

GARDEN AS ENVIRONMENTAL INTERVENTION IN RESTORATION PROCESS OF HOSPITALIZED CHILDREN

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ABSTRACT *This study investigates the psychological benefits attained by pediatric patients after experiencing a hospital garden during their restoration process. The benefits are measured from patients' increased cognitive performances, improved performance tasks and increased social performances when they play or rest in the garden. Thirty-one patients, aged 6 to 12 years, from the pediatric ward of Batu Pahat Hospital are allowed to experience the garden and their behavioral responses are elicited through field observations by the investigator and caregivers. The responses are measured in two ways: (1) qualitative i.e. preference and satisfaction of patients to the garden properties and attributes by semi-structured interview, and (2) quantitative i.e. movement of patient in play activities by behavioral mapping. It is found that 81% (n=25) patients preferred to be in the garden than the ward. Their preferences are influenced by 11 properties or attributes of the garden including refreshing smell, fresh air, full with light, cheerful environment, pleasant sound, scenic view, open space, free to play, not confined, home feeling, and place for variety of activities. Moreover, 68% (n=21) of patients played actively in the garden with long length of play (mean=52 minutes) and high to moderate number of equipment played (11 to 25 equipment). Such behavioral responses suggest the garden fosters the patients' restorative process by increasing their functioning: cognitive, physical and social. This finding suggests the importance to include garden as an environmental intervention to enhance the health recovery of the pediatric patients in the hospital setting.*

Keywords: pediatric patients, garden, restoration, cognitive performances, physical functioning, social functioning

Introduction

Research in nursing (Zahr 1998; Lau 2002), healthcare management (Ruga 2000), and pediatric psychology (Bricher 2000) found that hospitalization often erodes the feelings of toddlers and young children resulting to stress. Being in stress leads to

reduced cognitive performance, helplessness, restlessness, crying, anxiety, and elevated blood pressure (Lindheim et al. 1972; Oremland and Oremland 1973; Zahr 1998; Hana Haiat et al. 2003). As a result, the pediatric patients react regressively in the hospitals such as excessive fears, anxiety, being reclusive, increased clinging to and dependence on parents, loss of bowel and bladder, intensified thumb-sucking, or low self-esteem (Lindheim et al. 1972; Johnson 1994; Lau 2002). Apart from the medical regimens, the regressive behaviors are also due to the environmental conditions of the hospitals including the wards. The conditions may include confined space, loss of habitual control due to the clinical treatment, alien smells, and staying with strangers, and way-finding difficulties in complex and unfamiliar hospital settings (Lindheim et al. 1972; Copper-Marcus and Barnes 1999; La Greca and Bearman 2000). Hence the children perceive the hospital environment as an unfamiliar and strange setting with conditions that inflict pain and segregation from their families and favorite places (Lindheim et al. 1972). In such environment the children have no control on their bodies and their behaviors (Lindheim et al. 1972; La Greca and Bearman 2000).

Such regressive behaviors are pertinent in pediatric wards of 114 governmental hospitals in Malaysia, including 12 nucleus hospitals (Ismail et al. 2002). In year 2002, the Ministry of Health Malaysia (MOHM) healthcare service has administered 330151 children, ranging from neonate to 12 years old (MOHM 2004). Inclusively, the nucleus hospitals administered more than 22000 acutely and chronic ill children whose length of stay ranging from 2 to 14 days (Ismail et al. 2002). Restorative activities especially physiological and pharmacotherapy are done indoor where patients are restricted to their beds, and limited space to play and socialize with peers and caregivers except in the ward's playroom. The nurturing potentials of garden as playspace to stimulate the patients' senses, to generate feedbacks and to allow affordances are very limited, and little being practiced by hospital rehabilitative program (Ismail et al. 2002).

