PREGNANCY AND PLACE: CREATING THERAPEUTIC GARDENS FOR
MATERNITY CARE PATIENTS

by

LARA M. BROWNING
(Under the Direction of Sungkyung Lee)

ABSTRACT

Research and design guidelines for therapeutic gardens target certain patient populations such as acute care, psychiatric, pediatric, geriatric, and Alzheimer’s patients. A significant patient population that has not been addressed, however, is maternity care patients. This thesis includes a literature review, a site analysis, and concludes with design development. The literature review covers topics such as stress in pregnancy, environmental psychology related to childbirth, nature and gardens as restorative agents, general meanings of home, and design development. The primary goal is to design a therapeutic garden that will alleviate maternal stress during hospital stays thereby protecting fetuses from adverse effects. Qualities of the home environment may assist in stress reduction are thus used to develop guidelines for therapeutic garden design specific to maternity care patients. The design guidelines are applied to develop a rooftop garden for a maternity care center in Atlanta, GA.

INDEX WORDS: therapeutic gardens, maternity healthcare, pregnancy, home, stress, landscape architecture
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by

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PREGNANCY AND PLACE: CREATING THERAPEUTIC GARDENS FOR
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DEDICATION

I would like to dedicate this thesis to my parents, Robert and Janet Browning, who have been an endless support throughout my education. I am forever grateful.
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1. Introduction

Research and design guidelines for therapeutic gardens target certain patient populations such as acute care, psychiatric, pediatric, geriatric, and Alzheimer’s patients (Marcus and Barnes 1999). A significant patient population that has not been addressed, however, is maternity care patients. Pregnancy and childbirth may be one of the most important experiences for women and families. In the United States, approximately 4,058,000 live births occur every year (American Pregnancy Association 2009). By the time women reach the age of forty-five, eighty percent have had children (Zezima 2008). Of these childbirths, ninety-nine percent occur in the hospital setting (American Pregnancy Association 2009). In addition, each year approximately one million women have a high-risk pregnancy, and eighteen percent are prescribed to bed rest where their movement is limited for an extended period of time (Maloni 2005). Of women prescribed to bed rest, a significant portion stay in the hospital.

Over the past several decades, the healthcare industry has increased its emphasis on how the design of the healthcare environment contributes to the health outcome of its patients (Hartig and Marcus 2006). As this industry attempts to improve the recovery and experience of its patients and staff, therapeutic gardens are becoming increasingly popular. These gardens are comparable to hospitals in that they can provide general services to the community, but they can also provide services that are valued by only specific populations, such as cardiac centers serving patients with heart
issues (Hartig and Marcus 2006). As the demand for therapeutic gardens increases, it is important to understand that each patient population has specific wants and needs that should be addressed in design.

Therapeutic gardens for maternity care patients have the potential to affect a broad range of the American population. Having recognized the importance of women’s care, a hospital in Atlanta, Georgia, is planning to build a therapeutic garden for its Women’s Center of Excellence. Landscape architects, however, lack a prototype to guide design for this specific population. The purpose of this thesis is to determine the needs of the maternity care population and to develop a set of design principles for a therapeutic garden. The question this thesis seeks to answer is twofold: how can design principles be derived from qualities of the home, and, when combined with the principles of therapeutic garden design, what principles can be developed specifically for maternity care?

Description of Current Setting

The hospital where the therapeutic garden will be located is in Atlanta, Georgia. The maternity center delivers approximately 4,000 new babies each year. Currently the hospital has sixteen labor/delivery/recovery (LDR) rooms that allow mothers to labor and recover in the same room, an antepartum (pre-delivery) unit with eleven rooms for women who have complications during pregnancy and need to be hospitalized, a

* As requested by the hospital for which this design will be utilized, the author will not use any direct identifiers that could disclose the institution’s identity.
postpartum (post-delivery) unit with thirty-two rooms, a nursery with thirty-eight bassinets, an intermediate care nursery, and a neonatal intensive care unit (Figure 1.1).

Figure 1.1 Roof context and access

The maternity center encircles a black tar and gravel roof scattered with air ventilation units, vents, and other equipment (Figures 1.2 & 1.3). The roof is visible from four postpartum patient rooms, six antepartum patient rooms, the neonatal intensive care unit, the visitors’ waiting room next to the nursery, and sections of the hallway.
(Figure 1.4). The roof is completely enclosed by buildings with no access to overlooks or edges. Building heights bordering the roof range from one to five stories. Windows look out onto the rooftop from all sides with the exception of a covered walkway that borders the northeast end of the rooftop. This section is windowless. Access to the roof is located at the nurses’ station between the antepartum and postpartum units. Information regarding the live and dead load weight capacities of the roof is not currently available.

Figure 1.2 Maternity center rooftop: current condition
The roof is divided into three levels that reflect the varying heights of the building beneath it (Figures 1.5, 1.6, and 1.7). The lowest level is two inches above the finish-floor elevation (FFE) of the antepartum and postpartum units within the maternity center. This section of the roof is currently covered in gravel and is 3,735 square feet. The roof then steps up one foot two inches to a black tar covered portion. This is the largest area of the roof consisting of 3,990 square feet. This section of the roof is one foot four inches above the FFE of the antepartum and postpartum units. The highest section of the roof is two feet four inches above the FFE of the maternity center. This portion of the roof surrounds a large air ventilation unit and covers an area of 760 square feet. The entire surface of the roof is approximately 8,500 square feet.
Figure 1.5 Roof areas
Figure 1.6 Section AA': east-west section elevation of rooftop
Figure 1.7 Section BB': north-south section elevation of rooftop
Methods

This thesis includes a literature review and site observations that lead to design development for a rooftop garden at the Women’s Center of Excellence in a hospital in Atlanta, Georgia. This study is heuristic and inductive in nature. The literature review covers substantive topics such as stress in pregnancy, environmental psychology related to bed rest and labor, the history of childbirth in the United States, nature and gardens as restorative agents, and the general meanings of home. This research reveals the extent of maternal stress during pregnancy and what women are looking for in an ideal childbirth setting. The history of childbirth in the United States, general research on the meanings of home, and more specifically, the homebirth movement are interpreted to establish attributes of the home related to pregnancy and childbirth. These analyses result in a diagram that explores these attributes and how they are related to each other. This diagram is then used to create a framework for a more in depth study of these attributes and to determine how qualities associated with the home environment can be interpreted into a physical form to create design principles. In addition, design guidelines for general therapeutic gardens are researched. Principles specific to other patient groups, but applicable to the maternity care population, are used to make an additional set of design guidelines. These conventional guidelines for therapeutic gardens are ultimately combined with the principles derived from the home environment to develop a set of principles specific to maternity care (Figure 1.8).

In an effort to better understand the hospital setting where the rooftop garden will be located, observational studies were conducted on October 5th and November 20th, 2009, and February 9th, 2010, for approximately two hours each. During these visits, the
Figure 1.8 Design method
author met with hospital personnel to discuss information about the site and documented the roof’s physical condition including an assessment of the ground plane, existing equipment, areas that need screening, views from patient rooms, light studies, and opportunities for private and public spaces. In addition, the author completed a functional analysis to better understand the broader context of the hospital environment. The functional uses of rooms surrounding the rooftop were documented in order to avoid conflict between rooftop activities and activities occurring within the hospital. Graphical synthesis of data resulted in a series of visual diagrams that communicate the conditions of the rooftop and the functional context of rooms surrounding the garden. These diagrams were included in the prior pages of this chapter and in chapter six.

The final product of this study is a design for the rooftop garden of the Women’s Center of Excellence. The author utilizes the design guidelines and site analysis to generate a design concept specific to the Atlanta hospital. Design guidelines are offered to assist others in the development of therapeutic gardens for maternity care patients.

**Design Considerations**

The characteristics of maternity care patients, their needs, and design issues are identified and explored from three angles: as an event, as people/patients, and as related to the environment. Although these angles are not included in the literature review, they are considered throughout the design process. To begin, childbirth is a celebratory event. Unlike most patient populations within the hospital, pregnancy and childbirth are natural and not diseases. The vast majority of women have healthy pregnancies and babies (The Boston Women's Health Book Collective 2008). In Our
Bodies, Ourselves: Pregnancy and Birth, chapter one begins with, “Congratulations! As a pregnant woman planning to bring a new life into this world, you are embarking on an amazing journey (The Boston Women’s Health Book Collective 2008)”. The book calls for a “climate of confidence” that reinforces women’s power and control of childbirth while minimizing fears. Pregnancy and childbirth embody life are symbols of women’s strength. Therefore, it is important to remember the celebratory aspect of these women’s situation and approach their needs in an appropriate manner.

Second, maternity care patients have particularities that should be considered in design. There are generally two groups of maternity patients at the hospital: women who check into the hospital during labor and remain for a short period of time after childbirth, and women who are on bed rest and living in the hospital for up to four months. Both of these populations are important, but their needs are different. Therapeutic gardens for women who enter the hospital during childbirth may be used by patients for a place to walk during the early stages of labor and as a place to reduce stress and relax, thereby facilitating the ease of the labor process and potentially decreasing its length (Boucher et al. 2009). Women on bed rest, on the other hand, are likely to experience severe stress and depression over a prolonged period of time, which can be detrimental to both the mother, child, and family (Dunn and Handley 2007). In these circumstances, therapeutic gardens are crucial in assisting mothers through difficult times by providing a sense of escape, helping to alleviate stress, creating a sense of control, supplying areas for social support, and offering access to nature and other positive distractions (Marcus and Barnes 1999).
In addition to the patients, it is important to remember that childbirth and pregnancy are often a family event. Stress occurring within one family member is likely to impact other family members, and women frequently rely on their family for support. In addition, hospital staff often provide comfort and assistance to their patients. Similarly, stressed staff members are less likely to be effective supporters for these women. Therefore, a therapeutic garden should facilitate family interaction and visitation and also address the needs of husbands, partners, children, and hospital employees that provide regular assistance to the maternity care patients. For this project, however, the Atlanta hospital specified that they did not want hospital staff to be utilizing the garden. Consequently, hospital employees are not included in the design application of this thesis.

Finally, the environment plays an important role in women’s mental health during pregnancy and childbirth. Although pregnancy is a normal and often happy event, childbirth requires adjustments in the lives of women and their families (Zwelling and Phillips 2001). During this time of transition, families should receive nurture and reinforcement through physical care, emotional support, education, and an accommodating environment. Familiar environments are associated with stress reduction and a general sense of satisfaction in the birthing experience of many women (Lock and Gibb 2003, Sherr 1995). The home is an iconic symbol of a familiar, comfortable environment (Gunter 2000). Therefore, a goal of the therapeutic garden design in this thesis will be utilizing the concept of home to create a familiar environment within the hospital setting.
Thesis Structure

Chapter two explores the extent of stress in pregnancy and identifies common stressors. The hospital environment is critiqued as a potential stressor followed by an investigation of bed rest within the hospital and the effects of limited activity on women’s physical and mental health. The chapter also examines how maternal stress and well-being impact fetal development.

Chapter three investigates maternity care and approaches to stress management through environmental design. The chapter begins by reviewing the history of childbirth in the United States and how maternity care has changed to reflect the culture and values of the time. Women’s experience of childbirth is traced from pre-seventeenth century to the modern day. Similarly, therapeutic gardens are examined across time in association with the hospital setting. Social values and developing research are used to explain the application of nature as a healing element in hospital care. Modern therapeutic garden design is examined to extrapolate therapeutic garden design principles related to maternity care. The chapter culminates with an introduction of home as the antithesis of the hospital environment.

Chapter four explores the meanings of home in multiple contexts. The author then discusses the homebirth movement to try and identify the values and aspects of home that maternity patients would seek for childbirth. Concepts of home are explored diagrammatically and placed in context of childbirth and pregnancy. Chapter five strives to create principles that are derived from evidence-based design discussed in the previous sections. Diagrams developed in chapter four are used as a framework to create design principles based on the concept of home. These principles are then
combined with pre-existing theories of therapeutic garden design to generate a new set of design principles specific to maternity care. Chapter six utilizes these new design principles to develop a therapeutic garden for the Atlanta hospital. Chapter seven ends with a critique and conclusion.

**Definitions**

The following definitions are for common terms used throughout this thesis and are provided for clarification:

**Antepartum pregnancy:** An adjective describing the period of pregnancy from conception to labor (Mosby’s Medical Dictionary 2002).

**Bed rest:** The restriction of a patient to bed for clinical purposes over a prescribed time period (Mosby’s Medical Dictionary 2002).

**Postpartum pregnancy:** The term applied to the maternal phase immediately after childbirth (Stedman’s Medical Dictionary 2006).

**Stress:** The body of research that explores stress among pregnant women includes a variety of definitions. It is important to note that the studies in this thesis might have approached stress slightly differently. Affonso et. al (2009) looked at stress by measuring the symptom of worry, which she defined as “a cognitive activity that can be a behavioral expression to better understand how a person is coping and will adapt to his or her situation.” Woods et al. (2009) measured psychosocial stress in pregnancy and defined this stress as “the imbalance that a pregnant woman feels when she cannot cope with demands…which is expressed both behaviorally and physiologically.” For the purpose of this thesis the following definition of stress will be used: “an internal
psychological state of the individual who perceives threat to wellbeing (Ruiz and Fullerton 1999)."

**Therapeutic garden**: A garden designed to achieve a degree of relief from physical symptoms or awareness of those symptoms, reduce stress, and facilitate an improvement in the overall sense of well-being that an individual is experiencing (Marcus and Barnes 1999).
2. A Population at Risk: Why Stress-Inducing Environments are a Problem

“Stress results not from a particular life event per se but from the individual’s perception of that event and of his or her ability to control and deal with the event.” (Mercer and Ferketich 1988)

Common Stressors During Pregnancy

Stress in pregnancy is common (Talge et al. 2007; Woods et al. 2009). One study surveyed over 2000 pregnant women to reveal that six percent withstood high stress, seventy-eight percent felt low to moderate stress, and sixteen percent perceived no stress (Woods et al. 2009). In general, the sequence of antepartum stress follows a U-shaped curve (Figure 2.1) (Costa et al. 1999; Curry, Burton, and Fields 1998; Hedegaard et al. 1993; Heron et al. 2004; Woods et al. 2009). Pregnancy, like many life changes, requires an adjustment period for both the woman and her family. During the first trimester of pregnancy, women are adjusting to the emotional and physiological changes of pregnancy and are more likely to display physiological and behavioral responses to various stressors. By the onset of the second trimester, however, women have become more adjusted to pregnancy. Although stressors have been found to be constant across the course of pregnancy, women appear to be able to cope with stressors more effectively during this time. The third trimester is often the period of highest stress for pregnant women as the pregnancy nears full-term.
Stressors can include agents, conditions, or other stimuli that have the potential to affect all human beings or they can be pregnancy specific (Mulder et al. 2002). For example, stress from life events such as divorce, serious illness of a loved one, or a natural disaster, and daily hassles including domestic affairs, financial or relational problems, and traffic can affect anyone at any time. Common stressors specific to pregnancy include concerns of body image associated with pregnancy, fear that the child will not be normal and healthy, anxiety about the impact of pregnancy on the relationship with the spouse or mate, and concerns about employment and finances (Affonso et al. 1999). Other factors that may cause high levels of stress include domestic violence, drug use, medical problems, and depression (Woods et al. 2009).
Studies examining age, marital status, education, race, employment, and history of pregnancy complication differ in their conclusions about each of these variables’ relationship to high stress levels (Costa et al. 1999; Woods et al. 2009). The majority of research on this topic, however, has shown that young age, poor education, low socioeconomic status, sexual abuse, unwanted pregnancy, having no partner, poor preparation for pregnancy or delivery, and depressive symptoms and psychiatric history negatively influence the psychological well-being of pregnant women. Meanwhile, other factors such as adequate social support, older age, and stable employment assist in combating stress (Costa et al. 1999; Hedegaard et al. 1993; Mulder et al. 2002).

