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ENABLING ARCHITECTURE
Rehabilitation And Therapeutic Environment

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ABSTRACT

Each year in the U.S., there are more than 12,000 people who survive from spinal cord injury, more than 470,000 people who survive and require rehabilitation, and more than 550,000 surgeries for joint replacements, primarily knee and hip replacements; unfortunate demand for rehabilitation services is increasing and boosting due to more baby boomers and the OIF/ OEF wars. Meanwhile rapid development of medical techniques, methods, and biomedical engineering over the last decades has created a need for development of completely new medical clinics, centers and hospitals. However, there is still a gap between architecture and occupations like health, medicine, and engineering. Successful diagnosis, treatment and therapy environmental needs to be combined with the knowledge of medicine, pharmacology and medical technology, as well as architecture of facilities in which these activities take place.

The overall purpose of this study was to systematically investigate the environmental and communicational requirements of healthcare by designing in a rehabilitation and recovery setting and to identify the specific supportive design conditions contributing to the promotion of healthy living and working environments. This project proceeds with an analysis of human behavior and environmental needs and conceptualization of a healing space to patient. Insisting on both macro and micro planning gives optimal results for patients as well as treatment and recovery process.

My attempt is to develop a contemporary relationship to the architecture based on medical care and environment to establish a symbiotic relationship through physician directed rehabilitation services to patients from a wide range of ages. A proper and adequate rehabilitation and nursing facilities and program can reverse many disabling conditions or can help patients cope with deficits that cannot be reversed by medical care. This research will focus on a variety of patient needs such as physical and occupational therapy, speech pathology, nursing, nutrition, clinical psychology and social work in a comprehensive family focused environment that would stimulate learning and development.
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1. INTRODUCTION
You never think it will happen to you. When in the prime of one’s life, in the peak of health, it is hard to imagine needing skilled nursing care. My thesis investigation was initiated from a horrible personal experience. I encountered severe injury by falling from third floor of an apartment. It was approximately 40 feet high, and, unfortunately, I landed on concrete pavement at the entrance hallway. I was immediately hospitalized and fell into physical impairment by multiple fractures. After surgery and a short hospital stay in the ICU, I was transferred to a rehabilitation facility for acute care and rehabilitation. At first, I thought after surgery I would be able to walk soon without difficulty, but I was wrong. I was in a wheelchair for two months. During rehabilitation, it took great effort to walk; steps tended to be too big or too small, and I had to keep my leg locked to support my weight against gravity. I was frustrated about the fact during a physical therapy session, and I started to become aware distracted by small details of the surroundings. Since the accident, my interest is to pay attention to a relationship between human perception or behavior and the surroundings through my experience as orthopedics patients. Moreover, I realized that my experience as patient and therapeutic process is an important case study to rethink about architecture. First goal of this study is to explore architecture and recovery from a patient’s viewpoint, tracing my own recovery from a serious leg injury, and this study further examines the conceptual frame work for rehabilitation and the ideal environment from patients’ perspectives as contextual factor. This architectural study analyze to bring together the two kinds of recovery or rehabilitation needs—“environmental factors” which focus on diagnostically or scientifically relevant data, and “human factors” which are a dimensional approach to the patient’s experience and the relationship to healthcare facility stuff and family.
1. INTRODUCTION

1.1 CASE STUDY - Campus Recreation Center Housing

Discharge from hospital could have any possible emotional significance to the patient, even if one is acutely aware of this possibility. The treatment team in the rehabilitation facility reluctantly agreed that I regained most of the function of my body and was almost ready to be discharged from rehabilitation to continue my education. After discharge from the rehabilitation facility with a wheelchair, I was transferred to Campus Recreation Center Housing on UC campus. The dormitory was designed by Morphosis, in collaboration with local firm, KZF Design, Inc. and opened in Fall 2005. It is a part of Campus Recreation Center on MainStreet at the heart of campus. The architect was interested in developing a series of connective events with fluid form in order to generate or augment an urban density and to encourage, the polyvalent nature of social experience on campus. The residents have easy access to recreation facilities, CenterCourt, the new dining center, Market on Main, and all of the other facilities along MainStreet. The monumental housing building houses 224 upper-class residents in suite-style accommodations with typical dormitory room layout. Each two or three person suite contains two or three private bedrooms, a shared bathroom, and shared living space. I was assigned in a three-person suite on the 4th floor. This hall includes study lounges, laundry facilities, and a student lounge with big screen TV. Each suite contains two private bedrooms, a shared bathroom, and shared living space. This beautiful hall is ideal housing facility for students,
1.1.2 Physical Environment - Americans with Disabilities Act (ADA)

The reason I was transferred to this hall is that the Campus Recreation Center Housing was only dormitory available for Americans with Disabilities Act (ADA) accessible accommodations. In other words, it was only place I could stay for every day commute with wheelchair. Both the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 are civil rights laws that protect individuals with disabilities from discrimination. The integration of people with disabilities into the mainstream of society is also fundamental to both laws. In daily life, as we maneuver through society, nothing is more important yet taken for granted more often than access. 48.9 million Americans with a disability, 19.4% of the population, approximately one out of five persons will continue to demand full inclusion in the social and economic fabric of this country now. The access that most of us take for granted is difficult, impossible, or achievable only with the intervention of a third party. We live in what is considered an independent society, yet I realized independent access to programs, facilities, and employment are not easily achievable by many. Within ADA, I experienced that physical access provides the source of opportunity in education, employment, and social freedom to disabilities. In the dormitory, although I never appreciated the existence of a single bar in a bathroom before, the ADA accommodations are lifeline to maintain personal daily activities without any help. The importance of inclusive design is an important part of the health and design ethical responsibility to create opportunities for all individuals. The purpose of this case study became to consider the scope of physical environmental design and determine current ADA compliance of healthcare facilities.
1. INTRODUCTION

1.1.2 Mental Environment - View

The students are assigned essentially randomly to rooms that are identical except for the number of window and the view: one member of each pair overlooked a small stand of trees and open sky, the other had a view of a red brick wall. My room was one of the latter. Usually, patients who are discharged from a hospital or skilled nursing facility often suffer complications that lead to the need for medication. Since my mobility was limited, the medication helped to relief from extreme anxiety and to think clearer. However I started to suffer perceptual problems of changes in visual perception of the environment during the medication. I noticed significant changes in the perception of the world around me, such as problems with judging distance and motion in the street and problems reaching for objects and moving through narrow spaces within the dormitory. Especially, the room condition in the dormitory modified my psychosocial health since only things I could see was brick wall. Hence the quantity of analgesic medication used and the pain medication cost was increased to maintained my health conditions. These findings suggest that view from windows may have healing and stress-reducing effects on occupants. Mental environment has significant impact on the perception of occupants in order to improve patient outcomes and satisfaction.
2. LITERATURE REVIEW
The main focus of this research paper is to develop an idea of healing environment. Literature reviews provide a foundation of this research work and offer insights into the form and construction of design. Using case studies drawn from my own practice and personal experience, I choose two important literature reviews. Both are related to this research work and stress the importance of personal experience and a patient's story. Both researchers have also drawn on personal experience for deep resonant scientific research concerns, diagnostically relevant information about a patient and use the language of biomedical science, an empathic knowledge about a patient, which uses descriptive language. This approach will preserve the fullness of human reality, achieving understanding by means of an empathic identification with the patient's experience with architecture.

2.1 Nature is the Best Medicine

 Patients with the natural window view had shorter postoperative hospital stays, had few negative comments in nurses’ notes, and tended to have lower scores for minor post-surgical complications such as persistent headache or nausea requiring medication. Moreover, the wall-view patients required many more injections of potent painkillers, whereas the tree-view patients more frequently received weak oral analgesics such as acetaminophen.”

The article focuses on the effectiveness of exposing patients to nature in hospitals for better healing. Roger Ulrich, professor of architecture at Texas A&M University published a seminal article in *Science*. In 1984 after Ulrich was hospitalized with a broken leg, he began the –classic study in the field of healing environments. He reported that patients recovering from surgery who had a window view of trees from their hospital room had shorter postoperative stays, fewer negative evaluations from nurses, and lower consumption of potent analgesics than matched patients who had a view of a brick wall. Since then, the relevant experimental and observational evidence has steadily increased. Records on recovery after cholecystectomy of patients in a suburban Pennsylvania hospital between 1972 and 1981 were examined to determine whether assignment to a room with a window view of a natural setting might have restorative influences. Twenty-three surgical patients assigned to rooms with windows looking out on a natural scene had shorter postoperative hospital stays, received fewer negative evaluative comments in nurses’ notes, and took fewer potent analgesics than 23 matched patients in similar rooms with windows facing a brick wall.
postoperative hospital stays, received fewer negative evaluative comments in nurses’ notes, and took fewer potent analgesics than 23 matched patients in similar rooms with windows facing a brick building wall.

The presence or absence of a window and the view it affords includes one aspect of the physical environment that has been demonstrated to affect patients’ experiences in the hospital. In a study using hospital records to examine the effects of views out of windows on patients recovering from gallbladder surgery, Ulrich found that patients recovering from surgery in rooms with a view of nature versus a view of a brick wall “had shorter postoperative hospital stays, had fewer negative evaluative comments from nurses, took fewer moderate and strong analgesic doses, and had slightly lower scores for minor post-surgical complications”.

The article also discusses a study conducted involving an extensive review and focus groups with various categories of staff members at hospitals. Physical environment is an important component in the acute care environment that can affect nursing and medication accuracies, as any inadequacy in physical environment would contribute to facility staff fatigue, stress, and burnout and result in medical errors. The review demonstrates that the following environmental variables can contribute to errors in acute care settings.
2. LITERATURE REVIEW


Oliver Sacks

“A pure and intense joy, a blessing, to feel the sun on my face, and the wind in my hair, to hear birds, to see, touch and fondle the living plants,”

In this book, Oliver Sacks writes about the conditions of injury and patienthood and their effects on the brain, using an autobiographical example. Sacks’ own experience of losing awareness after he suffered a severe knee injury. He was chased off a cliff by a bull. He experiences a period of isolation from normal life by his hospitalization, isolation from a part of his body by neurosensory damage to the injured leg. He tells how his immobilized leg became an alien thing that did not seem to belong to him. After his operation, he felt like he had lost his leg although it was intact and attached to his body. He develops both a “perceptual deficit”—a loss of feeling of the leg—and a “sympathetic deficit”—a loss of feeling for the leg. “I had lost,” he explains, “the inner image, or representation, of the leg. There was a disturbance, an obliteration, of its representation in the brain—of this part of the body-image as neurologists say. Part of the ‘inner photography’ of me was missing.” He suffered tremendous difficulties regaining the use of his leg. The doctors and nurses were largely unsympathetic. In this book, the author, a physician, is forced into role-reversal and learns what it is like to be a patient. At various stages after his injury, he uses music to improve his situation. For example, right after his injury, he uses inner music to get down the mountain he was on. He also describes how, after a traumatic leg injury, he recovered best not in the hospital but at a rehabilitation center with a garden.

“Some essential connection and communion with nature was re-established after the horrible isolation and alienation I had known. Some part of me came alive, when I was taken to the garden. Wild places, vistas, green sanctuaries—even a potted plant or a single flower—seem to draw people universally. Who hasn’t retreated to the woods or taken a vacation in a beautiful natural spot to relieve stress or recover from illness?”

Because of his dual perspective as researcher and patient, as well as his deep concern for the welfare of afflicted humans, he returns with new insight and an altered vision of the meaning of recovery. Sacks’ study of his own experiences with injury and the care system overlaps this research intention.
3. RESEARCH
3. RESEARCH

3.0 Rehabilitation and Recovery

Each year in the U.S., there are more than 12,000 people who survive from spinal cord injury, more than 470,000 people survive and require rehabilitation, and more than 550,000 surgeries for joint replacements, primarily knee and hip replacements. Joint replacements are expected to increase dramatically in the coming years as more baby boomers demand the surgery and unfortunate demand for the Operation Iraqi Freedom (OIF)/Operation Enduring Freedom (OEF) wars. Rehabilitation services will increase and boost accordingly. In the United States, the proportion of the population aged 65 and older is projected to increase from 12.4% in 2000 to 19.6% in 2030. The number of persons aged and older is expected to increase from approximately 35 million in 2000 to an estimated 71 million in 2030, and the number of persons aged 80 and older is expected to increase from 9.3 million in 2000 to 19.5 million in 2030. In 1995, the most populous states had the largest number of older persons; nine states (California, Florida, Illinois, Michigan, New Jersey, New York, Ohio, Pennsylvania, and Texas) each had more than one million persons aged 65 and older. Without a breakthrough in the treatment of dementia, the number of people 65 and older living in nursing care facility will likely double by the year 2020. Interestingly, the occupancy rates in nursing homes have gone down over the past several years, so that the average nursing home is less than 90% full. Generally, this is thought to be because there are other options for long-term care, such as assisted living facilities. Other social and financial causes are also likely.

After surgery and a short hospital stay, patients are typically released to a rehabilitation facility or other nursing care facilities to fully recover. The goals of rehabilitation are to help survivors become as independent as possible and to attain the best possible quality of life after their discharge. Precisely, rehabilitation is a treatment or treatments designed to facilitate the process of recovery from injury, illness, or disease to as normal a condition as possible. The purpose of rehabilitation is to restore some or all of the patient’s physical, sensory, and mental capabilities that were lost due to injury, illness, or disease. Rehabilitation includes assisting the patient to compensate for deficits that cannot be reversed medically. It is prescribed after many types of injury, illness, or disease, including amputations, arthritis, cancer, cardiac disease, neurological problems, orthopedic injuries, spinal cord injuries, stroke, and traumatic brain injuries. The Institute of Medicine has estimated that as many as 14% of all Americans may be disabled at any given time.