These unfamiliar and strange settings are common in hospitals because design of most late twentieth century hospitals concentrate on biomedical approach rather than holistic approach to treat patients (Dilani, 2000; (Nagasawa 2000). The biomedical

approach considers the pathogenic treatment that focuses on the physical needs of the treated body part. Thus emotion and belief of patients towards the illness are less considered, but focuses on pharmacotherapy treatment. Therefore, interaction with environmental elements such as vegetation and climatic factors and scenic views are not part of the treatment. Moreover, transactions with adults and peers are only happening in the indoor, not at the outdoor landscape of the hospital setting. Inasmuch, the opportunity to interact with the landscape is limited because many hospital designs left the outdoor spaces such as gardens as peripheral landscape which not intended for the restorative process of the patients (Copper-Marcus and Barnes 1999).

On the other hand, holistic approach is salutogenic treatment that considers the physical, mental and social health of the patient (Dilani, 2000; Lercher, 2003). In this approach, while being administered with the medical treatment in the ward, the patients are encouraged to interact with the landscape elements and the climatic factors. With respect to environmental psychology, such interaction stimulates the children's senses and allows them to have their own movement and control. In addition, the landscape such as garden or playground affords them to socialize with relatives, siblings, peers and caregivers that generate social communication and affection (Moore 1999). Studies in environmental psychology and ecological perceptual psychology found that such interactions foster psychological harmony or well-being to the patients (Korpela and Hartig 1996; Korpela et al. 2001; Korpela 2002).

The aim of this study is to determine the restorative impact of a pediatric-ward garden on the cognitive, physical and social functioning of 6-12-year old patients. The endpoint of the environmental restorative process is to foster the patients' recovery process. Recovery is the condition that patients reach their homeostatis level to equilibrium state (Schor 1998). This means the health of the patients is a state of complete physical, mental and social well-being as stipulated by 1948's World Health Organization.

Theories of Environmental Restoration

Two theories have a direct bearing on the notion of restorative impact of experiencing with garden on hospitalized children. They are Stress Coping Restoration Theory (Ulrich, 1999) and Attention Restorative Theory (Kaplan & Kaplan, 1989). Both theories largely focus on psychophysiological stress recovery that experiencing with garden renews diminished functional resources and capabilities of a patient (Hartig & Staats, 2003). In perspectives of pediatric psychology, nursing, environmental psychology, horticulture therapy, and landscape architecture, the recovery to increase the functioning of patients in three ways: physical, cognitive, and social (Rubin et al. 1998; Ulrich 1999; Hartig and Staats 2003). In healthcare perspective, increment in these functioning is restorative effect which would later generate to several clinical outcomes. Rubin et al. (1998) suggested seven outcomes including: (1) decreased medication intake, (2) decreased stress, (3) increased recovery rate, (4) decreased length of stay, (5) reduced pain, (6) decreased recovery time, and (7) increased psychological and physical peacefulness and increased psychological adjustment. Increased in physical functioning means improvement in performance tasks (Hartig and Staats 2003). For example, a pediatric patient is experiencing stress and reacting regressively by being passive and stay on his bed. Allowing him to play in a garden, as an environmental intervention, stimulates and encourages him to move and play in the garden. According to (Kytta 2003) children's mobility (motion) reveals a lot of significant information about the environment. Inasmuch, motion allows the patient to assume different body posture, create his own boundaries, have access to diverse territories, manifest power, have control, and explore his abilities (Olds, 1989).

Increased in cognitive functioning means positive shift in cognitive performances. For example, playing in the garden generates sense of affection (Kellert 2002) to play equipment and perhaps, sense of attachment or affiliation to similar features that he used to play (Chawla 1992). The play may also generate assimilation and accommodation as childhood behavioral development (McDevitt and Ormrod 2002). Other increased cognitive functioning include self-regulation (Korpela et al. 2002), memory, attentiveness, information processing, intuition, skill and many others (Yates

2002). Participating in outdoor play reduces the stress of pediatric patients leading to decrease in anxiety, satisfaction and other positive psychological adjustments (Rubin 2003).

Increased in social functioning means improvement in social play. For example, a child would communicate, negotiate and conduct turn-taking with other patients or siblings during the garden activities. Subsequently, the positive behavioral changes lead to progressive development in peer relationships including acceptance, competence and acquaintance (Ladd & Coleman, 1993; Ladd, 1999).