**Stress from the Hospital Environment**

Another potential stressor for pregnant women is the hospital environment. In the twentieth century, the dominant impetuses for hospital architecture were function and efficiency (Ulrich 2001). This led to the design of hospitals that were operatively effective, but inadequate in attending to the emotional and psychological care of patients. Poor hospital design has been linked to negative effects on patients such as anxiety, delirium, elevated blood pressure, and increased use of pain medication (Wilson 1972; Ulrich 1984). Furthermore, environmental qualities that create feelings of uncertainty, the possibility of harm, and the inability to flee have been associated with increases in blood pressure and anxiety (Hodnett 1989). Uncertainty can be measured by the degree to which an environment leads an individual to approach or avoid it. Factors affecting approach and avoidance include affiliation, or one’s familiarity with the environment and to others in the environment; exploration, if an individual feels free to
move within and throughout the environment; and performance, how well a person accomplishes a task (Hodnett 1989). Hospital settings create a sense of avoidance in that they are often sterile, unfamiliar environments that limit movement and self-expression (Hodnett 1989; Ulrich 1999).

A sense of avoidance is further created by the technology used to perform many modern medical procedures. Patients who are unfamiliar with the equipment may become anxious when surrounded by machines that appear foreign and complicated (Hodnett 1989). In addition, lack of attention to easy wayfinding, unfamiliar and unwelcoming interior design, and patient restriction to their hospital rooms have the ability to create feelings of uncertainty and increase stress levels in hospital patients.

Many hospitals are also designed in a way that patients have little control over their environment. For example, hospital architecture attempts to create distractions for patients that are counterproductive, such as television or wall art mounted directly in a patient’s line of vision (Ulrich 1999). One study compared stress levels between groups of blood donors who stayed in a waiting room with the television on and those who remained in a waiting room with the television off. Data for 440 blood donors indicated that donor stress, measured by heart rate and systolic blood pressure, was higher for donors in the waiting room where the television was constantly playing (Ulrich 1991). Similarly, another study by Ulrich (1991) found that abstract painting and prints elicited negative responses from hospital patients. Before this study, all paintings were assumed to be a positive distraction for patients, but the varied style and content of artwork were not yet considered. This study showed that paintings of nature evoked a positive response in patients, while paintings where the content was unclear or
ambiguous resulted in unsolicited complaints to hospital staff and physical attacks, such as tearing the picture off the wall, by patients who were not considered to be aggressive. Over the course of fifteen years, seven paintings and prints evoked physical attacks, and five of the graphics had to be removed after being attacked more than once (Ulrich 1991). All of the attacked art had similar qualities: unclear content, abstract elements, and chaotic arrays of contrasting colors.

Other qualities of the hospital environment that evoked patient stress were noise, absence of windows, and lack of sunlight (Devlin and Arneill 2003; Ulrich 2000). Noise in hospitals was calculated to be as high as sixty-five to eighty-five decibels compared to the recommended thirty-five decibels for hospital rooms in which patients are treated, observed, or at rest (Bayo, Garcia, and Garcia 1995). Noise at this level was reported to be “annoying” and created visible agitation and stress in patients. Lack of windows was linked to high rates of anxiety, depression, and delirium compared to hospital rooms with windows (Parker and Hodge 1967; Ulrich 2000). Patients were thought to respond negatively to windowless rooms due to lack of positive stimulation and sensory deprivation. Windowless rooms also led to increased awareness of potentially annoying environmental factors often found within hospital rooms, such as the repetitive sound of respirators or monitoring equipment (Ulrich 1991). Hospital studies comparing rooms overlooking sunny spaces and north-facing rooms overlooking spaces obscured by shadows found that patients had greater difficulty combatting depression in rooms with little sunlight and had higher mortality rates (Beauchemin and Hays 1998). Reduced mortality in sunny rooms was linked to increased depression mitigation.
In summary, unfamiliar people and types of equipment, inattentive interior design, lack of windows and sunlight, and foreign stimuli such as noises and smells can have a negative impact on women’s psychological well-being and their perception of fear, anxiety, pain, and control during childbirth (Enkin et al. 1995; Hodnett 1989). Women who feel familiar within their surroundings and who are allowed freedom of movement and self-expression during childbirth experience greater control of their labor and greater satisfaction with their childbirth experience. As Taylor (1979) noted, “The hospital is one of the few places where an individual forfeits control over virtually every task he or she customarily performs.”

**Bed Rest**

Women who are especially vulnerable to stress invoked by hospital settings are typically those who experience high-risk pregnancies and stay in the hospital for extended periods of time. It is estimated that one million pregnant women each year have a high-risk pregnancy, and approximately eighteen percent of antepartal women with a high-risk pregnancy are prescribed to bed rest as part of their treatment (Dunn and Handley 2007; Maloni 2000). It is not uncommon for women to remain on bed rest in the hospital for as long as three or four months. Such chronic stress can have lasting effects on the mother and child.

Hospitalized high-risk antepartum women reported greater anxiety and depression, lower self-esteem, and less optimal family functioning than pregnant women not hospitalized or at high risk (Gupton, Heaman, and Ashcroft 1997; Mercer and Ferketich 1988; Schroeder 1996). One study found that fifty-one percent of high-
risk women were clinically depressed compared to twenty-four percent of low risk women (Maloni 2000). Common stressors of women on hospitalized bed rest included boredom, separation from home and family, childcare issues, financial issues, feelings of helplessness and loss of control, loneliness, concerns for health of the fetus, and frequent mood swings (Gupton, Heaman, and Ashcroft 1997; Maloni 2000; Maloni, Cohen, and Kane 1998).

In another study, stressors fell into three categories: situational, environmental, and familial (Gupton, Heaman, and Ashcroft 1997) (See Figure 2.1). Situational stressors consisted of stressors created by high-risk pregnancy and bed rest, such as uncertainty, lack of control, loneliness, fear of the fetus’s well-being, frustration over waiting, and being placed in the sick role when most of the women did not feel sick. Stressors from the environment included confinement, boredom, feeling like a prisoner, and a sense of “missing out.” Women, unable to leave their rooms, had few options for entertainment. Activities such as taking a walk or going outside were restricted, and oftentimes, the only source of entertainment in patients’ rooms was television. Stressors in the family category included concerns about other children and role reversal. Quite often, women on bed rest who already have children had to reallocate their maternal role to other people in the household (Maloni, Brezinski-Tomasi, and Johnson 2001). Such role reversals created feelings of guilt amongst the women and potentially strained spousal relationships.
In addition, antepartum women on bed rest commonly experienced physiological deconditioning and dysphoria, a composite score of anxiety, depression, and hostility (Maloni et al. 1993). According to Maloni, the more prolonged the time a woman was on bed rest, the more symptoms she experienced. However, some symptoms, such as skeletal muscle atrophy, appeared within as little as six hours. Maloni also found within the first twenty-four to forty-eight hours on bed rest, increased diuresis, or production of urine by the kidneys, and decreased blood and plasma volume by approximately 500ml or seven percent of body weight (Maloni et al. 1993). Similarly, in as little as three days, women lost muscle tone and experienced constipation, fatigue, anxiety, and depression (Dunn and Handley 2007). Other physical symptoms of bed rest included rapid weight
loss due decreases in muscle mass, intracellular and extracellular fluid, and calcium content and bone mineralization. In addition, women experienced increased heart rate, blood coagulation, heartburn and reflux, and decreased cardiac output, stroke volume, glucose tolerance, and insulin resistance in skeletal muscle (Maloni et al. 1993). Over a period of five weeks, women lost twenty-five to thirty percent of their muscle volume. Such physical deconditioning lasted into postpartum and required a prolonged period of recovery.

Impact on Fetal Development

Charles Dickens (1981) begins his chronicles of David Copperfield with “Chapter 1: I AM BORN… To begin my life with the beginning of my life, I record that I was born…” As we now know, our lives do not begin when we are born but in the womb where the growth and development of a child begins well before birth. Fetuses can be influenced by a number of factors such as complications of pregnancy, maternal stress, infections, teratogens (substances that cause birth defects), intrauterine exposure to multiple drugs, and nutritional deficiencies (Mulder et al. 2002; Van den Bergh et al. 2005).

Maternal stress can result in two types of reactions that have the potential to impact fetal development: changes in maternal behaviors and physiological reactions by the woman’s body. Behavioral modifications can include changes in nutrition, sleep, exercise, substance use, tobacco use, and prenatal services (Woods et al. 2009). Inadequate nutrition can lead to low birth weight and may cause a stress response in the fetus resulting in premature birth (Mulder et al. 2002; Van den Bergh et al. 2005).
Lower birth weights, including those within the normal range, may increase the risk of developing cardiovascular disease and metabolic disorders, such as diabetes, in adulthood (Barker 2002, 2004, 2005; Barker and Hanson 2004). Similarly, maternal use of social drugs such as alcohol, cocaine, and tobacco may cause structural and/or functional developmental deficits that can result in the child having life-long physical or mental handicaps (Mulder et al. 2002).

When women are stressed, large quantities of hormones are released into the blood, including corticotropin-releasing hormone, adrenocorticotropin-releasing hormone, cortisol, and (nor)adrenaline (Mulder et al. 2002). Changes in these hormones can modify placental function, uterine blood flow, uterine irritability, and internal fetal hormone development, which may lead to a range of problems including neurodevelopment disorders (Talge et al. 2007; Allister et al. 2001). For example, reduced uterine blood flow has been linked to fetal growth restriction resulting in developmental delay and low birth weight. Low birth weight has been singled out as the most important factor contributing to infant death and disability and, as previously noted, has been linked to many adult health problems (Buescher et al. 1991).

Increased maternal cortisol affects the fetus by creating a substantial increase in fetal cortisol levels during the third trimester of pregnancy (Mulder et al. 2002). Cortisol increases the rate of maturation for fetal organ systems, while inhibiting the growth and differentiation of the developing nervous system (Mulder et al. 2002). This can permanently damage the brain by increased uterine activity and subsequent premature birth.
Other studies have shown that stress during pregnancy increases the risk that a child will have emotional or cognitive problems including Attention Deficit Hyperactivity Disorder, Schizophrenia, Autism, anxiety, behavioral issues, and language delay (O'Conner et al. 2002; O'Conner, Heron, and Glover 2002; O'Connor et al. 2003; Talge et al. 2007; Van den Bergh et al. 2005). For example, two studies found that the top fifteen percent of participants with strong symptoms of anxiety during their third trimester of pregnancy had double the risk of having a child with behavioral problems at ages four and seven and a five to ten percent increase in the risk of having a child with symptoms of Attention Deficit Hyperactivity Disorder, anxiety, and depression (O'Conner et al. 2002; O'Connor et al. 2003). Similarly, a study by Van den Bergh, Mennes et al. (2005) linked high maternal anxiety in the first half of pregnancy to greater impulsivity and lower cognitive functioning in fourteen and fifteen year olds.

Depression can also have serious impacts on fetal development. A study found that ten percent of all women met psychiatric criteria for major or minor depression at some point during pregnancy (Allister et al. 2001). Women experiencing depression are less likely to take prenatal vitamins during pregnancy and are more likely to smoke, consume alcohol, use drugs, lose their sense of appetite leading to weight loss, and fail to receive prenatal care. Fetuses of mothers experiencing depression displayed increased fetal heart rates (FHR) and had a three-and-a-half-fold delay in returning to baseline FHR after vibroacoustic stimulation. This inability of the fetus to habituate to external stimuli may indicate autonomic nervous system immaturity, resulting in possible problems with postnatal information processing (Allister et al. 2001).
As demonstrated, an abundance of studies exist that report associations between antenatal stress and negative impacts on the fetus and child (Talge et al. 2007). Fetal impact can range from minor to severe and can even be life-changing. Decreasing high antenatal stress will not only affect maternal well-being, but will also potentially avoid future health problems as an infant and adult.
3. Counteracting Stressful Environments

Childbirth in the United States: Historical Values & Progression

Any woman who has had a child marks the event as a key memory in her life. The experience of birth, however, is a product of interacting cultural, social, and medical values. The method and meaning of childbirth have changed throughout history to reflect the values of the time. Childbirth has transitioned from a practice commonly associated with the home environment to a medical procedure occurring within the hospital environment (Howell-White 1999). Furthermore, the social aspect of childbirth where women would gather to offer emotional support to a woman in labor diminished in the twentieth century with the medicalization of birth (Wertz and Wertz 1979).

Before the seventeenth century, childbirth in the United States was a social event. Women would gather and aid in the labor process for several weeks during a period referred to as "lying-in," which included the periods of childbirth and recovery. The midwife was the primary person responsible for assisting a woman in childbirth, but other women offered emotional support, aided with household chores, and tended to other children (Howell-White 1999). The process of birth was looked upon as natural, and midwives would let labor run its own course unless complications arose. The psychological support of women experienced in childbirth helped to relax and reassure the woman thereby easing the pain of her labor (The Boston Women's Health Book
Collective 2008; Wertz and Wertz 1979). In addition, women remained in the comfortable, familiar environments of their own homes.

In the seventeenth and eighteenth centuries, men entered the realm of childbirth care as male midwives and began to professionalize as physicians (Howell-White 1999). Although attention was paid to new technologies, the social structure of the birthing practice remained intact. Labor still occurred within the home and women relatives, friends, or community members continued to gather for emotional support.

Hospitals did not become a setting for childbirth until the early 1900s when maternity wards opened as a refuge for poor, homeless, or married working-class women who could not deliver at home. During this time, less than five percent of women gave birth in the hospital setting. The 1920s, however, marked a dramatic transition from homebirths to hospital-births as giving birth at the hospital became seen as “fashionable.” Hospitals were viewed as a place where one could get the best of “both worlds”: the social care system where the doctor could personally relate to his patient and the safety and efficiency of the hospital setting (Wertz and Wertz 1979).

The first maternity wards were associated with medical schools and thus brought many changes to the birthing experience. These university hospitals became clinical laboratories where students tested new knowledge and skills and tried different operations. Doctors focused on the instances of difficult or diseased birth and began to look less upon the women as persons and more as “cases.” As technical approaches to medicine became increasingly important, attention began to focus on selected processes and control over these processes rather than care of the whole person (Marcus and Barnes 1999). Holistic medicine, in general, was abandoned, and hospitals
began to divide into specialty units. Consequently, the psychological support system historically valued in childbirth all but disappeared (Howell-White 1999).

It was not until the 1930s that women and doctors began to realize that medicalizing birth had its own problems: mortality rates had not decreased and the medical treatment had alienated women from their social support network. Despite the growing recognition of issues within the hospital setting, the increased focus on potential disasters that could occur during childbirth and the popularity of anesthesia for pain relief kept women in the hospital environment (Howell-White 1999). Furthermore, the American values system reinforced the expansion of doctors and disappearance of midwifery. A portion of the population whose religious foundation was based on Puritan values shunned midwifery due to its association with magic (Wertz and Wertz 1979). Also, Americans’ faith in practical science and the culture’s admiration for instrumentalists and inventors led to an embracement of the medical approach (Howell-White 1999; Wertz and Wertz 1979). Slowly women relinquished more and more control of the birthing experience to doctors and science.

The feminist movement of the 1950s marked the first strong opposition to the medical approach to childbirth. Women began to question the behavior of the medical industry and its treatment of women. In particular, the idea of being in control over one’s body became popular among educated, middle-class women. These women became proponents of the Lamaze technique for childbirth, which stressed autonomy and childbirth education (Wertz and Wertz 1979). The concept of “natural childbirth” that limited the use of medicine became more and more fashionable. As part of this movement, feminism promoted changes in the hospital experience, including changing
Medicare, promoting birth education, using less anesthesia, and humanizing birth, often by allowing the husband to be present during labor (Fannin 2004; The Boston Women’s Health Book Collective 2008; Wertz and Wertz 1979).

Other aspects of the hospital environment, however, remained the same. Alternative childbirth choices were no longer readily available due to limited availability of providers and narrowed perceptions of women’s need for different types of care (Howell-White 1999). Obstetricians who provide care to the majority of women in the United States continued to be trained to approach childbirth as a potential disaster. Many educational programs did not even require male students to observe a healthy woman throughout her birth without any interventions (The Boston Women’s Health Book Collective 2008).

