EBD: Evidence-Based Design

Art's healing powers & HealthCare

As an architect I want to share a very personal perspective before explore EBD articles:

It was really difficult to accompany a middle-aged man's suffer from a sudden heart attack at a local hospital for several days. My expectation was that he will take a long time to recover, but something made this middle-aged man feel better sooner than I expected. A picture in front of his bed made all this difference:

It was a photograph of a big pine tree in a summer forest with morning sunlight streaming through the branches, illuminating the forest floor. He kept staring at the picture and meditates deeply. He told me that the way the sun shined through the trees made him feel "like God was going to walk out." Whatever he saw there, it brought him a sense of peace and comfort during an incredibly stressful and frightening time in his life.

This case made me wonder if a hospital looks dismal, people won't prefer to go back, but if it's a positive experience, if they felt more relaxed when they were there, if the beautiful environment counteracted some of the stress of being sick; they will certainly want to go back.

What is Evidence-based Design?
The ….EBD

Introduction

The purpose of this research is to provide hospital environments with methods to manage Health care facilities as they have become multi-million, almost billion, dollar investments just in their construction alone. The trends in holistic design will not only influence the interiors on the larger scaled projects like hospitals, but the trend will also affect small local private practices and government funded facilities. There is a need for interiors to promote and facilitate healing in their patients. Hopefully, we can soon say goodbye dreadful, depressing healthcare facilities and with the introduction of more vibrant colors and nature inspired spaces, create healing environments.

Evidence-based Design (EBD) is a revolutionary idea that promises to use design to improve healing. Scientists perform controlled trials and carefully measure the impact of design on patient outcomes.

In another word, EBD is a growing trend in healthcare design which has the potential to be a tremendously powerful tool to help us build better healing environments by making simple changes that could create a more pleasant environment for patients.

Contents

Background

Many recent studies have examined how physical environment can influence well-being, promote healing, relieve patient pain and stress, and also reduce medical errors, infections and falls. Many hospitals are adopting elements of evidence-based design in new constructions, expansions or re-modeling. It is a process used by architects, interior designers, facility managers, and others in the planning, design, and construction of commercial buildings. An evidence-based designer, together with an informed client, makes decisions based on the best information available from research, from project evaluations, and from evidence gathered from the operations of the client. Critical thinking is required to develop an appropriate solution to the design problem; the pool of information will rarely offer a precise fit with a client's unique situation and therefore research that is specific to the project's objectives is almost always required. In the last analysis, though, an evidence-based design should result in demonstrated improvements in the organization's outcomes, economic performance, productivity, customer satisfaction, and cultural measures.

Current State of healthcare centers

From the perspective of the hospitals Current State was the absence of color or only very soft shades of color. These hospitals and clinics were almost starting to resemble museums with their cold and stark finishes. The thought at that time was that we were creating “calming” environments for families and people who were under stress and facing great challenges.