The concept of garden for children's restoration (healing) has evolved for more than fifty years in North America and Europe (Moore, 1999). The garden include adventure playground in residential neighborhood (Wolff 1979) to therapeutic garden and courtyard in children hospitals designed by landscape architects (Copper-Marcus & Barnes, 1999). Despite the long establishment, there is lack of empirical studies on the effects or impacts of garden on healthcare outcomes of hospitalized children (Rubin et al. 1998; Whitehouse et al. 2001; Irvine and Warber 2003; Sherman et al. 2005). Question on what are the properties and attributes of the garden that generate restorative effect remains without empirical proof (Whitehouse et al. 2001; Sherman et al. 2005). Relating question includes what are the patients' behavioral changes to be elicited to prove they gain recovery from experiencing the garden. Therefore, this study aims to fill the gap in determining the environmental qualities of pediatric-ward garden that foster the restorative process of young children in a hospital setting. Thus, this study can be seen as proving the garden as an environmental intervention (Rubin et al., 1998) or as green healthcare therapy (Irvine and Warber, 2003).

Method

Subject

An experiment was conducted on 31 pediatric patients experiencing a pediatric-ward garden of Batu Pahat Hospital for three months, from January to March 2004. During this period the hospital administered 259 children between the ages of 6 to 12 years

old. The children were inpatients administered in the ward for an average of length of stay for 3.7 days. They were recuperating from acute to some chronic diseases, congenital problems and injuries. The patients were allowed to participate in the garden activities from 9:00 to 11:30 am and 4:30 to 6:00 pm. In the ward as well as in the garden the patients were accompanied by their caregivers, mostly by mothers. Most of them were able to walk to the garden. However, a few patients suffering from fractures, ankle injuries or nephritic syndrome were pushed on wheelchairs into the garden.

Garden

The 878.8m² garden was design and built by the first author (researcher). Its design was based on healing garden design guidelines proposed by Robin C. Moore (1999) and design philosophy described by (Barnes and Copper Marcus 1999) (See Figure 1.0—Master Plan of Children’s Garden at Batu Pahat Hospital). It is located beside the ward, thus patients are able to view it from their beds through glass-louvered windows. It is easily accessible through two ward’s doors via the bathrooms and toilets. The garden is composed of eight play areas including (1) an alphabetical walk, (2) two multipurpose lawn areas with play equipment, (3) two sand play areas with spring-riders and rope play equipment, (4) a short, lawn bowling pitch, (5) a fishpond with deck, and (6) a patio. There are 25 play equipment laid on lawn or sand and frame with a variety of tropical trees, palms, shrubs and groundcovers. The play equipment are a set of swing and timber ladder, a balancing bar, eight treasurer chests, two rope play structures, an overturned urn for lawn bowling, four spring-riders, a shovel and a trolley, a chatter box, a spiral slide, two bucket swings, a hop-scotch, a frog and a snake sculpture. A ward wall painted with a mural also frames the garden. The mural consisted of large cartooned figures including dinosaurs and other animals, toys, and trees, which are drawn based on 22 children’s books. For rest and shelter the garden is also equipped with two timber pavilions and seven timber benches distributed throughout the garden. In sum, the garden is a play setting with play equipments, garden accessories and tropical greenery.

The garden offers 30 to 50m² of play space for each patient per period of play—the pediatric maximum capacity is 24 beds. This is much more than the ward space, only 8 to 10m² per child. Thus the patients afford to move freely away and having his own control and choice playing in the garden. The available play space in the garden is much larger than suggested by some playspace standards, for example, Greenham (1988 cited in (Strinsite and Moore 1989) proposed about 9 m² per child and Frost (1985 cited in (Hartle and Johnson 1993) recommended 8 to 9 m² per child. The choice of play equipment in the garden including the play equipment and vegetation is 5 to 6 choices per child when 5 children occupied the garden per time. This is more or less with the number recommended by (Prescott 1987) which is 4 to 5 choices per child.

Measures

To elicit the perceptual responses of the patients to the garden the study used a research study design called observational study with paired data (Rubin et al. 1998). Direct observation was conducted in the ward and the garden on the patients' behavioral responses. Two instruments were used simultaneously to elicit the patients' responses, observational behavioral mapping and semi-structured interviews. A total of 47 hours were spent to observe the patients' behavior and to interview them.