Currently, the social networks amongst women are still severely weakened although women are allowed to have visitors in the hospital. For example, in the hospital where the design application for this thesis will be located, women on bed rest have little opportunity to meet other women who have experienced similar circumstances. Furthermore, attempts to make the hospital environment more comfortable are minimal. In this hospital, the only area where women can walk for relaxation during the early stages of labor is in the sterile hallways. As previously described, studies suggest that walking through such environments are likely to increase stress levels, possibly impacting the progression of labor. Women on bed rest at this hospital remain in the center for months at a time with a television as the only source of entertainment in their room. Windows often overlook dismal black tar roofs with large equipment scattered across them as though the hospital was set in a foreign, desolate land. The natural
world is nonexistent for these women. The seasons outside may change, but these women would never know it. As hospitals work toward becoming more patient-centered, such environments will need to become more comfortable, familiar, and connected to the natural world.

**History of the Use of Therapeutic Gardens in Hospital Environments**

Gardens represent one of the first settings for organized healing in the Western world (Marcus and Barnes 1999). As a component of the monastic infirmaries of the Middle Ages, cloistered gardens were considered essential as part of the healing process in which herbs and prayer were central focuses. These small, enclosed gardens typically consisted of an arcaded courtyard offering shelter, sun, or shade. A hospice patient, St. Bernard (1090-1153), in Clairvaux, France described the monastery garden as a green lawn enclosed by shade (Marcus and Barnes 1999). The patient delighted in the colors, bird songs, and pleasant smells of the garden and described it as a place for “the comfort of his pain,” where he felt secure and hidden. In the fourteenth and fifteenth centuries, the number of monasteries began to decline, and those that still existed were overwhelmed with periodic plagues, crop failures, and waves of migration to urban centers. This weakening of the monasteries’ ability to provide medical care led to a loss in hospital courtyard traditions (Marcus and Barnes 1999). Not until the seventeenth century, when fears that infectious diseases were spread through stagnant air, did nature reemerge as part of the healing process. During this time, medical provisions were created for fresh air and sunlight. As a result, hospital staff wheeled patients onto sun porches and roofs and increasingly paid attention to
hygiene, indoor air quality, and cross-ventilation. Such concerns remained prominent and, in the nineteenth century, expanded into a movement to address public health through the creation of urban trees, parks, and forests (Perdue, Gostin, and Stone 2003; Peterson 1979). Frederick Law Olmstead’s creation of Central Park in New York City was based on his theories on the effects of parks and trees on the mental and physical health of its citizens (Peterson 1979). Olmstead, who in 1872 became chairman of the American Public Health Association’s committee on the “sanitary value and uses of shade trees, parks, and forests,” encouraged doctors to take their patients to Central Park where sunlight, fresh air, and the air filtering properties of trees would improve their health (Peterson 1979).

In the twentieth century, an increased focus on hospital profits, efficiency, and modern technology led to a design emphasis on creating environments that promoted effectiveness and ease for physicians and nurses rather than positive patient experience (Ulrich 1999). As technical approaches toward medicine became increasingly important, medical attention toward the body and awareness of the spirit became ever more separated. In particular, many hospitals abandoned holistic medicine and began to divide into specialty units (Marcus and Barnes 1999). These units examined only specific parts of the body such as the eyes, ears, or heart, or specific afflictions such as cancer, diabetes, and arthritis. Although these new hospital environments were functional, they were often sterile, institutional, stressful, and unsuited to the emotional or psychological needs of patients, visitors, and staff.
Therapeutic Gardens Offer Patients Relief

Only recently has the modern health industry begun to reconsider the value of nature and the garden as important tools in healing. Today the Joint Commission on Accreditation of Health Care Organization, the largest standard-setting and accrediting organization for health care in the United States, requires that hospitals allow safe access to outdoor settings appropriate specifically for patients experiencing long lengths of stay (The Joint Commission 2008). New facilities are beginning to incorporate both cost-effective and user-friendly design.

Furthermore, new emphasis on therapeutic gardens is taking place as a growing body of scientific literature links patient-centered designed environments to their well-being and recovery. For example, design can reduce anxiety, lower blood pressure, lessen pain, and shorten the length of hospital stay in certain situations (Ulrich 1999). Also, a report from John Hopkins University listed as many as seventy studies examining the effects of healthcare design on medical results (Ulrich 1999). The study revealed that environmental characteristics such as light, temperature, noise, and music have positive impacts on patient health outcomes.

Research studies have also highlighted the restorative components specific to therapeutic gardens. A study examining the use of outdoor space in a hospital setting found that ninety-five percent of participants reported a positive change in mood after spending time outside (Marcus and Barnes 1999). Participants felt less depressed and stressed, and meanwhile felt more calm and balanced about life. When questioned about the source of emotional improvements, two-thirds of the participants mentioned elements associated with plants such as trees, flowers, and seasonal change. More
than half mentioned other stimulants of the senses such as birdsongs, the sound of water, fresh air, and fragrances. Natural elements were deemed critical for not only their soothing qualities, but also for the contrast they represented to the hospital environment.

In addition to therapeutic gardens, research has pointed to the restorative aspects of nature as a healing component. Therapeutic gardens often seek to mimic and expand upon nature, and therefore research in this field is applicable to garden design. Studies have shown empirical data demonstrating that children and adults exhibit better psychological well-being, superior cognitive functioning, fewer physical ailments, and speedier recovery from illness when exposed to natural environments (Louv 2005). For example, a study at Cornell University found children in rural areas with homes close to nature scored significantly lower on measures of behavioral conduct disorders, anxiety, and depression than children with less nature near their homes (Wells and Evans 2003). Similarly, access to nature has been found to reduce stress and improve one’s ability to cope with life challenges. A study by Frances Kuo compared coping mechanisms of women assigned to random apartments, some with views of trees and flowers and others with views of parking lots and basketball courts. Women with views of natural elements had significant improvements in their ability to handle life challenges compared to those with views of hardscape (Lehrer 2009).

Nature’s restorative impact on cognitive functioning was also demonstrated in a study by Marc Berman at the University of Michigan in 2008. In his research, Berman had students walk down an urban street or through an arboretum. Afterward he immediately ran psychological tests on each of the groups and found that those who
had walked in the urban environment were in worse moods and scored significantly lower on tests of attention and working memory than those who walked through the arboretum. Nature was found to affect cognitive functioning within minutes (Lehrer 2009). Similarly a study by Faber Taylor and Frances Kuo (2009) on unmedicated children clinically diagnosed with Attention Deficit Hyperactivity Disorder found that the attention performance after walking in a park was much better than in a well-kept downtown and residential area.

Another important aspect of nature is that green space fosters social interaction, thereby promoting social support. For example, a study in Sweden found that families living near green spaces had twice as many friends as those who were restricted to outdoor access because of traffic (Huttenmoser 1995). Historically, social support networks were critical for women in childbirth where experienced women would impart their knowledge and give emotional support to a woman in labor. The opportunity to socialize and interact with women going through similar experiences may prove very useful to women who are on bed rest. Relaxing in a garden may provide the opportunity for them to meet one another and share their stories.

**Modern Therapeutic Garden Design**

Today, hospitals incorporate therapeutic gardens into design to provide both active and passive spaces for physical therapy, individual or group counseling, exercise, sitting, walking, listening, and observing. In general, a modern therapeutic garden seeks to achieve three common goals for its users: relief and distraction from physical symptoms, increased comfort and ability to cope with current life situations, and
improvement in over-all sense of well-being and mental outlook on life (Marcus and Barnes 1999).

Therapeutic gardens are a built-form of nature, and it is important to mention some of the differences between a therapeutic garden and nature or wilderness. To begin, a garden is defined from its surroundings and can be experienced as a whole (Stigsdotter and Grahn 2002). In a sense, therapeutic gardens are rooms where visitors feel separate from the surrounding context and do not worry about safety. Secondly, therapeutic gardens are a form of “applied art” and, if well-designed, can give a visitor a rich variety of experiences that stimulate all of the senses (Stigsdotter and Grahn 2002). Elements of the garden such as type of seating, height of walls, location of plantings and features, types of plants used, and the characteristics of space are selected to meet specific needs of the targeted patient population (Marcus and Barnes 1999). According to Stigsdotter and Grahn (2002), a person who is ill or experiencing a heightened state of anxiety needs an environment that requires few demands. For example, a person who is blind would not feel at ease in a garden with a poorly marked, irregular pathway. Similarly, a woman on bed rest might experience frustration if the only way to access a garden was by way of stairs. Unless being utilized as a component of physical therapy, therapeutic gardens generally strive to make the environmental experience as accessible as possible to visitors.

Contemporary theory in therapeutic garden design focuses on four broad design guidelines that should be incorporated into healing gardens in healthcare facilities: control, social support, movement and exercise, and natural distractions (Ulrich 1999). As reported by Ulrich, control is a person’s perceived or actual ability to determine what
they do, to manipulate their situation, and to decide what others do to them. A sense of control reduces stress, increases one’s ability to cope with stress, and improves general well-being (Ulrich 1999). A design that allows patients to determine what they do must include options in order for a person to be able to make a choice. For example, a patient may want to bathe in the sun or may prefer a sheltered area in the shade. Similarly, a patient may want to watch other people or may prefer to read a book in isolation. A well-designed therapeutic garden seeks to enhance opportunities for personal choice.

A garden that allows patients to manipulate their situation implies universal access. A therapeutic garden should be both physically and temporally accessible to patients. Patients who are unable to navigate through the garden might find the environment to be more frustrating than restorative. In addition, a garden should be located as close as possible to patients’ rooms in order to allow for easy access. Patients are much more likely to use a garden that is near their rooms and easily accessible than a garden that is more remote (Carpman and Grant 1993). Similarly, a garden that is closed to the patient population at various times may result in increased perception of lack of control and heightened stress. Therapeutic gardens should be made available to patients at all hours.

Lastly, therapeutic gardens can be designed to increase feelings of control in visitors by providing a temporary escape (Ulrich 1999). A temporary escape insinuates a degree of privacy where one’s mind can wander away from the current situation. Therefore, therapeutic garden design should provide opportunities for day-dreaming and privacy where external stimulation is minimal. In addition, an aspect of control includes the ability of a patient to determine what others do to them, and a hospital
environment is a place where people are subject to routine medical procedures and therefore cannot control what is done to them (Ulrich 1999; Wertz and Wertz 1979). In order to maintain a sense of escape within the garden, routine medical procedures should not be enforced in a therapeutic garden. On the other hand, patients may be provided the option of utilizing the garden for certain procedures. For example, cancer patients undergoing chemotherapy may prefer a garden as a place to receive their treatment.

Modern therapeutic garden design also seeks to increase social and emotional support for visitors. Studies have shown a positive relationship between a person’s health status and their number of social ties (Ulrich 1999). For example, one study examining the survival length of patients with metastatic cancer found that patients with social support lived longer than those without social support (Spiegel et al. 1989). Therapeutic gardens incorporate design for social support by presenting spaces that are conducive to both group interaction and offer privacy (Ulrich 1999). In hospitals that develop group programs for patients, areas need to be large enough to support patient participants, yet provide privacy needed by the group for such programs to exist.

In addition, different cultures may require more or less space for family interaction. For example, a study found that social support for hospitalized Hispanic patients in southern Texas involved frequent visits by large groups of family members (Ulrich 1999). Therefore, a therapeutic garden in a predominately Hispanic setting may need to incorporate areas that are better suited for larger family groups.

Therapeutic gardens also promote physical movement and exercise, which are important to both the physical and psychological well-being of patients. Not only does
exercise improve cardiovascular health and decrease the risk of certain types of cancer, but it also is effective in reducing depression (Ruuskanen and Parketti 1994). Therapeutic gardens can encourage exercise by motivating patients to simply move outdoors, which is an active movement in and of itself. Once outside, gardens may encourage additional exercise by offering horticultural therapy and providing components such as walking loops that allow for extended movement (Ulrich 1999).

The type of physical exercise provided in therapeutic gardens is dependent on the patient population. For example, therapeutic gardens for children need to pay particular attention to more strenuous physical exercise and play, while therapeutic gardens for nursing homes may need to facilitate easier types of exercise that only require small, limited movements. Walking loops are particularly useful for women who are in the early stages of labor when movement is beneficial. Women on bed rest are severely limited in their ability to move and exercise; however, a regime of exercise programs for these women is established (Reynolds 2007). In order to encourage exercise programs for women on bed rest, provision of space and the necessary equipment for the programs should be incorporated into therapeutic garden design.

Lastly, therapeutic gardens offer positive distractions that can help to reduce stress and anxiety. Surveys questioning patients on their preferences regarding the hospital environment repeatedly emphasize the widespread desire for access to nature and windows with views of nature (Ulrich 1999; Verderber 1986). Visitors who witness the living, growing, and constantly changing qualities of nature within a therapeutic garden are instilled with feelings of security, hope, and life (Stigsdotter and Grahn 2002).
Natural distractions can be incorporated into therapeutic garden design by focusing on views from windows and incorporating natural elements into the design. A therapeutic garden that is bordered by patients’ rooms should consider their views when designing a garden. For example, most gardens consist of hardscape material (paving, walls, seating etc.) and planting areas. Design should strive to create views that incorporate planting areas and nature as much as possible. A wall helps to create an intimate setting in a therapeutic garden, but it would be ill-placed in front of a patient’s window. Similarly, outdoor spaces may be designed to consist of little vegetation. Such environments may not have as equal success in reducing stress compared to therapeutic gardens that emphasize vegetation and nature. Therefore, therapeutic garden design should highlight natural elements.

These studies demonstrate that therapeutic gardens have the potential to greatly improve the experience of maternity care patients (Table 3.1). Nature reduces stress, offers relief for patients, and provides an opportunity to recapture a value that is currently missing in the hospital setting. A carefully designed healing garden can promote women sharing their experiences of childbirth with other women, and it can also create a social support network for pregnant women reminiscent of those that existed prior to modern times. Lastly, therapeutic gardens provide a place within the hospital framework that is distinctly different from the interior hospital setting. This is not only important in that it allows patients access to nature, but it also offers a place where women can recapture a sense of control. Within hospital rooms, women have little power over their environment and are at the mercy of hospital staff that can enter and exit without patient consent. Patients mentally associate hospital rooms with required
checkups and medical procedures. These experiences are in turn related to stress and feelings of lack of control. Although women visiting the garden will remain under the surveillance of hospital staff, there is a perceived separation from the actions commonly associated with patient rooms. A garden presents patients with a chance to escape from hospital pressures in an environment that is more comfortable and familiar.

Table 3.1: Therapeutic garden design principles

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<tr>
<th>THERAPEUTIC GARDEN DESIGN PRINCIPLES</th>
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<tr>
<td>1. Design for Control</td>
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<tr>
<td>• Enhance opportunities for personal choice</td>
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<tr>
<td>• Develop garden to be accessible to patient population</td>
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<tr>
<td>• Locate garden as close to patients’ rooms as possible</td>
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<tr>
<td>• Allow patients to utilize garden at their will</td>
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<tr>
<td>• Provide opportunities for privacy where external stimulation is minimal</td>
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<tr>
<td>• Perform routine medical procedures outside of the garden except at patient’s request</td>
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<td>2. Design for Social Support</td>
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<tr>
<td>• Present spaces that are conducive to social interaction for groups of people yet allow for privacy</td>
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<td>• Consider cultural context in creating spaces for family interaction</td>
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<td>3. Design for Movement and Exercise</td>
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<tr>
<td>• Provide walking loops for women in the early stages of labor</td>
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<tr>
<td>• Provision of space and the necessary equipment for exercise programs for women on bed rest should be incorporated into therapeutic garden design</td>
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<tr>
<td>4. Design for Natural Distraction</td>
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<tr>
<td>• Attempt to create views from windows that incorporate nature</td>
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<tr>
<td>• Emphasize plantings and the natural elements within the therapeutic garden design</td>
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Other Counteracting Agents of Stress and the Hospital Environment

Ample evidence linking maternal stress to fetal behavior and health affirms the need to take active steps in alleviating stress and depression during pregnancy (Talge et al. 2007; Van de Bergh et al. 2005; Weerth and Buitelarr 2005). Although some causes of stress such as poverty, family-member illness, and natural disasters are difficult to overcome, other stressors can be mitigated and managed. Van de Bergh et al. (2005) suggest prevention, intervention, and support programs be offered to pregnant women through stress reduction instructions and cognitive-behavioral treatments to reduce anxiety starting at the early stages of pregnancy. Woods et al. (2009) recommend nutritional counseling, physical and mental relaxation, education, and social support.

