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Analysis of the Effects of Color in the Design of Hospital Inpatient Care

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Abstract

Colors affected life by different ways. The basic principles of each color and how to use it in creating a suitable environment is important in medical centers; Color therapy is associated with different aspects, including color therapy can be associated with the nature of different cultures, its impact on eliminating or reducing physical disorder, physical, mental and emotional impact of color on workplace health and industrial psychology, creativity and especially its application in medicine and the hospitals. Therefore purpose of this study, hospital inpatient care is designed to evaluate the effect of color in this way can be effective in improving the quality of the hospital environment and thus accelerating healing and reducing anxiety in the lead. In this regard, this study is a comprehensive review and searches the corporate sites and reputable domestic and foreign electronic databases were conducted. A review of studies show that proper choice of colors and harmony of colors, can reduce hospitalization time and reduce stress in patients in the hospital environment. So this raises the right choice of colors in health centers improve their patients but inappropriate choice of colors can irreparable psychological effect on the patient.

Key words: *Hospital Design, Design for Inpatient Care, Colors in Hospitals Inpatient Care*

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Introduction

Hospital as one of the main principles and requirements in the healthcare community is. Patients in the hospital due to their condition of health care needs are at different levels. Given the vital role of hospitals and other medical centers to maintain or restore the health of the society which it serves yard, hospitals need to consider both physical and functional architectural design as well as the internal architecture more than is necessary. (Gorji Mahlabani et al., 2014: 62)

Since hospitals can play an important role in restoring the health of the various sectors of society, so Hospital of circulation, architecture, interior architectural design can have positive impact on the hospital. So attention the patient's condition and assess the physical and emotional needs and attention to architecture components, during hospitalization, the patient can be reduced to a minimum. Therefore using proper lighting and scenery and beautiful decoration and colors could all be patient comfort.

Nowadays center architecture to create an environment curative treatment than functionalism spending is changing. Healing environment means creating a space in treatment centers have a positive impact on treatment. (3: 2004Ulrich, et al.) There is evidence that changes in environmental graphic design medical centers, so that they can more comfortable environment, prettier and create more expressive, reduce stress and increase patient satisfaction with the quality of treatment in patients treated in centers.

For example, rebuilding a psychiatric clinic waiting room in the hall with small changes in the overall plan, color scheme, furniture, floor coverings, blinds provide information on the screen and how to increase positive assessment of the environment, improve mood and physiological state and ultimately improve patient satisfaction has been expressed in the waiting. (842 - 869: 2003 Leather, Beale, Santos,)

One of the most important pillars of colors

is a healing environment. Any color requirement of a kind property in the human body, psychological and social behaviors affect his case. Colors are active and influential presence in the lives of individual human beings and therefore the most important in terms of visuals, are emotional times. (Pourhosseini, 2005: 45) Color therapy in the field of alternative medicine or complementary medicine known vibratory, as a catalyst used in the treatment of patients.

Primary colors of the rainbow have proved their healing properties. Color can be used to balance the energy in different areas of the body that no vibration and physical movement are and people who have problems with mental, spiritual and emotional are to be applied. (Anonymous, 2012: 54). Therefore, in designing the infrastructure in order to create a culture and health centers step towards raising the level of health in society; The main objective of this paper is to provide evidence-based instructional strategies and to experiment with colors inpatient care in hospitals and thus drawing the healthcare environment is better, which can be used to architects, interior designers and other specialists to create environments have therapeutic use. In this context, this study aims to evaluate the color of hospital inpatient care, so that in this way, though small step in determining the relevant issues to apply the principles of color, space and architecture in the design, especially the design of healthcare environments oneself.

History of research

In the sixth century BC in Greece Orpheus founder of school metaphysics, for the first time as a means of healing and treatment of vibration of color and light use. In the seventeenth century a French psychologist Pierre Janet of the light rays used to treat hysteria. In 1876, the first blue light and red light to stimulate the glandular system to stimulate the nervous system to work; In 1943 Max Lucher in order to achieve the hidden information in mind, a psychological test launches color is still

usable. In 1978, various colors were used to heal the internal organs of the human body and in during the years 1930 to 1991 to balance the nervous system, accelerate learning and as a housing of colored lights were exploited in surgery (Anonymous.2013).

Of phototherapy (treatment using full-spectrum white light) and chromotherapy (using certain colors affect health) so far in 2000 BC Ancient Egypt, Greece, China and India are used. (Wright, 2013) Green as the color of the medical profession in the operating room staff clothing, hospital furniture and medical equipment in 1984 for the first time in the hospital was introduced in San Francisco, as a coloring agent therapy ever found in the organizational culture of hospital admission (Pantolany, 2009).