Behavioral mapping measures the overt behaviors of the patients experiencing with the features and activities in the ward and the garden. In other words, it illustrates the operational value of how the garden is utilized by the patients (Moore 1978; Hart 1979). The behaviors include play or rest performed by a patient alone or with peers. Play means movement or locomotion of a patient in the ward space or garden play areas. It also means the movement of patient from a play equipment or garden structure to another. The researcher began the mapping by observing the patients in the garden and then into the ward. Location of a patient playing in the garden was represented by a bold dot in an A-size garden plan with a scale of 1:250. Thus the dot denoted the overt choice of playing with a particular equipment or plant in a

particular play area of the garden. Moore and Young (1978) called this behavior as operational value which means how the garden is actually used by the patient. In addition, a star represented location of his/her caregiver. Date of observation and length of play in minutes were also noted on the garden plan. This plan is called individual play behavior plan.

The semi-structured interview elicits patients' cognitive and social capabilities interacting with the garden features and transacting with their peers in the garden and the ward. Words from the patients were elicited by asking the patients on their perceptual judgments toward the conditions of the garden and the ward. Before the interview, the researcher developed rapport with the patients, first doing garden maintenance works, and later assisting the patients in their play. The interview was conducted at one of the pavilions or any play spots following the tempo and mood of the patient. The conversation was tape-recorded and each patient was let to hold the recorder. Questions were poised in tactful manner so that the patient would tell what things to ask rather than what to ask (Graue and Walsh 1995). One or two short breaks were taken during each interview to relax the patient from boredom and lose interest to the conversation. The breaks included letting the patient to hear his recorded voice, playing with equipment or even getting back to the ward for drink and later resume the interview.

Data Analysis

Locations of the play for each patient were transferred onto a composite behavioral plan in a similar scale as the individual play behavior plan. Thus, the composite plan illustrated the distribution of play location of play locations for the 31 patients. The distribution of play can be either clustering or scattering. This analytical method was similar to the behavioral mapping technique conducted by Moore and Young (1978, p.290) in their study of children behavior at Washington Environmental yard. From the composite plan, clustering or scattering of the dots indicated the play behavior of the patient. Clustering of dots means the patients' preference to the garden features (equipment or plant) and play areas. In contrast, scattering of dots means there is no

pattern of preference. Moreover, the clustering illustrated the movement pattern of the patients in the garden. Information from the composite behavioral plan was later triangulated with the data from the interview. More information of the patients' play behaviors and responses were summarized in Table 1.

TABLE 1: Data of patients' behaviors participating in the garden

Observational Mapping Data for 31 patients	Rate
Mean length of participation (LOP)	52 minutes
Maximum LOP	106 minutes
Minimum LOP	24 minutes
Patient having LOP greater than the mean	39% (n=12)
Patient having LOP less than the mean	61% (n=23)
Mean garden area visited (GAV)	505m ² (57%)
Maximum GAV	844m ² (96%)
Minimum GAV	207m ² (52%)
Patient having GAV greater than the mean	48% (n=15)
Patient having GAV less than the mean	52% (n=16)
Mean time spent to play with an equipment	4 minutes
Longest time a patient spent to play with an equipment	7 minutes
Least time a patient spent to play with an equipment	2 minutes
Mean number of equipment or features visited (EFV)	14 units
Maximum EFV	25 units
Minimum EFV	6 units
Play area most visited and percentage of patient visiting	D; 84%
Percentage of patient played in a group	68% (n=21)
Percentage grouped play without introduction	35% (n=11)

Data from the interview were words from the patients on their behavioral responses to the garden and the ward. The words were either positive feeling or negative feeling to the two settings. The data were analyzed by content analysis to elucidate the patients' behavioral patterns or regularities (Patton 2002). Therefore, the analysis was an interpretive process to determine the perceptual judgments of the patients toward the garden. The positive perceptual judgments toward the garden may include preference, fascination and satisfaction, attachment, affiliation, affection,

feeling relax and calm, being cheerful, and forgetting worries (Korpela et al. 2001; Kellert 2002; Korpela 2002; Yates 2002). The process included bracketing or categorizing the behavioral responses into essential elements, and constructing the behavioral phenomenon, and finally contextualizing the phenomenon back to the garden-ward context (Denzin 2001).