One study that researched stress reduction potential of women on bed rest found that offering the study participants group support was effective in relieving stress and facilitating coping (Maloni 2000). In the study, twenty-seven women on bed rest in a hospital were offered the opportunity to “get together and talk” as part of a group support system. The facilitator of the support group was not affiliated with maternity center staff, and gatherings were unstructured and nondirective. Women felt comfortable in discussing a wide variety of issues, including those concerning hospital care, as group discussions were confidential and content was not shared with hospital staff. As noted by Maloni, although attendance to group support was voluntary, women rarely missed a meeting. The most common reason for refusal was the presence or expectation of visitors. When the study group was asked about their high levels of attendance, they attributed it to the helpfulness of the group sessions as well as the rare
opportunity to leave their rooms. As Maloni (2000) notes, “Upon hearing each other’s stories, women expressed surprise and relief at learning that there were women in similar situations. They saw others struggling with the same issues and learned they were not unique or alone.” During the group sessions, the most common topic was ways in which to cope with issues of concern. Women not only validated each other’s experiences, but also gave advice and shared information that helped others deal with their problems. Group therapy helped women to realize that they were not alone, instill hope in one another, share information, and promote interpersonal learning. Other means to reduce stress and alleviate boredom included crafts; reading materials; social events such as gathering women for a video, lunch, or to celebrate a special occasion; physical exercise; music therapy; and contact with Sidelines, a national high-risk pregnancy support group that offers women on bed rest the opportunity to interact with women who had a previous high-risk pregnancy (Maloni 2000).

In addition to these methods of stress reduction, women’s counteraction of childbirth in hospitals provides a better understanding of what women feel is missing from the hospital experience. Counteraction to the hospital environment is demonstrated in the movement of some women to request homebirth. Reasons for women to choose a homebirth include: perceived safety, avoidance of unnecessary medical interventions common in hospital births, previous negative hospital experience, greater control, and a comfortable, familiar environment (Boucher et al. 2009). Although the reasons women choose home birth are not all directly related to the hospital environment, each explanation for the preference of homebirth is at least indirectly associated with the hospital environment. For example, the need for medical
interventions increases with amplified stress levels. Amplified stress levels caused by the hospital environment leads to delays in labor progression and increased cesarean rates (Sakala 1993).

A study comparing labor and birth experiences between women who delivered at home and women who delivered in a birth center found that the women who delivered at home perceived less pain, desired less pain-relieving medication, believed they knew their midwife better, and rated their birth setting ‘higher’ than the birth center group (Borquez and Wiegers 2006). In an effort to explain the reduced cesarean section births associated with homebirths, numerous interviews with midwives were conducted. Responses commonly included how the home environment eliminated stress and thus reduced the frequency of emergency operations. Specifically, the aspects of the home environment that aided in stress reduction included a sense of control, the ability to move freely, and laboring in a familiar, comfortable environment (Sakala 1993).

Despite these benefits, promoting homebirth as an alternative birthing option remains ineffective. Ninety-nine percent of all births occur in the hospital setting, and these numbers do not appear to be changing (American Pregnancy Association 2009). Considering that the majority of women will experience childbirth in a hospital setting and that women with high-risk pregnancies on bed rest may be in the hospital for prolonged periods of time, beneficial aspects of the homebirth movement should be applied to hospital environments.
4. Home: The Antithesis of the Hospital Environment

“I long, as does every human being, to be at home wherever I find myself.”
(Maya Angelou)

Meanings of Home

Home is an extremely malleable concept (Manzo 2005; Moore 2000). For example, home can refer to a country, a birthplace, a special childhood dwelling, a person’s current residence, or a number of places simultaneously (Moore 2000; Sixsmith 1986). Home can also be defined as social and cultural contexts, such as a territory, a representation of self and self-identity, and a social and cultural unit (Moore 2000).

In addition, home is not always a specific location. For example, in the short story, “Going Home: A Poetic Memoir”, McElroy (1996) describes her life on the road and her “home” as not a particular place, but as the process of traveling itself. At one point during the story the author asks, “What is home if the road that draws you away from it is more familiar, more comforting?” Similarly, people who live a nomadic lifestyle, such as the Bedouins of Asia Minor, and those who go on pilgrimages as part of their religious faith, view the concept of home differently than those who remain in one residence (Manzo 2005). Although these peoples may have a place of dwelling, their concept of home is their journeys rather than a specific location.
The concept of home can also have negative or other worldly connotations. Some people associate home with a place of abuse and imprisonment (Manzo 2003; Moore 2000). As Kuribayashi and Tharp (1998) mention in their book *Violence and Women’s Writing:*

Much of the violence women experience takes place in their home, belying the social myth that the home is safe space for all residents. Home is supposed to be, but often is not, safe for women, as is attested by the number of women battered at home and children sexually and otherwise abused by their family members.

Home is also used as a metaphor for death (Moore 2000). Demonstrated in the song ‘Swing low sweet chariot, coming for to carry me home’ (Early Black American spiritual, 1850) and in the verse, ‘From God who is our home’ (Wordsworth, 1770-1850; ‘Ode: Intimations of Immortality From Recollections of Early Childhood’), home can describe leaving this world and represent the idea of an afterlife. Furthermore, a home can be reduced to a meaningless house where a person experiences changes, such as a modification in the family unit or work requirements, that make the home environment stressful and uninviting (Sixsmith 1986).

In addition to describing relationships of people to various places, the concept of home also depicts a way of being in the world (Manzo 2005; Moore 2000). For example, the term “at-homeness” is used to describe an experience versus a specific location (Molony, McDonald, and Palmisano-Mills 2007). “At-homeness” is portrayed as “the usually unnoticed, taken-for-granted situation of being comfortable in, and familiar with, the everyday world in which one lives, and outside of which one is visiting” (Seamon 1979). According to Seamon, the components of this experience are rootedness, the sense of possession and control over a space, regeneration, at-easeness, and warmth.
Mack (1993) states that the modern popular construct of home as a haven and domestic retreat did not exist until the mid-eighteenth century when the workplace was separated from the house as a result of urbanization and industrialization. As members of the middle class moved into urban centers, the concept of the home became “a rural retreat from the city within the city.” Family life became characterized by privacy rather than sociability, and the home became important to the middle class as an essential aspect of identity and self-definition (Mack 1993; Moore 2000).

In an effort to simplify and integrate the meanings of home, several researchers have attempted to create a framework that divides the concepts of home into core sites of meaning. Sixsmith (1986) categorized home into three experiential modes: the personal home, the social home, and the physical home. The personal home encompassed meanings that described the relationship between places, attributes, and processes of self. Examples of meanings that fell into this category were happiness, belonging, self-expression, permanence, and privacy. The social home comprised of meanings that described the presence of and relationships with other people that contributed toward the place being considered a home, such as type of relationship, quality of relationship, friends and entertainment, and emotional environment with others. As Sixsmith stated, “it is familiarity with other people, their habits, emotions, actions etc., indeed the very knowledge that they are there, which creates an atmosphere of social understanding whereby the persons’ own opinions, actions, and moods are accepted, if not always welcomed.” Lastly, the physical experiential mode contained meanings of not only the physical structure and architectural style of the
home, but also of the human use of its space. Examples of physical home meanings included structures, services, architecture, work environment, landscape, and spatiality.

Another study by Smith (1994) aimed to determine the essential qualities of home that help to facilitate personal attachment to a residence. The qualities she found to be consistently used by individuals when describing homes were continuity, privacy, self-expression, personal identity, social relationships, warmth, and a suitable physical structure. Similarly Tognoli (1987) reviewed literature to extract five general attributes that he considered integral in distinguishing a house from a home: centrality, continuity, privacy, self-identity, and social and family relationships. Centrality referred to the home as a central place in one’s existence and emphasized the feelings of rootedness and place attachment. Continuity described aspects of heritage, connections to one’s past, and the childhood home. Privacy portrayed home as a refuge and a place of ownership, and self-identity expressed the home as a mechanism for personalization and social and gender identification. Lastly, Tognoli argued that the familial setting differentiates a house from a home; a home is where relationships are kindled and supported.

**Meanings Associated with Childbirth**

The meanings of home are complex and multi-layered. Depending on the context and whom you ask, a home is a country, a birthplace, a childhood dwelling, a person’s current residence, a journey, a place of abuse and imprisonment, or a metaphor for death. For the purpose of this thesis, however, the meanings of home that are associated with a positive childbirth are of fundamental importance. Although it is recognized that categorizing the elements of home disables the reader from capturing
the complete breadth of its meanings, only the key elements of home that would be
integral to the ideal childbirth experience are useful in creating design principles for
maternity care therapeutic gardens. After sorting through numerous studies to get a
better understanding of what women are looking for in the homebirth experience, the
meanings of home for the purpose of this thesis remain complex. As seen in Figure 4.1,
characteristics of the home amalgamate into seemingly unclear correlations. A
characteristic may be fundamental to a key concept of home but may also affect
another key quality. For example, relaxation and warmth are central to the concept of
comfort, but they can also impact relationships and people’s willingness to share
information about themselves. Similarly, memories are a significant component of
familiarity, but memories are also an influential component of one’s sense of belonging,
which is associated with relationships.

Despite complications, four intrinsic characteristics repeatedly surface throughout
the readings: familiarity, haven, relationships, and self-expression (Fig. 4.2). Each of
these characteristics can be subdivided into attributes that are essential components to
the characteristic’s formation. For example, relationships associated with the home are
established on the attributes of intimacy, a sense of belonging, and a sense of welcome.
In the following paragraphs, the four characteristics and their attributes are described
with the purpose of assisting the author and readers in considering multiple
connotations.
Figure 4.1 The complexity of home relating to childbirth
Figure 4.2 Home diagram
Familiarity

In the Merriam-Webster Dictionary (2010), familiarity is defined as a “close acquaintance with something,” or “a state of close relationship.” These definitions, however, fail to describe the substance behind the term. The sense of familiarity associated with the home is more than simple acquaintance with a place. What about the home environment creates such strong feelings of intimacy and familiarity? “The familiarity of the home is a source of comfort to us in a world that is characterized by so much uncertainty. The home therefore provides a sense of order in our lives (Gunter 2000).” Characteristics that strengthen the sense of familiarity associated with the home are a foundation based on cultural norms, an environment that is personally relevant, a place that evokes memories, and a space that provides a sense of order (Cupchik, Ritterfeld, and Levin 2003; Gunter 2000; Mack 1993; Manzo 2003; Marcus 2007; Zeisel 2006).

To begin, familiarity is based on cultural norms. A woman in Tibet is going to feel much more “at-home” and familiar within a Tibetan house than an American house. Similarly, a woman who grew up in the southern Appalachians is more likely to feel a sense of familiarity with the style characteristic of that region than the style associated with the Southwest. A familiar aesthetic is rooted in the culture of the majority of patients (Marcus 2007). Preference for the familiar based on cultural norms is demonstrated in the desire for ‘popular style’ residential architecture by the general population and in evidence that people prefer to furnish their homes with furniture that is typical and familiar (Gunter 2000).
Not only is familiarity based on cultural norms, but it is also personally relevant. A familiar place speaks to the identity of the people inhabiting the space and to the experiences that are emotionally significant to them (Gunter 2000). In addition, ideal homes address personal wants and needs.

Memories are also fundamental to the concepts of familiarity and home (Mack 1993). Objects and space derive meaning from their ability to evoke memories of significant people, events, and values (Rechavi 2009). For example, in neuroscience, studies associate the ability of a person to remember and learn words with their meanings (Zeisel 2006). Non-meaningful terms are more difficult to remember, while meaningful words are easier to retain. Similarly, a childhood home may provide deep personal and intellectual meaning for people because of the memories it provokes, while a street corner in the center of a city may hold no special meaning because there are no memories to associate with it.

In a study that examined people’s judgments of living and dining rooms featured in architectural and interior design magazines, “familiar “ rooms were judged to be warm, orderly, personally relevant, and involving (Cupchik, Ritterfeld, and Levin 2003) (Figure 4.3). Participants could easily visualize themselves within the familiar room prototype and tended to explore the space more thoroughly. Details of the room stood out, and participants were able to recall the room’s attributes in later testing. In other words, the familiar room was more memorable. In contrast, stylish rooms were rated as the least expressive and considered the least beautiful. Participants were unable to remember the stylish room’s details during later testing and were less apt to explore the space. Places that excite or create memories appeared more familiar and comforting.
Time is an important factor in establishing familiarity and is a component of memories. The more time a person spends in a place, the more likely the environment itself will appear less threatening. As Nezleck (2007) reports, the more time people spend in an environment, the more they are able to cope with negative events. As people become accustomed to an environment, they are able to adjust their coping skills to meet the demands of that environment.

In addition to affecting one’s ability to cope with life stressors, familiarity impacts a person’s commitment to a place. The more time a person spends in a place, the more

Figure 4.3 Room types according to Cupchik, Ritterfeld, and Levin 2003
likely that significant events have occurred within that space. Memories increase the personal value associated with a place and give it meaning. Similarly, as people get involved in communities and explore neighborhoods, they familiarize themselves with their surroundings and become more invested in that place (Gunter 2000).

Lastly, familiar environments create a sense of order. Homes are centers of consistent and predictable events and fulfill people’s need for continuity (Gunter 2000). Regularity and routine are part of people’s way of being in the world and are therefore critical to creating a sense of place (Manzo 2003). People are aware of what to expect when entering a familiar environment and can feel at ease in their surroundings.

**Haven**

Within American society, the home is often idealized as a utopian retreat from the outside world (Mack 1993). As previously noted, the home was not considered a family’s haven or a domestic retreat until the industrial revolution when the workplace was separated from the home. Since that period, the relationship between home and the concept of haven has been strong within our society.

One of the most basic components of a haven is the feeling of security. Homes provide a shelter for basic needs such as eating, sleeping, washing, dressing, and relaxing (Gunter 2000). They bring well-being, stability, and permanence to a person’s life (Gunter 2000; Mack 1993). Homes are also a refuge: a safe place where people can always return to and receive care (Marcus 2007).

In addition, a home often implies ownership and control over the environment; it is mark of self-reliance (Gunter 2000; Mack 1993). In particular, owning a home gives
people a sense of freedom and authority over their lives; they can choose what they do where and where their items are placed. If their home environment is displeasing, they can change it. Homes also represent a place where people can control their social interactions. According to Gunter (2000), the link between satisfaction of home life and perceived control over one’s social circumstances within the home is consistent across cultures. The home is a person’s territory and thus they can control who enters, when they enter, and where they go (Mack 1993).

Lastly, a home is a place of comfort. A symbol for home that has been seen throughout literature is the hearth, the center and focus for the family (Mack 1993). The hearth brings warmth to the family. It is a place where people gather. It is the mark of settlement. Another more modern association with the comfort of home is the couch (Rechavi 2009). The couch offers well-being and relaxation, and it is considered a place for hosting and for solitude. These elements of the hearth and couch contribute to the ‘soft’ environment of the home (Gunter 2000). Such an environment includes comfortable furnishings, soft lighting, gentle acoustics, and a used and lived-in feeling with expressions of care about the physical space (Smith 1994).