Rehabilitation services are provided in a variety of settings including clinical and office practices, hospitals, skilled-care nursing homes, sports medicine clinics, and some health maintenance organizations. Some therapists make home visits. Advice on choosing the appropriate type of therapy and therapist is provided by the patient’s medical team. Each rehabilitation program is tailored to the individual patient’s needs and can include one or more types of therapy. The patient’s physician usually coordinates the efforts of the rehabilitation team, which can include physical, occupational, speech, or other therapists, nurses, engineers, psychiatrists. Family members are often actively involved in the patient’s rehabilitation program.

The aim of this research combines psychotherapeutic methods with architectural design to create healing healthcare
environments that, evidence shows, can enhance and support the care and treatment process. A proper and adequate rehabilitation program and setting can reverse many disabling conditions or can help patients cope with deficits that cannot be reversed by medical care. Rehabilitation addresses the patient’s physical, psychological, and environmental needs. It is achieved by restoring the patient’s physical functions and/or modifying the patient’s physical and social environment. The major premise of this study is that the physical environment is a very important factor in determining an individual’s degree of independent living and in defining the status of people with disabilities in society. Environmental barriers can actually thwart the best effort of health professional to restore function. Successful rehabilitation facility design promotes patient-focused care in a healing environment and satisfies a wide range of patient, staff, community, technological change and environmental impact demands. Patients desire comfort, adequate patient/nurse ratios, social interaction and distraction.

Rehabilitation is not simply a physical event. It is physiological and behavioral one as well. Factors such as stamina and motivation come into play, as does pure physics. Behavioral issues are of particular concern in the development of regulations because ultimately a decision has to be made about the definitions of terms such as “accessible” or “reasonable accommodation.” Thus, to study even such a seemingly simple issue as ramp design requires a relatively complex theoretical framework in order to understand the phenomenon fully and to make valid recommendations about policy from the result. There are a number of theories in the fields of rehabilitation, healthcare, disability studies, and in environment-behavior studies that can provide a theoretical basis for this research. It is possible to develop improved research methods and better applications of research findings.
3. RESEARCH

3.1 Rehabilitation Classification

There are a number of theories in the field of accessibility, disability studies, and in environment and behavior studies that can provide a theoretical basis for this research to understand the framework of rehabilitation and recovery. The World Health Organization (WHO) is a specialized agency of the United Nations (UN) that acts as a coordinating authority on international public health. The WHO constitution mandates the production of international classifications on health so that there is a consensual, meaningful and useful framework, which governments, providers and consumers can use as a common language. The purpose of the WHO classification is to provide health care service providers and organizers, and researchers with a common tool for reporting and analyzing the distribution and evolution of health interventions for statistical purposes. It is structured with various degrees of specificity for use at the different levels of the health systems, and uses a common accepted terminology in order to permit comparison of data between countries and services. The WHO works towards ensuring equal opportunities and promotion of human rights for people with disabilities in order to develop policies on disability, which include community involvement and national rehabilitation programs. The WHO is also requested to work to ensure early identification and treatment of those with disabilities, including the provision of assistive devices such as rehabilitation classifications. (World Health Organization)
3.1.1 International Classification of Impairments, Disabilities, and Handicaps (ICIDH)

In 1980, the International Classification of Impairments, Disabilities and Handicaps (ICIDH) was published by the WHO, as a manual of classification relating to the consequences of disease (and injuries and other disorders) and as a conceptual framework for information. The ICIDH is widely accepted and provides a theoretical foundation for discussing rehabilitation and recovery outcomes. The ICIDH distinguishes between “impairments” or disturbances at the level of the organism, “disabilities,” or limitations in activities, and handicap, or limitations in societal participation. Though the consequences of disablement are interrelated, they are also quite distinct. The WHO model distinguishes and clarifies the three levels of disablement outcomes as follows:

1. Impairments at the organ level
2. Disabilities at the person level
3. Handicaps at the societal level

The traditional view is that impairment, disability, and handicap act like a linear cause-and-effect process, that is, impairment causes disability and disability in turn leads to limitations in societal participation or “handicap.” The current official version of the ICIDH does not include environmental factors in its schema. Both social and physical environments, however, clearly play a role in the success of rehabilitation. In rehabilitation practice, the narrow focus of research on environmental factors has restricted the development of fundamental knowledge about the relationship of disability of environment that would help professionals assess individual needs and identify both optimal and cost-effective interventions for their clients. It has also limited our understanding of how environment contributes to disability as opposed to handicap. The effectiveness of the norms in actual rehabilitation outcomes either improved daily function or increased social participation. One of the most important proposed revisions is the recognition that the context of a person’s life, that is, personal factors such as age and motivation and environmental factors such as physical facilities, consumer products, and family support, must be incorporated in the ICIDH to reflect real world conditions more accurately.

This structure would also shift the emphasis from a traditional medical model that treats only the person to the view that interventions in the context of an individual’s life may be just as important as medical care. A second important proposal recognizes that a linear relationship between impairment, disability, and handicap is an oversimplification. Health conditions do not necessarily result in an impairment, but they can result in functional limitations. Moreover, an impairment could result in limitations in social role participation even if it causes no functional limitation. An example here is the result of the stigma associated with mental illness. A third major proposal is to move toward a
more positive language for describing the relationship of disablement to environment. From this new perspective, the environment can be conceptualized as a mediating factor in both functional ability and social participation.

3.1.2 International Classification of Functioning Disability and Health (ICF)

As a reaction to the new developments in measurement language and the approaches to definitions of disability developed through the revisions of the ICIDH, the International Classification of Functioning Disability and Health (ICF) was developed to provide a comprehensive framework of definitions and structures for rehabilitation. These domains are classified from body, individual, and societal perspectives by means of two lists: a list of body functions and structure, and a list of domains of activity and participation. Since an individual’s functioning and disability occurs in a context, the ICF also includes a list of environmental factors.

The ICF puts the notions of ‘health’ and ‘disability’ in a new light. It acknowledges that every human being can experience a decrease in health and thereby experience some degree of disability. Disability is not something that only happens to a minority of humans. The ICF thus ‘mainstreams’ the experience of disability and recognizes it as a universal human experience. By shifting the focus from cause to impact it places all health conditions on an equal footing allowing them to be compared using a common metric – the ruler of health and disability.

The ICF describes functioning at three perspectives: body, person and societal. The ICF organizes information in two parts. The first part deals with Functioning and Disability, and the second part covers contextual factors.

The components of Functioning and Disability are divided in two categories: (1) Body component including Body
and “Participation” components where Activity is defined as the execution of a task or action by an individual and Participation is defined by involvement in a life situation. A difficulty at the person level would be noted as an activity limitation, and at the societal level as a participation restriction.

The component of Contextual factors is an independent and integral part of the classification and is divided into (1) “Environmental factors” and (2) “Human Factor (personal factors)”. Environmental factors have an impact on all components of functioning and disability but ‘Personal factors’ are not classified in the ICF. Furthermore the ICF takes into account the social aspects of disability and does not see disability only as a medical or biological dysfunction. By including Contextual Factors, in which environmental factors are listed ICF allows to record the impact of the environment on the person’s functioning.
3. RESEARCH

3.1 CONTEXTUAL FACTOR

The ICF provides a professionally agreed upon framework for viewing behaviors from three broad and different perspectives: physiologic, physical–environmental, and psychosocial functions. The ICF’s focus centers directly on the work of rehabilitation specialists who partner with clients to promote functional life activities and participation in social and other settings.

Functioning and disability are viewed as a complex interaction between the health condition of the individual and the contextual factors of the environment as well as personal factors. The classification treats these dimensions as interactive and dynamic rather than linear or static. It allows for an assessment of the degree of disability, although it is not a measurement instrument. It is applicable to all people, whatever their health condition. The language of the ICF is carefully designed to be relevant across cultures as well as age groups and genders, making it highly appropriate for heterogeneous populations.

Rehabilitation after a stroke has been described as a process in which the patient and the healthcare system, through interaction and negotiation, try to reach agreement about activities to be emphasized and goals to be pursued. Involvement and empowerment of the patient are implicit in, and integral to, this process. Participation in setting goals seems to have a positive impact on patients’ motivation, and there is now consensus among professionals in rehabilitation that the patient’s degree of motivation will influence the outcome of an intervention. Consequently, an important element of any proposed intervention should be an assessment of what the patient is motivated to achieve as well as the promotion of a high level of motivation.
3.1.1 Patient autonomy

The impact of contextual factor, the effect of being in healthcare facilities on the behavior of patients with, including their initiative and autonomy, is not well understood. Yet the low level of activity initiated by patients when they are in healthcare facilities, and the disempowering nature of their role as patients, suggest that we should pay close attention to contextual factor in rehabilitation and recovery. Patient autonomy (dimensions: self-determination, independence and self-care) increases during rehabilitation due to human factors (conditions and strategies of patient) and environmental factors (rehabilitation facilities and strategies of health professionals and family). During rehabilitation, patients are in a state of transition regarding autonomy: patients need support to enhance autonomy, gradually regain autonomy, and eventually need less support. Although facilitating environmental factors were discovered, patients also experienced constraining factors regarding patient autonomy. Health professionals should give more attention to self-determination and independence; the rehabilitation environment should offer patients more opportunities to do familiar activities autonomously.

Efficiency of wellness environments as Environmental factors ergonomically optimize design means. Patients obtain more autonomy within the hospital room environment, allowing hospital staff to have easier access to the necessities of providing better healthcare. The Wellness Environments three-zone approach is a logical layout for both patients and staff to move freely within the space. The Wellness Environment designed spaces allow the hospital staff to better satisfy the needs of the patients, and in less time.

Human response to wellness environments as human factors are designed to make facilities much more efficient, give the patient more autonomy and create an atmosphere conducive to healing. If healthcare staff has a better attitude about their work environment, they will have a greater commitment to the job. Decreasing the facility stuff turnover rate can mean significant savings for the facility.
3. RESEARCH

3.1.2 Activities of Daily Living (ADL)

Activities of Daily Living (ADL) is “the things we normally do in daily living, including any daily activity we perform for self-, work, homemaking, and leisure.” A number of national surveys collect data on the ADL status of the U.S. population. The ICF defines motivation as a global mental function—a conscious or unconscious drive—that produces the incentive to act. Essential components of the classification are those contextual conditions, that interact with body function, activity, and participation. Thus, motivation may be influenced by both human factors and environmental factors, which together shape the physical, social, and behavioral context for rehabilitation.

Clinically it is often assumed that “low motivation” in patients is a symptom of depression. Can low motivation be attributed to organic damage resulting from the destruction of brain tissue, to reactions to a changed life situation after a stroke, to personality traits, or to environmental demands and expectations? There are no straightforward, indisputable answers to these questions. Nevertheless, most of the emotional disturbances in patients is not the result of specific brain damage. Recently, researchers have begun to ask what characteristics enable patients to play an active part in managing their illness and recovery. The impact of environmental factors for example, the effect of being in a hospital on the behavior of patients with a stroke, including their initiative and autonomy, is not well understood. Yet the low level of activity initiated by patients when they are in the hospital, and the disempowering nature of their role as patients, suggest that we should pay close attention to environmental factors in rehabilitation. Architecture aims to place human welfare at the heart of the art and science of building design and environmental management as a contextual factor.

Disused syndrome

Preventive medicine is supposed to be important for reducing bed-ridden or frail elderly people. One of the other important causes of room-bound is disused syndrome. A few weeks after staying in bed, not only muscle power but also bone mineral density and intellectual interest often decrease in the elderly. Rehabilitation in daily life is expected to prevent disused syndrome. Room-bound is supposed to be another cause of reduction of ADL. There are miscellaneous causes of room-bound. Aging is one of the most important factors, but cannot be modified. Physical, mental, social or environmental factors are also important. Participation in social activity, improvement of intellectual interest and habitual physical excise, as well as prevention of diseases, is expected to be useful for preventing room-bound and bed-ridden in the elderly.
Disability is measured by ADL, or conversely, by the degree those activities involve restrictions or dependencies. Similar disabilities can result from a variety of impairments, just as similar impairments can lead to different disabilities. Rehabilitation professionals rely on a number of instruments to measure disability, including the Functional Independence Measure (FIM).

Functional Independence Measure (FIM) Scores are used. These scores indicate a 71% improvement in function for persons graduating from the program.

The majority of measurement scales used to evaluate outcomes in rehabilitation are ordinal in nature and consequently statistically valid assessments of change are difficult to make. The Functional Independence Measure (FIM) can be weighted to possess interval properties, potentially allowing more accurate analysis of change. In this study, the FIM was compared to the Barthel Index (BI) to determine its validity, reliability and ease of use in two groups of 25 patients undergoing neurorehabilitation. The FIM was considered to be more valid than the BI, and equally reliable in the assessment of disability. When the two disability scores were compared using subjective and objective assessment, the agreement between them was comparable, although neither was high.

The importance of ADL as an outcome is also highlighted by the WHO. Dysfunctions in ADL are considered to be activity limitations within the ICF framework, these dysfunctions can in turn lead to participation restriction. Rehabilitation interventions aim to overcome activity limitation and thus prevent participation restriction in the areas of education, work, play leisure and social activities. Participation must however, be considered in relation to the client’s skills, abilities and as the overall contextual factor.
3.3 ENVIRONMENTAL FACTORS

The notion of a healing space goes back to ancient Greece: people who were ill looked towards temples in the hope of having dreams where the God would reveal cures. Environmental factors influence functioning and development for patient and can be documented as barriers or facilitators and the physical, social, and attitudinal context for rehabilitation and recovery. The role of the environment factors in the healing process is a growing concern among health care providers, environmental psychologists, consultants, and architects. There are two research themes: the impact of the ambient environment (mental environment), and the emergence of specialized building typology for defined populations (physical environment). Environmental factors should support efficient milieu processes and provide physically and emotionally with places where they can rest and reenergize. There are a few facts how much influence environmental factors can have in altering patient's and stuff behavior.

3.1.1 Biophilia - Therapeutic Environment

Mental health professionals have long speculated that the physical environment in which treatment occurs has an impact on both the treatment process and its outcome. The few empirical studies that evaluated the effects of psychoenvironmental design have shown encouraging results and demonstrated clinically desirable behavioral changes and even reduced psychopathology. In view of the concept that architecture is a tool in the therapeutic process, the design is important execution of the psychiatric process.