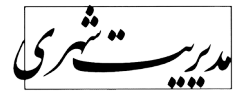
In addition, the publication of Color Therapy at the University of Yale in 1971 and published a chapter in a book called color therapy cam, in 2000 by Donnelly from the latest research findings in this area are (2013Anonymous); in recent years, the ancient and traditional color therapy called Ayurveda, in India from colors used to create equilibrium in human beings. (Anonymous. 2013) It seems people in all historic periods were dealing with colors not only

on how good it is but also has tried to understand its secrets and its own life. Research on the impact on patients of color is related to last year. Recent studies show that the nerve to know the spectrum of colors directly on the human biological system and affect his health. (132 - 63: 2008Edelstein,) In 1976, a study in conjunction with the colors of the national standards in healthcare environments Maryland was in office. (Town Gaithersburg) This teamwork, architects, engineers, financial institutions creators and users of health care facilities together. Marcela Graham environmental design consultant was a spokesman for the working group. He believed that the human response to color in 6 categories is shown in Table One. (14 - 15: 2003Jo edge K,)

Theoretical Framework

Color and Color Therapy

The first step in scanning a comprehensive definition of it is subject. Color is defined in the literature the kind of appreciation from the environment by different wavelengths of light absorbed through the eyes and is interpreted by the brain. The human eye is capable of seeing colors. Light shines on surfaces reflective enters the eye and produce an electrical current in the eye that the brain translates these trends



Physiology	Changes in blood pressure, heart rate, body autonomic nervous system, hormone activity Hough, oxidation rate and growth of tissues
Eyes	Change in the size of the pupil, lens, exposure mode eyeball, chemical responses of retinal nerve endings
Cognitive	Refresh your memory and understanding information in perspective, the evaluation and decision-making, associative responses
Mental status and mood	Stimulation, outrage, cordiality, relaxation, boring, exciting, sad, happy
Environmental emotions	Space appears larger or smaller, warmer or cooler, cleaner or dirtier than that. Space seems to be more clear or opaque. People seem healthy or unhealthy. The food appetizer, younger or older show, newer or older show
Dependency and participation	To nature, technology, religious and cultural traditions, typical or atypical art and science

▲ Table A. The effect of colors on patients, Source: (15: 2003Jo edge K,)

in color. Recognizing the different color levels by different patterns of neural signals that are generated by receptors in the retina. That pattern helps distinguish the different color levels are. (2003: 8 Jo edge K_s)

Length hair long and short towers are different colors. The human eye can light towers between 400 and 700 mm length hair to receive microns (Figure 1) Hence man sees colors that are in the range of wavelengths. Red color has the longest wavelength and violet has the shortest wavelength of about 700 nm to about 400 nm. (Ethan, 1384: 19)

Familiar with the known characteristics for colors, taking into account contextual factors, will be very helpful in creating a pleasant environment and convenient. Continue to investigate the properties of each color will be discussed.

- Red: The color red and animating spirit is increased. In psychology red color resonator emotions, excited, refreshing, activating the sympathetic nerve. If a large amount of red color used to adversity and felt strongly stimulates the nervous system. (Seyyed al-Sadr, 2001, 206-204) This color is caused schizophrenic attacks. The use of red in all areas, stressful, stressful and busy to avoid negative neural stimulation is prohibited.

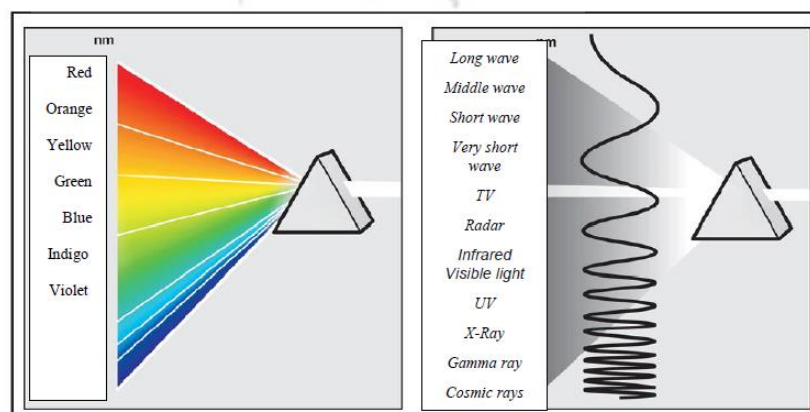
- Yellow: The strongest point in the human body can be affected by yellow color, is the human mind. All mental activity driven by the yellow color. However, to eliminate adversity and despair is useful. Yellow is one of the col-

ors that patients are recommended by psychologists to treat depression. This color creates vitality and happiness spirit of the people and strengthen the human desire to live in. (Seyyed al-Sadr, 2001, 209-206) See continuous yellow in a large area causing visual disturbance, interference with vision, eye fatigue eye pain. Neurological patients and people with mental conditions are not favorable, long-term exposure should be yellow.