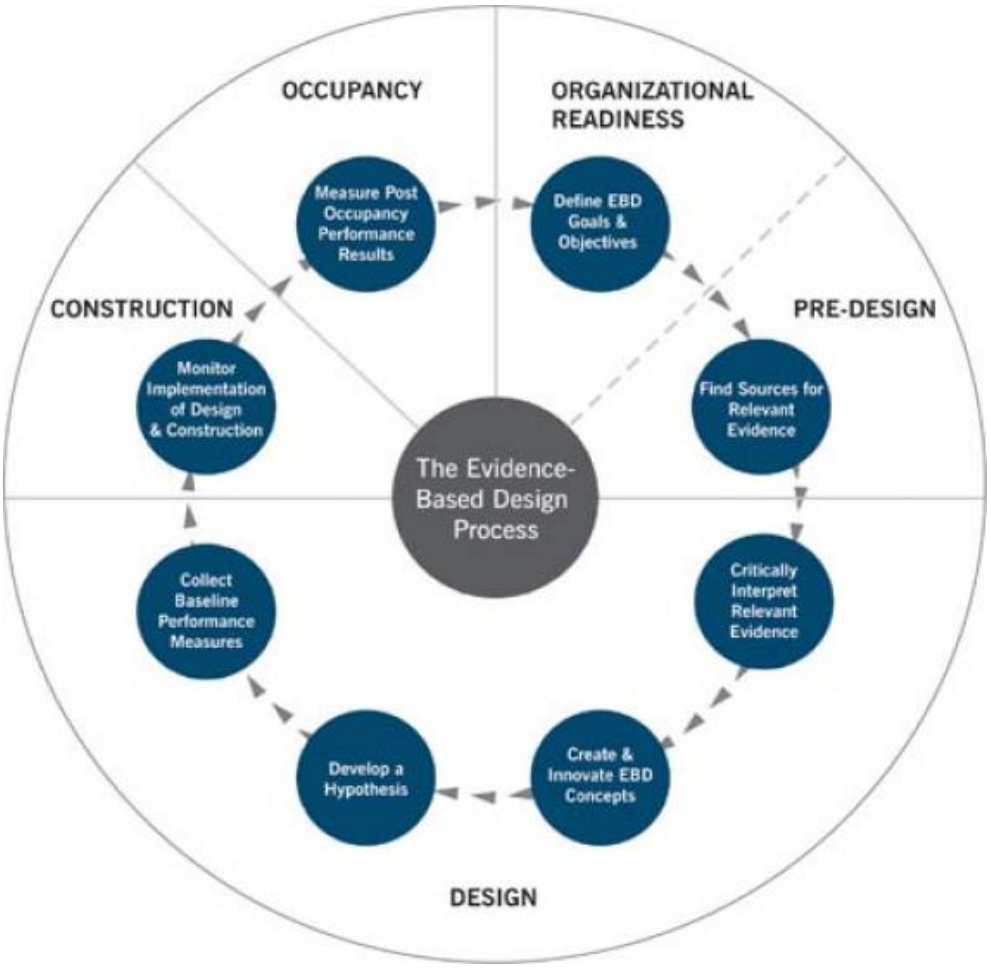
If patients were more like machines, hospital environments wouldn't matter. Targeted medical therapy would be enough. Healthcare providers and designers recognize the growing evidence, though, that a sense of place, appealing space, and human grace do matter in the healing process. Visual art has a role in that whole-patient prescription.

The idea that physical environment can impact patient wellness, staff efficiency, and financial performance has been increasing for about 30 years and has given source to many studies and researches aimed to infer from evidence practical recommendations for healthcare building design. As EBD becomes more widespread, supported by a growing body of evidence –based design.
Many healthcare organizations are realizing its importance, are transposing its principles, and trying to build their facilities with the guidance of EBD practitioners

In the past decade there's been a sea change in the way hospitals approach art. Thirty years ago, there was none. Twenty years ago, there was poster art here and there. Now, major hospitals are spending 1 to 2 percent of multimillion-dollar construction budgets on artwork. According to EBD researches, it's because so many studies have shown patients benefit in tangible, measurable ways; and because in competitive health care markets, it helps the bottom line.

The Evidence-based Design process

Evidence-based design often shortened to **EBD** is a field of study that emphasizes the importance of using credible data in order to influence the design process. The approach has become popular in Healthcare Architecture in an effort to improve patient and staff well-being, patient healing process, stress reduction and safety. Evidence-based design is a relatively new field of study which borrows terminology and ideas from several disciplines including **Environmental Psychology**, **Architecture**, **Neuroscience** and **Behavioral Economics.**



This figure is a working model that helps designers to use and implement EBD decision-making practices. As shown in figure, at the center of the model is the main goal for EBD that is “providing a healing environment”; this includes identifying four increasingly levels and the related methods:

Level 1

- Analyzing the data in the field in order to follow the related environmental researches
- Reading the meaning of the evidence in the relationships to the project

Level 2

- foreshadowing the expected outcomes of design decisions upon the general readings
- measuring the results through the analysis of the implications, the construction of a chain of logic connection from decision and future outcome, in order to reduce arbitrary decisions

Level 3

- reporting the results publicly, writing or speaking about results, and moving in this way information beyond design team
- subjecting methods and results to others who may or may not agree with the findings

Level 4

- publishing the findings in reviewed journals
- collaborating with academic or social scientists

Related facilities Healthcare Data factors are multi-faceted and complex. The following are just a few of the logistics to designing a healthcare environment: ease of maintenance, durability, clean ability, life cycle of products, new systems in technology, the selection of healthier products and cost. Assessing responsibly manufactured, less-toxic and recycled products have also become important factors to health care design thanks to the USGBC (U.S. Green Building Council). Waste prevention opportunities, energy and water efficiency, planet and people friendly possibilities, recycling and donation opportunities, and innovation are also key components to healthcare facilities. All these factors effects the EBD concept design .