Psychotherapy’s notion of environment and its environmental responsibilities have always been narrowly defined. The profession has tended to neglect natural environmental issues or accept shallow ecological conceptualizations of nature. The Biophilia Hypothesis basically suggests that there is an instinctive bond between human beings and other living systems. The Biophilia Hypothesis is introduced by Harvard biologist, Edward. O. Wilson, in 1984, however the term “Biophilia” was originally used by German social psychologist, Erich Fromm, to describe a psychological orientation of being attracted to all that is alive and vital. In his book *The Heart of Man: Its Genius For Good and Evil*, he defines biophilia as a “tendency to preserve life and to fight against death”
Edward. O. Wilson proposed the possibility that the deep affiliations humans have with nature are rooted in our biology in a book titled Biophilia. Wilson is interested in thinking about how these positive feelings towards nature are inborn in human beings. He feels that there is a reason to believe that all humans truly want nature, though it is sometimes hidden within a person. The essence of biophilia is that human beings have a need a biological imperative, to connect with nature in order to maximize their potential and to lead productive, fulfilling lives. Biophilia researchers from diverse fields such as architecture, landscape design, environmental and ecological psychology, social work, biology, medics, genetics, or geography are beginning to examine in more detail both the limits and possibilities of this emerging interdisciplinary impulse. They have believed that natural settings are good for the mind, body and spirit. The conceptual development of Biophilia theory offers key insights to incorporate Biophilia into medical practice strategies and techniques.

**Attention Restoration Theory (ART)**

The Attention Restoration Theory (ART) offers an alternative way of explaining psychological benefits of Nature. The theory was developed by Rachel and Stephen Kaplan in the 1980s in their book *The Experience Of Nature: A Psychological Perspective*, and has since been found by others to hold true in medical outcomes as well as intellectual task attention. ART asserts that people can concentrate better after spending time in nature, or even looking at scenes of nature. Natural environments abound with “soft fascinations” which a person can reflect upon in “effortless attention”, such as clouds moving across the sky, leaves rustling in a breeze or water bubbling over rocks in a stream. ART provides an analysis of the kinds of environments that lead to improvements in directed-attention abilities. The right prefrontal cortex has been implicated in both the capacity to deliberately direct attention and the presence of attention fatigue. A number of studies have produced evidence of a right frontal–cortical locus of attention control, and another has shown that the right prefrontal cortex is subject to fatigue after sustained demands on directed attention.

Nature, which is filled with intriguing stimuli, modestly grabs attention in a bottom-up fashion, allowing top-down directed-attention abilities a chance to replenish. Directing attention to demanding tasks and dealing with disturbing environmental factors may lead to mental fatigue. On the other hand, environments that provide a possibility for more beneficial of performing these tasks in a natural environment, or the physical and social advantages can explain the observed benefits. Unlike natural environments, urban environments are filled with stimulation that captures attention dramatically and additionally requires directed attention (e.g., to avoid being hit by a car), making them less restorative. Three experiments were designed to test the hypothesis that exposure to restorative environments
facilitates recovery from mental fatigue. To this end, participants were first mentally fatigued by performing a sustained attention test; then they viewed photographs of restorative environments, nonrestorative environments or geometrical patterns; and finally they performed the sustained attention test again. Only participants exposed to the restorative environments improved their performance on the final attention test, and this improvement occurred whether they viewed the scenes in the standardized time condition or in the self-paced time conditions. Results are in agreement with Kaplan’s attention restoration theory, and support the idea that restorative environments help maintain and restore the capacity to direct attention.
Natural Versus Urban Scenes: Some Psychophysiological Effects

Description
Ulrich comments on the intuitive belief held by many people that contact with nature is good for them. He then evaluates this assumption for the specific case of visual exposure to outdoor environments. He asserts that this “nature benefit assumption” underpins most actions such as establishing city parks, urban landscaping programs and the provision of urban fringe nature areas.

Methodology
The study examines the psychophysical effects of three categories of outdoor visual environment:

- nature with water
- nature dominated by vegetation
- urban environments without water or vegetation

The experiments use alpha wave amplitude (eye closed alpha data which shows electrical activity associated with arousal, alertness and anxiety, etc.) and heart rate (electrocardiographs to show arousal or activation which can often accompany mental problem solving for example) as measures in the study of exposure to different landscapes. These were viewed in a room using a slide projector. This was supported by a semantic questionnaire consisting of 36 scales to measure an individual’s moods and feelings at the time of the test.
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Results

The study showed that the subjects' psychophysical states changed in different ways during the slide presentations as a function of the type of environment viewed. Compared to the influences of urban slides, exposure to the two nature categories - especially water - had more beneficial influences on the psychological states.

Differences revealed by the alpha results are consistent with the conclusion, based on the self-ratings, that the most positive influences on well-being were produced by the nature scenes. However, findings from the psychological measures suggest that, compared with the influence of the urban scenes, exposure to natural scenes have more positive effects on emotions such as sadness and fear arousal. Thus it is possible that some effects of outdoor visual exposures interact in a complex way with other factors such as personality, time of day or mood prior to the test.
Changes During Stress and Recovery

Description
Different conceptual perspectives converge to predict that if individuals are stressed, an encounter with most non-threatening natural environments will have a stress reducing or restorative influence, whereas many urban environments will hamper recuperation. Hypotheses regarding emotional, attentional and physiological aspects of stress reducing influences of nature are derived from a psycho-evolutionary theory.

Methodology
To investigate these hypotheses, 120 subjects first viewed a stressful movie, and then were exposed to color/sound videotapes of one of six different natural and urban settings. Data concerning stress recovery during the environmental presentations were obtained from self-ratings of affective states and a battery of physiological measures:

- heart rate
- muscle tension
- skin conductance and pulse transit time
- a non-invasive measure that correlates with systolic blood pressure.

Result
Findings from the physiological and verbal measures converged to indicate that recovery was faster and more complete when subjects were exposed to natural rather than urban environments. The pattern of physiological findings raised the possibility that responses to nature had a salient parasympathetic nervous system component; however, there was no evidence of pronounced parasympathetic involvement in responses to the urban settings. There were directional differences in cardiac responses to the natural vs urban settings, suggesting that attention/intake was higher during the natural exposures. However, both the stressor film and the nature settings elicited high levels of involuntary or automatic attention, which contradicts the notion that restorative influences of nature stem from involuntary attention or fascination.

Findings were consistent with the predictions of the psycho-evolutionary theory that restorative influences of nature involve a shift towards a more positively-toned emotional state, positive changes in physiological activity levels, and that these changes are accompanied by sustained attention/intake. Content differences in terms of natural vs human-made properties appeared decisive in accounting for the differences in recuperation and perceptual intake.
Conclusion

Both Ulrich’s research works consider to be the dominant framework in experimental aesthetics. The most important property of a visual stimulus is complexity, which refers generally to the number of independently perceived elements and their degree of dissimilarity. Ulrich suggests that complexity is a less important factor in attention/interest than is landscape content in real life views. He also considers that development of realistic and accurate models of responsiveness to outdoor views should include the differential effects of nature versus built environment.
3.3.2.1 Specialized building typology for defined populations (physical environment).

**Health Care Environment**

The belief that the traditional, institutional designed health care facility has no bearing on the wellness of its patients as long as the level of care is superb is in question. Likewise, research in previous chapters are explaining that sensitive design can enhance recovery and shorten hospital stays. Later 1860s, Florence Nightingale fixed ventilation and fresh air as “the very first canon of nursing,” and underlined the importance of quietness, proper lighting, warmth, and clean water. Then, a pioneering study conducted by Roger Ulrich in 1984 found that surgery patients with a view of nature suffered fewer complications, used less pain medication, and were discharged sooner than those with a brick-wall view. In addition, studies exist about the psychological effects of lighting, carpeting, and noise on critical-care patients. Currently there is evidence that links the physical environment with the improvement of patients and staff safety, wellness and satisfaction. The role of the physical environment and facilities themselves are not universally included in routine patient satisfaction assessments. For example, in a survey measuring whether patients were satisfied with their hospital experience, no items directly related to the physical environment were. Yet patients mention the importance of such aspects of the environment as cleanliness, comfort, and privacy when asked about their rooms. Although this gap exists between research findings and applications, increasingly, health care providers understand that the physical environment of health care settings can affect patient health, and articles linking health care design and well-being appear with more frequency in design journals. “Many healthcare researchers contend that research has linked poor design to such negative patient consequences as anxiety, delirium, elevated blood pressure levels, and an increased intake of pain drugs.” (Ulrich). Unfamiliar environments in clinics, hospitals, and nursing homes can produce psychological stress that can negatively affect healing and wellness.

**Patient-Centered Design**

Patient-centered design that fosters interaction between patients and family members is one response to the pressures in health care has been to emphasize what has been called patient-centered care. What has emerged as a priority in health care is providing the patient with choice—a concept that is fundamental to environmental psychology. Beatrice, d. F., thomas, c. P., & biles, b. Cited seven areas of patient-centered care: (a) respect for patients' values, preferences, and expressed needs; (b) coordination and integration of care; (c) information and education; (d) physical comfort; (e) emotional support and alleviation of fear and anxiety; (f) involvement of family and friends; and (g) transition and continuity of care. Many researchers pointed to the following dimensions that are important to consider in health care design: scale, relationship of indoor and outdoor space, materials, acoustics, lighting, accessibility, variety, and special population needs. There are two challenges how to create a healing environment, and how to design for special patient populations. In addition, because what will be a healing environment for one person may not be identical to the form needed for another.
3. RESEARCH

3.3.2.2 Building Configuration/Infrastructure

The rapid change in the healthcare economy and simultaneous evolution of new hospital operating methodologies, have coupled with competing capital demands to bring new focus on the obsolescence of hospitals. Even as institutions identify new needs, the risks inherent in investment in flexible fixed assets cause reconsideration and appear to demand the development of other vehicles for the delivery of healthcare. The healthcare industry is currently experiencing a construction boom. Fifty-eight percent of hospitals plan to add beds in the next several years, and $31 billion in new healthcare construction is currently in the planning phase. These numbers add up to a significant opportunity to design safe and efficient healing environments that support caregivers and their changing work processes. Due to the fact that many existing rehabilitation or skilled nursing facilities that have been designed with an institutional medical model similar to a hospital, it is important to develop design ideas that may be used to change these existing facilities into a model that reflects this desire for recovery space. These criteria give the designer many suggestions for how this change may be accomplished within the parameters of a traditional, “institutionally” designed facility. Historically, healthcare facilities at the turn of the century were designed with narrow, linear buildings that utilized natural ventilation and lighting. Gardens were incorporated to create a restful setting for people to destress. By 1900, steel skeletal buildings, and the common use of the elevator brought about the creation of taller buildings and reduced the patient’s and family’s connection to nature and the outdoors. Air conditioning created fat buildings and soon people/patients lost the connectivity to light and air. The disenchantment with the oppressive larger medical center began to take hold. Most patient treatments and therapies were accommodated in the skilled nursing units with the exception of surgery. Adequate electrical lighting and mechanical ventilation made it possible to build thicker buildings. Advances in imaging technology, surgical practices and a new understanding and treatment of disease caused a metamorphosis in hospital design (Mohinder S. Datta).

Open Wards

A curious and until now unnoticed element, the interior walls played a key part in the evolution of hospitals. The original, open nursing wards, had no partitions. The open spaces of the wards provided good visibility and flexibility. Minimal privacy was created using movable or ceiling hung curtains. See next figure. While the first nursing units used churches as the model, modern nursing units evolved with the introduction of scientific medicine in the 1800s. The open ward, or Pavilion, was probably best characterized by Johns Hopkins Hospital at the turn of the century. These wards were designed with large windows and many vents to encourage ventilation and to remove contamination from the air. Florence Nightingale influenced nursing units of the time and emphasized cleanliness and focused on providing for bright and airy spaces. Beds were typically lined up along a center aisle with the head of the bed
1800s. The open ward, or Pavilion, was probably best characterized by Johns Hopkins Hospital at the turn of the century. These wards were designed with large windows and many vents to encourage ventilation and to remove contamination from the air. Florence Nightingale influenced nursing units of the time and emphasized cleanliness and focused on providing for bright and airy spaces. Beds were typically lined up along a center aisle with the head of the bed along the wall. This arrangement provided good observation and access and kept the travel distance for nurses at a minimum. There was, however, no patient privacy, and most of the patient's psychological needs were ignored. There was also very minimal support space, but the supplies were also minimal (Mohinder S. Datta).

**Segmented Wards**

Segmented wards were designed with fixed walls for separation of people by gender and for infection control. The smaller groups of 6 to 8 patients had a little more privacy. Sound levels were lower and the tile and plaster walls had only minimal electrical power, which was usually expanded outside the wall. The first major evolutionary step after the open ward came with the design of Rigs Hospital in Denmark. Beds were turned sideways – parallel to the windows and placed in 2 to 4 bed open bays, separated by low partitions. This arrangement did not reduce noise throughout the unit nor did it appreciably change infection rates among patients. However, it did decrease the travel distances for nursing staff, and gave patients a greater sense of privacy – both by what they could see around them and the overall activity level on the unit (Mohinder S. Datta).

**Divided Wards**

The next step in the evolution of nursing units came with the use of corridors to separate the 6 to 8 beds. At first this appeared to be a minor revision, but it actually created a major change. The addition of partitions and doors with a common corridor created more privacy, but more importantly it reduced cross infection. This initial revision to the Modified Ward was the first step in an even greater change. Multi-patient bedrooms were designed with fixed walls for privacy, both personal and acoustical. Building services were still minimal. Electricity and water were the only utilities provided. Medical gas services were portable/movable. Tile block and plaster walls were used to establish the locations of the washbasin and toilets were provided centrally (Mohinder S. Datta).
Double Room Units with Single Corridor

By the 1960’s hospital design began to recognize the issues of patient separation and management not only by gender but by disease and between medical and surgical units. Surgery became the primary user of patient units in the 1970’s. These realizations and the development of staff management systems began the centrally controlled single corridor design. The minimal support needed could easily be placed in the center of a long unit whose length was limited by the legal distance from the nursing station to the last bed. The addition of the in-room toilet/shower was a great benefit for both patient and staff convenience. It provided improved convenience as well as improved sanitation/isolation, lessening the need for disease specific pavilions. The drawback is yet another obstruction between the nursing staff and their patients (Mohinder S. Datta).