The words of the patients on the garden suggesting their positive feelings were best, comfort, happy, fun, beautiful, inviting, refreshing, not bored, open, a playground, and a place with flowers, play equipment and fishpond. They noted that the presence of plenty playing equipment, lush and varied vegetations, and some animals were the major physical features that generated those feelings. Additionally, the presence of wind, sunlight and openness of the garden as an outdoor space also triggered the feelings. Hence, 81% (n=25) of patients mentioned those words indicating their preferences, bonding, memories, fascinations and satisfaction toward the garden. Nineteenth percent (n=6) of them gave no negative comments to the garden. From the 25 respondents, 14 of them mentioned the word 'best' towards the garden. Additionally, 74% (n=23) mentioned they played with manipulating equipment, namely shovel, swing, bucket swing, chatterbox and rope play structure.

On the other hand, 48% (n=15) of the patients having negative feelings toward the conditions of the ward by mentioning words including hate, bored, worry, not free to move, restless, noisy, and crowded. Moreover, the negative feelings toward the ward were also due to medical regimens that the patients mentioned they afraid or hated the injection, pain and medicine. However, 42% (n=13) of them mentioned positive words to the ward such as not afraid, enjoy being alone on bed, like to be in ward, nurses are nice and helpful, having many friends in the ward, happy, comfort, ward has a playground, and ward is a cool place. Furthermore, there were only 6% (n=2) of patients preferred both of the settings suggesting feeling of ambivalence toward the garden and the ward.

Discussion and Conclusion

Most patients (81%) felt positive towards the garden and only 19% of them towards the ward. On average, they visited 57% of the garden. Some have visited 96% of the garden suggesting their perceptual preferences and mobility to participate in the garden activities. They have participated as long as 106 minutes while others as short as 24 minutes; an average of 52 minutes of length of participation (LOP). Sixty-one percent (n=23) of them participated less than mean LOP. These behaviors suggest that the patients are more active and mobile in the garden than the ward suggesting increase in their cognitive and physical functioning.

As can be seen from the composite behavioral plan, the clustering of dots were most seen at manipulating play equipment and none at plants. Play area D with the most number of play equipment (nine types) and a pavilion is the most frequent visited by the patient. The clustering signifies the patients focus their attention to manipulables which are shovel, swing, bucket swing, chatterbox and rope play structure. In other words, the patients are fascinated more on these equipment than non-manipulables (e.g. slide) and plants. Playing with these equipment enable them to manifest power and explore abilities allowing them to assume different body postures (Olds 1989). For example, the shovel affords a patient to grasp, to move the equipment's arms, to scoop sand, and to dump sand into a timber trolley. Thus the shovel stimulates at least three senses: touch, hear, and sight. Another equipment, the Mars rope play equipment affords the patients to grasp, climb, look-out-from, stand-on, and balance. The equipment is a flexible climbing structure in which a child has to establish at least three-point contact rather than two-point contact on rigid structure (BerlinerSeilfabrik 2004). Thus, the rope play structure affords more tactile contacts (grasps) to a child in order for him to balance himself on the structure. Therefore, the manipulables not only stimulate the patients but also generates feedback and sense of affordances (Wohlwill and Heft 1987; Heft 1999). The patients begin to perceive the affordances of the equipment or play area from their beds looking through the ward's windows. When the patients approach the play area and its equipment, they perceived more affordances through utilization, for examples, grasping arms of shovel, climbing rope

play structure, swinging in a bucket swing, riding on a spring-rider. The affordances of the manipulables are generated through direct action with them. Gibson and Spelke (1983 cited in Kytta 2003) posit “the child learns what things are manipulable and how they can be manipulated.” It seems clear that direct action and contact with the garden features and its spatial composition generate cognitive and physical functioning.

