

Addressing infant, parent and caregiver stress in a neonatal intensive-care setting

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In the fall of 1997, Ellerbe Becket, in association with the Zimmerman design group, was commissioned by Children's Hospital of Wisconsin (CHOW) to provide planning and design services for a new 40-bed NICU.

Due to a rising patient census, combined with changes in Standards for Newborn ICU design and patient care delivery models, the current unit no longer met CHOW's future needs. The purpose of the project was to provide an appropriate environment for the delivery of Neonatal Intensive Care.

The existing nursery, see Figure 1, was based on the open ward plan that was popularized in the late 70s. At that time, state building codes and recommended guidelines for the design

of NICUs were based more on efficiency and cleanliness, but had little consideration for the premature infant. CHOW's unit was designed with five rows of continuous head wall, each of which was designed to support four infants under normal circumstances, but could be stretched to accommodate up to six infants each in an emergency. In terms of flexibility and staffing efficiency, the plan met the goals of the 70s model, but did not meet criteria for the provision of developmental care.

Although CHOW had done some remedial work in an attempt to control lighting levels; sound levels, the inability to control the environment, and lack of adequate space for pa-



Figure 1. NICU – Third Floor.



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Ms LeDoux is a Project Director for Ellerbe Becket's Healthcare division based in Minneapolis, Minnesota. The majority of her thirty-year career has been focused on the planning and design of healthcare environments and, particularly, the psychological effect of environment on its inhabitants. During her twelve years employment at Ellerbe Becket, Ms LeDoux's expertise has been applied to large, complex US-based projects and international healthcare facilities in Russia and Korea. Most recently, Ms LeDoux has directed her interest to the alpha and omega of life's spectrum – children and the elderly. Her latest research studies the environmental impact of the Development Care model to the Neonatal Intensive Care environment and its subsequent effect on babies, their families and caretakers.

rent/baby interaction, teaching rounds and caregiver support yielded a stressful environment for all concerned: infant, parent and caregiver.

To accomplish the project, the construction phasing would prove to be a challenge as special consideration had to be made to insure the continuous operation of the current NICU with minimal disruption to patient care delivery. Isolating the unit from noise and construction dust posed additional concerns.

The first phase of construction included the third floor build out of 10,330 square feet of shelled space, see Figure 2, and the enclosure of 1,010 square feet of existing roof space to accommodate the expanded program. Upon completion of Phase 1, the babies and staff would move into the newly constructed space to allow for renovation of the vacated 5,660 square foot NICU.

An additional 4,615 square feet on the adjacent fourth floor was available for remote support functions.

Project Process

To kick off the project, a series of three town meetings were scheduled as information gathering sessions. Separate meetings with physicians, directors of support departments and parents of infants who had been cared for in the NICU, were conducted to solicit critical input from each stakeholder. Prior to each meeting, a purpose statement and agenda were distributed so participants would come prepared to share their thoughts on how their needs might affect the NICU design. Our goal was to gain a very broad perspective of all factors that might influence the NICU, so that no opportunity or obstacle would be overlooked in the design process.

Next, the Core Group, consisting of representatives from CHOW physicians, administration, facilities integration, NICU department manager, EB and zdg, participated in a partnering session. The agenda included introduction of the team members and explanation of each member's role, and exercises to Set (Project) Va-



Figure 2. Department Boundary – Third Floor Unoccupied Space.

lues, Establish Performance Goals and Identify Obstacles to Success.

Finally, the Core Group met with the NICU staff and physicians to share feedback from the previous sessions, outline the project goals and values and record their particular areas of concern.

Incorporating feedback from the meetings, EB created a preliminary program for a 40-bed NICU. The program was sorted into four categories, Patient Rooms, Patient Support, Staff Space, and Parent/Family Space. Each programmatic element was prioritized as to whether it had to be located within the unit, adjacent to the unit or could be remotely located. The area allocated to each element was then fine-tuned to fit the total available area. Space for some non-clinical support functions was sacrificed to ensure that there was adequate care space for each baby.

Before we began the actual planning process, we decided to conduct site visits of recently completed, state-of-the-art NICUs. We felt it

was important for the team to see other units and talk to other staff to help them better articulate, during the upcoming design phase, what they wanted and did not want for CHOW's new NICU.

For recommendations I contacted the experts, several authors of the "Recommended Standards for Newborn ICU Design" including Drs. Robert White, Stanley Craven, George Little and Robert Cicco. Each of their recommendations included the name of a contact person at the facility who I telephoned for further information. Based on the feedback gained from these telephone interviews, including the similarity of their programs and care philosophies, the selections were narrowed to Children's Mercy Hospital in Kansas City, Missouri and Arkansas Children's Hospital in Little Rock, Arkansas.

A facility assessment form was created to note Design Issues, Family Issues, Staffing/Operational Issues, and Medical Staff Issues observed during the site visits. At the end of the form we included a Post-Occupancy Evaluation section which asked the single question, "What would you change about your current space if you had to do it again?"

As predicted, the site visits yielded many good ideas of what to do and what not to do in planning a new NICU unit, but the most interesting feedback was regarding the post-occupancy evaluation of each unit. The response from each nurse manager was the same as the design's effect on the staff.

Like CHOW's, both hospitals' previous units had been designed as open wards which, by virtue of their design, facilitate staff interaction and foster a true sense of teamwork. If a baby arrested, nursing support was immediately proximate and could be summoned with a gesture as subtle as eye contact. In this setting, working seamlessly as a team, the staff celebrated their triumphs and mourned their defeats.

In the new units, care was delivered to pods of 6 to 8 babies. To make the most effective use of staff, the acuity mix of the babies in each

pod ranged from critical to convalescing and was staffed by a care team of 4 to 6 members. All necessary supplies were located within the pod and orders were picked up by the unit secretary to further increase efficiency. Essentially, each pod was designed as a microcosm. Each care team worked within the physical confines of their pod and had very little contact with other teams or staff members.