Single/Double room Units with Racetrack Corridor

The introduction of the Racetrack corridor, was enabled by air-conditioning. It allowed nursing support spaces to be brought closer to the patients, reducing the travel distance to patient rooms from the nursing station. The Racetrack corridor concept also provided closer access to more support space, permitting inclusion of some treatment spaces. These had become very remote in the diagnostic base block. The issue of transport costs was recognized. The reduced ‘nursing distance’ allowed hospitals to add more beds, often up to 50 beds per unit. Patient rooms are basically unchanged, but a move toward providing a few single patient rooms began. Patient observation was improved by locating the Nursing Station in the core area between rooms. Two-patient bedrooms and Single patient bedrooms provided the fixed walls for acoustical, medical separation and privacy needs. Walls were utilized as chases for medical gases and electrical power. Masonry and plaster walls were typical. Renovation took place every 10 to 15 years and was very expensive.

Contemporary/Universal Room Units

The trend toward Universal Rooms endeavored to solve a number of issues: a) Outboard toilets to bring back the visibility of patients. This had been lost with the introduction of individual toilets at the corridor wall. b) Single, universal concept rooms are arranged to provide zoning of patient rooms for family space, patient area and staff/service needs. c) Larger rooms provided flexibility for varying types of care
and unknown future equipment needs. d) All single rooms eliminated scheduling conflicts, providing flexibility for facility operations. e) The increased unit size (due to larger rooms) leads to more and dispersed smaller Nursing stations. f) Personalized care in response to the need for earlier discharge of patients. The move to all single and larger rooms has its drawbacks. Additional square feet equals increased building cost. Staff travel distance, especially during night hours when staffing levels are reduced creates access challenges and some increases in operating costs. Contemporary Patient Rooms use walls for the distribution of power, gases, lighting, data, and sound systems. While ceiling spaces are used for primary distribution, walls are the final pathway for all support systems. They have generally become almost as fixed as the structure. The basic limitations have remained. The search for the universal ideal solution continues (Mohinder S. Datta).

Flexible coordination centers

Creating a truly supportive work environment for caregivers begins with redefining the areas traditionally referred to as “nurses’ stations” or “charting stations.” These terms are limiting in their description of places where doctors, nurses, pharmacists, respiratory and physical therapists, social workers, case managers, and dietitians interact and perform a variety of complex tasks. Today’s care teams require flexible coordination centers that provide options for collaboration, consultation, and concentration.

The concept sketches presented here provide an example of what such a center could look like. Located in an open area defined by demountable glass walls, the center balances the desire for visibility throughout the unit with the need for acoustical privacy that allows comprehensive discussions of patient care plans. The collaborative spaces are large enough to accommodate in-services or conferences, yet can be subdivided with moveable screens and partitions to support smaller groups. Overall, the amount of physical space dedicated to the coordination center is appropriate and provides the team with a comfortable work space.

The concept also includes spaces where two to four people can meet for a quick, discrete consult among caregivers or between caregivers and family members. These consultation spaces can provide crucial support for mentoring, and seasoned nurses can use them for on-the-fly meetings with newer nursing staff. These versatile spaces can also serve as offices or ancillary work areas, adapting to the changing needs of the unit.

Another essential component of the coordination center concept provides single-occupant spaces where caregivers can focus on individual tasks that require a high level of concentration. These spaces are designed to support all members of the care team who need to access and retrieve information from both electronic medical records and paper charts.

Lounges where staff can meet for peer support and camaraderie need to be thoughtfully programmed to give caregivers room to breathe. Access to natural light and adjacent outdoor spaces promote rest and rejuvenation. Small, single-occupant respite rooms—with amenities such as lounge furnishings, warm colors, nature imagery, music, and adjustable lighting—provide solitary sanctuaries for over-stimulated caregivers.
A staff-sustainable environment that cares for and responds to the needs of caregivers gives them time and energy that they can give back to doing what they want to do: care for patients. Environments designed to support efficient and effective work will go a long way toward recruiting and retaining caregivers who love their work and who can heartily recommend their profession and the healthcare facilities in which they work.

The goal of this approach is a truly flexible chassis, which promotes and encourages primary interaction of patients with families, and with physicians, and with their nurses and caregivers. The Universal Nursing Unit has demonstrated that it provides a flexible building layout and an organizational system to achieve operational savings and to minimize final cost (Mohinder S. Datta).
Caregiver work environments need to be designed with sustainability in mind. In this case, creating places that sustain the energy, spirit, and productivity of the staff is the goal. In a recent survey of nurses, 67% said that their workload has increased over the past six months. Fifty-nine percent reported burnout. Nursing is hard work, physically and emotionally. Days are long—40% of nurses today work shifts of more than 12 hours. The stress of caring for high risked patients, using increasingly complex technologies, also contributes to staff fatigue and burnout. Staff fatigue and burnout result from many factors, but helping to alleviate some of the causes can be addressed in the design of the caregivers’ work environment. If the design enables caregivers to work more efficiently by reducing travel distances and the time spent “hunting and gathering,” then caregivers should have more time to spend in direct patient care activities.

This typical configuration, in which a caregiver work environment with centralized support rooms creates a racetrack design that literally keeps staff running back and forth between patients and supplies. Centralized spaces for equipment, supplies, and medications require nurses to constantly backtrack in inefficient work patterns that add miles to their days and pull them away from their patients. The result: wasted motion. Wasted motion is a significant drain on a caregiver’s time and energy. A recent study showed that 50% of nurses’ work time involves transport, motion, and delay. Locating equipment, supplies, and medications close to the patient in order to reduce travel distances and eliminate the need for hunting and gathering is a top priority. Inventory is another form of waste if it means storing more than is needed and storing items that are rarely used. In those cases, inventory wastes space. Another form of inventory waste is hoarding. It is a behavior most of us are familiar with, and it typically happens because caregivers lack confidence that they’ll have what they need when they need it. But hoarding isn’t efficient. It takes up space and doesn’t create a purposeful and organized approach to inventory.

Studies show that nurses who stay in the profession at least three years are likely to remain for their entire careers. Considering that it costs a hospital $90,000 to $145,000 to replace one RN, the benefits of providing safe and
efficient work environments that enhance caregivers’ effectiveness and satisfaction can have an enormous impact on the bottom line as well. Caregiver work environments need to be designed with sustainability in mind. In this case, creating places that sustain the energy, spirit, and productivity of the staff is the goal. A safe and efficient working environment will help to reduce travel distances and streamline processes and, in so doing, reduce caregiver stress and fatigue. Staff-sustainable environments will also play a key role in attracting new talent and retaining valued caregivers (Kerrie Cardon).

**Decentralized Layout**

![Decentralized Layout Diagram](image)

This design provides multi-use space at the patient room, which gives it the ability to adapt and flex as needed. Unlike an environment where all architecture and furnishings are dedicated and static, these flexible spaces can be used as locations for supply storage, direct observation and charting, or “front porches” that provide a place for patients and their families to rest and interact during early ambulation. Multiple use spaces are one way the design of the environment can become more flexible and efficient.

Another feature of an adaptable nursing unit is the inclusion of an equipment closet in every patient room versus storing equipment in a centralized location. Locating an equipment closet in every room keeps caregivers in closer proximity to their patients. By stocking these closets with the equipment most needed by patients—IV poles, pumps, walkers, and commodes—a significant amount of wasted motion and time can be eliminated. Turning over the patient room and its equipment at the same time eliminates the multiple steps of moving items to a soiled storage area, then to central supply, then back to the unit, and finally back to the patient room.

Keeping equipment at the patient room also minimizes the risk of transferring potentially contaminated items and infectious bacteria throughout the hospital.

Patient supplies can be similarly decentralized to eliminate wasted steps. One hospital designed spaces to accommodate patient supplies within the patient room and calculated that the new design saved every nurse six
trips on average to the supply room. This translated into 18 minutes of saved time per nurse—time that can be returned to direct patient care.

Decentralizing equipment and supplies alone will not realize the full benefit of reducing staff travel distances. Distributing medications to the patient rooms or to a support pod adjacent to a group of rooms will reduce staff travel distances and eliminate time wasted waiting for access to centralized meds. A more decentralized medication distribution process may also improve patient safety by reducing the occurrence of a caregiver retrieving medications for several patients at one time, and thereby reducing the potential for medication errors.

The floor plan also incorporates support pods of clean and soiled utility rooms, food supply, and the linens and trash that serve four to six patient rooms. Decentralizing support spaces further reduces staff travel distances. Every nurse travel mile saved by the new configuration returns 20 minutes of caregiving time to direct patient care. Giving nurses more time for patient care leads not only to reduced medical errors and improved patient safety, but also to reduced stress and improved job satisfaction for caregivers. It gives them back their profession’s goal: to care for patients.

A staff-sustaining, adaptable nursing unit creates an environment that responds to the needs of caregivers. Visibility throughout the unit keeps caregivers connected to each other and aware of the activity on the unit. Decentralized support pods for supplies, equipment, and meds provide greater efficiency, managed inventory, less time wasted in travel and searching, and, ultimately, more time available for direct patient care. Designing caregiver environments that sustain the activities and spirit of caregivers and patients is immeasurable (Kerrie Cardon).
3. RESEARCH

3.3.2.3 PATIENT ROOM

In the process of providing a more welcoming environment, the patient room is of particular importance. The challenge for the designer is to create a residential feel while preserving whatever technology is deemed necessary. In the evolution of health care architecture, researchers discussed the shift from a staff-centered (modern) to a patient-centered (postmodern) room. In this transformation, the role of the window and the view it affords are of special significance. Hospital patients during the next 30 to 40 years largely will come from the baby boomer generation. As these individuals grow older they'll have a greater need for healthcare and frequently will have multiple problems and also may be having elective procedures and a general expectation of a higher level of care, including spa-like amenities. Obesity also will be a factor among patients. This creates concern for staff and patient safety. For example, overweight patients are harder to move, potentially harming caregivers and the patient. Placing room functionalities, such as sinks and work counters, where they aid efficiency will save time and therefore labor costs. Additionally, families will become an important part of providing care so the room must have space for them during all hours. Along the lines of saving money, the room must be universal enough to allow changes dependent upon hospital needs. The key is to make the room flexible so transitional expenses are minimized.

Physical Environment

Responsible healthcare design is founded upon creating a balance between human needs and the health of natural systems on which. It means planning and designing buildings that improve the health of their occupants by reducing stress and anxiety for patients, staff and family; that halt ecological degradation; and that truly restore and nourish the people within its walls through safe materials and safe care practices. Many strategies for healthcare environment draw on the principles of reflecting research into the ways that healthcare architecture and interior design can improve medical outcomes, financial performance, and consumer satisfaction. Current ideal setting of the patient room is organized into three zones: patient, family, and staff. Each area is meant to improve patient care by increasing comfort and minimizing disorder and stress. Three distinct zones make up the design: one each for caregivers, the patient and family members and can reduce the perception of density.

Staff zone

The staff zone is located on entry and organized to accommodate staff work flow to improve efficiency and reduce errors, improve staff visualization of patient and vital data, as well as reduce stress and anxiety. It offers better access to equipment by reducing clutter and improving lighting, thereby helping minimize injury and medical error. A dedicated work area provides electronic charting, a hand-washing sink promotes safety and infection control, and desk space facilitates medication prep, charting. The room incorporates modular prefabricated casework which allows greater flexibility as the pieces can be moved and reconfigured to accommodate layout changes or staff preferences, reducing material waste and construction downtime.
3. RESEARCH

Patient Zone

Creating a patient-centered room is paramount to creating a healing environment. The patient zone, which includes the bathroom and much of the bedroom, is designed to give patients as much control over their environment as possible. The design features a non-institutional, aesthetically soothing interior environment to mitigate patient anxiety and maximize patient comfort. Examples include the headwall, which has medical gases located discreetly on the casework that are easily accessible to staff and the wood-paneled ceiling system which contributes to a warmer aesthetic while providing a cleaner surface over the bed. Potentially intimidating medical equipment is discreetly located on one side of the bed, easily accessible to medical staff yet out of sight of patients and their families.

Family Zone

The family zone is designed in response to studies showing that families who visit frequently and stay longer are more involved in patient care, helping to improve patient well-being and facilitate healing. Reminiscent of a living room, this family space includes a sleeper sofa, television, desktop space, and other amenities. A designated area that brings the feeling of home into the patient room allows the family to feel welcomed and promotes a feeling of ownership on the part of the family. By allowing family members to work while at the hospital, a dedicated workspace can minimize stress and encourage more frequent and longer visits.

