

OPTIMIZING CAREGIVER WORKFLOW IN A PEDIATRIC INTENSIVE CARE UNIT

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Children’s Healthcare of Atlanta is a system of three hospitals and 16 neighborhood locations. It is also a teaching hospital that partners with Emory School of Medicine. Children’s recently completed a major expansion to meet the needs of Georgia’s growing pediatric population. Children’s has 474 staff beds with an annual demand of 570,000 patient visits. Children’s is also a level II trauma center with over 170,000 annual emergency visits and 37,000 surgical procedures. In 2008, Children’s Healthcare at Egleston expanded the Pediatric Intensive Care Unit from 21 to 30 beds. The new unit is over 22,000 square feet larger with three pods and decentralized nurse stations. Although the PICU was created using evidence-based and patient-centered principles, caregiver workflow was not optimized. The new PICU layout altered caregiver’s workflow, decreasing time at the bedside and delaying patient care.



Children’s Healthcare of Atlanta at Egleston

Objectives

The PICU project team developed three objectives to optimized workflow: increase caregiver time at the bedside, improve efficiency of patient-centered processes, and align team cohesiveness. The project was completed in two phases. Nursing workflow was assessed first, followed by physician rounding. Observational studies and Lean tools were used to enhance the structure and processes in the PICU for improved outcomes.

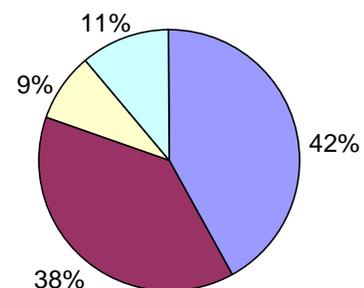
Phase I: Nursing Workflow

Nursing challenges in the new unit included less time at the bedside, feelings of isolation, and limited communication. The pod system, long linear hallways, and decentralized nursing stations contributed to the challenges. Nurses were faced with traveling longer distances to gather equipment and supplies. They also had less contact and visibility with other nurses. These barriers caused limited support for patient care, lunch coverage, and collaboration. Phase one assessed staffing requirements needed for the expanded unit. It also focused on equipment and supply locations and methods for improved communication.

Human factors techniques were used to collect over 40 hours of observational data. Nursing activities, times, and locations were recorded by shadowing 12 different nurses. Nursing activities developed and defined by Robert Wood Johnson’s “Transforming Care at the Bedside” were used to categorize the data. Task and link analysis were used to identify opportunities for improvement. Spaghetti diagrams provided a tool to visualize waste and inefficiencies.

The PICU has a 2:1 patient to nurse ratio. The current state revealed nurses only spent 42% of a 12 hour shift on direct patient care. Two primary causes for limited time at the bedside were identified. The first was a misallocation of resources and the second was wasted time on non-value added tasks.

Staff Nurse Workflow



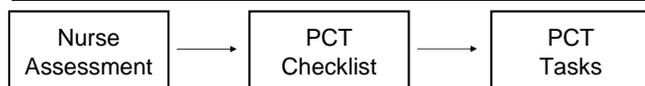
■ Direct ■ Indirect □ Non Value Added □ Regulatory

Over 30% of a staff nurse’s 12 hour shift was devoted to activities that could be reallocated to a different resource. These activities included gathering equipment and supplies, cleaning patient rooms, and basic patient care. Disorganized equipment and supplies led to over 50 minutes of non-value added time during a 12 hour shift. Completing one activity took on average 1.3 links (changes in location) due to disorganized supplies and limited communication with nursing staff. Inefficient care processes also led to delays in patient assessment after shift change. Some nurses were unable to assess their second patient until an hour after patient report. These key findings were used to generate recommendations for improvement by implementing Lean methodologies.

The following recommendations were developed to reduce waste and optimize resources to provide better patient care.

- **Introduce Patient Care Technicians** – Nursing and PCT team approach to patient care. Allocating activities to PCT’s will provide nurses with up to 15% more time at the bedside.
- **Implement 5S methodology** – Color code omni cells, move commonly used supplies and equipment to the bedside, and create par levels with consistent restocking.
- **Improve communication / teamwork** – Create flexible four hour nursing shifts for lunch coverage, introduce ASCOM phones, and build support for a Resource Nurse.