After the first few weeks of operation, it became apparent that the staff was not adjusting well to the change. They felt isolated in their new setting and missed the stimuli of the old unit, especially the camaraderie of their colleagues. The resulting problems ranged from increased staff sick time to a rise in the number of staff requests to transfer to other units. Traditionally NICU staff "burn out" is high, but after occupying the new unit, the numbers climbed beyond the acceptable norm. After extensive interviews with the staff, the nurse managers from both facilities concluded that so much time was spent designing a unit that would be appropriate for the babies and families that not enough attention had been paid to preparing the staff for the transition.

Dr Mary Dowd Struck, confirmed the problem was not exclusive to these two facilities. In an article written for the Nursing Management journal, she chronicled her hospital's post-move experiences. Dr Struck believed that a comprehensive, advanced orientation program would have minimized her staff's post-relocation stress. "We had underestimated greatly the impact of the move on people's personal lives. Within 4 months, four of our six head nurses had resigned." She concludes by urging any facility planning a new NICU to pay attention to staff orientation.

We decided to take the challenge one step further. Although we agreed with the need to provide a comprehensive staff orientation program, our challenge would be to design an efficient unit which would meet the privacy needs of the babies and their parents while satisfying the staff's need for support and interaction. With this in mind, we began our planning pro-

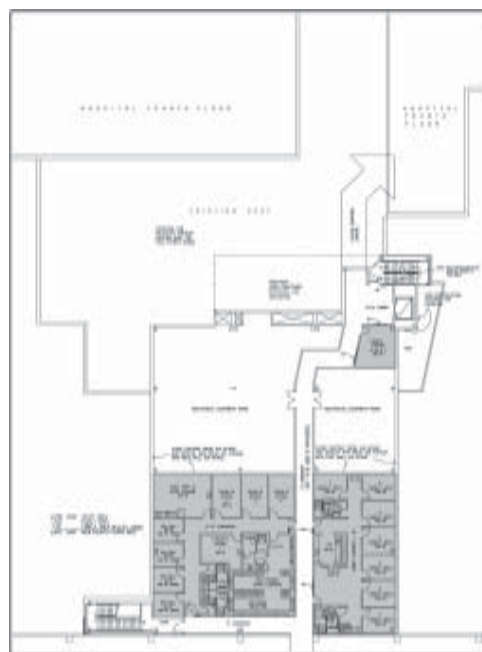


Final Plan – Third Floor.

cess by test-fitting the program into the space available.

During the program confirmation, we had determined that the space allocated to each baby should be a minimum of 120 square feet, with 150 square feet being the optimum size. This would provide required space for the bassinet and necessary support equipment, factoring in the recommended circulation around the bed for nursing support, plus adequate space for the parent to participate in the infant's care. Our decision was confirmed by mocking up one patient room and outfitting it with the required equipment and desired support and family space and furniture.

Unlike the 6- to 10-bed pod units we visited, we found that a mix of 4- and 6-bed pods better fit CHOW's desired care model and also worked well within the footprint, see next figure. Existing bay spacing and column locations dictated that the most efficient layout grouped six-bed pods and four-bed pods together leaving a generous 14'0" corridor between them for nursing



Support Functions – Fourth Floor

functions and teaching-support space during grand rounds.

The pod mix also allowed us to provide different environments to respond to the varying needs of the infant. In a letter to the editor of the American Academy of Pediatrics, Dr. Robert White advised that premature neonates are not a homogenous population. They differ in gestational age, in developmental maturity and have individual needs, which seem likely to be best met through individualized environments. He further suggests that the younger premature infant can be adversely affected by intense, rapidly changing stimuli; but as the infant develops stimulation may facilitate his development.

Heeding Dr White's advise, we planned the unit grouping the youngest, most critically ill infants in the four-bed pods, which would be quieter and have less traffic, allowing them to graduate across the corridor to a six-bed pod as they improved and developed. Provisions were also made in select pods to facilitate the expansion of certain rooms to accommodate multiple

births.

For consistency, each room is 12'm wide, with a universal headwall configuration including a hand wash sink and storage for immediately necessary medications and supplies. Our plans for infant/family interaction within the room include a reclining chair for kangaroo care and a high stool with casters to permit a parent's unrestricted view into the 39lo high isolette.

Scrub areas for family and visitors are provided near family waiting/lockers with visual supervision from the central team communication station. Parenting rooms for transitioning the infant to a home setting are placed adjacent to the care pods for family privacy, but with immediate access to staff for infant security and family peace of mind. To allow a respite from the stress of caring for a fragile infant, the family lounge outfitted with shower and laundry facilities and parent resting rooms are located off the unit on the fourth floor, see next figure. Beepers will be provided to maintain staff/parent contact.

Support functions such as clean and soiled

supply, equipment storage and respiratory therapy have been placed at the outside edges of the unit to eliminate unnecessary noise and traffic within patientcare areas with direct access from the main hospital corridor for efficiency of restocking and transfer.

Pharmaceutical dispensers are centrally located and visible to the central team communication space and bulk storage cabinets were located immediately outside the care pods to reduce noise and traffic and accommodate efficient restocking.

The 14'0ln wide north/south corridor is the central patient-care spine that runs the length of the unit interrupted only by the reception/communication station located midway. Here a care-team member can perform his/her charting functions, collect supplies, and, most importantly, communicate with colleagues without losing visual access of their team members within the care pod. Furthermore, as an added benefit, the extra- wide corridor allows doctors on their teaching rounds to step away from the babies' bedsides, to hold case discussions.

The staff, at this point in our project de-