Methodology and strategies - Healthcare interior design challenges

Interior design is a multi-faceted profession in which creative and technical solutions are applied within a structure to achieve a built interior environment. These solutions are functional, enhance the quality of life and culture of the occupants, and are aesthetically

attractive. Designs are created in response to and coordinated with the building shell, and acknowledge the physical location and social context of the project.

Based on The Center for Health Design, there are ten strategies identifies to help decision making, according to EBD practices. They are specified below.

- 1. Start with problems: identify the problems the project is trying to solve and for which the facility design plays an important role. For example: adding or upgrading technology, expanding services to meet growing market demand, replacing aging infrastructure.

- 2. Use an integrated multidisciplinary approach with consistent senior involvement, ensuring that everyone with problem-solving tools is included. It is essential stimulate synergy between different community to maximize efforts, outcomes and interchanges.

- 3. Maintain a patient-and-family-centered approach: patient and family experience are key to define aims and to assess outcomes efficacy.

- 4. Focus on financial operating impacts, getting past the paralysis of first-cost, exploring the cost-effectiveness of design options over time and considering multiyear returns of investment.

- 5. Apply disciplined participation and criteria management. These processes uses decision-making tools such as SWOT analysis, analytic hierarchy processes, and decision trees that can also be used in design processes, particularly for critical technical aspects, such as structural, fire safety, or energy design.

- 6. Establish quantitative criteria linked to incentives in order to increase motivation of the team design through the definition of measurable outcomes and to involve end users through checklists, surveys, simulations.

- 7. Use strategic partnerships to accelerate innovation, in order to create innovative new products using hospital staff expertise and leverage.

- 8. Support and demand simulation and testing assuming the patient’s perspective through making lighting, energy, and other kinds of models; and computer visualizations.

- 9. Use a lifecycle perspective (30–50 years), from the strategic planning to the sustainment, especially to explore the lifecycle return on investment of design strategies as they impact safety and work-force outcomes.

- 10. Over communicate: positive outcomes are closely linked to the involvement of clinical staff and community members; it can be reached by attending meetings, sending out newsletters, creating Web cams, and other tools.

These are just a few of the many challenges facing healthcareinterior design today which can be abbreviated:

- **There are a host of codes** and regulations that must be adhered to, such as Public Health codes, Fire Marshal codes, HIPAA/privacy issues, and infection-control constraints, just to name a few.

- **In hospitals, there are people's emotions** at every level – from the extreme joy at the birth of a healthy baby, to the extreme grief of a loved one's sudden and tragic death.

- **There are facility users of all sorts**: staff, doctors, patients, visitors, volunteers, consultants, sales representatives, delivery personnel, and clergy.

- **There is every level of education and every level of job** – from housekeeping to brain surgery and everything in between.

- **And of course, there are budgets!**

There are also maintenance challenges, because cleaning and other work needs to be done while care-related functions continue.

Interior Design & Psychiatric Milieu.

Health care design experts trace the shift to a 1984 study in the journal Science by Roger Ulrich, PhD., Endowed Professor at Texas A&M University's School of Architecture. Ulrich compared two groups of patients recovering from gallbladder surgery: those whose windows looked out at a brick wall and those whose windows looked out on a stand of leafy trees. He found that patients with the view of nature recovered faster and needed less pain medication. His research evolved and expanded and a decade later yielded concrete guidelines that many hospitals are now consulting when selecting the interior design elements.

Interior design and the Psychiatric Milieu-The effect of information-generating process named EBD and provide a useful modeling technique to drive investment decisions. As all researchers in healthcare environments, are continually seeking new insights to better inform interior designers and decision-makers to assist them in making the very best design decisions that can positively impact both patients and their caregivers.

Facilities for psychiatric care have a tradition of standardization in design and treatment dating back to the moral treatment paradigm of the 1850s. As normative approaches to psychiatric care have changed, so too do the facilities used to house, treat and manage patients. The shift to evidence-based design (EBD) in hospital architecture means that the psychiatric milieu must follow suit. The search for evidence to

model psychiatric facilities is an important endeavor. But psychiatric illness is not like orthopedics or cardiology, where the needs and satisfaction of staff and patients can be relatively easy to assess and evidence can be easily measured. Mental illnesses are a heterogeneous group of disorders, and there is a risk in categorizing all psychiatric illnesses together and treating them alike. Environmental influences that exacerbate one condition frequently assist with another. As such, Facilities is soliciting approaches that are specific to:

EBD - Improving patient outcomes through environmental measures.