New PCT Functions	Avg. Time / Patient/Shift
Gathering equipment and supplies	52 minutes
Cleaning room and changing linens	34 minutes
Patient vitals, mouth care, feeding, Etc.	29 minutes



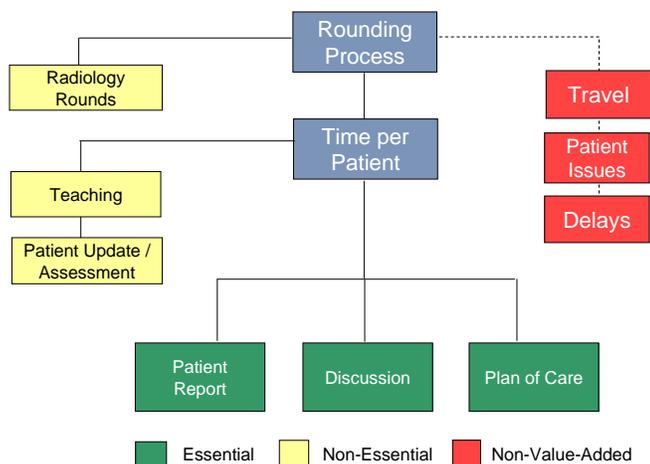
Recommendations increase nursing time at the bedside while optimizing resources and improving team work. The PCT role introduced the necessary support to handle more patients in a larger unit. Moving common supplies and equipment into patient rooms and implementing 5S reduces waste. New communication tools and shift options helped bring teamwork back to the larger unit.

Phase II: Physician Workflow and Rounding

Physician challenges in the new PICU included increased time for rounds, non-billable attending physician hours, and poor communication with PICU nursing staff. The physician team had a difficult time adjusting to nine additional patients and a floor plan without visibility to all patient rooms. The rounds became more “physician-centric” than “patient-centric” leading to disorganization. Patients were rounded on in two teams based on the residents’ assignments. This led to wasted travel around the unit and confusion regarding which attending physician was assigned to each patient. The inefficient rounds lasted up to four hours. This required a “Resource Attending Physician” to cover the unit during rounds to address patient issues and admissions / discharges. The PICU averaged 28 non-billable hours per week for the Resource Attending Physician. Delayed patient care was another negative impact. Rounding on patients later in the day postponed critical patient care decisions. The current state analysis showed less than 50% of PICU patients were rounded on before 10:00 a.m..

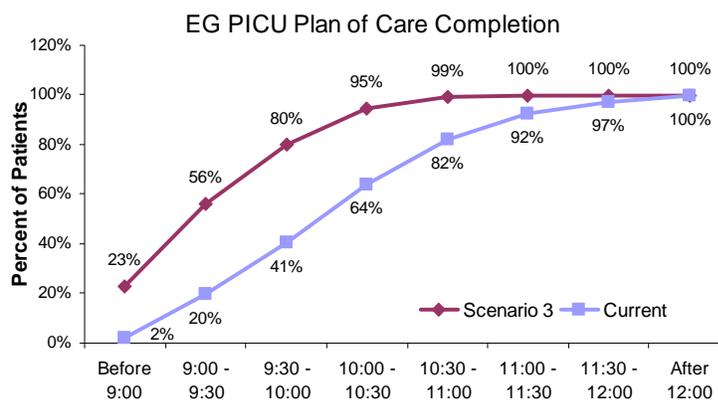
Human factors techniques were used to capture over 60 hours of rounding data. Twelve attending / resident teams were shadowed to capture rounds on 130 PICU patients. Rounding events, times, and patient interactions were recorded. The Resource Physician was also shadowed to assess their utilization.

Lean methods and scenario analysis were used to analyze the data and identify opportunities for improvement. Rounding events were categorized to determine value added and non-value added activities.



