



value  
advantage report

*post occupancy evaluation*

# Aspirus Wausau Hospital

*NICU*

PRA Project #08077  
3 November 2010

## **Abstract**

**Context:** In 2008, Aspirus Wausau Hospital determined a community need for neonatal intensive care services. To meet the growing demand for care, the Hospital embarked on a capital improvement project to improve patient outcomes, support family needs, and create an environment of care that would retain and attract the best and brightest while fulfilling its sustainability goals. Managers, nurses and allied health staff utilized a co-design process to create an environment which would respond to qualitative and quantitative performance measures. As a result of these efforts, a new patient centered NICU at Aspirus Wausau Hospital opened to patients in August 2009.

As part of an ongoing commitment to continuous improvement, Plunkett Raysich Architects initiated a post-occupancy evaluation (POE) in the eleventh month of occupancy. The POE's objective is to study the value of utilizing research and evidence based performance criteria related to pre-project performance measures and their effects on the caregiving environment. In its first year of operation, the unit has received high praise from the community and care givers. The project received a Gold Award from the American Society of Interior Designers – WI Chapter, Association of General Contractors (AGC) Build Wisconsin award, and Gold Level certification from Leadership in Energy and Environmental Design (LEED) for Commercial Interiors. The primary purpose of this study is to benchmark performance measures that positively affect the lives of the people who utilize this environment of care.



**Outcome Measures:** Design criteria based on Standards for Newborn ICU Design<sup>(1)</sup> was utilized throughout the NICU design process and then integrated into qualitative rankings for post- occupancy evaluation. Additionally, quantitative NICU performance measures were compared pre- and post-project.

**Results:** Thirteen unit care providers and managers responded to the survey. Environmental performance indicators were given an average ranking of 4.5 (scale 1-5). Quantitative performance measures within Women's Health Birthing Center are being reviewed, with insufficient data presently available for meaningful comparison.

**Conclusion:** Integration of evidence based performance design criteria supported overall satisfaction of unit design and provided a framework for qualitative and quantitative assessment.

### Purpose

This post-occupancy evaluation was created to provide staff and architects a structure for integrating evidence based design into this and future projects.

### Process

A web-based post-occupancy survey was initiated approximately one year after the Anya Marie Jackson Newborn Intensive Care Unit was completed. Survey was used to gather feedback on performance of the NICU compared to the previous neonatal care environment. Responses were anonymous, with Web site survey results aggregated for analysis. Additional statistical data was gathered independently through the LEED certification process and from Aspirus staff.

### Protocols

The survey was structured under four major sections:

1. General demographic information
2. Rate various aesthetic and functional aspects of project on a scale of 0 (unacceptable) to 5 (excellent)
3. Compare performance of project relative to former unit and researched benchmark facilities



4. Opportunities for other user feedback.

Survey questions were based on evidence based criteria for NICU design performance. Questions specific to quantitative success as a hospital inpatient care unit were also integrated into this study, such as number of births, revenues, energy use, key staff attraction, turnover, satisfaction, infection and mortality rates via straight line data.

### Participants

A link to the web-based survey was distributed to Hospital NICU staff. Responses were anonymous, but position was requested in a demographic section of the survey. The thirteen participants consisted of eight RN's, one nurse practitioner, one social worker, and three unidentified respondents.

### Results

Quantitative data responses revealed little or no change from pre-project state.

Qualitative criteria such as aesthetic, programmatic, and functional issues were considered successful for the project. Staff satisfaction compiled via surveys resulted in average ratings in ten categories between 4.25 and 4.92 on a scale of 0 (unacceptable) to 5 (excellent). Feedback also indicates the unit is seen as superior to other NICU projects within the region.

### Findings / Recommendations

- Project success can be attributed in part to intensive involvement by nursing, medical, and facilities staff throughout the design stages.
- Provide space for family accommodations. A pull-out sleeping couch is provided in each room for a parent, with one sleeping room provided within the unit for family overnight stays.
- Environmental quality for acoustics and communications was identified as a critical component of the unit design.
- Key acoustic design details:
  - Measure pre and post construction acoustic conditions at nurse stations, corridors and patient rooms
  - Provide acoustically absorptive surfaces to



- reduce reverberation
- Design should track attenuation through horizontal barriers (e.g., walls, doors, windows)
- Fire alarms in the infant area should be restricted to flashing lights
- Attention should be given to water supply, such as toilet flush valves and faucets
- Office equipment should be acoustically separated
- Evaluate medical equipment for sound generation
- Isolate noise generating rooms such as break areas, meeting rooms, and mechanical rooms away from the NICU.
- Sub-metering the NICU would have permitted better ability to track energy and water consumption rates.

