




**JOHN MUIR**  
HEALTH



## Single Family Room NICU Design

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*John Muir Health*  
*Walnut Creek Campus*



### Walnut Creek Campus

- A 572-bed acute care facility
- Trauma Center for Contra Costa County and portions of Solano County – Level II
- Magnet designated hospital

### Concord Campus

- A 313-bed acute care facility
- Designated Contra Costa and Solano County STEMI (severe heart attack) and Stroke Receiving Center
- Magnet Recognized Hospital

### Building a Bigger and Better Hospital

- Increasing from 324 to 572 beds
  - 6 year project, \$620 million projected
    - Begun August 2006
    - Move in begins 2011, to be completed by 2012.
- Birth Center-
  - plan to accommodate 36% increase in births by 2012
  - Increase from 3300 deliveries/year to 4500 deliveries/year

### 2008 Birth Center Expansion Plans

	Current	Add	Total
AP	8	8 new swing	16
MB	23	35 new	35 new
NICU	22	35 new	35 new
PEDS	17 double	16 private	16

### Background

- Planned move to new building
- 35 Single patient rooms
- Staff anxiety
  - Workflow
  - Communication
  - Patient safety
  - Emergency situations
- Needs assessment



## Graven's Conference

- Annual Conference on the Physical and Developmental Environment of the High Risk Infant
- University of Southern Florida in collaboration with the March of Dimes
- Planning committee attended initially in 2000 and then again in 2009
- <https://cmetracker.net/USF/Files/Brochures/223107.pdf>

## Learning Objectives

- Review current evidence based research as to best NICU design models: single family room versus suite (bay) style design
- Review the design issues as they pertain to the infant, the family, and the staff
- Learn of the staff concerns and methods to resolve and address those issues prior to the new area occupation and immediately following

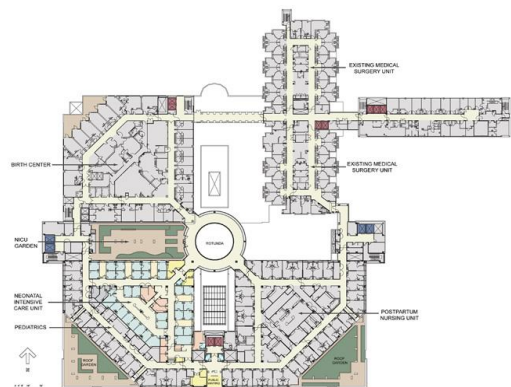
## Evidence Based Design

Problem-Solving Design  
Judy Smith, Jim Harrell, Bob White  
The 22nd Annual Graven's Conference on the Physical and Developmental Environment of the High Risk Infant and Family Support Summit

- Single family room is the best design for new construction
- The reasons private rooms are required in every other inpatient room in the hospital apply in the NICU
  - *Right to privacy and confidentiality*
  - *Avoidance of noxious stimuli from adjacent bed(s)*
  - *Safety – esp. with reduced risk of infection*
- Dozens of existing SFR units prove the concept works

## SFR Experience

- • France – Brest, Angers, Reims
- • Belgium – Brussels
- • Sweden - Stockholm
- • Switzerland – Lucerne
- • Netherlands - Nijmegen
- • Australia - Melbourne
- • US – Seattle, Pittsburgh, St. Paul, Des Moines, Cedar Rapids, Iowa City, Gastonia, Omaha, Lincoln, Vanderbilt, Orlando, Madison, Kalamazoo, Cleveland, and several more





## NICU Design – Why it Matters

- For infants
  - Crucial period of growth and development
  - Individualize the environment to promote better outcomes for the infant
- For families
  - Defining moment for relationships – with their infant, each other, healthcare system, spiritual
  - To be with and help their infant
  - To have information about their infant's condition and care
  - To have some control over the situations and the environment
  - For their situation and needs to be understood
- For staff
  - To be able to do their job without unreasonable restrictions or limitations
  - To be able to collaborate with their colleagues, on both work-related and non-work-related issues
  - To have some control of the situations and the environment

## NICU Design for Infants

## The Third Trimester Ex-Utero

- A critical window of vulnerability & opportunity



## Emergence of Consciousness James McKenna, PhD

- Evolutionary Development of the Brain
- The human is the most dependent mammal for parental support and for the longest time
- Brain development not complete at term
  - 25% at term
  - 50% at 9 months
  - 100% at 14-17 years (really???)
- Brain consumes 20-25% of energy expenditure

## SFR – Rationale for Infant

- Optimal environment
  - Individualized lighting and sound control
  - Infection control
  - Skin-to-skin contact has substantive biological impact
- Improved outcomes
  - Increase weight gain
  - Decrease ventilator days
  - Decrease nosocomial infections