Visual Access

While not currently recognized by healthcare industry standards as an acceptable means of ventilation, future designs may incorporate patient-controlled access to outdoor air. Limited application in non-critical environments is seen as a potential opportunity to boost the patient’s mental outlook and aid healing. A view to the outdoors and family space, while maintaining staff visibility into the patient room for better patient care. It is also flexible enough that remodeling to accommodate unit changes would be minimal. In related research by Stephen Verderber and David J. Fine, 125 staff and 125 inpatients of physical medicine and rehabilitation (PMR) units viewed 64 4°—5-inch color photographs that depicted the PMR units from 11 hospitals. Rooms in patient living areas, treatment areas, and staff areas ranged from windowed to windowless. Photographs with highest preference were of trees and lawns, neighborhoods surrounding the hospital, people outside the unit, and vistas (both near and far). “In hospitals, the representation of nature—be it ocean, sky, or forest—appears to help satisfy human informational needs”. Keep reported that “satisfaction is generally achieved when window area occupies 20-30% of the window wall” (p. 600). In a study on the value of windows, Verderber and Reuman concluded that involvement with windows and views helps the patient develop a “perceptual and cognitive link with the external environment” and positively affects the therapeutic process. Verderber also found that window conditions in most hospital settings often contrast with patients’ ideal window views found in research.
One reason windows may be of value to the patient is that they are a source of natural light. Natural light is used instead of electric lights during daytime hours, as well as varying air-fan speeds. Side-toilet room designs with fixtures back-to-back more effectively use space and allow common waste, vent and water piping. This reduces the amount of construction material needed and minimizes renovations when medical-unit changes occur. Using locally-sourced construction materials also reduces energy expended in transit. Heerwagen, J., and Heerwagen, D. examined people’s preferences for daylight versus electric light in office spaces and found that people preferred daylight to electric light for psychological comfort, for office appearance and pleasantness, for visual health, and for general health. Windows may be of therapeutic value because they provide a soothing, peaceful distraction. Researchers have found that people much prefer scenes of nature to cityscapes and urban environments, that scenes of nature have more positive effects on physiological states, and that scenes of nature influence faster recuperation from stress than do scenes of the urban environment. Visual access also reduces the perception of high density as compared to identical rooms without escape options. They also offer people the possibility of control (choosing to go somewhere else where there are fewer people – it is enough to even have the perception of this possibility.

**Physical Access**

Roger Ulrich’s studies indicate that views and access to nature help patients recover more quickly; experience less pain; and require fewer medications than patients with no view to nature. Terrace with its outdoor seating area, coffee table, and plants, may be difficult to incorporate in many healthcare settings, because of regulations, safety, buildings codes, and conventional construction practices, but it illustrates the benefits of connecting patients to the outdoors. That patients with views to nature heal more swiftly than those in conventional rooms. In mild climates, a private terrace with pleasant views, fresh air and daylight offers several benefits to the patient, family and staff. The terrace helps orient patients to daylight, allowing them to observe the passing of time, and also improves patient morale by offering a change of scenery. For less temperate climates, a solarium ‘porch’, which collects radiant heat from sunlight, can offer both views, daylight, and passive heating as well. Implying the actual experience of being outdoors in pleasant surroundings will enhance healing even more.
3. RESEARCH

Optimum Patient Room Layout

Inboard Toilet Design

Where the toilet is located along the corridor wall thereby allowing more natural light and extra space for family members.

Outboard Toilet Design

Where the toilet is located along the exterior wall to provide maximum patient visibility for hospital staff.
While both inboard and outboard toilet designs have merits, side-by-side toilet design version allows the best of both worlds.

The optimum design characteristics are serene, comfortable and conducive to healing, as well as takes practical, cost-effective steps to reduce resource consumption while improving patient health. The environment is calming and simple. The curved or angled wall and ceiling forms are a departure from the traditional institutional feel. Surfaces on walls, floors and furniture are textured but easily cleanable. Sights, sounds and smells are appealing. Positive visual and auditory elements can be introduced on the room’s video screen. From their bed, a patient can pull up a wooded scene with a babbling brook, which can lower stress and aid recovery. This is especially important for hospitals in urban settings where there are no views of nature. The video screen allows some patient control and also can be used for videoconferencing with their children at home, speaking to medical specialists, communicating with nursing staff and more. One drawback of the optimum design version may be the room is bigger. Overall, hospital buildings with side-by-side toilet design will be longer but not quite as wide, meaning cost typically won’t increase. Sustainable designed patient rooms is commonplace now. Flexibility in design has been a goal of healthcare visionaries since the days. Durable, sustainable design, if implemented properly, will allow future healthcare executives to hold the line on costs and continually improve the quality of patient care. The optimum design aims that healthcare environments can be sensitive to the needs of the patient, staff, family, and the institution—as well as the environment. Most importantly, this exhibit shows their interdependence.
3.4 HUMAN FACTORS (PERSONAL FACTORS)

Human factors is an important consideration in the design of medical facilities. Properly taking human factors into consideration can reduce errors, improve performance, and help inhabitants to find the design flaws that are the root causes of medical errors. Expanding awareness of human-factors can improve health care itself. Researchers are finding that changes and additions made to the health care facility’s physical and social environment with the patient in mind can positively influence patients’ outcomes. Facilities need to develop supporting patient-centered and family-centered care, design professionals need to provide work environments that are staff-sustainable, that help to improve staff satisfaction, and reduce absentee and vacancy rates. Patient-centered care, family-centered care and staff-sustainable spaces encourage communication and consultation among caregivers and create opportunities for peer support and mentoring.

3.4.1 INHABITANT CHARACTERISTICS

Patients receive basic humane care. As the patients began to live longer we began to define their complications. These complications led to the development of different medical interventions. The complexity of the nursing care and the lengths of the patient stay increased. Nursing units began to be categorized by acuity levels. The advent of major trauma care and serious surgical intervention decreased the rate of mortality. The patient stays in hospitals had been shortening – with this development, the hospital stay increased. Multi-disciplinary medical and surgical interventions brought new devices. Equipment and staff required for the new treatments created a dehumanizing environment. Reactions to this change heightened the sensitivity to environment and to the role of the emotional connects necessary for the patient’s sense of well being.

The physician diagnosed through observation. The touch, the contact between physician and patient, gave confidence. The bond was part of the treatment. The guilds established standards. They set up schools. Schools standardized the training, and the knowledge base increased. In rapid order; research led to the development of medical specialties and new technologies. Physician/patient contact decreased. The diagnostic tools of imaging and testing took over the care system. The search into the working of the mind took the profession back to the “alternative” medicines developed over the previous thousands of years. The patient access to information led to an informed partnership be tween patient and physician. The bond was re established.
In hospitals the primary contact of the patient has been with the nurses. The nursing unit has remained the territory of the nurse whose training has become very sophisticated, with knowledge of not only medicine but also of devices and pharmaceuticals. Most importantly the patient often sees the hospital through the nurse. As cost reduction efforts have evolved, there has been ever increasing pressure to reduce the level of nursing care and even to use telemedicine to utilize scarce skills from a remote location. This sobering statistic is only one of many red flags being raised by caregivers in the United States. 44% of nurses surveyed say they wouldn’t recommend nursing as a profession. Another 54% say they are suffering from burnout. In a separate study, more than a third of new RNs surveyed had already left their first jobs due to stressful work conditions, and over a quarter of the same sample reported that lack of supplies and equipment make it difficult or impossible to do their jobs. America’s chronic nursing shortage—at the 2008 annual meeting of the American Organization of Nurse Executives, economist Peter Buerbaus projected a shortfall of 285,000 nurses by the year 2020—receives plenty of attention. But one of the main issues driving nurses from the profession is consistently overlooked: the condition of the environments in which they are expected to work.

In rehabilitation facility therapists are also the primary contact of the patient. Therapists help patients suffering from disease or injury improve mobility, relieve pain, increase strength, and decrease or prevent deformity. They assess, plan, organize, and participate in rehabilitative programs and help people of all ages to improve their ability to perform tasks in their daily living and working environments. They work closely with patients who have conditions that are mentally, physically, developmentally, socially or emotionally disabling. They also help them to develop, recover, or maintain daily living and work skills. Therapists help patients not only to improve their basic motor functions and reasoning abilities, but also to compensate for permanent loss of function. Their goal is to help clients have independent, productive, and satisfying lives.

The family was the first and primary caregiver for the patient. The first hospitals isolated patients with contagious and infectious diseases reducing family contact. The increased use of technology and invasive treatment further distanced families from patients. The search for tools to improve outcomes and reduce costs is once again bringing the family into the care giving role. This has been coupled with medicine’s recognition of the trauma and stress suffered by families when a member is in the hospital. The information age has helped by creating a more informed public better able to share in the role of caregiver. With the advent of cooperative care and the Planetree model, family members were given complete access to the patient and encouraged to participate in the care of the patient during their hospitalization. The need for family space in the nursing unit has created new pressures on the reserves needed for the development of hospitals.
3.4.2 Sociofugal vs. Sociopetal space

The importance of a built environment that respects the patients’ auditive and visual privacy is deemed more or less self-evident. Lack of privacy may lead to loss of control and autonomy. It may also cause patients not to openly discuss matters or to refuse certain physical examinations, and it may adversely affect the quality of communication between patients and staff. Privacy perception is also likely to play a role in the patient’s wellbeing. Privacy proves important for a positive perception of the room. Both the extent of visual access (quantity of view of the room) and the extent of visual exposure (the extent to which a person is visible to others) turn out to affect the privacy perception. Research in the care for the elderly shows that the experience of lack of privacy and dissatisfaction with the environment leads to deterioration of the health. Research in a psychiatric setting indicates that lack of privacy also affects the social interaction. For example, isolated and passive behavior in multiple-bed rooms increases as the number of beds per room and the size of the room increase. If a patient has the possibility to withdraw, he will behave more socially. Smaller, separated rooms offer the patient freedom to choose what he wants, whereas large, frequently visited rooms reduce that freedom and lead to isolation. Closely connected with privacy is the possibility to have one’s own territory, own area or room that one can control. Generally, this will increase the predictability and stability in life. It gives people a sense of safety, it is a ‘home’, known territory, and it offers protection against stressors in the environment. Furthermore, a territory plays a role in organizing social interactions, expressing one’s identity and sense of association with a room, such as experiencing a room as more comfortable or homely. A territory provides people with a place for sharing intimate moments with family and friends and promotes social interaction.
British psychiatrist, Humphrey Osmond is best known for his research into the treatment of schizophrenia with psychedelic drugs, but his Weyburn hospital became a design research lab to examine the functional aspects of architecture and its impact on the mentally ill. In 1957, Osmond decided that changes in the physical milieu would benefit both patients and staff. When we attempted to learn about the connection between architecture and behavior. Osmond began observing the effects of environmental change on the interactions of patients in a mental hospital in Saskatchewan. From that research he eventually identified two major systems for patterning space. Sociofugal space (gridlike) tends to keep people apart and suppress communication while sociopetal space (radial) does just the opposite. It brings people together and stimulates interaction as routes merge and overlap.

Beyond his interest in drug- and vitamin-assisted therapeutics, Osmond conducted research into the long-term effects of institutionalization, and began a line of research into what he called “socio-architecture” to improve patient settings, coining the terms “sociofugal” and “sociopetal”, starting Robert Sommer’s career, and making fundamental contributions to environmental psychology almost by accident. Osmond would synthesize current research from a wide array of disciplines including sociology, communication, psychology, perception, criminal and carceral studies, education, animal behavior, architecture, and urban planning. His research recognizes these behaviors belonging to the most deeply seated, reactive parts of our brains. Many other researchers followed in Osmond’s footsteps, developing a body of work known as “proxemics” to describe the cultural distinctions between intimate, personal, social and public space. The Hidden Dimension by anthropologist Edward T. Hall is a classic reference on the spatial aspects of human interaction. Hall cites the early research done by Osmond and Sommer in Saskatchewan. Through the observations of how such spaces were actually used by inhabitants and visitors versus the idealistic but essentially inattentive designs of their architects, these critics assailed the psychological and sociological effects. The effects of proxemics, according to Hall, can be summarized by the following loose rule: “Like gravity, the influence of two bodies on each other is inversely proportional not only to the square of their distance but possibly even the cube of the distance between them.”

A typical pattern of proxemics might explain how the arrangement of furniture in a room discourages or encourages conversation or interaction. Airport lounges for example are designed to isolate people. So are most libraries, supermarkets and classrooms.
On a still-larger scale, Sociopetal and sociofugal patterns work on multiple scales. Washington Square Park in New York City is a fantastic example of sociopetal space. The book Drawing a Circle in the Square catalogs the series of interconnected rings, spirals, and funnels that bring people together throughout the park and contribute to its popularity as a gathering place. Spiro Kostof explores the isolating nature of grids in The City Shaped and compares the urban pattern of New York to radial cities such as Washington DC or Paris and organic cities such as Pittsburgh or London.

There are strong indications that social interaction (and the associated possibilities for social support) is promoted by creating specific rooms for that purpose. Here, too, variation in the type of rooms and facilities will create options and offer the possibility for various types of social interaction, according to need. One may think of lounges or niches, day care centres, living rooms, (additional) space in patient rooms (family zone) so that family can stay overnight if necessary, waiting rooms and an outdoor area. Moreover, rooms can be decorated so as to encourage or promote social interaction. Such a room will have a so-called sociopetal configuration, offering people the possibility to adjust the personal space so as to make it more easily accessible and facilitate communication about a person’s intentions.
A sociofugal configuration, on the other hand, separates people, reduces social interaction and leads to withdrawal and isolation. An important spatial aspect affecting the configuration is the setting of the furniture. If chairs are placed in (long) rows along the walls, users will show sociofugal behavior. They will stare aimlessly and there will be little communication. If furniture is placed in smaller circles in the centre of the room, the interaction between the users (and, thus, the chances of social support) will double. Settings with face-to-face contact promote social interaction, maintaining sufficient distance for a person to retain his sense of self-esteem. Small groups of furniture, centrally placed in the room increase the perception of crowding as compared to placing them along the walls (a sociofugal setting rather than a sociopetal setting);

Sociofugal/sociopetal distinction gives an important tool for approaching the problem of situated human interaction. These experiments showed him the distortions in the perceptions of patients. He realized that assumed insignificance of particular sights, sounds and smells to a “sane” person could become insurmountable fears to the patient. These include: self-perception, perception of others, space perception and time perception. He goes on to say that, “all of the senses, including those that transmit impressions of temperature, humidity, taste and sound” need to be included in the design. These sensations are embodied in the design of the building by accounting for space relationships, a lack of corridors, smaller room size, a retreat, and an “attempt to bring spaces into relative scale and shorten distances”
4. PRECEDENT ANALYSIS
4.1 Children’s Center for Psychiatric Rehabilitation

The Children’s Center for Psychiatric Rehabilitation is located in Hokkaido, Japan. It is designed by the Japanese architect, Sou Fujimoto, in 2006. This is the treatment center for mentally disturbed children where they live together to get regaining their mental health. It is rich life space that requested in origin like a large house and also like a small city, the intimacy of a house and also the variety of the city.