- **Reducing Pain**. Scientific studies have shown that exposing patients to nature can produce significant alleviation of pain. Besides, other researches also suggest that patients experience less pain when exposed to high levels of daylight in their rooms. Finally, some research also supports displaying visual art with nature subject matter helps reducing pain.

- **Improving Patients' Sleep**. Sleep disruption and deprivation are common problems in healthcare buildings; increasing acoustic performance with reduced reverberation time increased sleep quality.

- **Reducing Patient Stress.** Patient stress is a significant negative outcome in which bears many other healthcare negative consequences. A physical environment that contains stressful features makes psychological patient state worse. Several experimental studies have shown that real or simulated views of nature can produce restoration from psychological stress in few minutes. Other studies based on behavioral observation suggest that gardens in hospitals can reduce stress among patients and families. On the other hand, some studies suggest that many patients respond negatively to abstract art, causing stressful reactions. Besides, many researches have shown that noise is an important stressor.

- **Reducing Depression.** Many studies show that exposure to bright artificial light and daylight is effective in improving mood and reducing depression, even for people affected by deep depression.

- **Reducing Spatial Disorientation.** Way finding problems in hospitals have a significant impact both on patients and visitors, who can be stressed and disoriented. A large body of literature has explored how people find their way through hospitals and other complex buildings (i.e. Space Syntax Analysis). For example, complex layouts are difficult to find one's way in, and some studies have found that right turns are easiest to maintain.

- **Improving Patient Privacy and Confidentiality.** It is based on great evidence that the provision of single-bed rooms increases patient privacy. Furthermore, providing private discussion rooms near waiting, admission, and reception areas may help avoiding breaches of speech privacy.

- **Fostering Social Support.** Some studies recommend the provision of stays and waiting rooms with comfortable furniture arranged in small cluster, in order to encourage social interactions. Carpets instead of vinyl for floors in patient rooms seem to increase the length of people's stay.

In addition to:

Decreasing Staff Stress. Stress is the most common cause of staff retirement. Environmental stressors include noise, light, and multi-bed patient rooms. In fact, survey research shows that single-bed patient rooms are perceived to be less stressful for both family and staff than ones containing multi-beds.

Related approaches

Use EBD to inform design decisions is tremendously promising. Despite some concerns that mixing of science with the art of design is just like mixing oil with water—it can't work. Academic researchers have already completed several important studies to prove the opposite.

There is still so much that needs to be researched - some totally unaddressed and some areas more in-depth. Areas such as color and Culture, themes and art, special patient populations and art.

- Colors in Cultures.