Another study found that comfort was a key in creating a positive perception of environmental quality within hospitals. The study surveyed hospital patients, visitors, and staff and found that physical design attributes such as lay-out and spatial configuration; colors and materials of furniture; walls and floors; artwork; type, quantity, and focalization of natural and artificial light; kind of views inside and outside; size of windows; cleanliness; and climate were fundamental to user satisfaction (Fornara, Bonaiuto, and Bonnes 2006). Comfort was categorized into visual terms (adequate
lighting and panoramic views), auditory terms (avoidance of annoying noises), and in climatic terms (comfortable temperature and humidity).

**Relationships**

The atmosphere within a home is not only derived from the physical aspects of comfort, but also from the relationships of people who share the home or enter as guests (Gunter 2000; Smith 1994). One of the primary definitions for home is “the social unit formed by a family living together (Merriam-Webster 2010).” Throughout history human dwellings have been more or less communal (Mack 1993). People have a fundamental need to affiliate with other people and form social relationships (Gunter 2000).

The home is often where people first begin to develop social relationships and engage in social contact with other people. It is where we develop our value system and learn how to interact with others. The relationships within the home form the basis for who we are as individuals. Moreover, the home is where people are intimate with their partners and raise children. Regardless of people’s stage in life, the home is central to social relationships.

Homes reflect a sense of belonging and symbolize love and acceptance. People support each other within the home itself and often develop ties to their neighbors. Homes become a place where people can entertain and enjoy the company of others. As the social network of relationships within the home extends to include relatives, friends, neighbors, and neighborhood acquaintances, an individual’s personal attachment to the home and neighborhood increases. Homes become places for special
celebratory rituals and are associated with particular events. Neighbors develop a support system where they can rely on each other for certain needs. Slowly the perception of safety within the home increases and expands to include the community because people view themselves as being surrounded by their friends (Gunter 2000).

Ultimately, homes represent a sense of welcome and create an atmosphere that is friendly, sociable, and supportive. Social circles are widened where homes provide a comfortable place for people to get to know each other better. As relationships expand within and from the home environment, so does people’s attachment to the place.

Self-expression

In addition to a space that fosters family experiences and relationships, the home creates and expresses a sense of identity (Gunter 2000; Tognoli 1987). The neighborhoods people choose to live in, the type of home they buy, and their style of landscaping and decoration make a statement to others about who people are and how they perceive themselves (Gunter 2000; Sixsmith 1986; Smith 1994). Through the process of personalization, people feel a greater sense of attachment to a place and transform a house into a home (Gunter 2000).

The home is also important to self-expression in that it allows opportunities for self-reflection. People desire to return to places where they can separate themselves and find private space to contemplate (Gunter 2000; Oseland and Donald 1993). In a study by Manzo (2005), places are meaningful specifically because they afford people the opportunity for privacy, introspection, and self-reflection. As one of the first generation of German sociologists (1858-1918) wrote in his book Georg Simmel: On
Women Sexuality, and Love, “The home is an aspect of life and at the same time a special way of forming, reflecting, and interrelating the totality of life” (Simmel 1984). It is a place where people can be themselves and explore who they are (Manzo 2005).

On the other hand, self-reflection and privacy does not necessarily mean withdrawing from other individuals. Privacy is a boundary control process where people regulate the frequency and type of contact with others. According to Pedersen (1999), six types of privacy are important to the psychological functions and needs of people: solitude, isolation, anonymity, reserve, intimacy with friends, and intimacy with family. Although a person is with other people, the person is alone with those people thereby maintaining their sense of privacy.

Establishment of boundaries within the home is also a form of self-expression. Rooms and spaces become personalized territories for different family members, and the location of boundaries speaks to a person’s culture and identity (Kent 1991). For example, Americans tend to segment living spaces by functions or tasks, while Navajo Native Americans eat, sleep, and entertain in the same living space. In addition, people who are shy and uncomfortable with extensive social networking are more likely to use physical and symbolic barriers in their home to control their need for personal space (Gunter 2000).

The concept of home is closely associated with a person’s ability to behave freely within and manipulate a place (Manzo 2005). It is “a cocoon where we can feel nurtured and let down our guard” (Marcus 1995). Homes are a means of self-expression in that they present a person’s identity to others, allow for self-reflection and personal growth, and establish boundaries that demarcate a person’s zone of comfort.
5. Design for the Qualities of Home

The four characteristics of the home environment – familiarity, haven, relationships, and self-expression – are translated into design principles in this chapter. These principles can then be expressed in physical form during the design and construction of therapeutic gardens for maternity care patients.

In addition to designing for familiarity, haven, relationships, and self-expression, a therapeutic garden for maternity patients incorporates general principles that have been established for therapeutic garden design. Ulrich’s (1999) principles of control, social support, movement and exercise, and natural distractions are incorporated into design principles related to maternity care at the end of this chapter. As will be seen in the following pages, commonalities exist between established therapeutic garden principles and design principles derived from the concept of home. For example, relationships are fundamental to the concept of home, while social support is one of the four main principles of therapeutic garden design. Although some overlap will occur, each is addressed from slightly different viewpoints. Similarly, overlap also exists amongst the design characteristics. For example, personalization is significant in self-expression, but can also aid in the perception of familiarity. Although the author attempts to reduce redundancies, it is important to recognize the interconnectedness of these principles.
Design for Familiarity

Therapeutic gardens for maternity care patients can elicit a sense of familiarity through referencing cultural norms, becoming personally relevant, evoking memories, and providing a sense of order. These four pathways are discussed below.

Cultural norms can be incorporated into garden design by using architectural styles, plants, furnishings, art, and details that reflect the local culture and context of a garden (Marcus 2007). Such features can be especially beneficial to maternity care patients if they are used in a way that promotes movement and mild exercise. For example, therapeutic gardens can be useful to women who are in the early stages of childbirth where walking can help women to relax and induce labor (The Boston Women's Health Book Collective 2008). Providing cultural features throughout the garden can be calming, and they can encourage women to move throughout the space. For women on bed rest, where mobility is difficult, cultural details may be especially appreciated in areas where they can contemplate and rest.

In addition, consideration of “popular style” design of a region versus “high style” design may be useful to the designer in the development of a garden that is appealing to maternity care patients. According to Gunter (2000), designers often fall into the trap of creating “high style” architecture, characterized by fewer materials, more concrete, simpler forms, and oftentimes off-centered entrances, because this style is new and exciting to produce for the architect. The vast majority of ordinary people, however, prefer “popular style” architecture, characterized by the use of more building materials, horizontal orientation, framed windows, centered entrances, and warm colors (Gunter 2000).
In the case of maternity care patients, such details can have a profound impact on how a woman perceives the garden. For example, off-centered entrances preferred in “high style” architecture may make it more difficult for women on bed rest to maneuver through a garden, and concrete, which is more commonly used in commercial architecture than in residential architecture, may not provide the aesthetic separation from the hospital environment that would be most effective in reducing maternal stress. On the other hand, framed windows prominent in “popular style” design are more commonly used in residential architecture than commercial architecture and may provoke an image of the home. Therefore, window frames may assist in creating a distinctive environment from the hospital, elicit a sense of familiarity, and remind visitors that there are women living in the rooms. In addition to being more familiar and indirectly connecting women to other women within the hospital, window frames may assist in maintaining privacy in the women’s rooms adjacent to the garden. People will feel less comfortable looking into the windows of patients’ rooms that they think are occupied than looking into windows of a commercial building.

Personal relevancy, another pathway to familiarity, is created through design in two ways. First, structural and ornamental details reflective of maternity care functions increase relevancy to maternity care patients. For example, art and sculpture in the garden that is reflective of nature, families, and motherhood communicates to visitors the intention of the space. Women who enter a garden immediately know that it is designed to serve them at this particular stage in their lives for this specific purpose. Similarly, a garden can reflect its intended users through the location of its features. For example, therapeutic gardens designed for the perspective of women on bed rest will
have features positioned differently than those in a children's garden. For women lying on their backs in bed, the overhead plane is especially important. The garden becomes personally relevant to a woman because it is clear that it is designed for her enjoyment.

Secondly, garden users’ active involvement assists in making an environment personally relevant (Gunter 2000). In the maternity care setting, therapeutic gardens are an especially good place for a number of independent and group activities to occur, such as reading and day-dreaming or getting socially involved in book clubs, knitting groups, art classes, exercise groups, and group therapy sessions. These activities would allow women to get out of their rooms, alleviate boredom and stress, and generally provide a more familiar environment than indoor hospital rooms.

Evoking memories is the third pathway to create a sense of familiarity in design. Reconstructing and creating memories can be approached in three ways: by reminding women of personal memories, by including cultural memories, and by making the garden itself memorable. Of these three, personal memories are an important type to focus on when trying to create a sense of familiarity for people moving to or temporarily staying in a new, foreign environment, such as long-term maternity care. Methods of achieving ways for people to bring personal memories into a new environment are many and rely on the creativity of the designer. An example of recreating personal memories for maternity care patients would be assigning each patient the freedom to personalize a section of a garden. Meaningful items from home could be added to the space. Not only would this help the garden evoke memories for the patient, but also personal garden space would allow self-expression and a sense of ownership.
Cultural memories can be important for creating a sense of familiarity for short- and long-term users of a garden. These memories reflect everyday life events, activities, and locations that are common to the people in the region where the design is located (Zeisel and Tyson 1999). For example, porches would be likely to evoke memories for people in the South where they are a significant feature of historical and popular architecture. Similarly, laurel furniture is a cultural memory of people in the southern Appalachian Mountains. Cultural memories may also be broad in context. For example, cultural memories that are common to Americans, as well as many other nations, include bird feeders, spring bulbs, and ponds with goldfish. Lastly, cultural memories can also be reflective of certain events that are special to a specific location and may require temporary modifications to a site. For instance, managers of a therapeutic garden in New Orleans would want to decorate their garden for Mardi Gras during Mardi Gras season because the event is important to a large portion of the population in that region. Design that allows for flexibility and the ability to adjust to temporal events may be useful in allowing for expressions that evoke memories.

The ability of memories to create a sense of familiarity in design can be enhanced by making the designed environment itself memorable. According to Gunter (2000) and Kaplan (1979), users who are encouraged to explore and engage in their surroundings are more likely to value the space. Exploration and engagement can be advanced by incorporating variety and mystery into design (Gunter 2000; Kaplan 1979). Mystery is created by partially obscuring views of the landscape, while at the same time hinting at what is to be expected (Kaplan 1979). The element of mystery must be handled with caution. Too much mystery can result in feelings of insecurity and
isolation. According to Gunter (2000), features in the landscape that compel users to explore a space will result in the creation of personal meaning and commitment to that space. For women on bed rest, special attention to the height of planting beds and partial views from two-and-a-half feet above the ground surface versus five-and-a-half feet above the ground surface will be useful in creating a garden that provides variety and mystery, yet appears safe and accessible. If poorly planted, eighteen-inch planters, a common planter height for gardens, may form impermeable walls that block views throughout the garden.

The fourth pathway to establish familiarity is creating a sense of order in design. Specifically, a therapeutic garden for maternity care patients that “makes sense” and is legible to its users helps women to feel comfortable in exploring the garden (Huelat 2007; Kaplan 1979). Elements that may help to establish a sense of order and intended use of areas within a garden include the size, features, furniture and layout of a space. The use of repeated elements and readily identifiable components, such as light posts, materials, and color, can assist in the establishment of order and legibility (Kaplan 1979). For maternity care patients, therapeutic garden design would need to incorporate repeated elements and readily identifiable components that would be visible to women who are on bed rest, in a wheelchair, or walking.

A sense of order is also created by regularity and routine (Manzo 2003). Designers can incorporate spaces for programming and can emphasize to hospital staff the importance of such programs being dependable, offered on a consistent schedule, and continuous throughout a patient’s stay. Regularity can also help reduce potential conflict between programming and group activities and the privacy of others. Users who
are informed of programmed activities occurring in a garden can predict what will be happening. This awareness will give patients the knowledge necessary to decide how to best use the space for her personal needs. For example, a patient seeking quiet self-reflection may not want to be in a garden while an exercise program is going on even if space exists for privacy. A predictable schedule of activities will assist in establishing a sense of familiarity within the garden and will empower users to control their use of the space. For maternity care patients who are visiting the hospital for short periods of time, regularity and routine will not be as important to their stay. Tours of the garden before childbirth, however, can increase their familiarity with the garden and provide a sense of order to the routine they will follow while they are in labor and utilizing the space.

**Design for Haven**

A haven is a combination of safety, comfort, and ownership. A sense of safety can be created when a garden’s boundaries are clearly marked and the numbers of entrances/exits are limited (Stigsdotter 2002). In addition, user feelings of safety are increased when adequate yet not excessive lighting is provided at night and when users feel that they can see without necessarily being seen (Kaplan 1979). The arrangement and manipulation of space with plants, materials, topography, and furniture can help to create this sense of privacy while maintaining visibility (Stigsdotter 2002). For example, rooms can be created by the use of low-growing shrubs and seat walls without completely obstructing views into the space. For maternity care patients, safety is of special importance. Anti-baby theft devices are often placed on babies’ wrists and bassinets to ensure their safety. By limiting access of maternity care therapeutic
gardens to hospital staff, maternity care patients, and their visitors and restricting access by placing an entrance close to a nurses’ station or by only allowing direct access through patients’ rooms, fears of safety may be reduced. In addition, women who feel that hospital staff is close by and accessible may be more comfortable staying in the garden for extended periods of time by themselves.

Feelings of safety may also be enhanced by incorporating design qualities that evoke permanence, shelter, and well-being. Patient perception of quality of hospital care is linked to the quality of the environment (Fornara, Bonaiuto, and Bonnes 2006). Therefore, a garden that is well constructed and cared-for is more likely to help patients relax and feel less stressed about their safety. Characteristics of permanence can be reflected in the quality and type of materials used in the garden. Materials that are solid, durable, and evoke the impression of longevity are more likely to appear well constructed (Gunter 2000).

A therapeutic garden can also serve as a shelter for patients by providing methods to control exposure to sunlight and by incorporating spaces where a patient may remain outside even when it is raining or snowing. Such a space would not only have to shelter the patient from the elements, but would also have to provide warmth in case of temperatures dropping suddenly. Depending on the bed’s angle of incline, women on bed rest may be more susceptible to glare from the sun. Overhead features and surfaces that reduce direct glare would make a garden more comfortable.

Well-being is reflected in the maintenance of a garden. A garden that appears clean, taken care of, and properly managed reflects how the hospital takes care of its patients. Plantings may be dense, but they should still appear maintained. A garden that
is well cared for is also likely to be decorated for seasons and special events. For example, seasons can be incorporated into garden design through plantings such as bulbs and deciduous trees that change color in the fall and by seasonal items, such as pumpkins during autumn, being displayed when appropriate. “Seasonal maintenance” not only demonstrates that a hospital cares for a garden and indirectly its patients, but it also helps bed rest patients see the progression of time through the landscape. Watching the progression of the seasons may help women to feel more connected to the outside world.

Comfort is an integral aspect of haven created by the home environment. In a study examining patient perception of hospital care, well-furnished, well-lighted, and well-decorated hospitals were perceived as providing more comfort and better quality of care (Fornara, Bonaiuto, and Bonnes 2006). In addition, attributes including furniture, hardscape, views, lighting, sound, temperature, and color were significant. Each of these attributes is important to consider when designing for comfort.

For example, consideration of the type and size of furniture appropriate for maternity care patients will increase user comfort. Larger women may not feel comfortable sitting on small, unstable chairs and may need to be able to sit in a variety of positions in order to get comfortable. Sturdy, large, and well-cushioned furniture is more likely to be agreeable with their bodies. In addition, Rechavi’s (2009) research states that the piece of furniture most associated with comfort is the couch. In his study, couches serve both to host guests and to be by oneself. Couches would be particularly useful to maternity care patients because they allow for a friend or partner to sit with them and are large enough to allow for an array of seated positions.
Warmth is also essential to comfort and is an important quality of the home (Gunter 2000). Heating lamps located in the garden allow for extended garden use during cold months and at night. Warmth can also be incorporated into a garden with the addition of an open fire hearth with bordering seating. The hearth, a historically iconic symbol of the home, provides more than warmth because it creates a comfortable and relaxed atmosphere and encourages social interaction (Mack 1993; Gunter 2000). Although warmth is important, some environments can be excessively warm during the summer months. In hot environments, shade can be incorporated into the garden through the use of trees, shade structures, and umbrellas. If shade is insufficient for cooling a garden, fans may need to be utilized for additional comfort.