Little feedback and affordances are generated to the patients by the elements of the ward. The reason is obvious since the ward is equipped with biomedical equipment and accessories to facilitate the recovery of the patients’ health. Moreover, the ward affords 4 to 5 times less space than the garden. Limited space means less opportunity for movement leading to little chance for the patients to manifest their power and to have control (Olds 1989). Therefore, perception and movement in the garden increases the patients’ sense of cognitive performances as well as performance tasks. This finding is in accord with the view of ecological perceptual psychology that perception is an active experience, in which one finds information through mobility (Kytta 2003). “We must perceive to be able to move around, and we must move around to be able to perceive” (Gibson 1979 cited in Kytta 2003).

There are differences in movement between individual patients which are generally influenced by their health status. Some patients played in rapid pace as high as 2 minutes per equipment whilst others move slowly and played as slow as 7 minutes per equipment. For example, an asthmatic 10-year-old boy played for 50 minutes (2 minutes per equipment) with all the equipment covering 85% of the garden area. His mobility is high but participated less time than the mean LOP. On the other hand, two nephritic boys aged 11 and 10, spent 78 minutes and 88 minutes (more or less 4 minutes per equipment) in the garden, respectively. They played together on 21 equipment covering 96% of the garden. In comparison to the asthmatic boy, they are less mobile due to their illness and frequently used wheelchair to access to the garden. This difference suggests that the agile and passive children perceived the garden with high fascination. Being in the garden with man-made elements, plants, animals and climatic forces permits such cognitive functioning and Kaplan et al.

(1998) called it as quiet fascination. It is an effortless attention that is without mental fatigue that permits reflection to the children (Kaplan et al. 1998). This is the very reason why the children able to reflect positive feelings to the garden--best, comfort, happy, fun, beautiful, inviting, refreshing, not bored. It seems clear that playing with equipment, observing plants and animals, and interacting with the microclimatic factors of the garden generate the positive feelings.

As can be seen from Table 1, 68% (n=21) of the patients played in group either other patients (n=17) or siblings (n=4) that they had met in the ward. Eleven of them joined in the social play without introduction. And as illustrated in the composite behavioral plan, their pattern of social play happened in play area D and A with manipulating and non-manipulating equipment. With the manipulables including shovel and timber trolley, swing, chatterbox and rope play structure the patients play in a small group, generally two to five individuals. They practiced cooperative, associative, and parallel plays that generated several social skills such as communicating, sharing, cooperating, and turn-taking (Hartle and Johnson 1993). Playing with the shovel with timber trolley is the high cooperative play because the play required plenty of communications and turn-takings to scoop the sand with the shovel and to dump it into the trolley. For example, two asthmatic boys, both nine years old, played for 83 minutes in the garden in particular playing with the shovel. One of them scooped the sand while the other pushed or pulled the trolley. Lots of commands were given by the boy on the shovel asking his counterpart to place the trolley with the reach of the shovel.

Apart from the cooperative play, increased in social functioning also happened at bucket swings and spring-riders where they practiced parallel and mutual play. In this play one patient assimilates the action of another. For example, a six-year-old girl, followed the move of a 10-year-old girl to play with the pair of bucket swings at the ward's patio. Both were suffering from abdominal pain. They played for a very long duration, 96 minutes, participating in two parallel plays, two mutual plays, two associative plays, and one cooperative observation. They are among the eleven patients that played without introducing themselves. Their social transactions

generate affection to each other as well as attachment and affiliation to the garden features. In comparison to the behavior in the ward, most patients stay in their beds accompanied by their caregivers, generally mothers. The limited space, 8 to 10 m² of the ward per patient, does not afford them to socialize.

In summary, it seems clear that when pediatric patients move out from the ward and play in the garden they experienced positive shifts in cognitive, physical and social performances. The presence of a variety of play equipment (manipulables and non-manipulables) strongly affects the fascination of the patients more than the presence of the vegetations. The play equipment and the open space of the garden afford them plenty of functions which the ward physical conditions afford much less. In addition, the affordances of the manipulables are greater than non-manipulables. In general the patients played in a group with peers (patients or siblings) covering almost the whole garden area and almost all play equipment. The fascination towards to play together with the garden features is high that some played without introducing themselves. The findings of the study suggest that garden can foster the restorative process of hospitalized children by increasing their cognitive, physical and social functioning through play participation.