**Metrics**

**Loyalty**

- Surveys indicate 100% consensus that family satisfaction has improved after occupancy.
- Key staff retention, turnover, and staff satisfaction have remained constant or improved after occupancy.
- LEED certification resulted in positive media coverage in local TV and print, as well as professional publications *Licensed Architect and Environmental Design + Construction.*
- The project will be featured as a seminar at the 2011 Annual Gravens Conference on the Physical and Developmental Environment of the High Risk Infant.

0% Staff Turnover

**Operations**

- Patient infection and mortality rates have remained relatively constant after occupancy, but were very low in the previous NICU as well.
- Same number of staff required to operate fourteen bed department as in previous four bed unit.

**Environment**

- Water usage has been reduced by 30.35% under baseline established by Energy Policy Act

300% Increased Care Efficiency

of 1992 and LEED-CI requirements. The project is currently part of US Department of Energy’s Building Technologies Program for Hospitals as a case study on methods

to reduce water consumption at little or no increased cost.

- 93.9% of new and relocated eligible equipment is Energy Star compliant.
- 100% of materials selected with low / no volatile organic compounds, in compliance with Greenguard Product Emission Standard for Children and Schools or Collaborative for High Performance Schools (CHPS).
- 88.84% of waste was diverted from landfills during construction. Recycling program has been implemented.
- 7.76% of materials have recycled content, calculated by cost (50% pre-consumer / 100% post-consumer).
- Regional materials accounted for 35.26% of total, calculated by cost.
- 91% of regularly occupied spaces have views to exterior.
- All of the wood used was sustainably harvested and certified under Forest Stewardship Council Guidelines.

100% of materials selected with low / no volatile organic compounds, in compliance with Greenguard Product Emission Standard for Children and Schools or Collaborative for High Performance Schools (CHPS).



**Capital**

- The project was constructed for a cost of \$172 / sf, 18% below Owner budget (2).
- Accepted changes to the project during construction amounted to \$9,791.00, or 0.6% of total construction budget.

**0.6% Change Orders**

- Total cost of LEED certification added approximately 6% to total project budget. Construction costs due to LEED requirements were approximately equal to additional A/E/C

fees to submit project for LEED certification.

- Philanthropic contributions for furnishings and equipment totaled nearly \$500,000, attributable in part to high profile of project.
- Though no causality has been found, there is a 14% increase (from 1,060 projected births to 1,200 actual) in utilization of the Women’s Health Birthing Center after the first year of occupancy of the NICU. Further research needs to study if patient care confidence has risen due to the NICU project.

**18% < Budget**

**User Feedback**

*“There is not a NICU I have seen that even closely compares to ours.”*

*“Private room concept is far superior to large room or pod concept. A neonatologist from (another hospital) walked in for a tour and was wowed.”*

*“Love our NICU. We have the best NICU around this area.”*

**Acknowledgements**

Ms. Susan McDonald, Department Supervisor NICU

Aspirus Women’s Health Birthing Center

David Bosio, Construction Project Manager  
Aspirus Wausau Hospital

All those involved in research and design of the Anya Marie Jackson Newborn Intensive Care Unit

1. Recommended Standards for Newborn ICU Design, Report of the Seventh Census Conference on Newborn ICU Design, Committee to Establish Recommended Standards for Newborn ICU Design, Robert D. White, MD, Chair
2. Budgets established from Aspirus internal database.

**Limitations**

- Patients, families, physicians and hospital leadership were not included in the survey.
- Quantitative data is a straight line projection from previous NICU environment to new unit.

**Conclusions**

The Newborn Intensive Care Unit at Aspirus Wausau Hospital has become a state of the art healing center for newborn patients. An Evidence Based Design approach to their NICU design and implementation has resulted in informed and satisfied care providers, and a community perception of high quality of birthing care.



*“There is not a NICU I have seen that even closely compares to ours.”*