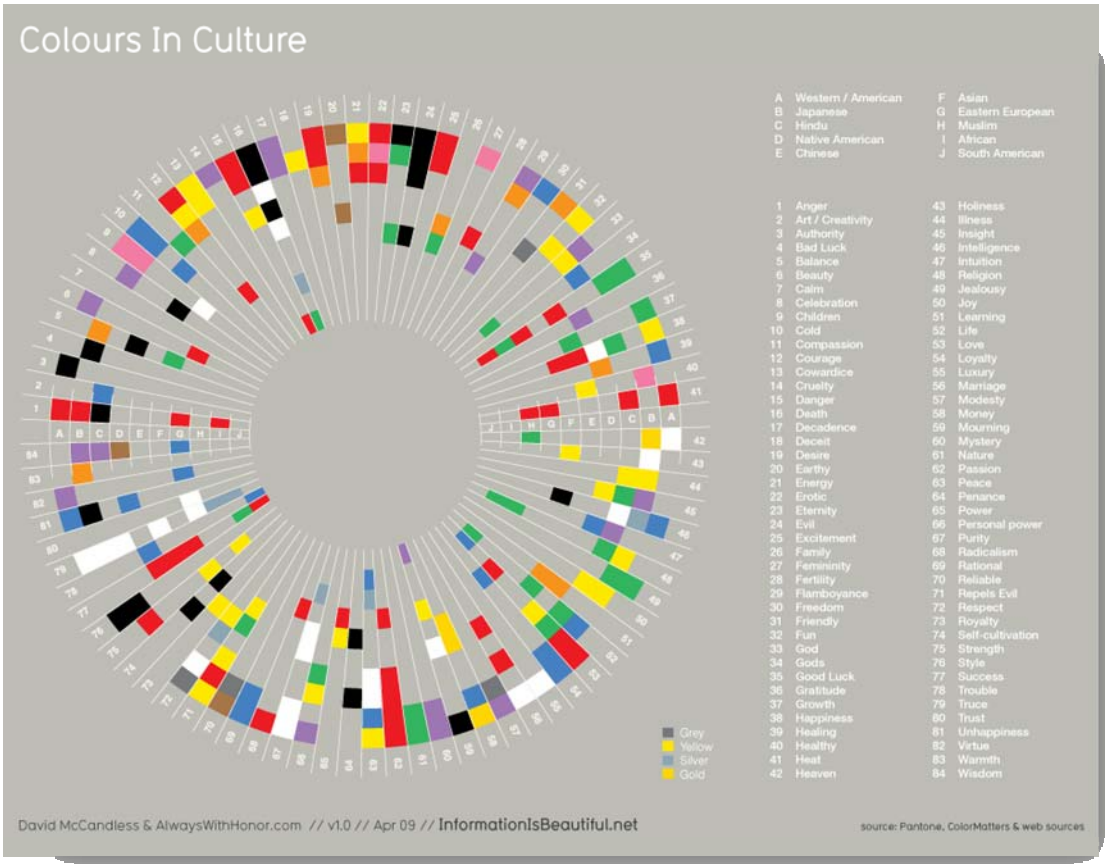
Colors, Symbols & Body Language have different meanings across different cultures.

If we apply this to the world of design and color, studies done by Medical News Today in 2007 confirm that East Asians and Westerners process visual information in different ways. For example, East Asians are more likely to pay attention to the context and relationships in a design than Westerners, who more often notice physical features or groupings of similar objects. Westerners are more attentive to

central, or dominant, objects, while East Asians pay more attention to the background.

Colors also have different meanings across cultures, for example while White is usually associated with the following in most of the world: spirituality, peace, purity, cleanliness, innocence, youth, goodness, light, fairness, Marriage, …etc. , in Eastern cultures such as in China, India or Japan, the color white is a symbol for Mourning, Death, Unhappiness, and Funerals.

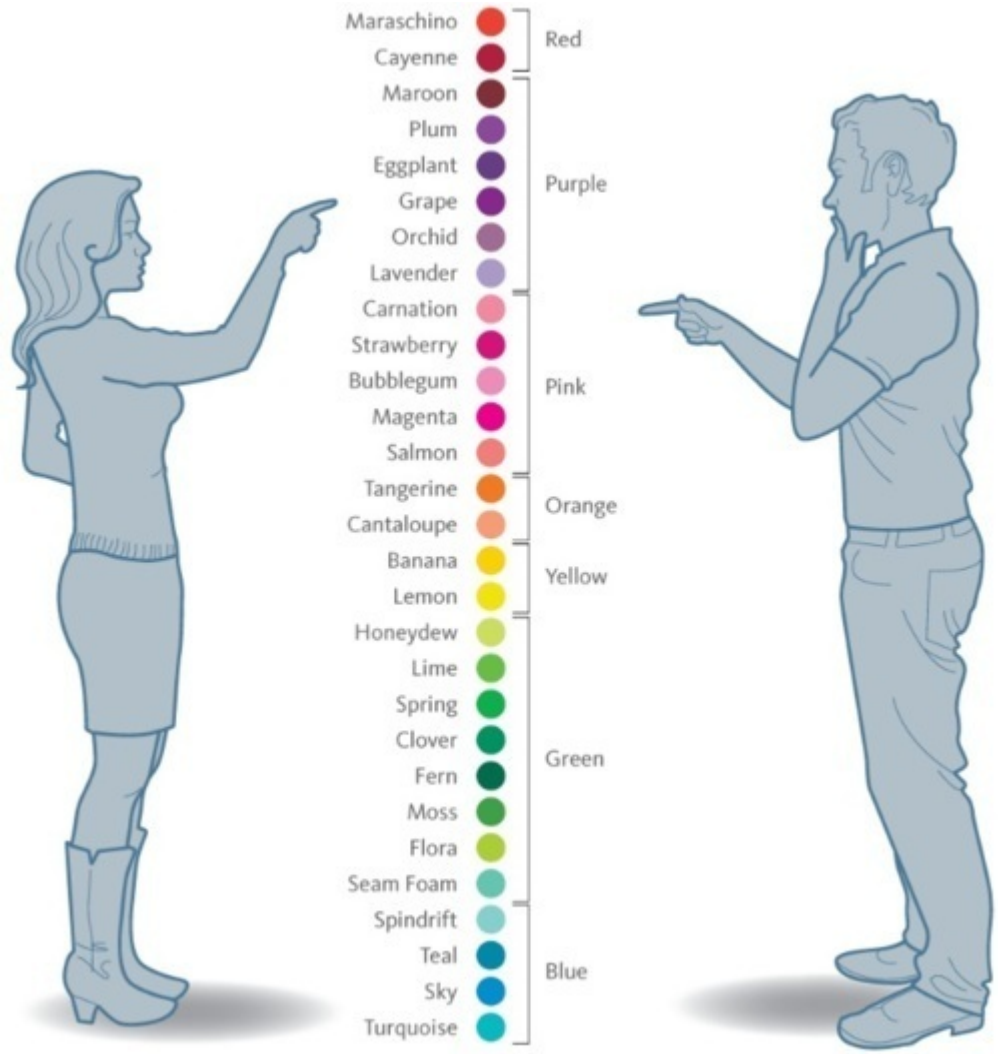
The Chart below encompasses 10 different cultures, and 62 emotions. The cultures are represented by concentric rings, and the emotions are represented by slices of the circle. Thus, if you want to understand about Japanese color sensibilities, you read around the graph. And if you want to learn what colors mean “danger” across cultures for example, you just read vertically.



