

Proactively Preparing Interns for their NICU Rotation

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Proactively Preparing Interns for their NICU Rotation

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Background

Teaching hospitals like Tampa General Hospital (TGH) play a vital role in educating the future generation of medical professionals. In the case of future physicians graduating from medical school, thousands begin their residency training in hospitals like TGH; this transition involves a significant increase in patient care responsibilities for first-year interns.² Long hours coupled with writing prescriptions for the first time contribute to the possibility of errors occurring during the learning process. In fact, studies have shown there to be an increase in medical errors that correlates with this time period, the so-called “July effect.”²

In the Neonatal Intensive Care Unit (NICU) at TGH, a new set of interns begins a rotation through the department every four weeks. Due to the degree of specialization required for the care of acutely ill infants, this high rate of resident turnover leaves potential for the interruption of quality patient care or manifestation of the “July effect” once a month rather than once a year. Full-time staff maintain a system of checks and balances to catch such errors, but this increases their workload. Pre-emptive resident education may be the solution to reducing those errors that would mutually benefit all parties involved.

Previous research has suggested that such improvements to resident education prior to starting a new rotation leads to less anxiety and overall better patient care.^{1,3} NICU residents at TGH reported feeling less than adequately prepared for some of the unique tasks at the beginning of their four-week rotation (Figure 1). We determined that providing new residents with a handbook containing valuable NICU protocols and medication dosage information could potentially decrease the time required for them to become comfortable with the daily tasks required while they are on service in the NICU.

Study Methods

Six first-year NICU residents were anonymously interviewed about their experience with the NICU rotation at TGH. Participants were asked to rate their level of confidence with various patient care tasks using a 1-10 scale (1 = no confidence; 10 = extreme confidence) – (Figure 1).

After compiling data on new resident confidence, we interviewed two neonatology attending physicians, one neonatology fellow, and three neonatal nurse practitioners to determine the most valuable information that would be useful to have in a new resident handbook. Data were gathered on each of the above subjects from multiple sources including TGH Portal (online handbook) and former unit handbook (TGH NICU 2006). The handbook was then systematically reviewed by one nurse practitioner, one attending physician and two interns.

Results

The interns, fellows, nurse practitioners and attending physicians compiled the following list that consisted of two general topics: unit protocol and patient care protocol.

Unit Protocol

- Unit Personnel and Responsibilities
- Team Members
- On-Call Obligations
- Unit Didactics
- Schedule of Rounds

Patient Care Protocol

- Amount of Primary Patients per Week
- Charting
 - New Admission Procedures
 - Progress Notes
- Sign-Out/Hand-Off

Tables, figures and high-yield information were compiled to elicit the best possible resource for interns (and all practitioners) with quick ease of access (see figures 2 & 3).