- Blue: calm and patience is inviting us into inaction. To deeply relax the nervous system, but it is not suitable for people who suffer from depression. Because they have low activity in the emotional need. Overuse from blue may cause psychiatric disorders and nervous people. The blue color reduces respiration, blood pressure and body heat. So very appropriate color for the mentally ill (patients nervous and aggressive) Heart disease, intensive care, hospitalization, etc. Blue can have insomnia, sedation on.

- Green: the best treatment for mental illnesses and mental disorders, sedatives, Relievers tolerance lifting is tired nerves and strengthen the sense of friendship, hope, faith and peace is very effective. These colors are not suitable for people who have depression, because it is less active, and their vitality. In all areas that need to be calm, focus and relieve stress and tension there, use these colors is recommended.

- Orange: The color orange is considered anti-fatigue. This color is the color of joy and hap-



▲ Figure A. light analysis. Source: lighting principles (Gorji Mahlabani et al., 2014: 63)

piness that person and by psychologists and psychiatrists to treat depression patients are recommended. This color increase feelings of socialization. The use of orange in all areas, stressful, stressful and busy to avoid negative neural stimulation is prohibited. Spicy colors such as orange visual stimulation, increased aggression is schizophrenic.

- Purple: Purple for mental disorders, like schizophrenia are used. Malkin, 1992, 20)) Violet is psychologically very effective in reducing the hate and anger. Its emotional effect in reducing feelings of hatred, irritability and anger. Color is a sad nostalgia-inducing lilac color and are not suitable for people who suffer from depression. (Seyyed al-Sadr, 2001, 210-209)

- Gray and neutral colors: neutral colors and colors that blend with gray or pale, are known relaxing and relieving anxiety. Neutral colors such as beige, gray and chrome, for interior spaces can be very helpful. From application of excessive gray colors should be avoided in the hospital, because it has low visual stimulation and dismal environment and may provoke depression.

In a hospital setting, white or pale colors, due to their implication on hygiene and cleanliness are of most interest among patients and staff. But it should be noted that using too much of one color would be uniform and should ensure that for the visual appeal, a special variety used in interior spaces. Evidence suggests that an environment that is completely white, may cause low visual agitation, leading to lethargy, depression and anxiety are patients who have long-term stay. (Kolivand, 2012: 5)

Conditions use of color

1. Generally speaking, the use of cool colors like green and blue spaces on the margins of the characteristics of tension, noisy and severe overcrowding helps in stress reduction and relaxation and more in environments where there is greater need to focus and peace and quiet are used. Use warm colors such as red and yellow, due to the high-energy environ-

ments with features of depression are effective in creating a sense of warm and breezy and more in environments where there is a need for mobility and activities are used.

2. Use too much of a particular color may be different problems. It is recommended due to the properties of the colors and the user-space, a clever combination of colors for maximum productivity is achieved.

3. In warm weather to cold and calm colors such as gray, green, light blue, etc., and in cold weather, hot and spicy colors such as yellow, orange, red, etc., are used.

4. It is believed that white, color and clinical care, so too has the demand among users of hospital. However, from research concluded that a completely white environment, could be motiveless vision and even stress inducer in long-term stay patients.

5. Colors that are usually not recommended by the designer: Very cold water can be color is very dark, yellow or dark green, because of the impact in relation to hate and hate, purple (largely the result of superstition and prejudice) and bright red that has clinical proof. Neutral colors such as beige, gray and cream colors can be helpful for interiors. These colors, gentle, warm and relatively attractive. A brightly colored beige walls can be also be used for roofing. In new color scheme, the use of neutral colors is emphasized. From a certain color, should not be overly used. Blue and white, other colors are preferred, but overuse of them will lead to medium uniformly bleak.

Research method

This study is based on the objectives of applied research, descriptive-survey methodology and data collection method is library-field. In this comprehensive review of the use of banks and sources of information and studies that have been done on the effect of color on hospital inpatient care, search in organizational sites and electronic databases at home and abroad were accredited.

