

FAMILY BEHAVIOR IN A SINGLE-FAMILY NICU

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This research involved the use of handheld computer behavioral observation in two neonatal intensive care units (NICUs), one providing single family room (SFR) care and the other caring for infants in an open bay setting (OBS). The study was conducted at a time when dozens of hospitals were engaged in design decisions regarding the development of new NICUs and trying to decide which spatial configuration to implement.

Subsequent to this study, the behavior mapping methodology has been used in a variety of health environment settings, including research on the use of gardens in a pediatric hospital and a study on resident behavior at a nursing station in a senior facility. Additionally, students that are registered for architectural programming at Texas A&M University (TAMU) are trained to use the software. Several aspects of this research pave the way for solid standards for future design research. Firstly, the study used reliable and valid social research methods for the gathering of data, and inferential statistics to analyze this data. Secondly, the research was interdisciplinary and involved participation from academics, practitioners and medical staff. Thirdly, the need for this study was generated from a request from practitioners considering the SFR option.

This research was disseminated in three formats: publications, presentations, and communication with standards-writing organizations. The endowment of this grant increased the team's credibility when we sought related research grants. Also noteworthy was the fact that a member of the team received the Graven's Award for Leadership in 2009. This award is given to one person annually--to an individual who has contributed significantly to the development of physical and developmental environments for high-risk infants.

The need for research on healthcare environments has been expressed by practitioners and researchers. The research for "Family Behavior in a Single-Family Room NICU" responds to this need and serves as a model for future research, both with regard to methodology and interdisciplinary content.

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Applications Beyond the Funded Project

This research (Shepley, Harris, White, & Steinberg, 2006) involved the use of handheld computer behavioral mapping in two neonatal intensive care units (NICUs), one providing single family room (SFR) care and the other caring for infants in an open-bay setting (OBS). The primary outcome of this study was the finding that family members in single family rooms spend more time talking with other family members than they do in OBSs, but that family members in OBSs interact more frequently with other family members than those in SFRs. The researchers concluded that an effort should be made to provide spaces that help ameliorate the negative effects of each of these options. For example, because families in SFRs are typically separated from one another, additional space should be provided for casual encounters. Conversely, families in OBSs should have access to spaces that allow for longer interactions. Alternatively, NICUs should be developed that have a mixture of both plan/room configurations to respond to individual family differences.

The study was conducted at a time when dozens of hospitals were engaged in design decisions regarding the development of new NICUs, and deliberating which spatial configuration to pursue. Both prior to this research and subsequent to this research NICU SFR studies have tended to address patient and staff behavior (e.g., Oelrich, 2003; Smith, Helseth, Khan, Munson, & Smith, 2009; Smith, Schoenbeck, & Clayton, 2009; Walsh, McCullough, & White, 2006). This research was intended to fill the gap in the literature by addressing the behavior and needs of families in these settings. NICUs are known to be highly stressful for parents of neonates (Fournier, 1999).

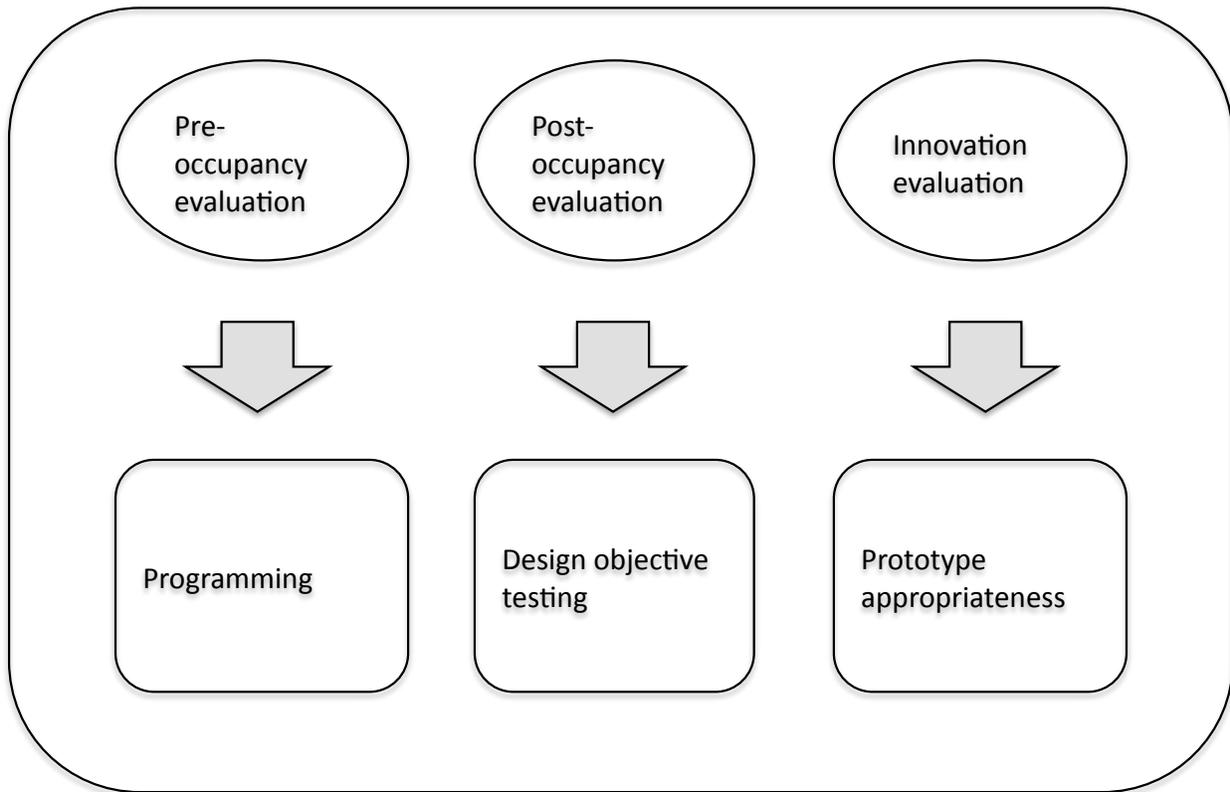


Figure 1: Three purposes of applied evaluation research and their objectives.