## NICU Design for Families

## SFR – Rationale for Family

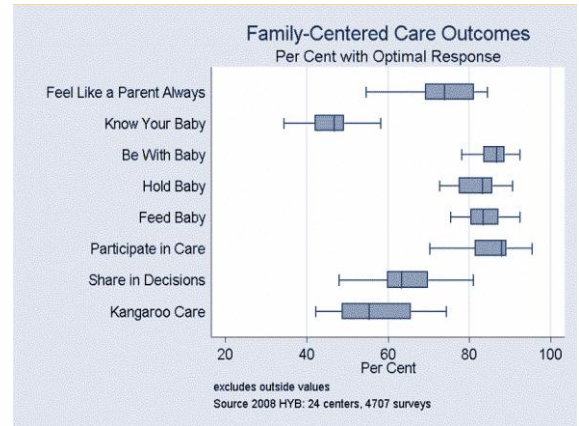
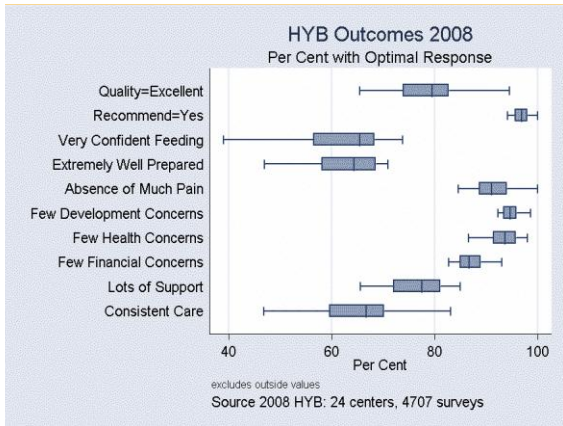
- Optimal environment
  - Privacy for interaction with baby
  - Privacy for interaction with medical staff
  - A sense of control, belonging, family
- Improved outcomes
  - Liked quiet private environment
  - More attention and information from staff
- Considerations
  - Felt isolated from other families
    - Family room, support groups, group classes

## Outcomes of Family-Centered Care Parents' Perspectives from >21,000 Surveys in 40 Centers

William H. Edwards, MD

22nd Annual Gravens Conference on the Physical and  
Developmental Environment of the High Risk Infant

- An on-line survey tool was developed in 2001 as part of the Vermont Oxford Network quality improvement family-centered care collaborative called "We Are Family".
- >21,000 surveys through 2008.
- The survey is anonymous and completed near the time of discharge by one or preferably both parents. About 75% of the surveys are by mothers and 25% by fathers.
- The surveys are not a random sample, and therefore are biased, most likely in the direction of more favorable responses.
- There are very consistent findings related to what practices and experiences parents feel are important.
- There are also a number of surprising and systematic deficits in our care as parents perceive it. These also represent great opportunities for improvement.



## NICU Design for Staff

- ### SFR – Rationale for Staff
- Optimal environment
    - To be able to do their job without unreasonable restrictions or limitations
      - Availability of necessary equipment and supplies
    - To be able to collaborate with their colleagues, on both work related and non-work-related issues
      - Communication systems
      - Privacy areas
    - To have some control of the situations and the environment
      - Individualized lighting and sound

- ### SFR – Rationale for Staff
- Improved outcomes (comparison to open bay)
    - Improved environment (more satisfied and thought that patient outcomes improved)
      - Better communication with families
      - Allowed some nursing functions to be completed outside of the direct patient care area
      - Less stress
  - Considerations
    - Felt isolated from other staff

- ### Communication Issues Reported in NICU
- Alarm management
    - Monitors tied to communication devices
    - Frequency of alarms-critical vs non-critical
  - Staff locator system
    - Instant access to staff
    - Paging systems
    - Keeping track of who has which pager or device
    - Emergency contacts-codes

## Key Types of Communication Technology to Evaluate

- Intercom
- Phones: regular/wireless
- Nurse call system
- Nurse locator systems
- Infant security systems
- Central monitoring
- PDA
- PC/Workstation Computers
- Pagers/Beeper

## Open-Bay and Single-Family Room Neonatal Intensive Care Units Caregiver Satisfaction and Stress

- The purpose of this study was to explore the implications of neonatal intensive care unit (NICU) single-family rooms (SFRs) relative to open-bay arrangements.
- Surveys of NICU medical staff ( $N = 75$ ) explored the preferences and experiences of individuals providing care in two facilities, an SFR NICU and a combination unit with open-bay infant stations and SFRs.
- The results of this study indicate that SFR NICU design may increase staff satisfaction and reduce staff stress.

McCuskey Shepley, M., et al Environment and Behavior, Vol. 40, No. 2, 249-268 (2008)

## Strategic Design

- Interviews with key members of the design team including:
  - Architects and hospital design team
  - Staff
  - Patients/families
- Information gathered
  - What went well
  - What could have been done better
- Goal: To share lessons learned

## Design Considerations

- Babies Lighting
  - Sound
- Families
  - Accommodations—food, rest area, waiting area, overnight accommodation
  - communication
- Staff
  - Convenient supplies (decentralized)
  - Headwall
  - Communication – alarms, families, colleagues
  - Comfort – flooring, seating, devices, lounge
  - General
- Sustainable design, maintenance issues, efficiencies of staff, supplies

## Twelve Common Design Errors

1. Poor location of nurses' stations
2. Sinks that are more attractive than functional
3. Inflexible headwalls
4. Inadequate space
  - Staff support
  - Family support
  - Storage
5. Inadequate sound control

## Twelve Common Design Errors

6. Poor visual ambience in work areas
7. Rooms or beds clustered in ways that are sub-optimal for staffing (quantity, layout)
8. Blind corners, poor traffic flow, and "choke points"
9. Limited protection against impact damage
10. Inadequate options for future pandemics or growth
11. No consideration for sustainable design
12. Limited use of nature – e.g., windows, gardens

## Communication Issues Reported in NICU

### ■ **Pagers**

- reduced noise with vibration;
- valuable canned text messages
- connected to heart rate/vent monitors alarms

### ■ **Bedside intercom**

- direct, hands-free communication that is easy to use; immediate response with private rooms