Hardscape materials can also provoke warmth. The subtle hues of yellow, orange, and red found in many natural materials such as wood and stone can emit an atmosphere of warmth. In addition, concrete and pavers can be colored and glazed with these same hues to create a similar effect. Cooler colors such as blues, violets, and greens may also be appropriate, especially in areas that are very hot. For women who may be suffering from depression, however, the creation of a cold and sterile atmosphere should be avoided. Attention to color and materials can help to create a comfortable and cheerful environment.

As mentioned in the therapeutic garden principle of natural distractions, views from the hospital rooms that are of nature are most likely to reduce anxiety and stress (Ulrich 1996; Verderber 1986). In addition to views from their rooms, patients may also want to enjoy natural views that are attainable from a garden. For example, a rooftop garden may provide views overlooking a nearby park or cityscape. Such views may help
women who are in the hospital for an extended period of time to feel more connected to the outside world and thereby provide comfort. On the other hand, unsightly views may cause stress and anxiety. Any view may appear differently to women on bed rest, in a wheelchair, or walking. Views from each of these angles should be considered when designing a therapeutic garden for maternity patients.

In addition to views, lighting levels can affect people’s moods and are therefore an important factor in creating a pleasant atmosphere (Gunter 2000). Soft lighting is desirable for creating an atmosphere of intimacy, whereas bright lighting is preferable for group situations. With the exception of landscape lighting at night, lighting that is user-controlled and has multiple illumination levels is the most likely to match user preferences. Lighting at night is not only an important feature of safety, but is also especially important for patients who are in labor and may need to walk around the garden at nighttime.

Sounds can also affect a patient’s comfort in the garden. Annoying sounds may need to be buffered to the greatest extent possible (Fornara, Bonaiuto, and Bonnes 2006). On the other hand, soothing natural sounds and music may be appreciated by visitors and may create an atmosphere of relaxation (Hodnett 1989; Maloni 2000; Marcus 1999; Sakala 1993). According to Marcus (1999), mid-range level sounds are the most appropriate for therapeutic settings. Incidentally, many sounds in nature such as rustling leaves, water falling, and birds singing occur at a mid-range level. Gardens can create pleasant and appropriate natural sounds by attracting birds, incorporating water features, and utilizing soft musical elements such as wind chimes that can highlight the sound of a breeze. Also, music may be a nice addition to a garden. Music
can improve pain tolerance, increase energy, and elevate patient moods (The Boston Women's Health Book Collective 2008). For women who are in labor, it is also useful in helping to maintain breathing patterns and focus on particular movements. On the other hand, music may be annoying to some patients. Music that is controlled by visitors and localized to different areas of the garden can increase its therapeutic value.

The use of color is another attribute that may affect a person’s comfort within a particular setting. According to Gunter (2000), research has demonstrated that bright colors manifest positive mood states while dark colors reflect dark moods. Similarly, calming colors are associated with blues and greens, while stimulating colors are affiliated with reds and oranges. Blues are related to coldness, while reds and purples evoke warmth. Based on the population of maternity care patients and location of the garden, designers should carefully select colors to create a therapeutic atmosphere for its users.

Ownership is the final characteristic associated with haven. Ownership consists of feelings of control, freedom, and self-reliance. Allowing for a sense of control is one of the fundamental design principles of therapeutic gardens (Ulrich 1999). An essential method to instill a sense of control in a visitor is to create designs that promote way-finding and accessibility (Huelat 2007; Ulrich 1999). Promotion of easy way-finding and on-site usage of therapeutic gardens can by facilitated by garden tours (Borquez 2006). In addition, way-finding can be improved by progressive disclosure where only the information necessary to get a visitor to the next decision-making point is visible in each section (Huelat 2007). Slow release of information helps to keep people from being overwhelmed and stressed. A more subtle method to improve way-finding is to
incorporate noticeable landmarks that provide visual cues along pathways (Huelat 2007). The appearance and visibility of features within the garden are different for someone walking versus a woman on bed rest. Consequently, it is important to consider users’ eye-levels when determining the height and location of features and signage that may assist in way-finding.

A sense of freedom can be incorporated into design by creating an environment that can be manipulated by its users. For example, seating within a garden that is moveable allows for various configurations and degrees of socialization and privacy. Depending on the amount and types of seating, a user can create different settings for conversation or privacy every visit. For women on bed rest, space may be an issue for the provision of seating in small gardens. Moveable seating is especially important in these circumstances, so that seating is available to walking visitors, but chairs can be moved to make room for a bed. In addition, unlimited access to the garden can increase users’ sense of freedom. Women are more likely to feel a sense of ownership over the garden when they know that it is available for them when they need it.

Self-reliance is created in a garden by making all sections and program elements completely accessible to its users. In the case of maternity care patients, women on bed rest may be unable to utilize areas of the garden that are accessible only by stairs. Depending on the severity of bed rest, women may be able to walk short distances, be moved to wheelchairs, or, if the case is severe, must remain in their hospital beds. A garden that is accessible to all maternity care patients will have every section reachable via ramps and handrails along paths that are large enough to maneuver a bed.
Design for Relationships

As noted in Ulrich’s (1999) therapeutic garden design principles and in the history of childbirth in the United States, relationships were an important component of stress alleviation. Historically, childbirth in the United States was primarily a social event where women gathered to assist other women through childbirth and recovery (Wertz and Wertz 1979). Similarly, Ulrich (1999) emphasized the importance of social support on improved health outcomes of patients. Relationships related to the home, however, are not just about social interaction; they include the need for a sense of welcome and a sense of belonging, in addition to providing opportunities to engage with others.

A sense of welcome can be constructed by developing a friendly, sociable atmosphere through personalized markers and decor (Gunter 2000). Not only do personalized markers enable women a form of self-expression, but also they give personality and character to a space, leaving an impression of warmth and amity. A sense of welcome can be further designed by creating a clear, defined entrance to greet visitors. Social relationships are especially important for pregnant women who have been separated from their friends and families. Women who are on bed rest may prefer the garden as a place to meet visitors rather than their hospital rooms. A clear, defined entrance would not only make the garden easier for visitors to find, but also create a more enjoyable space to socialize.

Relationships also consist of feelings of belonging and being part of a group. Feelings of belonging can be fostered by making women aware that other patients are in similar situations as themselves and by providing social support between them. As part of a therapeutic garden for maternity patients, at least one space could be designed
that is conducive to small group interaction (Ulrich 1999). Ideally this space would be
large enough to accommodate the maximum number of women who may be on bed
rest in the maternity center and intimate enough to allow for small group therapy
sessions and other programming. If the number of women on bed rest within the
hospital is large, other smaller subspaces may be created for smaller groups, such as
women and their families, to interact with more privacy.

Another opportunity to foster a sense of belonging and welcome is to recognize
other women in the center and display their picture and other pertinent information. A
photographic display area would not only signify to a woman that she was part of a
greater whole, but it would also help to familiarize newcomers with other patients in the
hospital and potentially facilitate conversation. On the other hand, some women may
not wish to disclose their personal information. Patients should always be provided the
choice to participate in certain features or programs within therapeutic gardens.

An environment can cultivate intimacy by creating a soft, comfortable
atmosphere. As reported by Gunter (2000), soft furnishings and lighting increase the
degree to which people will share personal information. Gunter recommends side-
lighting, cushioned chairs, rugs, wall decorations, and art to increase the intimacy of a
setting. The positioning of furniture can also affect intimacy and social behavior.
Furniture that is positioned for people to sit side by side makes conversation difficult
(Gunter 2000). Furniture that positions people at right angles from one another,
however, facilitates engagement amongst individuals. For women on bed rest, on the
other hand, furniture positioning that promotes intimacy may vary according to the
degree of incline of their beds. Some women may need to remain completely reclined in
their beds, while others may be able to incline their beds to varying positions. Moveable seating and ample space provide the greatest flexibility for social interaction and intimacy.

Maternity centers can also provide social support to women by connecting patients to national organizations, such as Sidelines, a high-risk pregnancy support group (Maloni, 2000). A telephone in the garden with a direct connection to such a group would provide women with the assurance that someone would be available for them to talk to at all times.

**Design for Self-expression**

Self-expression is developed through identity, opportunities for self-reflection, and establishment of boundaries. Identity can be expressed through personalization where women are given the opportunity to add individual touches to the environment. Personalization is positive for the self-esteem of women, fosters social interaction, and is vital to the creation of place attachment (Gunter 2000; Sixsmith 1986; Smith 1994; Zeisel 2006). Gunter uses an example of a Garden Club in Philadelphia to highlight the importance of personalization in the development of meaning associated with place and the encouragement of social interaction. In his example, the Garden Club placed garden boxes throughout a dilapidated neighborhood. As residents began to utilize the boxes, social activity increased as people began to converse over each other’s doings. Therapeutic gardens for maternity care patients can foster personal identity by designing features that enable women to express themselves. The addition of personalized symbols in a therapeutic garden allows the “personality” of a garden to
reflect the current patients. Examples of personalized symbols are decorative flags, artwork, garden art, and photographs. A subtler example of a personalized marker is a “Due Date” calendar where women can mark their expected date of labor.

The opportunity for self-reflection also includes the need for privacy and a temporary “escape” in a garden. When designing for privacy, more space does not necessarily equate with more privacy (Gunter 2000). Feelings of privacy are also determined by one’s ability to control social interactions (Ulrich 1999). Therefore, a therapeutic garden should provide a number of spaces to prevent crowding and undesired socializing. The avoidance of crowding may be especially challenging for maternity care patients. Not only are pregnant women generally larger than the average person, but hospital beds also take up an unusual amount of space. What might be considered an intimate space for two or three people may be constricting to maternity care patients. Consideration of the size of the hospital beds will be useful in designing appropriately sized spaces for privacy within a therapeutic garden.

Also, it is important to remember that privacy may mean different things to different people. Interestingly, one study found that natural, open settings were preferred by patients who were sitting, reading, or otherwise seeking privacy (Barnhart, Perkins, and Fitzsimonds 1998). On the other hand, enclosed settings were preferred for active behaviors such as walking and talking. A variety of spaces should allow for all peoples’ needs to be met. In addition, hospital gardens located in courtyards or rooftops may be susceptible to the “fishbowl” effect where garden users feel that they are being watched (Sachs 1999). Plantings and design elements can work as buffers to minimize this effect.
Privacy could potentially be an issue for women whose rooms overlook a therapeutic garden. Plantings or other materials can be utilized to create a barrier between patients' windows and the rest of the garden. Plantings provide a filtered view from patient rooms while maintaining their privacy (Marcus and Barnes 1999). Other materials that may assist in providing privacy to patient rooms overlooking gardens include curtains, blinds, reflective windows, or barriers that simply create distance between windows and the usable portion of the garden.

An establishment of boundaries is the final characteristic of self-expression. Due to the sensitive nature of the maternity population and the concern for mother/infant safety, the boundaries and availability of the therapeutic garden to other user groups are an important consideration. Maternity care patients’ power to determine when and how they use the garden also affects their sense of self-expression. If women are forced to utilize the garden for certain programs and events, the garden may lose its therapeutic properties. Similarly, women who undergo routine medical procedures in a therapeutic garden may begin to associate a garden with those procedures rather than with a sense of escape. Such considerations are important in deciding when and how to use a garden.

After determining therapeutic garden principles based on the home environment (Table 5.1), principles specific to maternity care patients can be developed. The following principles for maternity care patients (Table 5.2) combine general therapeutic garden design principles and the design principles based on the concept of home to meet the needs of the specific population.
Table 5.1: “Therapeutic garden design principles based on the home environment”

<table>
<thead>
<tr>
<th>THERAPEUTIC GARDEN DESIGN PRINCIPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>BASED ON THE HOME ENVIRONMENT</td>
</tr>
</tbody>
</table>

1. Design for Familiarity
   - Reflect the local culture and context in architectural style, plants, furnishings, art, and details
   - Utilize “popular style,” rather than “high style” design
   - Reflect of nature, families, and motherhood in art and sculpture
   - Incorporate space for programming within the garden and arrange regular events such as book club meetings, knitting group gatherings, art classes, exercise courses, and group therapy
   - Integrate methods for users to bring their personal memories into the garden
   - Utilize attributes pertaining to cultural memories that reflect everyday life events, activities, and locations that are common to people in the region
   - Allow for flexibility and the ability of the design to adjust to temporal events
   - Incorporate elements of variety and mystery into the garden design while assuring that the garden remains safe and visible
   - Establish a sense of order in the garden by creating a visual hierarchy of space where the layout and components in each area reflect its function
   - Provide regular, routine, dependable, and predictable programming
   - Use materials that are solid and give the impression of longevity

2. Design for Haven
   - Define garden boundaries and limit the numbers of entrances/exits
   - Provide subtle lighting at night
   - Arrange and manipulate space to create a sense of privacy while maintaining visibility
   - Use materials that are solid and durable
   - Provide methods for patients to control exposure to sunlight
   - Incorporate a space where a patient can remain outside even when it is raining or snowing
   - Properly manage the garden so it appears clean. Plantings may be dense, but should be well maintained
   - Incorporate seasonal displays and plantings into the garden setting
   - Use a variety of sturdy, large, and well-cushioned furniture that can allow for an array of seated positions
   - Use hardscape materials that provoke warmth and consider incorporating a variety of materials to avoid a sterile atmosphere
   - Attempt to have views from hospital rooms to be of nature
   - Highlight views that are attainable from the garden
   - Provide a variety of overhead views that are pleasing and relaxing to women on bed rest and consider unsightly views that may be more apparent to women on bed rest than walking individuals
   - Allow lighting to be user-controlled
Design for Haven continued

• Attempt to create pleasant natural sounds by attracting birds, incorporating water features, and utilizing soft musical elements such as wind chimes that can highlight the sound of a breeze
• Allow garden visitors to control music and, if possible, make audible music localized to different areas of the garden
• Heating lamps should be located in the garden during cold months and at night
• Provide opportunities for shade
• Apply soft, bright, warm colors
• Provide tours of the therapeutic garden and maternity center
• Utilize progressive-disclosure to create signage for easy way-finding
• Incorporate noticeable landmarks to provide visual cues along pathways for way-finding
• Employ moveable seating and features within the garden
• Make the garden accessible at all hours of the day
• Make all sections of the garden accessible via ramps
• Consider eye-level from women on bed rest when determining height and location of features and signage. Include features within the garden that are eye-level to women on bed rest

3. Design for Relationships

• Develop a social atmosphere through personalized markers and decor
• Create a clear, defined entrance to great visitors
• Design at least one space conducive to programming and group therapy for women on bed rest. Depending on the population of the maternity center, other spaces may need to be included for smaller group interaction
• Incorporate a photo display area that includes interesting information about patients within the maternity center
• Avoid side by side seating in areas with furniture
• Provide a telephone in the garden with direct connection to a support network, such as Sidelines, a national high risk pregnancy support network