Selection articles and research on the matter, according to research protocol, through



articles, books, journals, related reports and studies that have been published on the topic were selected. Study books in Persian studies at other ward of the book have been. Then they read the relevant books and taking notes and they were content analysis. Then output of the pre-analytical method was investigated and recommendations were presented to interpret the results.

The patient and his condition in hospital ward

Beautiful architecture, determine the correct position of the room admission, correct use of color and light environment in the graphics section that patient and his family spend most time spent in the hospital in this section, could have a huge impact on the patient. Color and proper use of inpatient care in hospitals can increase the activities of the hospital staff, on the recovery process is also said to total more suitable environment for all users of this section provided. Some of the key points that the designer must consider in choosing colors for inpatient care is as follows:

- Nursing stations should be specified color is visible in the ward.
- In Section substrate must be respected patient privacy and this privacy of the rooms of the board are to be followed by curtains.
- Patient room must be the right color with the addition of a beautiful decorations should all be coordinated colors.
- Design of the substrate should be admitted based on their performance displays.
- Visibility patients to nursing station.
- Maintain patient privacy, so that patients know the wholly-owned space.
- The patient can have some control over their environment. (For example, control of natural light entered the room, TV and telephone control or light control, etc. over the bed, etc.).
- Designing attractive and yet relaxing environment for patients.
- Use of natural light and good views out of the building in the hospital room.

Designed for inpatient care should be based

on the performance characteristics, such as the maternity ward, pediatrics, surgery and... also according to the length of hospitalization occur in its sector. Internal Diseases ward wide range of domestic and covers. These diseases can Diseases of the digestive, respiratory, heart and more. Treatment can include treatment with medication, diet and rest are. Generally due to the complexity of the diagnosis and treatment of ICU patients more time to be spent in patient's parts of other bed.

Surgical ward for patients who were operated. In general, two types of hospitalization in this section is done before surgery and after surgery. Before surgery and hospitalization for diagnostic imaging and laboratory tests done to determine the patient's readiness for action. Many correction procedures referred to in this section are considered wards in. (Gorji Mahlabani et al., 2014: 66)

In general, large hospitals and women in child-bed two parts are separated, however, in most general hospitals are witnessing the integration of these two sectors. This function is limited to women that are or intend to perform labor or cesarean section, or women are infected for that planning and design is done on the basis of their needs. In connection with the delivery of two hospitalizations before and after child-birth is considered, because doctor may order some women have needed hospital admission before delivery. (Ibid.)

Children's hospital ward dedicated to children. Children age for admission ranges defined in this section is different in different countries, but in general, children up to age 14 are hospitalized in this ward. In fact children's ward in a children's Internal Diseases. Elegant design and attention to the architectural characteristics of children should be considered a therapeutic center architecture. Hospitalized children should be designed to have a baby scale. View to the outdoors, beautiful scenery around and use different colors to accelerate the healing process for the child and family comfort guarantees. (Shamgholi, 2001: 137-139)

The use of harmony and contrast of colors for inpatient care is very important and is better in this part of the bright colors we use. Colors can cause headache, dizziness and extreme contrast their patients but some important parts can contrast dyes used in hospitals.

Color trophy in children's hospital

Experience shows that non-pharmacological methods to reduce pain in pediatric patients is very effective.

Appropriate color in hospitalized children (floor and wall and roof) can provide to create a passion for children. So proper colors to the delight of children and reduce duration of illness at the hospital. Selection of colors furiously on a large scale could be child abuse. Some of the colors that could comfort the children and these colors blue and green and yellow and pink colors can be used in children's play room. If the furniture and decoration colors hospitalized children to be happy. This could be admitted in place to minimize stress.

Apart from the issue of a bed or two-bed and these rooms can be checked on this section was identical. Again it should be light-colored floor, in addition to showing contamination windows allow the light to reflect light in the room to be balanced. Whitening ceilings in this section, for patients who can sleep only toward the ceiling and the roof cannot have you see is not always ideal. Lack of diversity in the visual environment may cause disturbances and loss of senses on patients. (1987 Mahnke & Mahnke,)

Providing provisions for this group of patients is required. While white roofs, the maximum amount of light reflects, can be use a tint appropriate in the ceiling, shine down and see easier for the patient to provide. Use texture and pattern art on the roofs of other measures which can be found in the ceiling used. Of course should be noted that this texture is very soft and light to create optical illusion in patients not. Wall color is better than reflectance of 60 to 50 percent, and its color is better with

tints ceiling is the same.

Paint the walls must be taken in designing a window, paint the walls with a window so that the contrast between light window and wall as low as possible, because the light contrast with the wall have more windows, more space and dark wall seems. Floor wall color differences should be between 20 and 15 percent, for patients who do not have enough visibility to not cause confusion in diagnosis.

