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ORIGINAL ARTICLE

The role of positive distraction in neonatal intensive care unit settings

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The neonatal intensive care unit (NICU) is a stressful environment for both families and caregivers. Positive distraction is a means of mitigating stress. A review of research reveals that several factors in the physical environment can contribute to positive distraction, the most prominent of which are nature, art and music. Design interventions that provide positive distraction and can be introduced into the NICU setting are window views of pleasant outside vistas, soothing artwork and the ability to listen to music.
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Introduction

Historically, noise, light and infection control have been the primary focus of health-care environmental design research. In the early 1980s, however, research on a cluster of physical dimensions was initiated which, instead of addressing the mollification of the negative aspects of the environment, switched the focus to the creation and reinforcement of positive experiences. These experiences were designed to allow one to project oneself into the environment outside the healthcare setting – typically a less hostile and more nurturing space. The focus of this new research had the common theme of providing positive distraction, or the ability to allow the individual to shift focus from negative foci within the health environment to the more restorative aspects of the non-medical world.

Several environmental psychologists have addressed the role of positive distraction relative to human need and preference. Clare Cooper Marcus, Steven and Rachel Kaplan, Jay Appleton and Roger Ulrich have formulated theories regarding positive distraction in the context of their areas of specialization. For example, in Roger Ulrich's Theory of Supportive Design,[1] he cites three significant factors which will help patients, family and staff cope with stress and, in turn, result in improved health outcomes: increased sense of control and access to privacy, social support and access to positive distractions.

Environmental variables that are most commonly known to contribute to positive distraction are art, access to nature and music. The literature on these topics is discussed in the following article, followed by design guidelines that provide suggestions as to how to apply the principles to real environments.

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Literature review

Art/color

Although art has been incorporated in hospitals since the early 14th century, its purpose has changed. *In lieu* of preparing patients for death, or serving to increase donations, works of art now serve to address 'a more holistic approach to medicine'.[2] Acknowledgement of the role of art in healthcare settings has become mainstream and discussions of the implications of this environmental intervention take place in widely circulated medical journals.[3]

If art is to be used for positive distraction, the choice of genre (e.g., modern, primitive or representational) and topic is critical. Regarding genre, Ulrich[4–6] noted that postoperative patients preferred representational pictures over abstract works. Part of this response might be associated with the topic portrayed in the images and part associated with color choice. Representational art tends to incorporate the subdued colors of the natural environment, whereas abstract art is often surprising in the color composition. Ireland, Warren and Herringer[7] found that anxious individuals prefer less saturated colors, therefore, color may be a contributor to the impact on the viewer.

Environmental Competence/Press Theory[8] implies that individuals will seek less challenging environments as they become stressed. When one's internal emotional stimulation increases, a stressed individual will seek a less stimulating external environment, in order to balance the overall experience. Zuckerman, Ulrich and McLaughlin[9] noted that abstract work was more often preferred by high sensation seekers. This would suggest that more representational work would be preferred by individuals seeking a less stimulating environment. If individuals in healthcare settings are trying to reduce the intensity of the visual

experience and achieve greater sensory control of their environment, they might prefer more representational work.

Several abstract artists have argued that abstract art is not necessarily perceived negatively all by patients. Some research shows that previous exposure to art genre may influence preference, as young children do not prefer one type over the other.[10] As such, providing patients and families choices regarding the art that is placed in their environment is an important consideration.

Nature

Kellert and Wilson, Steven and Rachel Kaplan and Roger Ulrich have engaged in intriguing discussions of the origin of our motivation to be associated with nature.[11] The term 'biophilia' was coined by Dr Edward Wilson, an evolutionary biologist and refers to 'the innately emotional affiliation of human beings to other living organisms'.[12] Wilson suggests that, when the opportunity to associate with nature is limited (as is typical in health-care settings), the biophilic impulses are disrupted. Steven and Rachel Kaplan suggest that certain preferences for nature are pervasive human qualities, and are significant because of their role in human evolution. Good interactions with and understanding of nature served to enhance human survival.[13,14] Adjunct to the Kaplans' theory is that preference is directly related to human perception and categorization behaviors which enable the individual to acquire more information. According to this hypothesis, nature views are most preferred when they provide information and simultaneously enable the viewer to be located at a safe (from predators) vantage point.

Dr Ulrich cites access to nature as a primary means of distraction. Ulrich[15] studied moderately stressed individuals, and found that more positive feelings resulted when these individuals were exposed to nature scenes than when they were exposed to urban scenes. Additionally, Ulrich[1] found that exposure to videos of nature were more restorative than urban scenes, after viewing a stressful movie. Physiological measures included pulse, skin conductance, muscle tension and heart period.

People appear to believe that access to nature may affect health outcomes. Olds[16] conducted a study in which workshop participants were asked to draw images of spaces where a sick individual might go to be healed. Seventy-five percent of respondents drew scenes of the outdoors and included nature elements and vistas, light animals and beauty.

The presence of windows is an extension of the concept of access to nature. Windows may impact a patient's health outcomes and psychological condition.[17] In Ulrich's comparison of post-surgical cholecystectomy patients, he found that views of trees, as opposed to the brick wall of the adjacent building, resulted in better patient progress, less use of analgesics and shorter length of stay. In another study, patients who viewed nature pictures had less postoperative anxiety,[18] and nature curtains with accompanying natures sounds, resulted in better bronchoscopy pain control.[19] The impact of windows on the attentional fatigue of intensive care unit (ICU) nurses has also been studied.[20] Although opposition to an increase in the number of windows may be a result of concern about increased construction costs, McKahan[17] gathered data indicating that the average savings (when considering decreases in operational costs associated with improved health outcomes owing to views of nature) would be as high as $118 per patient day.