The analysis revealed large variation and waste in the rounding process. Non-essential rounding events were highly correlated to physician preference and created a wide range in rounding time per patient. Variations in rounding tasks include radiology rounds, teaching residents, and family updates. These events are important for the physician practice and patients, but do not necessarily provide value to the rounding process. The differences by attending physician also sub optimized the value of these events. Non-standard practices created inconsistent learning opportunities for residents and varied the times for patient and family interactions resulting in poor service. Non-valued added events also contributed 25 – 30 minutes of waste per rounding team. This waste can be attributed to disorganized structure, unnecessary travel, and misused resources. The rounding teams were not divided geographically or by patient acuity, causing extended travel across the unit. Poor communication between staff, Resource Physician, and rounding team created interruptions to patient care. The essential rounding functions showed the least variation and represented a “lean process.”

Scenario analysis was used to determine the impact of removing waste and reallocating the non-essential tasks outside of rounds. The goal of the scenario analysis was to “lean” rounds as close as possible to the essential tasks. The following factors were included in the scenario analysis: reducing variation in physician practice, reducing travel time, shifting radiology rounds, and eliminating non-value added time. Results of the analysis indicated that rounds could be reduced by 42%. New rounds would be 1.5 hours long, ending by 10:00. These improvements would “buy-back” time for the teaching and family updates after rounds. Reducing rounding time would also shift patient plan of care earlier in the day.



Initial results from the scenario analysis were presented to the PICU attending physician practice to gain buy-in. The following recommendations were implemented.

- **Standardized Rounds** – rounds will consistently follow the essential tasks with one teaching point per patient. Radiology rounds and other teaching events will be formalized after rounds, and patient / family updates will be scheduled for an one hour block following rounds.
- **Geographic, patient-centered teams** – rounding teams will be divided into two teams by dividing the unit geographically. Rounding order will be based on patient acuity, and then follow a linear order.

- **Unit Assessment Tool** – clinical tool to visually track patient status. Classifies patient acuity and need for a critical care bed. Helps to prioritize rounds and manage PICU census.
- **Fellows and Residents as Resource** – reduced rounding time allows the residents and fellows to function as the resource role for PICU staff. This eliminates non-billable attending physician hours.

Recommendations for physician rounds incorporate the principles of Standard Work, Visual Management, and Value Stream Mapping. Creating a standardized rounding process optimized physician resources, improved patient / provider assignments, and enhanced patient care. Attendings, residents, and fellows are better allocated to meet patient demands. Rounds are completed faster creating time for teaching and family interaction. Preventing the need for an attending resource eliminated ~ 720 non-billable hours annually. This also streamlined communication between the PICU staff and patients' physician. Care delivery to PICU patient also improved. PICU patients now have a plan of care completed earlier in the day. New rounding processes have resulted in 100% of PICU patients rounded on by 10:30. This creates more efficient care delivery, improving patient outcomes and reducing length of stay.

Conclusions

Optimizing new healthcare facilities requires the integration between the physical design and caregiver workflow. Aligning design elements to enhance workflow will result in care delivery that is patient-centered and efficient. Common challenges to evaluate when designing a new unit include: location of equipment and supplies, teamwork and communication, and staffing needs. It is also important to identify key stakeholders to set actionable project goals and objectives.

Observational data and Lean methods can be used to evaluate and improve caregiver workflow. Improvements to both the structure and processes are essential to making sustainable improvements.

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Kristin Hermann currently works for Children's Healthcare of Atlanta as a Service Consultant. She has a Bachelors degree in Industrial and Systems Engineering from Auburn University and a Masters degree in Health Systems Engineering from Georgia Tech.

In her role at Children's, she works to improve systems and processes that will enhance the experience for patients and families. Additional project work includes reducing medication turn-around times, developing a patient forecasting and staffing tool for Immediate Care Centers, and designing the measurement strategy to assess patient satisfaction for Children's.

Kristin has also participated in a joint research venture between Georgia Tech and Children's Healthcare of Atlanta to improve patient flow. Her research has been spotlighted in the Georgia Tech ISYE Alumni Magazine.

Kristin is a member of HIMSS, SHS, and IIE professional societies.