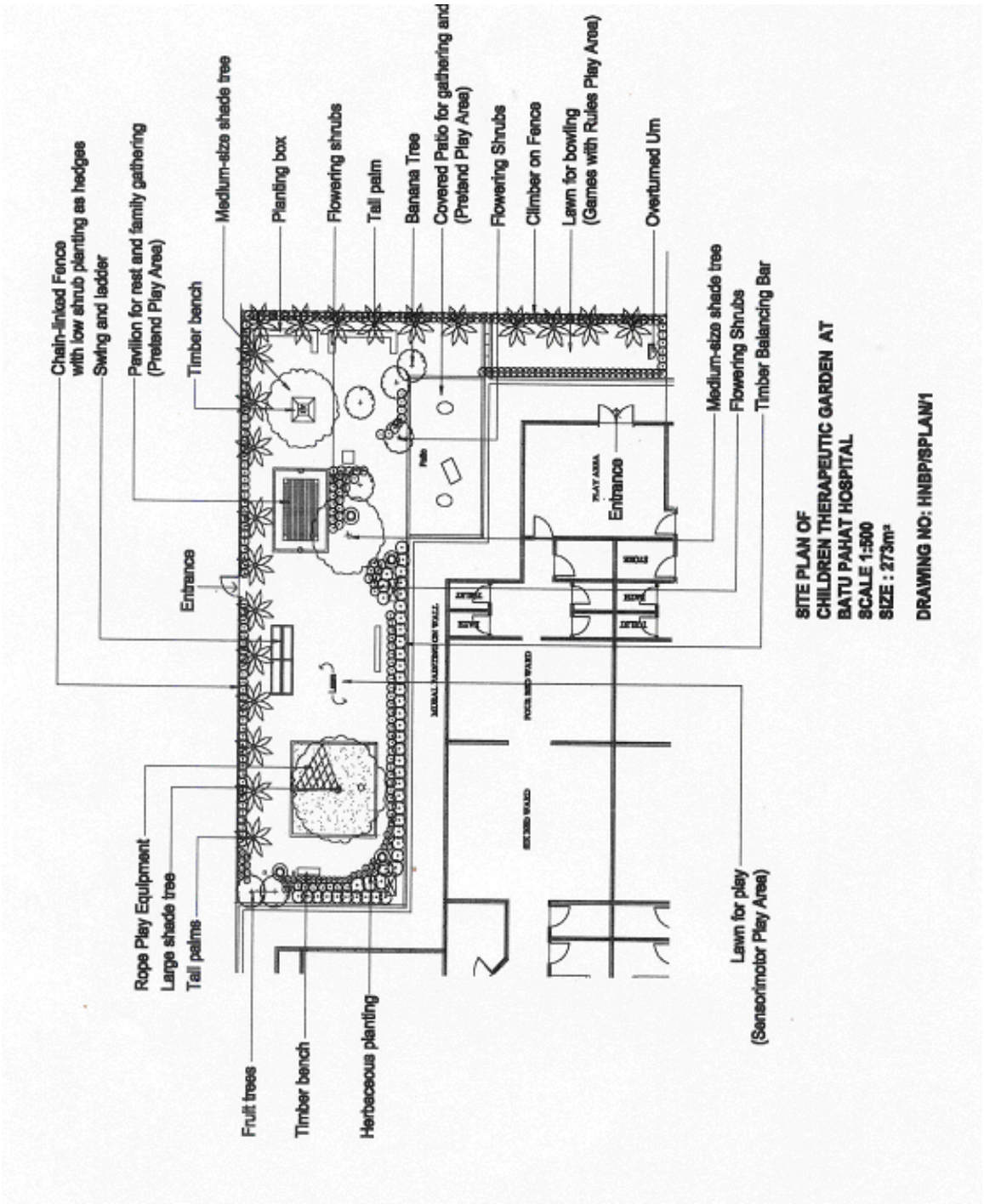

Figure 4.0: Master plan of children therapeutic garden at the paediatric ward of Batu Pahat Hospital

3.3 Construction Process

The six design considerations become the basis in the development of master plan and later construction drawings for the gardens. The construction drawings consisted of demolition plan, hardscape plan and details, and a set of planting plans. The demolition plan indicated the features to be retained or removed from the existing garden. This plan is not necessary for construction of garden on a vacant site. The hardscape plan illustrated the location of the garden accessories and play equipment whereas the planting plan indicated the location of trees and palms, and massing layout of shrubs and groundcovers. The paediatric ward gardens at BPH and SH were constructed in three stages: (1) demolition of existing garden, (2) preparation of base ground, and (3) installation of garden accessories, and (4) planting work. The implementation work begun with the drawing and painting of mural on the exterior wall of the wards. This is a large, long and colourful artwork of cartooned figures including animal, tree, people and toys painted on the wall using emulsion paints in various colours. These murals become the backdrop of the gardens.