A precise planning / Accidental landscape

Although, this space is created as a result of an infinite, strict and artificial design process, it stands as a place which is not planned at all, or which has been made automatically with no intention. The place which is vague, unpredictable, filled with unlikelihood. Something that is not meant is produced as a result of an intentional and strict design act. And plenty of a place is achieved because of ambiguity for not being intentional.

The Method Of Being Random

Like a small village aiming that offers a rich variety of activities within an intimate context. Fujimoto thought of his center as a “building out of a dream”. He intended to design with “the method of being random. Fujimoto planned his functions very precisely within something was merely scattered. He was able to adjust the complex program required by his client, moving his boxes. The plan turned out to be quite flexible just because it was random.

Freedom And Inconvenient

An Irregular Alcove-place Is Produced Between The Boxes Placed At Random. It Is The Place Of A Small Scale Where Children Can Hide In While They Are Connected To The Living Area. Although It Is The Space With No Function In Which It Can Make It Avoidable In A Simple Form Strangely, Children Play With The Place Like The Primitive Man Who Interprets Landscape Freely And Lives Very Well In It. They Hide In A Place Behind Something,
Show Up, Relax At Back, And Run About Here And There. By Being Separated And Being Connected Are Compatible, Freedom And Inconvenient Live Together In The Meantime. Plenty Of The Place For Living Is Achieved.
4. PRECEDENT ANALYSIS

VOLUME

PUBLIC SPACE

LIGHT

USER CIRCULATION

CROSS VENTILATION

INTERACTION

VIEW

LIGHT
4.2 REHAB, Center for Spinal Cord and Brain Injuries

<table>
<thead>
<tr>
<th>Formal name of Project:</th>
<th>REHAB, Center for Spinal Cord and Brain Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location:</td>
<td>Basel, Switzerland</td>
</tr>
<tr>
<td>Gross square footage:</td>
<td>246,386 sq. ft.</td>
</tr>
<tr>
<td>Total construction cost:</td>
<td>$110 million</td>
</tr>
<tr>
<td>Architect:</td>
<td>Herzog &amp; de Meuron</td>
</tr>
</tbody>
</table>

**Dematerializing the wall plane and bring nature indoors to deinstitutionalize a clinic**

REHAB Basel, a privately run clinic for spinal-cord and brain injuries, ingeniously subverts the stereotype while bolstering its therapeutic goals. It appears residential and natural—though not with a funky, down-home earthiness, but a crisply turned-out mien. Here, oak, pine, larch, and ironwood enclose and screen exterior walls, and a rectilinear plan brings daylight and landscape into its precincts through courtyards, grassy roofs, glazed walls, upper-level decks, and skylights.

In providing 92 beds in double and single rooms, where patients with spinal-cord or brain injuries can stay up to 18 months, the clinic directors eschewed the institutional hospital look. Gone is the typical maze of corridors and doors to anonymous rooms. The staff sought to connect patients visually and physically with the landscape while giving wheelchair-bound paraplegics a sense of autonomy. The program called for a day clinic, physical and neurological therapy rooms, medical facilities, conference rooms, a gym, a patient swimming pool, plus overnight accommodations and semiprivate meeting areas for family members.

On the border between Switzerland and France, the new Swiss Center for Paraplegics (REHAB) has been realized on a lot of 144 by 86 meters. In this building created for the rehabilitation of paraplegics and brain-injured, Herzog & de Meuron emphasize the horizontal. The structure comes alive through the use of concrete, timber and glass, making it very bright in the interior and giving it a very light appearance on the exterior. The architects have structured the facade as well as the network of paths connecting the 9500 m² floor area in the building with four large and four small courtyards. As a result there is an abundance of light channels and numerous rooms with aquatic plants (designed by landscape architect August Kunzel). In this western city, the new building appears like the pavilion of
4. PRECEDENT ANALYSIS

An East-Asian temple or palace ensemble. The Pfaffenhofen sports complex is located on the other side of the border fence.
4. PRECEDENT ANALYSIS

ACCESSIBLE AREA

LIGHTING & VENTILATION

PHYSICAL & VISUAL ACCESS
5. SITE ANALYSIS
5. SITE ANALYSIS

This design challenges to investigate an existing SNF and develop an original set of design standards for renovation and new construction to meet today’s use of nursing facilities while improving on aspects of living conditions and work environment. The developed program includes a set of drawings, general programmatic constraints and recommended space requirements for redeveloping a real life case study located in Bushnell, Florida.

5.1 Geography

Location
Bushnell, Sumter County, Florida, United States

In general rehabilitation facility like their predecessors the sanatoriums of the 19th and 20th century are based on a dualistic set of values: they embody the belief in the healing power of technology and the healing power of nature, which is why they are mostly situated in pristine landscapes. The site is located in Bushnell, Florida. Bushnell is situated in the geographical center of Florida with the Florida Turnpike originating here and I-75 extending through the entire length of the city. Although extremely rural atmosphere, in recent years Bushnell has sustained an exceptionally large increase in population, almost solely due to the expansion of the village retirement complex, a significant portion of which is in the county. This has dramatically changed the demographics of the county and has brought in significant income.
In these days of “shabby chic” home decor and “grunge” fashion, “Cracker” houses are making a comeback in the Deep South. Florida developers are trying to capture the casual, homey style with modern developments sporting metal roofs, cedar siding and deep shade porches. The St. Petersburg Times dubs the mini building boom, “Cracker Chic.” While pioneers to the Deep South found an inhospitable land of searing heat, merciless biting insects and semi-tropical rains, settlers to these new “rustic” deed-restricted, gated communities leave air-conditioned homes to stroll on paved streets and sidewalks leading to swimming pools and clubhouses. Promotional literature for one of the planned developments, Riverwalk, near Gainesville, boats of a “Key West style of architecture in keeping with the charm of the old Florida Cracker homes.” Another, Seaside, claims that the pricey development is “more than design. It is a way of life.” Long time regarded as a poor relative in the family of American architecture, Cracker style is now being celebrated for its inventiveness and energy efficiency.

In its simplest form, a Cracker house is a wooden shelter built by the early Florida and Georgia settlers. Lured to Florida by cheap and plentiful land, these pioneers arrived with few provisions and needed to erect shelter quickly and cheaply. The brush provided abundant supplies of cedar and cypress. Rocks or bricks made of oyster shell and lime served as pilings to keep the shelters off the ground. A wide shade porch wasn’t just an embellishment. In pre-air-conditioned Florida, the porches provided relief from the relentless sun. The Florida Cooperative Extension Service notes the energy efficiency of the style it calls “Florida Vernacular:” Site orientation for shade, wide, covered
porches, crawl spaces beneath the homes for ventilation, and windows that took advantage of cross breezes. Floor cracks "helped with house cleaning, and raised first floor was used to keep hounds (hunting) and chickens (food), which in turn provided service of consuming fleas and other pests," according to an extension publication on energy efficiency. The simplest of these cabins were called single pen houses. As money permitted and family size dictated, these "single pen" square cabins often were added to, producing such fanciful names as "saddlebag" and "dog-trot" house.
5. SITE ANALYSIS

5.2 Climate

The Climate for Bushnell, is considered subtropical with warm, humid summers and mild, relatively dry winters. The nearest climate data recording station is located in the city. It reaches 51 inches of rain per year. The US average is 37. Snowfall is 0 inches. The average US city reaches 25 inches of snow per year. The number of days with any measurable precipitation is 95. On average, there are 239 sunny days per year in Bushnell. The July high is around 92 degrees. The January low is 46. Our comfort index, which is based on humidity during the hot months, is a 27 out of 100, where higher is more comfortable. The US average on the comfort index is 44.

<table>
<thead>
<tr>
<th>Climate</th>
<th>Bushnell, FL</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rainfall (in.)</td>
<td>51.2</td>
<td>36.6</td>
</tr>
<tr>
<td>Snowfall (in.)</td>
<td>0</td>
<td>25.2</td>
</tr>
<tr>
<td>Precipitation Days</td>
<td>95</td>
<td>101</td>
</tr>
<tr>
<td>Sunny Days</td>
<td>239</td>
<td>205</td>
</tr>
<tr>
<td>Avg. July High</td>
<td>91.6</td>
<td>86.5</td>
</tr>
<tr>
<td>Avg. Jan. Low</td>
<td>45.6</td>
<td>20.8</td>
</tr>
<tr>
<td>Comfort Index (higher=better)</td>
<td>27</td>
<td>44</td>
</tr>
<tr>
<td>UV Index</td>
<td>6.5</td>
<td>4.3</td>
</tr>
<tr>
<td>Elevation ft.</td>
<td>75</td>
<td>1,062</td>
</tr>
</tbody>
</table>

Climate Consultant

Climate Consultant is free graphic-based computer program displays climate data in dozens of ways useful to architects, builders, contractors, and homeowners, including temperatures, humidity, wind velocity, sky cover, and solar radiation in both 2-D and 3-D graphics for every hour of the year in either Metric or Imperial units. Climate Consultant 4.0 also plots sun dials and sun shading charts overlaid with the hours when solar heating is needed or when shading is required. The psychrometric chart analysis shows the most appropriate passive design strategies in each climate, while the new wind wheel integrates wind velocity and direction data with concurrent temperatures and humidity and can be animated hourly, daily, or monthly. This list of Design guidelines by Climate Consultant applies to this particular climate;
1. Window overhangs (designed for this latitude) or operable sunshades (extend in summer, retract in winter) can reduce or eliminate air conditioning.

2. In this climate air conditioning will always be required, but can be greatly reduced if building design minimizes overheating.

3. Good natural ventilation can reduce or eliminate air conditioning.

4. On hot days ceiling fans or indoor air motion can make it seem cooler by at least 5 degrees F (2.8C) thus less air conditioning is needing in warm weather, if windows are well shaded and oriented to prevailing breeze.

5. Raising the indoor comfort temperature limit will reduce air conditioning energy consumption (raise thermostat cooling setpoint) (see Criteria).

6. Minimize or eliminate west facing glazing to reduce summer and fall afternoon heat gain.

7. Use plant materials (ivy, bushes, trees) especially on the west to shade the structure (if summer rains support native plant growth).

8. Keep the building small (right-sized) because excessive floor area wastes heating and cooling energy.

9. Traditional homes in hot humid climates used light weight construction with openable walls and shaded outdoor porches, raised above ground.

10. High Efficiency air conditioner (at least Energy Star) should prove cost effective.

11. Use light colored building materials and cool roofs (with high emissivity) to minimize conducted heat gain.

12. Screened porches and patios can provide comfort cooling by ventilation and prevent insect problems.

13. Locate door and window openings on opposite sides of building to facilitate cross ventilation, with larger areas facing up-wind if possible.

14. Traditional homes in warm humid climates used high ceilings and high operable (French) windows protected by deep overhangs and porches.

15. Locate garages or storage areas on the side of the building facing the coldest wind to help insulate.

16. A whole-house fan or natural ventilation can store nighttime ‘cooling’ in high mass interior surfaces, thus reducing or eliminating air conditioning.

17. Orient most of the glass to the north, shaded by vertical fins, in very hot climates, if there are essentially no passive solar needs.

18. For passive solar heating face most of the glass area south to maximize winter sun exposure, but design overhangs to fully shade in summer.

19. High mass interior surfaces like stone, brick, tile, or slate, feel naturally cool on hot days and can reduce day-to-night temperature swings.

20. Trees (neither conifer nor deciduous) should not be planted in front of passive solar windows, but rather beyond 45 degrees from each corner.
5. SITE ANALYSIS

5.3 Existing Condition

5.3.1 Osprey Point Nursing Center

With over 675 nursing facilities in Florida alone, developing a set of design methods for these existing structures will not only stimulate better design and building practices for future nursing facilities, but also ensure that there is not an influx of obsolete structures in need of renovation. Chosen for its familiar design aesthetic, Pelican Point represents hundreds of skilled nursing homes throughout Florida built within the past two decades. The building is neither old nor obsolete; rather, it accommodates a medical model for the delivery of skilled nursing services, which no longer represents best practices in the field of long term care. Students should carefully inspect the case in order to create new and original methods for recycling and rearranging the current structure. Pelican Point currently serves 60 residents through a two thirds mix of double occupancy to single occupancy bedrooms. The current size of the nursing home is 27,336 sq. ft with only 15,570 of that space utilized for programmed functions. The supplied plans identify a wide range of service areas (medical, therapeutic, nursing, wellness and social) offered at the facility. When compared to other skilled nursing homes in the state, it is less likely for long-stay residents to have moderate to severe pain, long-stay residents to be physically restrained, long-stay residents to be more depressed or anxious, long-stay residents to have catheter inserted and left, long-stay residents to spend most of their time in bed, long-stay residents to have a urinary tract infection, long-stay residents to lose too much weight, short-stay residents to have delirium, and short-stay residents to have moderate to severe pain.

5.3.2 CiteHealth Survey

CiteHealth is a health care ratings website for consumers to evaluate their health care providers quality in an effort to enable them to make informed decisions about medical care they may be receiving. Their survey contains on each health provider comes from numerous government and commercial sources, direct contact, and from the user base. The survey covers Nursing Home Report - Quality, Staffing, Reviews, Ratings and More. The facility has 55 residents indicating 92% of it’s beds are occupied, which is about average within this state. The provider participates in the medicare & medicaid programs and provides resident counseling services. A total of 213 Medicare patients were given 8,772 days of non-swing bed care and services in 2006, and the provider was reimbursed $2,585,518 by Medicare. 56 Medicare patients were given outpatient care and services by this provider in 2006. The provider was reimbursed $62,718 by Medicare for these services. On a state level, the number of registered nurse hours per resident per day is average. Certified nursing assistant hours per resident per day is average. The number of licensed practical or vocational nurse hours per resident per day is higher than average. Licensed staff hours per resident per day is average. When compared to other nursing homes in the state, it is more likely for long-stay residents to be given an influenza vaccination, long-stay residents to be given a pneumococcal vaccination, short stay residents to be given an influenza vaccination, and short-stay residents to be given a pneumococcal vaccination at Osprey Point Nursing Center.
Osprey Point Nursing Center
Detailed report on the nursing home located in Bushnell, Florida (FL).