Source: Information is Beautiful – Colors in Cultures

Less educated audiences for example may find it hard to understand simpler and cleaner designs, they tend to judge the design by the amount of “bells and whistles” and tend to like strong colors – I used to tell some of my clients “it’s not how many liters of paint you put in a design, it’s the amount of thought that matters” – usually a highly educated audience would appreciate clean and simple design concepts and want more thought done rather than just a colorful painting.

The example below shows how gender could have an effect on color perception and choice



- Art & Healthcare

Because of the special requirements for art in hospitals, selecting the right artwork is not as easy as you might think. When selecting art for healthcare it is critical to understand that the viewers of that art are under stress. All people in hospitals are under stress, whether they be patients or visitors. People are anxious because they are wondering: “Is this pain caused by cancer?” “Will I be able to return to work after this heart attack?” Even under happy occasions like the birth of a child many people are anxious with questions: “Is the baby healthy?” “Did the mother have any problems?”

Designers who select the appropriate art for healthcare settings satisfy not only the patients; they also create a more appealing environment for the staff and patient’s families.
Research into Evidence-based art has given us a few guidelines on how to
Best select art for the healing environment.

Nature art is the best….

Nature art is clearly the best choice for healthcare for several reasons. First, it is the people's choice. Many studies investigating people's preferences for art have been done around the world in different cultures and with different age groups. Every study shows the same thing: the vast majority of people prefer realistic nature art. A study by Hathorn and Ulrich found that irrespective of race or ethnicity, patients rated nature art the highest. (see reference below). A more recent study of art preferences in patients concluded: "A quantitative study with the survey results yielded statistically significant results for the popularity of nature images, over best-selling abstract/ unique images."

By nature art its mean "happy" nature art in which the foliage is lush, the plants look healthy and the spaces are inviting. Bleak, cold, parched scenes or images with threatening weather are not what people like to see when they are sick. Winter scenes suggest death, while pictures of threatening weather suggest trouble.

This preference for realistic nature art may not hold true for the small segment of the population that is highly visually trained—people like architects, interior designers and art consultants. This can create a problem because such people may assume that their educated tastes should dictate the art selection. Perhaps they think that presenting the general public with challenging art will raise their appreciation for art. This is a worthy goal for galleries, schools and museums, but not in healthcare settings. Patients don't need to be challenged in new ways; they are challenged enough.

Nature art is easy for people to understand; they intuitively "get it"; they don't need an owner's manual. Perhaps that's because we are hard-wired with an inherent tendency to appreciate the natural environment. In addition to its basic appeal, nature art can trigger positive memories.