Windows are more than openings in an exterior wall, and must be considered for their size and proportion. In a comparison of window and windowless hospital rooms, Verderber[21] found that windows that are very small, distant or high, were not thought of as windows at all. Where windows may not be possible, access to natural light may have a positive impact. Residential sunlight was found to be associated with lower frequencies of breast and colon cancers.[22] Lowered average length of stay and mortality was found in myocardial infarction patients who were located in sunny rooms.[23]

Regarding interior spaces that will accommodate interaction with nature, Burnett and Hamilton[24] suggest providing a space for plants and a window seat. When the patient rooms are on the ground floor, a greenhouse space can be added adjacent to the room, which should be maintained from the exterior.

Gardens are a primary opportunity to provide access to nature in a hospital setting. Medieval hospitals were often designed around courtyards[25] and the ancient Greeks incorporated spas with water elements among their building types. The use of gardens in contemporary hospitals was less common until the 21st century. A set of post-occupancy evaluations of hospital gardens conducted by Cooper Marcus and Barnes[26] found that, of the people who used the gardens, they normally visited the space at least once per day. The vast majority went there to relax and reported positive mood changes including spiritual experiences and stress reduction.

Pet therapy (interaction between animals and patients in a healthcare setting) is a means of positive distraction and a form of access to nature. Although the opportunities for pet therapy in a neonatal ICU (NICU) setting may be limited, several studies have confirmed the benefits of this activity. Interaction with pets has been found to reduce perception of pain[27] and improve perception of quality of life.[28]

Music

Music may elicit a psychoneuro-immunological response, although this has not been confirmed. Several studies suggest that music, especially when controllable, can reduce anxiety or stress and helps some patients cope with pain.[29,30] Music has been employed to reduce stress or mitigate noise in several ICUs[31–35] and Routhieaux and Tansik[36] found that music reduced self-reported stress levels in ICU waiting rooms. With regard to infants, the studies on the impact of music and mother's heartbeat are conflicting. The presence of music and subsequent withdrawal

of music may actually have complex implications. Standley and Moore[37] found that on the first day of exposure to music, infants had significantly higher oxygen saturation levels, but these effects diminished on subsequent days. Furthermore, babies exposed to music had significantly depressed oxygen saturation levels after the music was terminated.

There has been conflicting information as to which type of music (e.g., classical, jazz, pop and alternative) might be most appropriate for healthcare settings. Evidence from environmental psychology, however, would suggest that choice in selection is at least important as the genre. One of the common characteristics of patients and their families is a lack of sense of control. Choice of music may enhance a sense of control and help them to achieve a healthy state of mind.

Minimally, music can be a distraction, and if the distraction deflects from focusing on the negative aspects of the healthcare environment, it should be considered. In the case of noisy intensive care environments, it can additionally serve to provide 'white noise' to mask disturbing NICU sounds.

Design guidelines

One of the shortcomings of design research is the lack of communication between researchers and those who create environments. As such, it is important to identify the physical implications of the research. Some of the guidelines in the following discussion are reported in the *Recommended Standards* provided elsewhere in this issue, others are the suggestions of this author.

Art

Regarding permanent art displays, it may be safer to provide realistic or 'gentle' abstract art. In situations where art displays can be changed, depending on the preference of the infant's family or the NICU staff, options should be provided for multiple genres. The provision of an art cart from which patients select art to hang in their rooms is a tenet of the Planetree philosophy,[38] a program that supports patient-centered care.

Apart from genre, the subject matter is important. Generally it is recommended that works of art communicate a soothing experience or provide nature content. Lastly, it is important to remember that the art preferences of designers, who typically have extensive exposure to contemporary art, may be different from those of laypersons. Therefore, the population who will be experiencing the art should be consulted during the selection process.

Nature

There are three principle ways to provide access to nature. The ideal situation would be to provide NICU family members and staff with access to gardens, outdoor spaces and atria. Cooper Marcus and Barnes[26] provide the following guidelines regarding hospital garden design:

- interior and exterior environments should contrast with one another,
- construction and plant materials should account for handicapped accessibility and the potential hypersensitivity to microclimate,
- spaces should provided which are imbued with qualities of safety and security, to compensate for the distressed state of the users,
- sensory stimulation should allow for an external focus,
- the design should allow for both psychological and physical journeys, and
- areas should allow for night group interaction and soliloquy.

Minimally, all staff and families should have views outdoors through windows somewhere on the unit. In the case of families, they are best located in infant rooms and the waiting area. In the case of physicians and nurses, views should be provided from the lounge (where staff retreat for respite) and the nursing station (where staff spend extended periods of time). When that is not possible, natural light can be brought in through skylights, supplemented by art that includes nature images.

Music

As mentioned above, no specific genre of music is a prescription for healing, however, music which is enjoyed by an individual may serve as a positive distraction. The design recommendations are as follows:

- provide access to music or white noise for patients and their families; it is critical that the potential listener have a choice in the presence or absence of music and, when it is available, be able to select a particular type of music; an option would be to provide equipment which would allow the patient or their family to bring their own music selection,
- sound levels should not disturb other patients or their families, and it is recommended that head phones be provided, and
- music can be provided in staffing lounge settings, assuming it does not interfere with alarms or communication.

The potential stress-reducing impacts of positive distraction are demonstrated by the research on this topic. It is likely that stress-reduction may have a role in supporting the immune system. Minimally, positive distractions are desirable by NICU families and staff and will enhance satisfaction with the physical environment. Although art, nature and music are options for achieving these effects, other contributors are possible and should be explored. Proponents of positive distraction suggest that health-care environments cannot be fully enhanced if they are limited to mitigating the negative environmental dimensions. In addition to these important modifications, positive distractions should also be provided.

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