3.3.1 Demolition of existing garden

Removal of existing vegetation and garden structures gave space for the installation of new plants and garden accessories as indicated in the construction drawings of the gardens. But some vegetation such as matured trees and palms and garden features including fences were retained because they are part of the elements in the new garden. Excavation of the garden pergola is done carefully without injuring the conserved vegetation or damaging the infrastructure of the ward such as manhole and drain. The demolition work also includes the removal of turf and stones found near the ground surface. This practice prepared the ground for new turf and free from hard object for the safety of the children to play barefoot on the lawn. All excavated materials were carted away from the site.

3.3.2 Preparation of the ground

The ground was levelled and backfilled with topsoil as a base for the new turf. Drainage at depression and waterlogged spot was improved to ensure all area of the garden could be used for play or planting. Planting pits for trees, palms and shrubs were excavated and backfilled with appropriate soil mixture to receive the plant materials. Cow grass was selected for the lawn because of its suitability to the tropical climate and soil condition, and its durability for garden use.

3.3.3 Installation of garden accessories

Before the planting work, all garden accessories and structures including play equipment, pavilions, benches, timber grid, planting boxes, bird feeders, treasure chests, sand pits, bucket swing, and standpipe for water supply were installed to the specified spots. All features were manufactured in workshop and later assembled in the garden. This practice allowed quick installation of the features. Almost all of the play equipment was fixed to the ground except for the balancing bar. Four identical treasure chests were placed in the

garden after the completion of the planting. A chest is a large clay urn with a timber lid for the storage of plastic toys. This makes the children curious to search for the toys by recognising the different planting composition as background for each chest. Hence, this play promotes the cognitive development of the children and engages them to be in the garden.

3.3.4 Planting work

The completion of installation of the garden accessories permits the planting of trees, palms, shrubs and climber, and finally the turf. All plant species were approved according to the specification agreed by the landscape contractor to deliver and install in the garden. Trees and palms were planted first because they set up for mass planting of foliage or flowering shrubs. They defined the garden edge. Then shrubs and climbers were planted in several compositions to define the play spaces (four in BPH and seven in SH). The climbers were either planted against the existing fence or a timber trellis at a resting spot in the garden. Once the planting was completed, the exposed ground was planted with cow grass, which become the base for all play activities. A period of 4 weeks was designated for the plants to establish before the gardens were allowed for use.

4.0 CONCLUSIONS

Garden is a therapeutic platform for hospitalised children to experience the outdoor environment for active and passive play activities. The experience with the natural and man-made features as well as the climatic factors engage and fascinate the ill children to go out and play in the garden. The garden is full of multi-sensory stimuli that promote positive responses to the children through play activities. Such participatory actions permit the children to move freely, to select own space and features to play, to assume different body postures, to create their own boundaries, to manifest power, and fulfil their potentials. The participation has resulted in physiological peacefulness and adjustment to the children. This result is one of the clinical outcomes suggested by Rubin et al. (1998) to signify the environmental intervention toward the healthcare of the hospitalised children. This outcome is only possible when the garden is properly planned and designed by considering spatial organisation of the garden, its planting composition and layout of garden accessories that allow variety of play activities and stimulation for the children.

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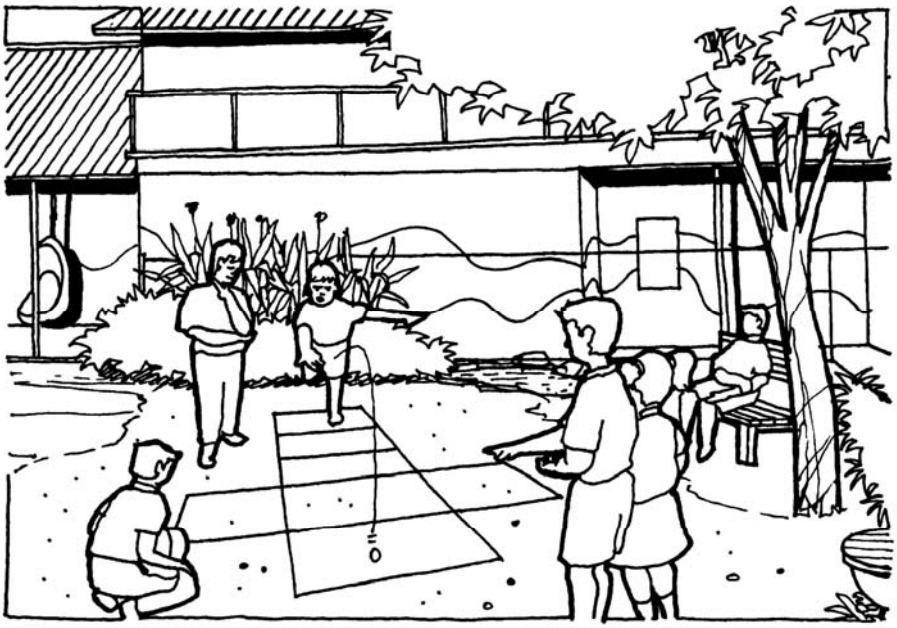

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