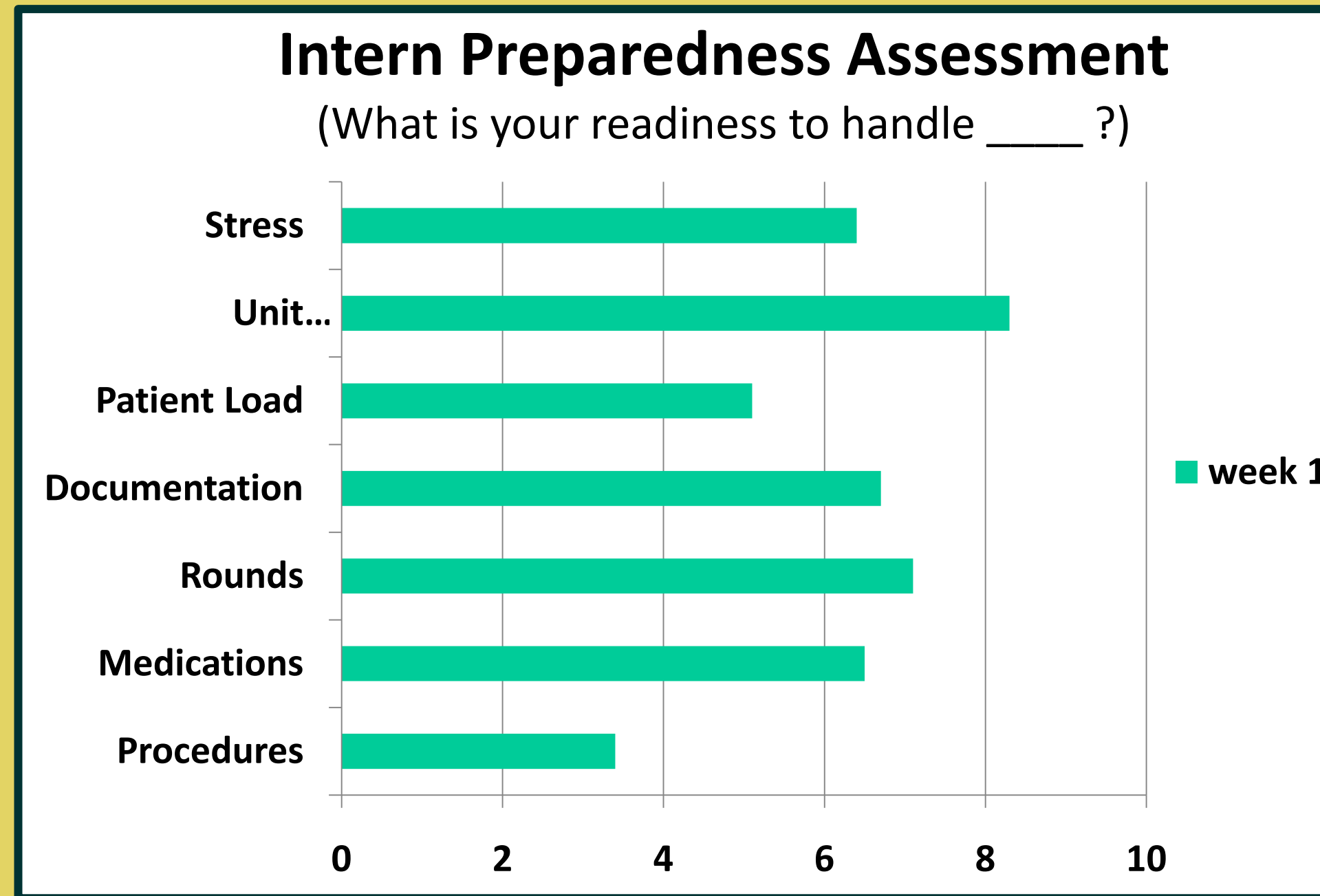


Figure 1. Interns reported various levels of comfort with the typical tasks required of them while on service in the NICU at TGH. Familiarity with medical procedures was, on average, the lowest-ranked category. (n = 6; Scale: 0 = no confidence, 10 = extreme confidence)

CALORIE AND FLUID CALCULATION	
1. Fluid (ml/kg/day): Total ml of all fluids (include blood products, IV meds, flushes, IV, HAL, IL) in 24 hrs ÷ kg	
2. General Information	
• Dextrose = 3.4 kcal / gm	○ D10W = 3.4 × 10 = 34 kcal/100ml or 0.34kcal/ml
• Protein = 4 kcal / gm	○ D12.5 = 3.4 × 12.5 = 42.5kcal/100ml or 0.42kcal/ml
• Intralipids	○ 20% IL = 2 kcal/ml
• MCT oil = 7.5 kcal/ml	
• Polyose = 2 kcal/ml	
• Bepreproten® = 25 kcal (6 gms protein) per packet (packet = 7gms or 1/4 tsp)	
• Formula	
○ 20cal/oz = 0.67kcal/ml	
○ 22cal/oz = 0.73 kcal/ml	
○ 24cal/oz = 0.8 kcal/ml	
○ 27cal/oz = 0.9 kcal/ml	
○ 30 cal/oz = 1.0 kcal/ml	
• Cereal = 15 kcal/tbsp	
• Human Milk Fortifier = 3.8 kcal/pkg	
3. Calorie Calculation	
• TPN	
○ Calories from Carbohydrates (CHO): (Final concentration ___ % dextrose) × (volume infused (ml) ___) × 0.034	
○ Calories from protein: (Actual volume infused in ml) × (grams/kg/day of Amino Acids) × (weight in kg) × 0.04	
○ Calories from IL: (Volume infused in ml) × 1.8 for 20% lipids or 1 for 10% lipids	
○ Total calories from TPN in 24 hrs: Calories from: CHO + Protein + IL = kcal/kg/day	
• Breast Milk and formula	
○ (Volume ingested (ml) in 24 hr) × (kcal/ml for each product) = kcal/kg/day	
• IV Glucose	
○ (Total fluid volume (ml) in 24 hr) × (kcal/ml for each product) = kcal/kg/day	
• Parenteral and Enteral:	
○ (Total ml IV fluids) × (kcal/ml for each solution) + (total ml PO feedings) × (kcal/ml for each product) = kcal/kg/day	
4. Glucose Infusion Rate (GIR)	
• Glucose mg/kg/min = ml/kg/day × % dextrose × 10	
1440	
• Glucose mg/kg/min = hourly rate × % dextrose	
6 × weight (kg)	