Abstract art is the worst

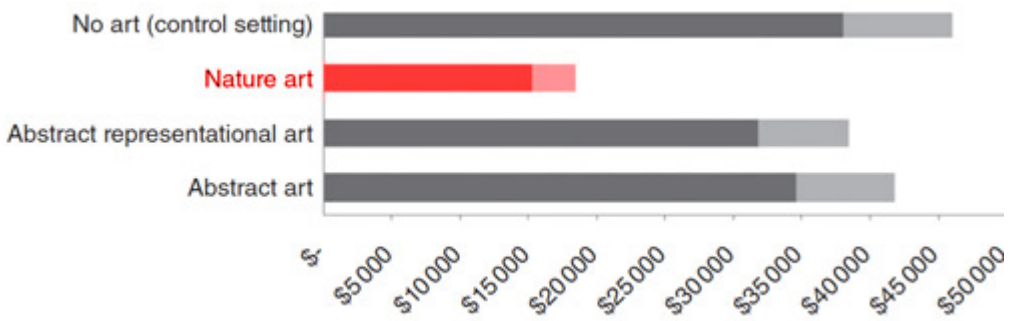
The preference studies that show that “regular” people prefer nature art also show that abstract art is the least popular. Not only is it least popular; some people actively dislike it. By abstract art, I am referring to art where the subject is ambiguous; it is unclear.
When untrained people are presented with abstract art they often try to find the subject matter. Imagine a child in a museum looking at a large abstract painting trying to find hidden objects; they see it like a game. Perhaps they imagine that they are seeing a flock of birds flying overhead. When people are stressed or in pain they tend to interpret ambiguous images negatively. Now they may imagine that painting depicts vultures coming to eat them after they die. In this way abstract art can make their anxiety worse.

In a recently published study research examined the impact of artwork on mental health patients.

Some important findings:

- Realistic nature art can have a therapeutic effect on patients.
- Realistic nature art is significantly better than abstract art & representational abstract art.
- Art can save hospitals money because less medication is needed for agitation and anxiety

As the chart below shows, the estimated annual costs for medications when patients view nature art is much less than when then when they have no art or have abstract art.



Ideal colors for healthcare

There are many theories about how people respond to colors. Designers are often taught that certain colors are calming while others make the heart race.

- There is a healing component in color as with anything that stimulates the senses. The thought about 10 years ago was that all the colors that were incorporated into the interior should be soothing and calming. Now, research has discovered that it is better to stimulate the brain by using more bold colors, thus creating the potential for self-healing. Color is treated differently depending on what type of facility it is.

- Science shows that nature has a huge healing component. There is a growing body of evidence indicating that exposure to art and nature imagery has a positive impact on the viewer's health and well-being. Nature imagery helps to stimulate healing properties in people.

- When color is an integral part of the interior design and a key element in the space, and all elements are brought together appropriately, they create a therapeutic environment.

- Through stimulating environments, those weighted in representations of nature and color, patients, family, and staff report feel "normalized" and researchers indicate their healing rates are dramatically increased.

Conclusion:

Four key ideas to reflect on when selecting art for healthcare settings:

1. Realistic nature art is the best.
2. Abstract art is the worst.
3. There is no ideal color.
4. Evidence-based Design is great, but not much is known yet.
5. People must be cognizant of the various factors affecting art selection, based on the EBD recommendations. 'One size does not fit all.'

Finally, those who select art for healthcare should consider the special needs and preferences of patients and visitors. They need to be careful not to be swayed by their personal preferences as they select art that reduces stress.

- Music power for healing.

Science shows that there have been many positive and powerful responses that go some way to demonstrating the influence of music and performing arts within the Patient Environmental at healthcare centers.

Between 1999 and 2002 Dr Rosalia Staricoff and Jane Duncan carried out a research project to explore ‘whether visual and performing arts could have an effect on psychological, physiological and biological outcomes of clinical significance.’ The research focused on certain clinics within Chelsea and Westminster Hospital. . The report found in certain cases that ‘Live music was more effective in diminishing the levels of anxiety of patients receiving day chemotherapy treatment than visual art’; ‘Levels of anxiety and depression of women who have given birth were significantly lowered after a programme of live music’.