There are three important applications of applied research, 1) the gathering of pre-occupancy evaluation data to help inform the programming process, 2) the collection of post-occupancy evaluation to confirm whether design goals have been adequately achieved, and 3) the examination of innovative design prototypes to confirm their appropriateness (Figure 1). The use of single-family rooms falls into the third case. The SFR NICU units are being implemented throughout the United States and evidence as to the implications of this approach is needed. The circumstances around this research issue are very similar to the situation in the 1990s regarding SFR maternity rooms. Design teams were in search of knowledge that addressed the relative merits of maternity units that separated the birthing phases into separate rooms (labor, delivery, recovery and postpartum) versus single-room maternity care (combined LDR or combined LDRP). Several studies were conducted at that time to confirm the effectiveness of this architectural approach (e.g., Shepley, Bryant, & Frohman, 1995).

Subsequent to this study the computerized behavioral mapping methodology that was employed in this project has been used in a variety of settings, including research on the use of gardens in a pediatric hospital (TAMU doctoral dissertation research) and research on resident behavior in a senior facility (TAMU post-doctoral research). Additionally, graduate students who are registered for architectural programming at Texas A&M are trained to use the software. This research-integrated approach engenders a sense of importance of the role of evidence-based design during the programming process. After completing the research for this study, additional equipment was purchased through a Texas A&M technology grant for the purpose of providing broader access by masters and doctoral students wishing to conduct behavioral mapping as part of their design and research projects. The credibility of the grant request to acquire this equipment was enhanced by having previously received AIA funding.

How this Research Defines Reliable Research Standards

Several aspects of this research pave the way for solid standards for future design research. Firstly, the study used long-tested, social research methods for the gathering of data. Independent and dependent variables were identified and explored. The inter-rater reliabilities were calculated, and inferential statistics generated. By expanding on traditional methods by using contemporary technology, the sophistication and accuracy of the study was brought to another level. The technology involved handheld computerized behavioral observation. Secondly, the research was interdisciplinary. The research team included an academic/architectural practitioner, an academic/interior design practitioner, a physician, and a nursing administrator. One of the benefits of interdisciplinary research is the clarity that comes from approaching a problem from a variety of perspectives, and the quality of documentation that must be generated to be understood by a variety of professionals. Thirdly, the need for this study was generated from the field. Facility representatives and designers had been craving information that would permit them to better understand the implications of single family rooms.

This research was disseminated in three formats: publications, presentations, and communication with standards-writing organizations. Regarding publications, the paper was the second in a trilogy of research studies on this topic. The first, Harris, Shepley, White, et al. (2006), was a multi-methodological study. This study was expansive in certain areas, but provided limited data regarding families. The number of family survey responses was limited, and provoked the research about which this essay is written. It was published in the *Journal of Perinatology*. The last of the three related research projects, Shepley, Harris, & White (2008), focused on caregivers and was published in the *Journal of Environment and Behavior*. One of the successes of this AIA-funded research and the two associated projects was the interdisciplinary range of publications. One article appeared in a medical journal, another in a journal focusing on environment and behavior, and the third in a professional practice journal.

Multiple presentations were spawned as a result of the data provided for this study, including presentations at Health Design 09, the AIA annual meeting in 2008, the Environmental Design Research Association in 2008, and the annual Physical and Developmental Environment of the High-Risk Infant in 2006. As with the publications, the interdisciplinary distribution was broad. One organization appeals to professional practice, another is attended primarily by academics, and the third is attended principally by medical staff. In addition to conference venues, the results were presented at CEU lectures at two large architectural firms in Boston.

Another way in which the results were disseminated was by linking the conclusions to standards-writing organizations. Two of the authors serve on the committee for Recommended Standards for Newborn ICU Design, and brought the results of this study and other related studies to the discussion of future recommendations.

Other Achievements Brought About by the Grant

This work precipitated additional achievements. In addition to the peer-reviewed publication and presentation acceptances, the endowment of this grant increased the research team's credibility and success when we sought related research grants. Also, one of the recipients received the Graven's Award for Leadership in 2009. This award is given in honor of Stanley and Mavis Graven and acknowledges the contribution of an individual who has shown "outstanding leadership, innovation and creativity in change the physical and developmental environmental needs of infants and their families." Only one of these awards is given out annually, and it is typically given to an individual affiliated with a healthcare organization.

Uses for this Research

Although the authors are frequently contacted regarding what we know about these environments, it is difficult to determine how frequently the results are being used elsewhere. Regarding impact on researchers, the *AIA Report on University Research* is not included in Google Scholar citation index, one potential measure of its effectiveness. However, subsequent articles have appeared on this topic (e.g. Carter, Carter, & Bennett, 2008), which may have been influenced by presentations at conferences. With regard to the impact of the research on professional practice, there are also no direct measures of its influence. We know, however, is that SFRs have increased in number. Studies like the one described here have likely influenced hospitals that are considering SFR design to incorporate this approach. More specifically, this study suggests a combination of layouts and the provision of additional spaces that support family interaction--a recurring approach in new NICUs.

The need for research on healthcare environments has been articulated by practitioners and researchers alike. The research for "Family Behavior in a Single-Family Room NICU" has contributed to this requirement and serves as a model for future research, both with regard to its methodology and its interdisciplinary content.

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