4. Design for Self-Expression

• Allow the "personality" of the garden to reflect the current patients
• Provide a number of spaces to prevent crowding and undesired socializing
• Incorporate both open and enclosed spaces
• Use plantings and design elements as buffers to minimize the "fishbowl" effect in courtyard and rooftop gardens
• Utilize plantings or other materials to create a barrier between patients' windows and the rest of the garden
• Limit accessibility to the garden to hospital staff, maternity care patients, and their visitors
• Give patients the power to determine when and how they use the garden
Table 5.2: “Therapeutic garden design principles for maternity care patients”

| A. | Pay special attention to the overhead plane in design. Attempt to reduce direct glare from the sun and incorporate elements of interest for women on bed rest |
| B. | Create designs that promote way-finding and accessibility for women walking, in wheelchairs and on bed rest |
| C. | Locate features and utilize structural and ornamental details that communicate the intention of the garden and its relevancy to maternity care patients |
| D. | Incorporate at least one space in the garden that is conducive to small group interaction and group therapy. Ideally this space would be large enough to accommodate the maximum number of women on bed rest in the maternity center. Consider providing additional social support through connections with national organizations etc. |
| E. | Allow the “personality” of the garden to reflect current patients and enable women to express themselves |
| F. | Provide walking loops for women in the early stages of labor and the space and necessary equipment for exercise programs for women on bed rest |
| G. | Account for the size of hospital beds when creating intimate spaces in the garden |
| H. | Protect the privacy of women whose rooms overlook the garden |
| I. | Incorporate elements in the therapeutic garden design that recognize the women in the hospital and provide ways for them to get to know one another |
| J. | Give women the opportunity to incorporate personal memories into the garden and utilize design features that speak to the cultural memories of the region |
| K. | Create a distinctive environment from the hospital. Consider architectural features from “popular style” architecture, such as window frames, that may have beneficial side effects for maternity care patients |
| L. | Pay special attention to views from the patient’s perspective in design. Examine height of planting beds, partial views, and unsightly views from the perspective of women in walking, in wheelchairs, and on bed rest |
| M. | Incorporate seasonality into the design |
| N. | Consider the type and size of furniture appropriate for maternity care patients. Utilize moveable seating so that furniture can be moved to make room for hospital beds |
| O. | Provide cultural features and details within the garden that are calming, yet encourage women to move through the space |
| P. | Clearly mark the boundaries of the garden and limit the number of entrances/exits. Incorporate elements that may increase the accessibility of hospital staff to women in the garden |
| Q. | Provide mechanisms for user-controlled thermal comfort, lighting, and music within the garden |
| R. | Utilize colors and materials that will create a comfortable, cheerful environment. Develop a friendly, sociable atmosphere through personalized markers and decor |
| S. | Emphasize plantings and natural elements within the garden. Integrate pleasant sounds by attracting birds, incorporating water features, and utilizing soft musical elements. Consider music that may assist women in maintaining breathing patterns during labor |
| T. | Give patients the knowledge necessary to decide how to best use the space for their personal needs |
| U. | Incorporate space for programming within the garden and arrange regular and dependable events such as book club meetings, knitting group gatherings, art classes, exercise courses, and group therapy |
| V. | Provide tours of the garden preceding patient’s hospital stay |
6. Design Application

Site Analysis

Over the course of several visits, observational studies were conducted on the proposed location for the maternity care therapeutic garden. Particular consideration was given to identifying the location of existing equipment and areas that need screening, measuring changes in elevation on the site, analyzing views from patient rooms, and determining opportunities for private and public spaces (Figures 1.1-1.7 and Figure 6.1). In addition, a shadow study was conducted to determine the need for shade structures and to select proper planting material (Figure 6.2). Although the study examined how shadows change over the course of the year, the site analysis diagram only incorporates data from summer months when the garden will be in peak use.

The roof is approximately 8,500 square feet and is divided into three levels with the highest level at two feet four inches above the finished-floor elevation (FFE) of the surrounding maternity center (Figures 1.5, 1.6, and 1.7). A parapet wall (two feet two inches height) forms a partition along part of the roof; however, the parapet wall can be lowered to the roof height, one foot two inches above the maternity center's FFE (Figure 6.3). Changes in elevation are farther apart along the east-west axis of the roof with approximately forty feet between each level. Changes in elevation are much closer on the north-south axis of the roof with only eight feet before the first change in elevation and approximately fifteen feet before the next level.
Figure 6.1 Site analysis in summer
Figure 6.2 Rooftop garden shadow study
Existing equipment on the roof is substantial and scattered (Figure 6.4). Large vents, pieces of equipment, and air handling units need to be screened (Figure 6.1). Currently all rooms adjacent to the roof have a view that includes some form of equipment (Figure 6.5). Special attention will need to be given to the privacy of rooms adjacent to the roof. Currently, there are no visual barriers between adjacent rooms’ windows and people on the roof.
Figure 6.4 Rooftop equipment

Figure 6.5 Patient room
During the site analysis, several items that would need to be addressed through design were found: circulation would need to concentrate on changes in elevation and the location of existing equipment to make the garden accessible to all patients; privacy, from both within patients’ rooms and from within the garden would need to be increased; equipment would need to be integrated into the garden or screened; and the overhead plane would need to break up the monolithic views of the surrounding five-story building. These aspects of the site analysis were then used to begin the design process.

**Design Process**

Information gathered from the site analysis was combined with the therapeutic garden design principles for maternity care patients to create a garden for the Atlanta hospital (Figure 6.6). In particular, three elements were fundamental to the design process: user function and accessibility, privacy, and the overhead plane (Figure 6.7). User function and accessibility were key determinants in the establishment of the entrance and circulation pattern of the garden. Although an entrance to the roof currently exists through the nurses’ station, hospital staff requested that one of the current patient rooms be chosen to convert into a more visible entryway, while maintaining the nurses’ entrance for emergency purposes. During the site analysis, a new entrance was selected along the postpartum unit based on potential ramp placement and the surrounding context. Ramps are a necessary component of circulation in order for the garden to be accessible to all patients (Table 5.2, B). The
Figure 6.6 Master plan
Resting areas are relocated to attract women to move throughout the space. Curves are added to corners and planters are reduced in size to allow for easier bed maneuverability.

Plantings along the postpartum unit are broken into large six foot by six foot planters to allow for tree plantings and provide access throughout this portion of the roof. In order to avoid tree trunks from blocking views into the garden yet maintain privacy, planters are slightly offset from the windows.

Overhead features are increased and diversified to create more visual interest. Trees are added in areas to break up views of the surrounding building and to reduce the potential of the sun shining directly in patients' eyes.
American Disabilities Act accessible guidelines recommend that the grade of ramps range from 1:16 and 1:20 (Harris and Dines 1998). Therefore, ramps that would enable women in wheelchairs or hospital beds to traverse the garden would need to be a minimum length of sixteen feet for every foot in elevation change. In addition, switchbacks were avoided due to hospital bed maneuverability. The distance between the patient rooms along the southern side of the roof of the antepartum unit was too short to create a ramp at a five percent grade or less. More space for ramping was available along the postpartum unit on the eastern side of the roof. Furthermore, the surrounding context was more appropriate along the postpartum unit. An innate quality of entrances is that they are active places where people are coming and going. Since women along the antepartum unit tend to remain in the hospital for extended periods of time, quietness and privacy may be more important to patients in this area. After observing the site and analyzing potential entrances based on the possibility of ramping and the surrounding context, location of equipment and vents determined which room was most appropriate to be converted into the entrance.

User function and accessibility also guided the circulation pattern of the garden. In the original plan, the author attempted to create a series of walking loops for women in the early stages of labor. Walking helps women to relax and induce labor (The Boston Women’s Health Collective 2008). These loops passed through a series of rest areas where visitors could contemplate and engage in more passive activities (Table 5.2, F). Such rest areas would not only give women a place to take a break, but they would also create features that attract women to move throughout the space. The form of the walking loops was strongly influenced by the location of vents and equipment made
some areas difficult to access. The circulation pattern was modified, however, to make all parts of the garden accessible to all patients. Also, details, such as curved corners and moveable elements that could improve the ease in which beds move through the space, were added in potentially narrow locations (Table 5.2, G and N; Figure 6.8). Moreover, a space large enough to allow for group counseling and programs was important to incorporate into the garden in order to provide social support and guidance for patients (Table 5.2, D). The site analysis revealed that areas large enough for programming were limited due to equipment placement and the general size of the garden. The selected location needed to be easily accessible and, if possible, separated from patient rooms. Only one area in the garden met both of these criteria.

Privacy was another essential component to the general garden design. Privacy is important in allowing for a sense of escape and creating feelings of control (Ulrich 1999). In addition to the recommended window treatment of reflective glass and shutters, planters were placed strategically throughout the site to provide views of vegetation (Table 5.2, K and S). Moveable planters were situated in front of the antepartum rooms to provide a barrier between the room and garden and to provide a space for personalization (Table 5.2, H and E). Permanent planters were also placed so that patients could see vegetation from any angle within their rooms. Plantings along the postpartum unit were broken into large six foot by six foot planters to allow for tree plantings and provide access throughout this portion of the roof. In order to avoid tree trunks from blocking views into the garden, planters were slightly offset from the windows.
Figure 6.8 Bed diagram

Turning radius is tighter than bed dimensions.
Lastly, the overhead plane was an important component to the overall design to create personal relevancy and visual interest for women on bed rest and to reduce glare from the sun. Planter location, tree and plant selection, and overhead feature placement and design were influenced by the potential visual experience of a woman on bed rest (Table 5.2, A; Figure 6.9). Trees were added in areas to break up views of the surrounding building and to reduce the potential of the sun shining directly in patients' eyes (Table 5.2, L). In addition, overhead shade structures were designed to be features and to provide visual interest for the patients rather than simply shade.

Design

The therapeutic garden for the Women's Center of Excellence is designed to address the specific needs of maternity care patients. The garden is completely accessible to women on bed rest and is subdivided into two levels to minimize the number of ramps. The ground surface consists of a system of elevated pedestal pavers and boardwalk. Sections of the garden on the elevated pedestal system subtly mark the social gathering areas, while portions of the garden with boardwalk designate more private, contemplative space.

Screening of equipment is addressed by incorporating vents into the planters and by partitioning them from the garden with a wooden fence. Vents that are small (less than one foot in height) are covered by the elevated pedestal and boardwalk system. Medium-sized vents are camouflaged by planting beds, and when lower in height than the surrounding planting beds, are topped with wooden vent covers. An open space around each vent is maintained for access. The large ventilation units are disguised by
The Overhead Plan illustrates the visual experience of the garden from the perspective of a person laying in a hospital bed.

Figure 6.9 Overhead plan
vines or fencing. Each form of screening subtly blends the equipment into the landscape.

Privacy within the garden is addressed through plantings, overhead structures, physical separation, and reflective windows. Tree plantings and overhead structures limit the views from the upper floors of the building into the garden and prevent garden visitors from feeling the “fishbowl” effect. Patients’ rooms have reflective windows and are bordered by plantings to physically separate visitors from their personal space.

The garden is divided into six zones: the entrance, the dining area, the quilt arbor patio, the water wheel patio, the fish pond and butterfly program area, and the personal gardens. Each zone is separated according to a specific feature within that area or to a particular function of the space. The variety of spaces is meant to provide a number of options for patient use including individual privacy, small group interactions, and large group activities. Although a specific zone may be described for a particular purpose, the spaces are intended to be flexible in their design. For example, the quilt arbor patio, which is designed to accommodate group programming, may also accommodate large families and groups of visitors. The following paragraphs describe each of those zones in detail. Design elements that incorporate therapeutic garden principles for maternity care patients are recognized by referring to the principles’ corresponding letter (A-V) in Table 5.2: “Therapeutic garden design principles for maternity care patients” on page eighty-two.
Entrance

The first level of the garden is a foot and a half above the FFE of the hospital. The hallway (formerly a patient’s room) connecting the hospital corridor to the garden is ramped at a five percent grade to get patients to the garden level. Bookcases are located along this corridor to offer women the opportunity to take books into the garden. This corridor is located before the dispersal point at the garden entrance and is sheltered from the weather. In addition, the brick wall is converted to glass with automatic sliding doorways, making the garden visible from within the maternity center (Table 5.2, P; Figure 6.10)

Upon entering the garden, the visitor’s eye is drawn to a statue of a mother figure reading to her child next to a gurgling stream (Table 5.2, C; Figure 6.11). An awning is located over the entrance to allow patients’ eyes to adjust to sunlight, and a welcome sign is immediately adjacent to the automatic sliding glass doors. This sign presents announcements and program schedules and recognizes women staying in the hospital by posting their pictures or other fun, interesting information (Table 5.2, I and T).

Trees and a due date arbor frame the interior of the garden. The due date arbor is made of a grid of soft-colored glass circles that cast a colorful mosaic on the ground plane beneath them. Each circle is approximately a half-inch thick and five inches in diameter with hooks in the center. The twelve sections of the arbor mark the twelve months of the year, and each circle indicates a day of the month. Upon entering the hospital, women can make a mobile and hang it on their expected due date (Table 5.2, A, E, I, M, and R). Not only does the arbor serve as a method for women to personalize the garden, but it also serves as an additional way for women to announce their
presence in the hospital and get to know each other. Depending on the time of year and when women enter and leave the hospital, the arbor will constantly change to reflect its patients. Women may also choose to take their mobiles with them at the end of their stay as a keepsake.
The Due Date Arbor marks the days of the year with inscribed glass circles and changes over time to reflect the hospital’s current patients. Upon entering the hospital, women may make a mobile and hang it on their due-date. Upon leaving, the mobile can be taken with them as a memory of their stay.
Dining Area

To the immediate right of the entrance is the dining area (Figure 6.12). This space serves as a social gathering point that is easy to find and where women can meet with family members, doctors, and visitors. The focal point is a water wall located along the northern edge of the space that provides a soft, pleasant sound, yet is not loud enough to interfere with conversation (Table 5.2, S). A wooden fence lined with artwork screens the surrounding equipment and defines the space. Planters form a barrier between visitors and patients’ windows and provide views of vegetation (Table 5.2, H). Tables and seating are located away from patients’ windows, yet open space allows for flexibility and for beds to enter and turn around (Table 5.2, G and N).

Quilt Arbor Patio

Visitors pass under the due date arbor, which is ramped at a five percent grade, to reach the central portion of the garden. The arbor frames a low planting area with a bubbling stream and pink-flowering dogwood (Figure 6.13). This is the only at-grade planter in the garden, and it serves as an interesting focal point and directs circulation.

To the right of the stream is the quilt arbor patio. This area is large enough to accommodate programming and group therapy sessions for eleven antepartum patients and a facilitator, yet intimate enough to feel comfortable for smaller groups of people (Table 5.2, D and U). In the center of the space is a burbling pebble fountain encircled by boardwalk trim. The boardwalk marks the edge where beds can be lined up in a circle for programming events. If necessary, the pebble fountain can be turned off and
Figure 6.12 Plan detail: dining area

- Water Wall
- Planters with Art
- 18" Planters
- Patient Window
- Tables with Seating
- 6' Wall with Art
- Zelkova Trees

Scale: 1/4" = 1'0"
Figure 6.13 Plan detail: quilt arbor patio
covered with a wooden lid to allow for someone to stand in the center of a group for certain programs.

The quilt arbor patio is bordered by a gas fireplace, which symbolizes the hearth and the core of the home. The fireplace gives ambience to the space and provides warmth to visitors in the wintertime or during chilly mornings and evenings. Although not illustrated, outlets should be placed throughout the garden to allow for fans and heating lamps when needed. The gas fireplace is user-controlled (Table 5.2, Q).

A quilt arbor provides dappled shade to the patio and creates a soft patchwork of shadows reminiscent of an American quilt (Table 5.2, J and O; Figure 6.14). The arbor’s framework is a series of two-foot squares made up of two inch by four inch boards secured by steel cables. A thin sheet of metal punctured with quilt patterns covers each square. The boards remain beneath the metal so that the shadow pattern is reflected on the wood as well as on the ground plane.

Water Wheel Patio

The water wheel patio offers a meditative space with the lapping of water and surrounding vegetation (Table 5.2 J, O, and S; Figure 6.15). The water wheel marks the beginning of a water sequence (Figure 6.6). Water from the wheel spills into a small collecting pool and seemingly disappears. The water then remerges at the spring in the ground-level planter. From here, the water appears to travel underneath the pavers into the adjoining planting bed where it collects in a small pool at the entrance.

The patio is enveloped by a vine-covered arbor and surrounded by River Birch, which provide a light, airy dappled shade. Moveable furniture allows for extended
The quilt arbor creates a soft patchwork of shadows reminiscent of an American quilt.
Figure 6.15 Plan detail: water wheel patio

- Water Wheel
- Feeder
- Arbor with Vines
- 18" Planters
- River Birch with Dogwood understory
- Equipment Access
- Perspective
- Scale: 1/4" = 1'0"

Bench
- Arbor with Vines
- Feeder
- River Birch
- 18" Planters

Perspective

Figure 6.15 Plan detail: water wheel patio
seating, and a user-controlled fan offers a breeze during the summer months. Plantings are meant to evoke a riverside in the Southeast (Table 5.2, J).