Figure 2. An excerpt from the handbook – a Neonatal nutritional calculation guide

Medications			
Antibacterials/Antifungals/Antivirals:			
Acyclovir	20mg/kg/dose	Q8 hours	IV
Amoxicillin (UTI Prophylaxis)	Less than 34 weeks PCA	Q12 hours	IV
Amphotericin B	10-20 mg/kg/dose	Q24 hours	PO
No test dose required in neonates	0.5-1 mg/kg/dose	Q24 hours	IV
Infuse over 2-6 hours			
Amphotericin B Lipid Complex (Abelcet)	5-7 mg/kg/dose	Q24 hours	IV
Infuse over 2-6 hours			
Ampicillin	100mg/kg/dose	Q12 hours	IV
Infuse over 10-15 minutes			
Bactrim	150mg TMP/m ² /dose	3x weekly (MWF)	IV/PO
UTI Prophylaxis	2mg TMP/kg/dose	Q24 hours	PO
Do not use < 2 months of age			
Cefazolin (Ancef)	25mg/kg/dose	**See Cefotaxime Table	IV
Cefotaxime (Claforan) 50 mg/kg/dose IV			
Postmenstrual Age (weeks)	Postnatal Age (days)	Interval	
Less than or equal to 29	0-28	Q12 hours	Q8 hours
30-36	0-14	Q12 hours	Q8 hours
37-44	0-7	Q12 hours	Q8 hours
Greater than or equal to 45	All	Q6 hours	
*Reserve for suspected or confirmed CNS infection			
Ceftazidime (Fortaz) 30-50 mg/kg/dose IV			
Postmenstrual Age (weeks)	Postnatal Age (days)	Interval	
Less than or equal to 29	0-28	Q12 hours	Q8 hours
30-36	0-14	Q12 hours	Q8 hours
37-44	0-7	Q12 hours	Q8 hours
Greater than or equal to 45	All	Q8 hours	

Figure 3. Another excerpt from the handbook – a Neonatal medication dosing guide.

Results (continued)

Statistically, interns that underwent teamwork-training in Neonatal Resuscitation exhibited better teamwork, faster resuscitation times and better workload management than interns who did not.⁴ Similarly, interns that underwent training of standardized sign-out procedures were more likely to detect missing information and more likely to lower communication error rates.³ Applying these principals to NICU, pre-emptively providing new interns with additional standardized information about the these topics (as opposed to verbal communication from previous interns) should aid in building team cohesion and competency.

Once the final draft of the handbook is completed, it will be introduced to future NICU residents prior to their start-date in the unit. A follow-up study could measure differences in the confidence level of these residents using the same scale as previously described.

Conclusions

With a unit as unique in operations and procedures as the NICU, it is natural for there to be a slower learning curve during an intern’s first rotation. These accepted adjustment periods create more work for the rest of the medical care team. While the unit does a phenomenal job accommodating efficient learning periods without creating dangerous lapses in patient care, improvements could be made to the orientation process. Currently, orientation occurs by short-lived, informal verbal communication between interns leaving the unit and interns coming on to their new rotation. It was clear after interviewing interns that informal learning is not the most efficient way to prepare and that a handbook might provide a simple, self-guided way to learning more about the unit beforehand. Also, the ease of access to high-yield formulas and charts that are used regularly could help expedite patient care and medical team decisions.

Research has shown that better orientation and preparation leads to an increase of preparedness and a decrease in errors.¹ The aim of this project was to increase ease of orientation for interns, independent of preceptor training. Results and metrics are as yet undetermined and both short-term and long-term analysis would be extremely beneficial.

Citations

1. Improving surgery intern confidence through the implementation of expanded orientation sessions. Antonoff MB - *Surgery* - 01-AUG-2010; 148(2): 181-6.
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