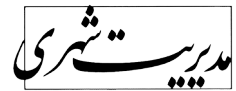
Very important point that should be considered is in hospital room colors that colors, the optical illusion in showing real color will not become sick, otherwise the doctor's diagnosis is difficult. Use neutral colors, cool colors and warm together of design solutions for this parts. Depending on the colors should be chosen. Inpatient Parts for a short stay patients should be friendly, attractive and generally is suitable for recovery.

For the parts that stay in them longer cool colors are more appropriate because it will cause eyestrain. This color contrast between mental alertness and physical weakness prevented (Figure 5) Misplaced use of colors along can negatively impact in diagnosis is in hospital wards. In use of blue in the section heart disease should be more careful there because it could affect the diagnosis of heart attack.

Similarly, the strong yellow color in the section children and infants can be difficult to diagnose jaundice. In the section skin diseases should also be careful in choosing colors. Warm colors with longer wavelengths (such as red, yellow, etc.) in shortness of breath or asthma have a negative impact. Cool colors with short wavelength), such as water, etc.) Reduces skin irritation.

Green as a color for use in joinery easier to show the human body fluids and consequently is cleanliness. This also makes it less fluid cleanliness levels and crashes of this kind is slipping. Patients who are not able to move around is full of medical supplies are surrounded by many.

The designer must pay special attention to this





area and can provide enough variety and attractive for these patients. In the public sector a combination of warm and cool colors can provide a balance between excitement and depression in patients. Strong colors in section bed can cause distraction and pressure in patients. It is better in a part of the section to determine the diversity and activity, the stronger the color used. (But modest)

In children section design effort should be in order to show more intimate space. Make good use of different colors and various steps to develop a warm and friendly environment for children, relatives and hospital staff. in hospital with modern medical equipment's and more than can be seen. The existence of this equipment, design to the choice of color themes with regard to these medical supplies direction. Can be coated by taking a color and apply it to the instrument builders, for further coordinate their colors with the color theme thus enhancing the quality of hospital and took action.

Conclusions and recommendations

We use colors to your surroundings, directly and indirectly affects our behavior. I.e. our own behavior on the one hand, and on the other hand the behavior of the people with whom we are dealing. This that colors reflect and express the feeling we are on the one hand and on the other hand we evoke certain feelings, show the dynamics of the relationship between our senses and emotional needs of a particular color is established.

No doubt Colors economic impacts, social, sexual, psychological and educating many in consequence. Color therapy is popular in worldwide popularity and is managed as a branch of complementary and alternative medicine to bring patient satisfaction. Color therapy even in the supportive therapy for refractory complex diseases such as heart disease and cancer applications.

Many years that paints his works on the mind, behavior, mental and physical balance, to create happiness, depression, restlessness or calm

humans have shown. So it seems color design in hospitals alone is not effective in the treatment, but also can improve the healing process. So, use too much of one color is dull in hospitals and is better to use colors that environment joyful and relaxing patients.

The use of color is very important in different parts of the health care centers and because the correct color selection can have positive effects on patient recovery, but inappropriate choice of color in health centers in addition to discomfort in patient's increases the length of stay, so careful attention must be paid to choose the colors.

It is the contrast in the colors of particular importance. But we must be careful sharp contrast in colors and on the other hand, causes patient discomfort caused by optical illusions. In any case, some important elements that patients and visitors to communicate, such as nursing stations and other field must be specified color to be visible from a distance. Using bright colors and the use of two or more color contrast that we have this space can be determined.

The remarkable thing is that the colors blue, green and silver that are the cool colors, it is useful for people who have high blood pressure and the best children's hospitalized room blue and green and yellow colors and using these colors make children happy, and thus reduces their stress.

- Paint surfaces must be various choices that lead to reflection and glare is not light. Because it do not have enough patients who have problems of vision. Also use of sharp colors on the ceiling and the floor covering is not allowed.

- It should be noted that warm colors and cool colors to increase awareness and orientation towards the outside causes less distraction and increasing focus.

- Environmental friendly design in section hospitalization is necessary. This can be done using neutral colors vibrant, but at the same time. The colors with high luster should be used in this section.

- The colors should not be admitted as raw and high luster, but it should be neutralized using white and gray colors.
- The designer must consider the effects of colors on diseases, such as cool colors for patients with high blood pressure or anxiety is beneficial. Red color is not used for patients with epilepsy, water is not suitable for patients with cardiac ... In general, the designer according to each patient's length of stay for inpatient care and disease should be careful in choosing colors.

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