Fish Pond and Butterfly Program Area

The fish pond and butterfly program area is the most private section of the garden, as it is the farthest away from patient windows (Figure 6.16). The space is enclosed by bamboo reminiscent of the river cane stands along southern streams. The bamboo provides a soft-textured background and a gentle, rustling sound when a breeze passes through the leaves (Table 5.2, S). A fish pond borders the bamboo and is filled with bright colored goldfish. In order for women on bed rest to enjoy the fish without having to strain their necks to see them, the bamboo planter is tapered at a fifteen-degree angle and covered with mirrored siding to reflect the fish in the pond.

Surrounding the seating area is a butterfly incubation program, where women can witness the life cycle of butterflies. This program not only relates directly to the maternity care patients, but also reminds the women of the greater world surrounding them (Table 5.2, C). Organizations, such as Monarch Watch (http://monarchwatch.org), can provide the knowledge and materials necessary for raising butterflies. Bird and butterfly feeders and beneficial plants are placed throughout the garden to attract and keep wildlife in the space (Table 5.2, S).

Personal Gardens

The personal gardens border the antepartum unit along the southern perimeter of the roof (Figures 6.17 and 6.18). These areas make a series of “rooms” formed by both
The mirrored siding on the bamboo planter allows women on bed rest to view the fish without straining their necks. The butterfly incubation program relates women to the greater world surrounding them through the life cycle of butterflies.
Figure 6.17 Plan detail: personal gardens

- 3' x 5' Personal Planter
- 'Forest Pansy' Redbud
- Camellia
- Rocking Chairs
- Feeder
- 18" Planters
- Antepartum Patient Rooms
- Support Telephone
- Couch
- Ven Cover
- Access to Nurses Station

Scale: 1/4" = 1'0"
Interactive rooms with moveable furniture and personal planters offer patients the opportunity to incorporate individual memories into the space and personalize this section of the garden. Levels of privacy for visitors and patients in neighboring rooms vary according to planter placement.
permanent and moveable planters. The moveable planters, each three feet by five feet, offer antepartum patients the opportunity to incorporate their individual memories into the space and personalize this section of the garden (Table 5.2, E and J). Personal planters can be moved to create different levels of privacy within each “room.” Upon arriving to the hospital, antepartum patients can choose flowers and perhaps a decorative feature such as a flag or bird feeder to go into their planter and can bring their own flowers and decorative items as well. Planters will be placed in front of the owners’ windows to provide privacy to their rooms, identify themselves, offer a means of self-expression, and provide a conversation starter. For women whose rooms do not overlook the garden, space will be provided for their planter boxes as well. Placing the planter boxes in front of owners’ windows allow other women to utilize the space without impeding on neighboring rooms’ privacy. If the owner decides to occupy the space in front of her room, however, the planter can be moved to allow for a more spacious and private setting. Depending of the severity of bed rest, women can use the planters for horticultural therapy or simply enjoy their beauty. In addition to the personal planters, a support telephone is provided in this area to connect women to national support networks, such as Sidelines, and to the nurses’ station in case of an emergency (Table 5.2, P).

**Planting and Materials**

Plantings were selected based on the shade analysis study and their variety of textures, color, subtle scents, and screening capabilities (Figures 6.19 and 6.20). Many of the plants also attract birds or butterflies. In addition, plantings were designed to
Figure 6.19 Planting plan
## PLANTING SCHEDULE

<table>
<thead>
<tr>
<th>TYPE/SYMBOL</th>
<th>BOTANICAL NAME / COMMON NAME</th>
<th>QUANTITY</th>
<th>SIZE</th>
<th>SPACING</th>
<th>REMARKS</th>
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<tr>
<td>BN</td>
<td>BETULA NIGRA 'HERITAGE' / RIVER BIRCH</td>
<td>4</td>
<td>3&quot; CAL</td>
<td>SPACING AS SHOWN</td>
<td>BIRDS; BUTTERFLIES</td>
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<tr>
<td>CC</td>
<td>CERCIS CANADENSIS 'FOREST PANSY' / FOREST PANSY REDBUD</td>
<td>4</td>
<td>2&quot; CAL</td>
<td>SPACING AS SHOWN</td>
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<tr>
<td>CF</td>
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<td>SPACING AS SHOWN</td>
<td>BIRDS; BUTTERFLIES</td>
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<td>CB</td>
<td>CORNUS FLORIDA 'CHEROKEE BRAVE' / PINK DOGWOOD</td>
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<td>SPACING AS SHOWN</td>
<td>BIRDS; BUTTERFLIES</td>
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<tr>
<td>ZS</td>
<td>ZELKOVA SERRATA 'GREEN VASE' / SAWLEAF ZELKOVA</td>
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<td>3&quot; CAL</td>
<td>SPACING AS SHOWN</td>
<td></td>
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<tr>
<td>BD</td>
<td>BUBELEA DAVIDII 'NANHO BLUE' / BUTTERFLY BUSH</td>
<td>3</td>
<td>5 GAL</td>
<td>SPACING AS SHOWN</td>
<td>BIRDS; BUTTERFLIES</td>
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<tr>
<td>CS</td>
<td>CAMELLIA Sasanqua 'CLEOPATRA' / Sasanqua CAMELLIA</td>
<td>18</td>
<td>5 GAL</td>
<td>SPACING AS SHOWN</td>
<td>EVERGREEN</td>
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<td>BUTTERFLIES</td>
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<td>BIRDS</td>
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<td>JUNIPERUS 'SKYROCKET' / SKY ROCKET JUNIPER</td>
<td>5</td>
<td>2&quot; CAL</td>
<td>SPACING AS SHOWN</td>
<td>EVERGREEN</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
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<td>AH</td>
<td>ANEMONE X HYBRIDA 'HONORINE JOBERT' / JAPANESE ANEMONE</td>
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<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
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<tr>
<td>AO</td>
<td>ASTER OBLONGIFOLIUS 'OCTOBER SKIES' / AROMATIC ASTER</td>
<td>20</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>BUTTERFLIES</td>
</tr>
<tr>
<td>CP</td>
<td>CERATOSTIGMA PLUMBAGO / DWARF PLUMBAGO</td>
<td>99</td>
<td>QUART</td>
<td>SPACING AS SHOWN</td>
<td>PLANT WITH NJ &amp; CV</td>
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<tr>
<td>CL</td>
<td>CHASMANThIUM LATIFOLIUM / RIVER OATS</td>
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<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>BIRDS</td>
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<tr>
<td>EA</td>
<td>ECHINACEA 'AFTER MIDNIGHT' / PURPLE CONEFLOWER</td>
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<td>SPACING AS SHOWN</td>
<td>BUTTERFLIES</td>
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<tr>
<td>GR</td>
<td>GERANIUM X 'ROZANNE' / CRANESBILL</td>
<td>62</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
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<td>HL</td>
<td>HELLEBORUS ORIENTALIS 'LADY SERIES' / LENTEN ROSE</td>
<td>158</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>EVERGREEN</td>
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<tr>
<td>HA</td>
<td>HEUCHERA AMERICANA 'PLUM PUDDING' / ALUM ROOT</td>
<td>59</td>
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<td>SPACING AS SHOWN</td>
<td>SEMI-EVERGREEN</td>
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<tr>
<td>PV</td>
<td>PANICUM VIRGATUM 'SHENANDOA' / SWITCH GRASS</td>
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<td>SPACING AS SHOWN</td>
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<tr>
<td>PD</td>
<td>PENSTEMON DIGITATUS 'HUSKER RED' / SMOOTH PENSTEMON</td>
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<td>SPACING AS SHOWN</td>
<td>BIRDS; BUTTERFLIES</td>
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<tr>
<td>PA</td>
<td>PHYLLOSTACHYS AUREA / YELLOW GROOVE BAMBOO</td>
<td>46</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>EVERGREEN</td>
</tr>
<tr>
<td>SF</td>
<td>SEDUM 'FROSTY MORN' / STONECROP</td>
<td>43</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>BUTTERFLIES</td>
</tr>
<tr>
<td>SR</td>
<td>SEDUM RUPESTRE 'ANGELINA' / STONECROP</td>
<td>20</td>
<td>QUART</td>
<td>1'-0&quot; O.C.</td>
<td></td>
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<tr>
<td><strong>VINES:</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>FP</td>
<td>FICUS PUMILA / CREEPING FIG</td>
<td>9</td>
<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>SEMI-EVERGREEN</td>
</tr>
<tr>
<td>CR</td>
<td>CLEMATIS 'RAMONA' / CLEMATIS</td>
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<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
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<tr>
<td>GS</td>
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<td>1 GAL</td>
<td>SPACING AS SHOWN</td>
<td>EVERGREEN</td>
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<tr>
<td><strong>BULBS:</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CV</td>
<td>CROCUS VERNUS / DUTCH CROCUS</td>
<td>500</td>
<td>BULB</td>
<td>1'-0&quot; O.C.</td>
<td>PLANT WITH AH, AO, CP, EA, &amp; SF</td>
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<td>NJ</td>
<td>NARCISSUS 'JET FIRE' / JET FIRE DAFFODIL</td>
<td>200</td>
<td>BULB</td>
<td>18&quot; O.C.</td>
<td>PLANT WITH CP &amp; SF</td>
</tr>
<tr>
<td>NT</td>
<td>NARCISSUS 'THALIA' / THALIA</td>
<td>100</td>
<td>BULB</td>
<td>18&quot; O.C.</td>
<td>PLANT WITH AH, AO, &amp; EA</td>
</tr>
</tbody>
</table>

Figure 6.20 Planting schedule
reflect the changing seasons with the use of spring bulbs, flowering trees and shrubs, deciduous trees, and fall color (Table 5.2, M). Plant scale and height was also considered when trying to create partial views into the garden (Table 5.2, L). Many of the plants are low-growing, with the exception of those used to screen equipment or separate outdoor areas.

A materials plan has been provided to suggest an aesthetic to be utilized within the garden (Figure 6.21). Although a lighting plan was not provided and would ideally incorporate user-controlled features, lighting along the planter walls offers a subtle mechanism for illuminating pathways a night. In addition, the selected furniture is large, comfortable, attractive, and appropriate for pregnant women.
Figure 6.21 Materials plan

Jackson Lounge Chairs by Janus et Cie
(http://www.janusetcie.com)

Tango Table & Armchairs by Janus et Cie
(http://www.janusetcie.com)

Linden Rocking Chair by Country Casual
(http://www.countrycasual.com)

Wooden Fence
(http://www.GardenStructure.com)

Integral Lighting
(http://www.integral-lighting.com)

Deuville Sofas by Janus et Cie
(http://www.janusetcie.com)

Faulkner Library Cabinet
by Crate and Barrel
(http://www.CrateandBarrel.com)

Statue
(http://www.basigifts.com)
7. Conclusion

The analysis of maternal stress at the beginning of this thesis emphasizes the need to reduce stress amongst maternity care patients. This thesis concentrates on ways in which the designed environment can help to alleviate stress through therapeutic gardens for these patients. Such gardens must address the specific needs for women who are visiting the hospital during childbirth and those on antepartum bed rest. Several requirements exist that are particular to the maternity care population: the importance of group therapy and social support, especially for women on bed rest, the need for accessibility to include maneuvering hospital beds within the garden, the significance of the overhead plane in the garden design, and the importance of providing areas to walk during the early stages of labor. In addition, principles derived from the concept of home such as the incorporation of memories, regular and predictable programming, user-controlled features, and personalized markers, assist in the creation of a therapeutic garden that is effective at reducing stress and anxiety.

The garden incorporates therapeutic garden design principles for maternity care patients to create a healing environment specific to this patient population. For example, interest is created in the overhead plane by a series of unusual arbors that use light and color to produce shadows and colorful patterns. Trees with varying foliage color, texture, and flowers are selected to provide overhead interest and to create distinct areas in the garden. The statue and welcome sign at the garden entrance makes the intention of the
garden clear, while providing a warm and friendly entry to all visitors. Personal and cultural memories are incorporated through the use of personal planters and by features such as the water wheel and quilt arbor. An area large enough to allow for group programming is included, yet the space seems intimate and comfortable. In addition, privacy of the women whose rooms overlook the garden is protected without blocking off large portions of the space. The only principle that is not included in the design is garden tours, which rely on the hospital staff.

Despite the large quantity of equipment, the author was able to incorporate a generous amount of vegetation into the garden and to utilize most of the roof. Every section of the garden is accessible to all patients, even with space limitations. Only two ramps exist within the entrance and garden, neither of which results in difficult maneuvering for bed operators or wheelchairs. On the other hand, space limitations resulting from equipment did restrict the author’s ability to create wide paths that would allow patients in hospital beds or wheelchairs to pass each other easily. The minimum pathway width is four feet along the bamboo and art walk. This section of the garden is the only area where it would be impossible for women to pass one another. The author chose to keep this path, however, in order to maintain a walking loop for women who are in labor. Due to the small size of the area and visibility through the plantings, patients and their helpers should be able to avoid encounters in unsuitable locations.

The elevated pavers/boardwalk system allows for user accessibility, while minimizing interference with current roof drainage. Screening of equipment is addressed by incorporating vents into planters, using vines such as Creeping Fig to cover the surface of large air-handling units, and by placing a wooden fence around the largest
section of equipment to maintain access yet separate it from the rest of the garden. Such screening techniques are relatively subtle and should be overlooked by visitors.

This therapeutic garden is not maintenance-free and will require upkeep by the hospital staff. Personalized gardens will need to be regularly changed to match new patients, and plants will need to be managed and cared-for. Although the garden will require upkeep, it is designed to be relatively low-maintenance.

As previously mentioned, a challenge of this thesis was to separate aspects of the home related to a positive childbirth experience into tangible categories, when in reality, the aspects of a home that make it so cherished are thoroughly intertwined. As a result, the author focused on organizing topics in a comprehensible manner.

Other challenges may present themselves when utilizing the principles given in this thesis, such as the variety of standard protocols at each hospital. For example, the therapeutic garden for maternity patients at the Atlanta hospital is on a roof completely surrounded by buildings and separated from the public, where security is not an issue. Therefore, leaving the garden open twenty-four hours a day may not be a concern to hospital management. In other places, hospital protocols and locations available for such a garden may conflict with garden use. Furthermore, several of the principles incorporate programming. These principles go beyond therapeutic garden design to include actions that would be under the direction of hospital staff. In such circumstances, it is important that the designer communicates the significance of such programming to the hospital personnel and incorporates the space required for such activities to occur within their design. The actual use of the space for that purpose, however, will ultimately depend on hospital employees’ commitment to programming.
In addition, there are several opportunities for further research that would aid in therapeutic garden design for maternity care patients. For example, the author was unable to speak with maternity care patients throughout her research and relied solely on literature reviews to obtain her data. A study that interviews women specifically about the issues discussed in this thesis might provide additional insight to their wants and needs in therapeutic garden design. Furthermore, although the garden is designed to accommodate for families, additional research on family systems theory and design methods that facilitate family use would be helpful in creating therapeutics gardens that respond to the social support needs of maternity care patients.

Lastly, it is unfeasible to declare principles successful at meeting the needs of a specific patient population without building a therapeutic garden and performing a post-occupancy evaluation. The goal of a post-occupancy evaluation is to assess the advantages and limitations of a built garden in addressing the needs of its users and non-users (Marcus and Barnes 1999). Such evaluations analyze the use of a space, user preferences, behaviors, site analysis, and user recommendations. This information is vital in determining the accomplishment of design intentions within a therapeutic garden and in furthering the development of guidelines that can help to address patient needs.
References


Parker, Donald L., and James R. Hodge. 1967. Delirium in a Coronary Care Unit. *Journal of the American Medical Association* 201 (9):702-703.


