Case Study: RPD NICU

Lean Synergy & Solutions

The Challenge

In preparation for a $30 million campus expansion, leadership in this large, multi-hospital system decided to apply Lean 3P principles in the initial design phase. The critical care department in this hospital system consisted of 38 Neonatal Intensive Care Unit (NICU) beds plus 26 Intermediate Care Center (ICC) beds. The NICU averaged 28 transfers per month to the Intermediate Care Center (ICC). The average length of stay in the unit was 15 days.

In order to meet forecasted demands without deferrals, a total of 80 beds would be needed. However, to avoid all back transfers, the unit would need the ability to flex up to 90-100 beds.

Space was not the only issue. Family satisfaction scores indicated a desire for enhanced private family areas. A 2007 survey showed that 67% of respondents were dissatisfied with the sleep rooms and 29% were dissatisfied with transfers/moves.

Targets

This multi-discipline team, including architects accepted the challenge to increase beds and reduce overall cost. The project sponsors and Management Guidance Team established the following targets:

- >=10% reduction in current volume idealized department gross square feet
- Create multiple blueprint unit designs for 36-bed developmental area & 44-bed acute care area
- Develop full-sized mock-ups
- Identify design to optimize flow

Vision for the 7 Healthcare Flows:

- **Patient Flow:**
  - Move care to the patient to minimize patient moves
  - Provide developmental care space
  - Greatest acuity close to life safety elevator
- **Family Flow:**
  - Provide privacy options without diminishing opportunity for community
  - Provide accommodations outside the room for conversation and private space for consultations and emotional needs
- **Provider Flow:**
  - Provide accessible and collaborative space for private care-team discussions
  - All multi-discipline care providers working together within the zones
- **Medicine Flow:**
  - Provide localized and secure med rooms to reduce travel by staff
- **Supplies Flow:**
  - Provide high use supplies in the room and distribute the rest to reduce travel for staff
- **Equipment Flow:**
  - Provide high use equipment in the room or zone and distribute the remainder to reduce travel for staff
  - Centralize storage of equipment for low use equipment
- **Information Flow:**
  - Utilize technology for enhanced communication

Code Simulation in mock up unit:

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Areas of Focus

This Rapid Process Design (RPD) event focused on the physical design and processes from the time a request is made for admission to the NICU/ICC until the patient is transferred out of the unit. There were several sub-processed included in the scope of this project, for example: establishing standard room set-up, standardizing supplies and equipment, organizing shared spaces, limiting patient moves, establishing a solid rounding and coverage model, and gaining staff acceptance.

Workshop Actions

The actions taken during the RPD were driven by the vision created for the seven flows, which included: 1) Patient Flow, 2) Family Flow, 3) Provider Flow, 4) Medicine Flow, 5) Supplies Flow, 6) Equipment Flow, and 7) Information Flow. The RPD process resulted in the following highlights:

- Defined care zones
- Established a "new community" with the design of care zones, identifying neighborhoods (zones) by certain décor, assigning addresses to patient rooms
- Designed rooms with ample space for multiple ventilators, IV poles and patient care activities
- Created headwall configuration to include vacuum and suction capabilities
- Included family support features such as pull out bed, desk/chair with computer connection, phone with voicemail, message board and linen storage
- Designed larger ECMO rooms
- Increased the usable space in NICU staff lounge
- Created a physician station which included computers and space for reference materials
- Designed space to include x-ray and PACS in each zone
- Designed Lactation/RCP Station
- Created a Teaming Room

Outcomes

The 30-member Team did a wonderful job of staying focused on the targets and ultimately achieving great success. Here are a few of those successes:

- Created layout to support "line of sight" and "line of hearing" models
- Created a design that would minimize patient moves and improve flow
- Mocked up four bed pods
- Simulated code scenarios in the new private room setting
- Moved staff lounge for more natural light and space
- Significant increase in parent and amenity space
- Designed ergonomically correct headwalls
- Improved communication systems for care givers was identified thus reducing noise by eliminating the need for overhead pages
- Increased patient/family privacy
- Organized supplies and equipment, including bedside supplies
- Determined off-unit functions
- Established standardized criteria for support and shared spaced
- More space for patient care
- Additional space for teaming
- Added more restrooms
- Increased private work space

Results

The overall objective was to reduce by 10% the May 2007 current volume DGSF of 46,480 square feet (664 square feet/bed for a 70-bed unit). By the end of this RPD event, the current volume DGSF for the 79-bed unit was 48,600, of which about 1,500 square feet occupied existing space resulting in net new DGSF of 47, 085 square feet. This reduced new construction by over 6,000 square feet thus saving the organization $2.3 Million in new construction costs.