Beds
The total number of beds the facility operates. Each resident is assigned to a single bed.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beds Occupied</td>
<td>60</td>
<td>135</td>
<td>120</td>
<td>106</td>
</tr>
</tbody>
</table>

Beds Occupied
The percentage of total beds that are occupied by residents.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
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<tbody>
<tr>
<td>92.00%</td>
<td>95.00%</td>
<td>87.92%</td>
<td></td>
<td>84.18%</td>
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</table>

Residents
The total number of residents residing at the facility.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residents</td>
<td>55</td>
<td>131</td>
<td>106</td>
<td>90</td>
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</tbody>
</table>

Located in a Hospital
Indicates whether the facility is located within a hospital.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
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</table>

Located in a CCRC
Indicates whether the facility is located within a continuing care retirement community.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
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<tbody>
<tr>
<td>No</td>
<td></td>
<td></td>
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RN Hours Per Resident
The average number of registered nurse hours per resident per day.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
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<tbody>
<tr>
<td>0.49</td>
<td>0.52</td>
<td>0.57</td>
<td>0.64</td>
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CNA Hours Per Resident
The average number of certified nursing assistant hours per resident per day.

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<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.06</td>
<td>3.96</td>
<td>2.94</td>
<td>2.34</td>
<td></td>
</tr>
</tbody>
</table>

LPN/LVN Hours Per Resident
The average number of licensed practical or vocational nurse hours per resident per day.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.18</td>
<td>1.40</td>
<td>1.00</td>
<td>0.79</td>
<td></td>
</tr>
</tbody>
</table>

Licensed Staff Hours Per Resident
The average number of licensed staff hours per resident per day.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.67</td>
<td>1.92</td>
<td>1.57</td>
<td>1.43</td>
<td></td>
</tr>
</tbody>
</table>
## Quality Measures

### Long-Stay Residents Given Influenza Vaccination
The percentage of long-stay residents given influenza vaccination during the flu season.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Given Influenza Vaccination</strong></td>
<td>95.00%</td>
<td>80.00%</td>
<td>75.40%</td>
<td>86.01%</td>
</tr>
</tbody>
</table>

### Long-Stay Residents Whose Need for Help With Daily Activities Has Increased
The percentage of long-stay residents whose need for help with daily activities has increased.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Whose Need for Help With Daily Activities Has Increased</strong></td>
<td>15.00%</td>
<td>17.00%</td>
<td>14.76%</td>
<td>16.08%</td>
</tr>
</tbody>
</table>

### Long-Stay Residents Given Pneumococcal Vaccination
The percentage of long-stay residents who were assessed and given pneumococcal vaccination.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Given Pneumococcal Vaccination</strong></td>
<td>95.00%</td>
<td>66.50%</td>
<td>69.48%</td>
<td>79.81%</td>
</tr>
</tbody>
</table>

### Long-Stay Residents Who Have Moderate to Severe Pain
The percentage of long-stay residents who have moderate to severe pain.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Who Have Moderate to Severe Pain</strong></td>
<td>0.00%</td>
<td>2.00%</td>
<td>4.19%</td>
<td>4.53%</td>
</tr>
</tbody>
</table>

### Low-Risk Long-Stay Residents Who Lose Control of Their Bowels
The percentage of low-risk long-stay residents who lose control of their bowels or bladder.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low-Risk Long-Stay Residents Who Lose Control of Their Bowels</strong></td>
<td>0.00%</td>
<td>0.00%</td>
<td>4.06%</td>
<td>4.39%</td>
</tr>
</tbody>
</table>

### Long-Stay Residents Who Have Catheter Inserted and Left
The percentage of long-stay residents who have/had a catheter inserted and left in their bladder.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Who Have Catheter Inserted and Left</strong></td>
<td>3.00%</td>
<td>4.50%</td>
<td>5.73%</td>
<td>5.89%</td>
</tr>
</tbody>
</table>

### Long-Stay Residents Whose Ability to Move Around Their Room Got Worse
The percentage of long-stay residents whose ability to move about in and around their room got worse.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County</th>
<th>Florida</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long-Stay Residents Whose Ability to Move Around Their Room Got Worse</strong></td>
<td>3.00%</td>
<td>7.00%</td>
<td>10.27%</td>
<td>14.45%</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>This Provider</td>
<td>Sumter County</td>
<td>Florida</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------</td>
<td>---------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Long-Stay Residents With a Urinary Tract Infection</strong></td>
<td>The percentage of long-stay residents with a urinary tract infection.</td>
<td>5.00%</td>
<td>9.50%</td>
<td>10.57%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents Given Influenza Vaccination</strong></td>
<td>The percentage of short-stay residents given influenza vaccination during the flu season.</td>
<td>95.00%</td>
<td>69.00%</td>
<td>60.86%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents With Delirium</strong></td>
<td>The percentage of short-stay residents with delirium.</td>
<td>1.00%</td>
<td>7.50%</td>
<td>9.25%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents Given Pneumococcal Vaccination</strong></td>
<td>The percentage of short-stay residents who were assessed and given pneumococcal vaccination.</td>
<td>95.00%</td>
<td>82.00%</td>
<td>65.27%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents Who Lose Too Much Weight</strong></td>
<td>The percentage of long-stay residents who lose too much weight.</td>
<td>3.00%</td>
<td>7.50%</td>
<td>9.25%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents Who Had Moderate to Severe Pain</strong></td>
<td>The percentage of short-stay residents who had moderate to severe pain.</td>
<td>7.00%</td>
<td>14.50%</td>
<td>19.79%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents With Pressure Sores</strong></td>
<td>The percentage of short-stay residents with pressure sores.</td>
<td>16.00%</td>
<td>18.00%</td>
<td>18.49%</td>
</tr>
<tr>
<td><strong>Long-Stay Residents Who Lose Too Much Weight</strong></td>
<td>The percentage of long-stay residents who lose too much weight.</td>
<td>3.00%</td>
<td>7.50%</td>
<td>9.25%</td>
</tr>
<tr>
<td><strong>Short-Stay Residents With Pressure Sores</strong></td>
<td>The percentage of short-stay residents with pressure sores.</td>
<td>16.00%</td>
<td>18.00%</td>
<td>18.49%</td>
</tr>
</tbody>
</table>
Non-Swing Bed Patients
The number of non-swing bed patients treated by this provider that were covered by Medicare Part A in 2006. A non-swing bed is defined as a bed that is used by a patient over a period of time at a skilled nursing facility, often as a residence.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>This Provider</strong></td>
<td>213</td>
<td>389</td>
<td>222</td>
<td>133</td>
</tr>
</tbody>
</table>

Non-Swing Bed Patient Discharges
The number of non-swing bed patient discharges made by this provider that were covered by Medicare Part A in 2006. A discharge is defined as a formal release from a hospital or skilled nursing facility. A non-swing bed is defined as a bed that is used by a patient over a period of time at a skilled nursing facility, often as a residence.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>This Provider</strong></td>
<td>232</td>
<td>401</td>
<td>222</td>
<td>124</td>
</tr>
</tbody>
</table>

Non-Swing Bed Utilization Days
The number of days of non-swing bed care that are chargeable to Medicare Part A facility utilization by this provider in 2006. This measure includes full days, coinsurance days, and lifetime reserve days. A non-swing bed is defined as a bed that is used by a patient over a period of time at a skilled nursing facility, often as a residence.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>This Provider</strong></td>
<td>8,772</td>
<td>14,328</td>
<td>7,530</td>
<td>4,470</td>
</tr>
</tbody>
</table>

Outpatients
The number of outpatients treated by this provider that were covered by Medicare Part B in 2006. An outpatient is defined as a patient treated in under 24 hours at a qualifying medical facility.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
<th>Florida Average</th>
<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>This Provider</strong></td>
<td>56</td>
<td>143</td>
<td>218</td>
<td>301</td>
</tr>
</tbody>
</table>
### Financials

#### Medicare Non-Swing Bed Payments
The total non-swing bed associated Medicare Part A payments made to this provider in 2006. A non-swing bed is defined as a bed that is used by a patient over a period of time at a skilled nursing facility, often as a residence.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
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</tr>
</thead>
<tbody>
<tr>
<td>$2,585,518</td>
<td>$4,776,391</td>
<td>$2,383,353</td>
<td>$1,318,701</td>
<td></td>
</tr>
</tbody>
</table>

#### Medicare Payments Per Non-Swing Bed Patient Discharge
The average Medicare payments made to this provider per Medicare Part A covered non-swing bed patient discharge in 2006. A discharge is defined as a formal release from a hospital or skilled nursing facility. A non-swing bed is defined as a bed that is used by a patient over a period of time at a skilled nursing facility, often as a residence.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>$11,144</td>
<td>$11,926</td>
<td>$10,721</td>
<td>$10,652</td>
<td></td>
</tr>
</tbody>
</table>

#### Medicare Outpatient Payments
The total outpatient associated Medicare Part B payments made to this provider in 2006. An outpatient is defined as a patient treated in under 24 hours at a qualifying medical facility.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
<th>Sumter County Average</th>
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<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>$62,718</td>
<td>$364,630</td>
<td>$228,515</td>
<td>$266,523</td>
<td></td>
</tr>
</tbody>
</table>

#### Medicare Payments Per Outpatient
The average Medicare payments made to this provider per Medicare Part B covered outpatient in 2006. An outpatient is defined as a patient treated in under 24 hours at a qualifying medical facility.

<table>
<thead>
<tr>
<th></th>
<th>This Provider</th>
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<th>United States Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>$1,120</td>
<td>$2,559</td>
<td>$1,047</td>
<td>$885</td>
<td></td>
</tr>
</tbody>
</table>
6. PROGRAM
6.1 OVERVIEW AND DEFINITION

A Skilled Nursing Facility (SNF), also commonly known as a nursing home, is a designated structure or group of structures that employs registered nurses in providing 24-hour care to people who can no longer care for themselves due to physical, emotional, or mental conditions regardless of age. A licensed physician supervises each resident’s care and a nurse or other medical professional is almost always on the premises. Most of these facilities utilize two basic types of services: skilled medical care and custodial care.

The following design criteria reflect suggestions for changing the current skilled nursing facility model from an institutional medical facility into a warm, home like environment. The main goal of this change is to afford residents with more choices and spaces that envelop aspects of both public and private ideologies. Skilled nursing facilities embody a community’s commitment to sheltering and caring for their vulnerable neighbors. These buildings should express health and wellness to those needing its services. In addition, many nursing homes strive to contribute positively to the architectural fabric of the local community by projecting an image of stability and integrity. There are eight basic principles that should be addressed when designing the renovation of the fictitious case study, the nursing home:

**Resident Unit:**
Each resident unit should consist of the resident rooms, resident support areas, and resident living areas. It may either be designed as a household or as a resident unit with single or double loaded exit access corridors.

- When the household unit design concept is utilized, the resident sleeping rooms should be designed or clustered around the resident support and living areas.
- When the double or single loaded corridor is utilized, it should be limited in length between places of visual interest sitting areas or other type to discourage a “bowling alley” appearance.

**Resident Rooms:**
Private resident rooms are preferred, but semi-private resident rooms may be used if the sleeping areas are visually separated from each other by a full height wall, a permanently installed sliding or folding door, partition, or other permanently installed visual separation such as built in furniture. In both private and semi-private rooms, an exterior window for each resident sleeping area shall be provided to ensure that there is a view of and direct access to the outside by the resident at all times. Resident rooms shall have a minimum clear floor area of 100 ft² (9.29 m²) per bed in semi-private rooms and 120 ft² (11.15 m²) of clear floor area in single resident rooms. This area does not include space dedicated for a toilet room, lavatories, closets, wardrobes, alcoves, door swings into the room, or entrance vestibules. A three foot (0.91 m) wide area to access each bed shall be provided along at least 75% the length of one side and shall be designed to allow access for the use of a wheelchair and other portable equipment. For planning purposes, a full-size bed is assumed to be 3 feet 6 inches (1.07 m) wide by 8 feet (2.43 m) long. Each resident room shall be provided with a bedside table (or equivalent), a reading lamp, a well-constructed appropriate bed, and a non-folding type armchair for each resident. Each resident shall have access to a toilet room without
having to enter the general corridor area or a resident bed area in a shared resident room. One toilet room shall serve no more than two residents and no more than two resident rooms. A hand-washing sink shall be provided in each resident toilet room. The door to the toilet room shall be at least 32 inches (813 mm) wide, side hinged, and either swing out from the toilet room or be equipped with emergency release hardware. Sliding doors that are not equipped with a bottom door track shall be permitted, but must be equipped with sliding door hardware located on the resident room side of the door. A shower or tub may be provided in each toilet room but is not required. If a shower is located in a toilet room connected directly to a resident room it shall be designed so that a shower chair can be easily rolled in and out of the shower area.

**Resident Support Areas:**

The size and features of each resident support area will depend upon the number and type of residents served. The resident support areas may be arranged and located to serve more than one resident unit, but at least one of each support areas below shall be provided on each resident floor.

**Nursing Staff Work Area:**

It shall have space for supervisory administrative work activities, charting, and storage. The minimum area required shall be equal to 2 ft² (0.19 m²) for each resident bed served. The staff work area(s) shall be located so as not to be visually or physically separated from the normal use areas of residents and family members (i.e., should not be located in a separate room).

**Clean Utility/Clean Holding Room:**

This room is for storage and distribution of clean supply materials. The minimum size of the room shall be 15 ft² (1.39 m²) with one square foot (0.092 m²) of additional space provided per resident served over 15. The required area may be allocated among several clean utility/clean holding rooms or closets.

**Clean Linen Storage Room/Closet:**

This area is for the storage and distribution of clean linen. This are may be located within the clean utility/clean holding room or may be dispersed in cabinets throughout the resident unit.