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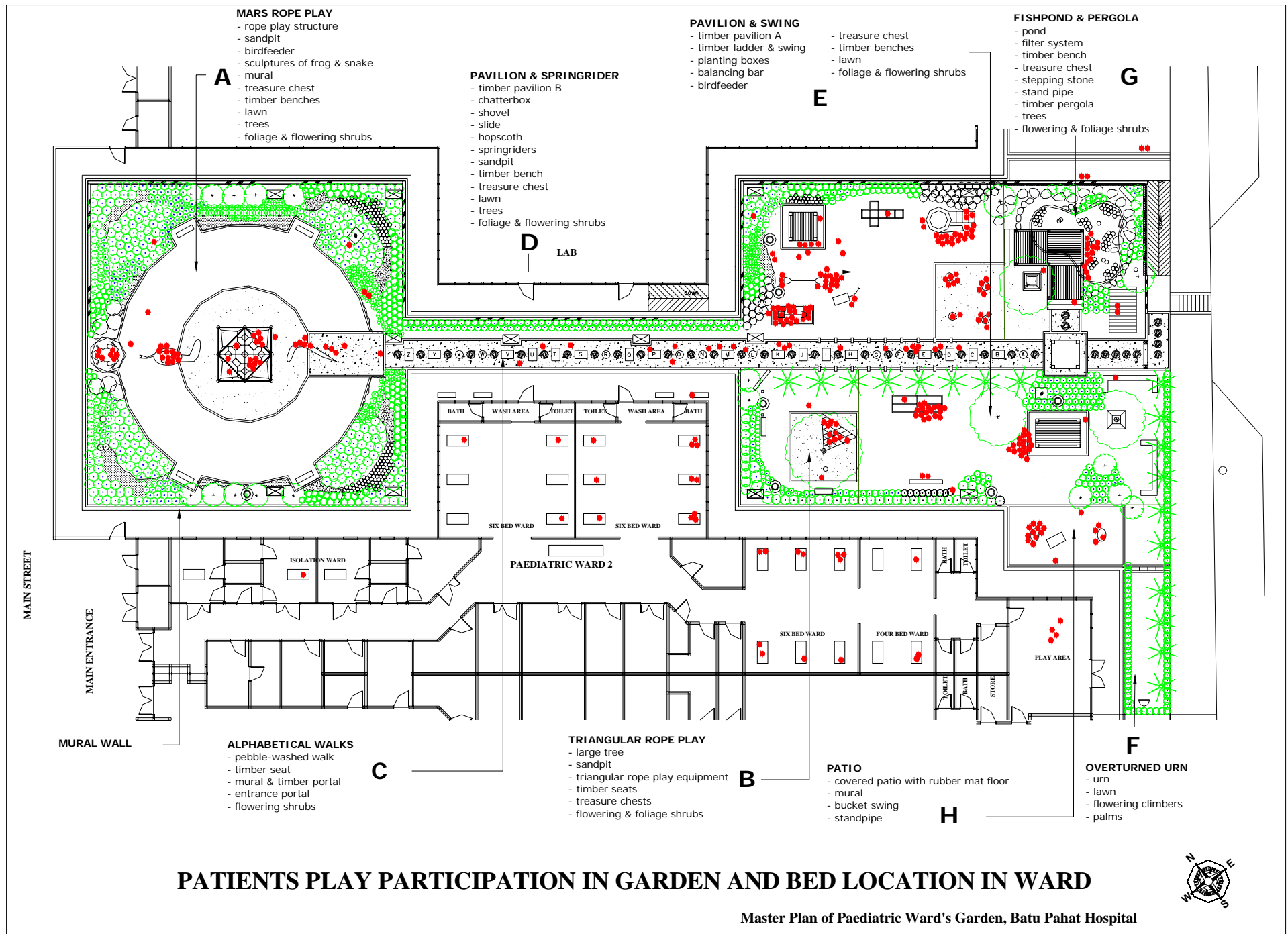
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PATIENTS PLAY PARTICIPATION IN GARDEN AND BED LOCATION IN WARD

Master Plan of Paediatric Ward's Garden, Batu Pahat Hospital

1 FIGURE 1: GARDEN PLAN OF PEDIATRIC WARD AT BATU PAHAT HOSPITAL