‘Patients exposed to visual arts and live music during the preoperative process showed significantly lower levels of anxiety and depression than patients who were prepared for surgery in the absence of the arts’; ‘Live music performed in the waiting area of the clinic was effective in lowering the blood pressure of patients waiting for their appointments’; ‘Patients exposed to visual arts and live music during the preoperative period required significantly less induction agents prior to an aesthesia’; ‘Patients exposed to visual art and live music during the post-operative period required less analgesia per day than those patients recovering in the absence of visual art and live music.’

Research by Older People’s Unit ward manager, Jon Willis, has shown that music has a particularly beneficial effect for patients with Dementia, who occupy 1 in 4 beds at the hospital, and that participation in musical activities can act as a form of social

inclusion, thereby reducing loneliness and anxiety. Jon explains: “These activities are also an important contributor to reducing stress as they are distracting, alleviate boredom and reduce focus on pain and illness.”

Activities include music & art workshops, creative writing sessions, reminiscence workshops, musical performances, storytelling and a ‘Befriending’ scheme involving volunteers encouraging patients’ recovery in a shorter time.

As interior designers our aim is that we want to take away the [patient’s] anxiety and we want to take away the fear, Music is one of the strongest tools to achieve this.

Financial impact

Hospitals’ chiefs and designers say that building a patient-oriented facility increases marginally the cost of construction, and the extra expense does not pass along to patients. EBD practices, if applied to the whole healthcare system, maximize the capital investment by quantifiably improvements, producing a significant multiyear return on investment. In fact, cost savings resulting from reducing infections, decreasing staff turnover efforts, reducing hospitalization time, properly managed and monitored, match to financial benefits that continue for several years, making the innovations a long-term investment.

Conclusion

Designs are not absolute. Our job is not to become Picasso's or Salvador Dali's, we are not creating paintings or artwork, we can't design without taking into consideration our limitations and our client's goals – design differs from art in that designers create something that should be functional, usable and suites the culture and environment of the people who will use your design.

A successful design is one that meets the expected goals and functions flawlessly as expected – a beautiful design that does not work is a failure. As with all things in life, context is everything: taking the time to understand the contextual filters that stand between you and your audience will help prevent you from creating "beautiful flops".

EBD research suggests that realistic non-threatening nature images are the best for medical interiors. Because of this the use of nature art in healthcare is expanding

Research has revealed the important role art plays in contributing to a supportive environment, which in turn contributes to stress reduction and the healing process.

Many factors play into the appropriate art selection: culture, gender, age, and ethnicity. Individuals need to understand the guidelines that research has generated for art selection.

Research relevant to healthcare design& Environmental psychologists focus on stress reduction, which includes:

1. Social support (patients, family, staff);
2. Control (privacy, choices, escape);
3. Positive distractions (artwork, music, entertainment);
4. Influence of nature (plants, flowers, water, wildlife, nature sounds).

References

- STANKOS M., SCHWARZ B., Evidence-Based Design in Healthcare: A Theoretical Dilemma, IDRP Interdisciplinary Design and Research e-Journal, Volume I, Issue I, Design and Health, January, 2007

- SADLER B.L., DUBOSE J.R., MALONE E.B., ZIMRING C.M., The business case for building better hospital through evidence based design, WHITE PAPER SERIES 1/5, Evidence-Based Design Resources for Healthcare Executives, The Center for Health Design, September 2008

- ULRICH R.S., ZIMRING C.M., ZHU X., DUBOSE J., SEO H.B., CHOI Y.S., QUAN X., JOSEPH A., A review of the research literature on evidence based healthcare design, WHITE PAPER SERIES 5/5, Evidence-Based Design Resources for Healthcare Executives, The Center for Health Design, September 2008

- CAMA R., Patient room advances and controversies: Are you in the evidence-based healthcare design game?, in Healthcare Design Magazine, March 2009

- The Web Designer's Theory of Relativity byAhmed Hussam on Jun 6th 2011 with 24 comments Healthcare Design Magazine, March 2010

- The healing power of nature – art installation :Posted on April 2, 2009 | Comments Off?, in Healthcare Design Magazine.

- WEBSTER L., STEINKE C., Evidence-based design. A new direction for health care, Design Quarterly, Winter 2009

- SADLER B.L., DUBOSE J.R., MALONE E.B., ZIMRING C.M., The business case for building better hospital through evidence based design, WHITE PAPER SERIES 1/5, Evidence-Based Design Resources for Healthcare Executives, The Center for Health Design, September 2008