**Soiled Utility/Soiled Holding Room:**

This room is for processing and storing dirty equipment. The total minimum size of the room shall be 20 ft² (1.86 m²) with an additional 1.5 ft² (0.140 m²) of space provided per resident served over 15, and may be allocated among several soiled utility/soiled holding rooms. Rooms used for the holding of soiled materials need to contain a hand washing sink.

**Medicine Dispensing**

The design should provide for medicine dispensing but not look like a hospital function. This can be accomplished by any combination of the following:
6. PROGRAM

- A medicine preparation room located near the staff work area(s) and equipped with a lockable door. Each room shall be a minimum of 50 ft² (4.65 m²).
- A self-contained medicine dispensing unit located in the staff work area(s), the clean utility room, an alcove, or other spaces convenient for staff control.
- A lockable storage unit or cabinet within the resident sleeping room or resident living areas may be used to store non controlled prescription drugs.

**Equipment Storage Room(s):**
These rooms are for storage of resident unit equipment. The minimum area required shall be equal to 2 ft² (.19 m²) for each resident with no room being less than 20 ft² (1.86 m²) in area.

**Housekeeping Room/Janitor’s Closet:**
This is a small room or closet for storage and use of housekeeping supplies and equipment.

**Resident Kitchen and/or Snack Area:**
In any household, the kitchen is often a main gathering point for eating and social interaction. This area may be used for preparing and serving nourishments between meals or for serving full meals at meal time. At a minimum it should contain a work counter, refrigerator, storage cabinets, and kitchen sink and dishwasher. It may also include cooking equipment for use by staff, residents (under supervision) and family, such as a stove or oven for baking. The cooking equipment shall be designed or secured in such a way to insure resident safety and shall meet all applicable fire safety codes. This kitchen can be supplied from the central dietary area of the facility so that only final food preparation is prepared here.

**Resident Bathing/Spa Facilities:**
If a tub or shower is not provided in each resident room, then one tub or shower for every 20 residents shall be provided in a central bathing area. This bathing area should be located adjacent to the resident unit and can be shared by more than one resident unit. There shall be at least one bathing or spa room per resident unit or floor sized to permit assisted bathing in a tub or shower. The bathtub in this room shall be accessible to residents in wheelchairs and the shower shall accommodate a shower gurney with fittings for a resident in a recumbent position. Other tubs or showers in this central bathing room shall be in individual rooms or curtained enclosures to provide private use of the bathing fixture, an area for drying and dressing and access to a grooming location containing a sink, mirror and counter or shelf. A separate private toilet room shall be provided that is directly accessible to each central bathing area without requiring entry into the general corridor.
6. PROGRAM

**Resident Living Areas:**

**Dining, Recreation, Social and Lounge Areas:**
These areas should be provided in each household/resident unit or can be shared between a maximum of two households/resident units. The total area of these spaces shall be a minimum of 35 ft² (3.25 m²) per resident with a minimum total area of 225 ft² (20.90 m²). At least 20 ft² (1.86 m²) per resident shall be available for dining. Storage for supplies and equipment shall be provided in the recreation area.

**Outdoor Area(s):**
This area (or areas) should be provided for the use of all residents and shall include walking paths of durable materials, benches, shaded areas, and visual focusing element(s) such as landscaping, sculpture, or fountains. If used, security fencing shall be of a residential design and provide some visual connection to the exterior of the secured area. If an exterior visual connection is not possible or desirable, the outdoor area(s) of the outside area shall be landscaped to be visually interesting.

**Supply Storage:**
This area is for resident storage needs and recreation, and shall be on site but not necessarily in the same building as the resident rooms (provided access is convenient). The minimum required area shall be 5 ft² (0.46 m²) per bed up to 600 ft² (55.74 m²).

**Barber/Beauty Room:**
There shall be one room per nursing home. The area of the room shall be a minimum of 120 ft² (11.15 m²) and shall not measure less than 10 feet (3.05 m) in any dimension.

**Resident Laundry:**
This room is not required but may be used by the staff, resident and or family members and should include washing and drying equipment for the laundering of resident’s personal items. If provided they shall be readily accessible from each household or resident unit without requiring the user to enter another household, resident unit, or floor and may be shared by no more than two household or resident units.

**Staff Support Areas:**

**Staff Lounge:**
This area may be shared by multiple resident units if the lounge is located to be accessible without requiring the user to enter into or through any other household or resident unit. A staff toilet room with hand-washing facilities shall be conveniently located to each resident unit.
Multipurpose Room:
At least one room should be provided for conferences, meetings, and health education purposes. This room may be remotely located on the campus and shall have a minimum area of 120 ft² (11.15 m²).

Administrative and public areas:
If a new resident entry is designed, a covered vehicular drop-off and pedestrian entrance that is located at grade level and provides shelter from inclement weather shall be provided.

Facility Support Areas:
A central facility dietary area (kitchen) shall be provided for dietary service to residents and others as may be appropriate or all cooking may take place on the resident units. A centralized kitchen area is already part of this project and does not have to be renovated and can be used for food distribution to resident kitchen/snack areas.

Architectural Details:
Interior corridor doors, except those to small closets, janitor’s closets, electrical or mechanical rooms, housekeeping closets and other small rooms not subject to occupancy, shall not swing into the corridor. A door located on the exit access corridor, and required to swing outward, shall open into an alcove.
### 6.2 SPACE REQUIREMENTS

#### Resident Housing

- **Resident Housing**
  - 14,040 s.f.
- Single Occupancy Room with toilet and entry (20 @ 230± s.f. each) 4,600 s.f.
- Double Occupancy Room with toilet and entry (20 @ 310± s.f. each) 6,200 s.f.
- Hallways, wall thickness and miscellaneous mechanical 30% of Gross

#### Resident Use and Resident Care Staff Spaces

- 18,355 s.f.
- Community Bathing Area as needed per design
- Living Room/Day Room as needed per design
- Dining Area as needed per design
- Activity Areas as needed per design
- Personal Laundry as needed per design
- Staff Offices and Lounge Spaces as needed per design
- Nursing Staff Functions as needed per design
- Hallways, wall thickness and miscellaneous mechanical 30% of Gross

#### General Use Space and Services

- 4,375 s.f.
- (Listed area indicates existing size, but may be altered per final design)
- Admissions Suite 900 s.f.
- Reception/Lounge 300 s.f.
- Conference Rooms (2) 425 s.f.
- Staffing Offices (3) 300 s.f.
- Beauty Shop 160 s.f.
- General Store 165 s.f.
- Therapy (Physical and Hydro) 635 s.f.
- Speech 90 s.f.
- Records 90 s.f.
- Hallways, wall thickness, and miscellaneous mechanical 30% of Gross

#### Central Food Preparation and Storage

- 1,990 s.f.
- Kitchen 415 s.f.
- Dishwashing 290 s.f.
- Storage 590 s.f.
- Office 100 s.f.
- Hallways, wall thickness and miscellaneous mechanical 30% of Gross

#### Central Laundry

- 1,550 s.f.
- Washing 325 s.f.
- Drying 325 s.f.
- Folding 230 s.f.
- Storage 200 s.f.
- Hallways, wall thickness and miscellaneous mechanical 30% of Gross

#### Total Minimum Floor Space

- 36,000 s.f.
7. DESIGN
7. DESIGN

Description
Based on this research, views and access to nature help patients recover faster, experience less pain, and require fewer medications than patients with no view of nature. Being outside with a private terrace with pleasant views, fresh air, and daylight, offers several benefits to the patient, family and staff. The terrace helps orient patients to daylight, allowing them to observe the passing of time and improves patient morale by offering a change of scenery. The design will be realized in collaboration with the surrounding landscape with a design that utilizes space, natural light, and outdoor gardens to encourage a positive mind. The simple layout of the buildings offers residents and staff ample opportunities for social relations as well as for optimizing the inter-disciplinary aspects of the palliative effort. The building is designed following a holistic approach where the main nursing functions are placed in the center lane as “a flexible work zone”. Patient rooms and the other functions are placed along the lane.

RENOVATION
Renovating the existing design improves ecological health and indoor environmental quality of the building and gives patients ample opportunity to use the whole area as their home. This creates the possibility for chance social encounters which also allowing patients to retreat and focus on their treatment.

ADDITION
The proposed addition is an elaboration on the recognizable contour and scale of a house. At the same time the design becomes an iconographic building as the small individual houses are interconnected by a sculptural roof structure that helps de-institutionalize the nursing facility. The building is enriched by the close relation to the surrounding landscape consisting of an inner courtyard, several terraces, and gardens.

This project will provide a relaxed and homely space where patients and their families can receive counseling and rehabilitation. This improvement can push the boundaries of traditional nursing home design to demonstrate that visionary architecture and therapeutic environment as well as energy efficiency aren’t necessarily contradictory forces.
Principles from vernacular, Cracker houses are tied together, and made recognizable in relation to the characteristic volume and space situations in the nursing facility. The exterior cedar siding provides familiarity in the surroundings. The configuration gives recreational spaces to the inhabitants, but also private places when necessary. The design works as an enclosure of the outside areas, creating variation merges the different movements and a walk through with various experiences and qualities - through the private or exposed spheres. The building block is positioned to create recreational spaces which adapt to changing conditions of weather, sun, view and line of sight. Cracker houses have ideal floor plans for dealing with ventilation in humid climates. These example use proper solar orientation in conjunction with operable openings for natural ventilation. A wide shade porch wasn’t just an embellishment. In pre-air-conditioned Florida, the porches provided relief from the relentless sun. A broad porch provided a relatively cool spot to sit and social space.
7. DESIGN

**HEALTH CONDITION**

- DISORDER OR DISEASE

**CONTEXTUAL FACTOR**

- ENABLING ARCHITECTURE
  - Rehabilitation and Therapeutic Environment
  - DECENTRALIZED DESIGN
  - AUTONOMY
  - ACTIVITIES OF DAILY LIVING

**HUMAN (PERSONAL) FACTOR**

- INHABITANT CHARACTERISTICS
  - PATIENT & FAMILY CENTERED DESIGN
  - SOCIOPETAL SPACE
  - SOCIAL LOGIC / PRODUCTIVITY

**ENVIRONMENT**

- PERCEIVED ENVIRONMENTAL SATISFACTION
  - ADA (ACCESSIBILITY / UNIVERSAL DESIGN)
  - HAPTIC-KINESTHETIC ASPECTS
  - VISUAL / QUALITY / PERFORMANCE

**BODY FUNCTION & STRUCTURE**

- IMPAIRMENT

**ACTIVITY**

- LIMITATIONS

**PARTICIPATION**

- RESTRICTIONS
7. DESIGN
7. DESIGN

HUMAN INTERACTION DIAGRAM - DAILY ROUTE

HUMAN INTERACTION DIAGRAM - DIMENSIONAL BUBBLE
Patient supplies can be similarly decentralized to eliminate wasted steps. One hospital designed spaces to accommodate patient supplies within the patient room and calculated that the proposed design saved every nurse 4 to 6 trips on average to the supply room. Another feature of an adaptable nursing unit is the inclusion of an equipment closet in every patient room versus storing equipment in a centralized location. Locating an equipment closet in every room keeps caregivers in closer proximity to their patients.

Traditional racetrack configurations distance staff from their patients and one another and increase time spent on non-patient activities.

This typical configuration, in which a caregiver work environment with centralized support rooms creates a racetrack design that literally keeps staff running back and forth between patients and supplies. Centralized spaces for equipment, supplies, and medications require nurses to constantly backtrack in inefficient work patterns that add miles to their days and pull them away from their patients. The result: wasted motion. Wasted motion is a significant drain on a caregiver’s time and energy.

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7. DESIGN

FLEXIBLE WORK ZONE @ RENOVATED EXISTING BUILDING

FLEXIBLE WORK ZONE @ PROPOSED ADDITION
7. DESIGN

PATIENT ZONE  FAMILY ZONE  STAFF ZONE

Views and access to nature help patients recover more quickly; experience less pain; and require fewer medications than patients with no view to nature. A private terrace with pleasant views, fresh air and daylight offers several benefits to the patient, family and staff. The terrace helps orient patients to daylight, allowing them to observe the passing of time, and also improves patient morale by offering a change of scenery.

INBOARD TOILET DESIGN

In the existing case, the toilet is located along the corridor. The wet chases zone become a barrier to keep patients in rooms and limit their activities.

SIDE-BY-SIDE BED ROOM

Most of the patient rooms have two full-sized side-by-side medical beds. This room layout of nursing homes limits the amount of privacy for residents in order to maximize ease of construction, purchase of building materials and lessen overall building costs.

RENOMATED PATIENT ROOM @ EXISTING

SIDE-BY-SIDE TOILET DESIGN

Side-by-side Toilet Design allows more natural light and extra space for family members. A view to the outdoors and family space, while providing facility staff maximum visibility into the patient room for better patient care. Three distinct zones make up the design: one each for caregivers, the patient and family members.

SIDE-BY-SIDE TOILET DESIGN WITH TERRACE ACCESS

Views and access to nature help patients recover more quickly; experience less pain; and require fewer medications than patients with no view to nature. A private terrace with pleasant views, fresh air and daylight offers several benefits to the patient, family and staff. The terrace helps orient patients to daylight, allowing them to observe the passing of time, and also improves patient morale by offering a change of scenery.
7. DESIGN

RENOVATED PATIENT ROOM @ EXISTING BUILDING

PROPOSED PATIENT ROOM @ ADDITION

1. PRIVACY GLASS
2. WORK AREA CASEWORK
3. SKYLIGHT
4. CARPETED AREA
5. SOFA BED
6. LINOLEUM FLOOR
7. EXTERIOR ACCESS
8. SUPPLY DIFFUSER
9. CLERESTORY
7. DESIGN

- Optimized building orientation for active and passive solar capture
- Photovoltaic panel array
- Solar thermal collector
- Operable windows provide natural cooling and daylight harvesting
- High efficiency L.E.D. and fluorescent interior and exterior lighting
- Social gathering nodes encourage interaction and creative exchange of ideas
- Geothermal heat exchangers
- Bioretention area collects excess roof stormwater
- Site stormwater collection and re-use
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