When a Pandemic Hands You Lemons, Make Lemonade: Just in Time Simulations to Ensure Ongoing Competency and Proficiency for Neonatal Emergencies
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Background and Hypothesis

Skill degradation is a significant concern for high-risk low-volume procedures. Learning from the aviation and space industry[1], healthcare professionals have utilized simulation to prevent skill degradation[2-4]. With the onset of a novel coronavirus pandemic many hospitals shifted ambulatory and well-patient services such as obstetrics to prepare for the expected surge of the acutely ill. This shift in well-patient services poses a unique challenge for maintaining competency and proficiency.

One local facility experienced a similar shift in obstetrical services, resulting in a sharp decrease in delivery volume. This posed a significant concern for skill degradation for neonatal emergencies. We strategized for a solution to ensure ongoing proficiency and competency for neonatal resuscitation through Just in Time (JIT) Simulations.

We hypothesized with JIT simulations, we could provide unique simulation-based education for Labor and Delivery, Couplet Care and NICU Nurses regarding the following:
1) Standardized preparation of basic delivery resuscitation equipment through behavioral and cognitive learning
2) Skill performance review with directed JIT feedback for airway recovery and troubleshooting interventions.

Methods

Two cycles of Just in Time Simulation were conducted from May 1-20, 2020 at Level 2 NICU facility in San Antonio, TX. A total of 154 simulations were conducted over the two cycles (80 and 71 for cycle 1 and 2 respectively). These simulations were conducted with individual staff members and a dedicated facilitator due to social distancing concerns. Scripting was provided for the simulation pre-brief and debrief to ensure all participants received the same education. Staff members participated multiple times during the 2 cycles to hardwire behaviors and knowledge.

Simulation Objectives and Design

JIT cycle 1 focused on a standardized approach to preparation for basic resuscitation equipment.

Cycle 1 Goal:
   Prepare the 5 basic items deemed essential for all delivery resuscitations

Cycle 1 Design:
   • The participants were instructed to prepare for an imminent delivery
   • Debriefing reinforced the skills and technique and highlighted the importance of thermoregulation and airway recovery

JIT cycle 2 focused on the initial stages of NRP through airway recovery and troubleshooting measures.

Cycle 2 Goal:
   Prepare for the imminent birth (30 seconds) and perform the initial steps of NRP for a depressed infant

Cycle 2 Design:
   • The 3-minute scenario (30 second preparation) led the team through the initial stages of NRP
   • Debriefing focused on the initial steps, standardized communication and improving handoffs amongst newly arriving team members

A Likert Scale pre- and post- self-assessment was completed by all participants regarding their knowledge and confidence level for skills and information disseminated in the JIT Simulations.

JIT Cycle 1 Results

Question	Pre-Education Mean	Post-Education Mean	% Change	P Value
Know 5 Items to Prepare	3.5	4	14%	0.02
T-piece Set Up	3.61	4	11%	0.05
How to adjust Pressures	3.39	4	18%	0.0017
O2 Requirement-Term	3.11	3.94	27%	0.0015
O2 Requirement-Preterm	2.94	3.94	34%	0.0044
Heat Loss	3.33	4	20%	0.0017

The data were analyzed using the Mann-Whitney U test. Of the 11 items assessed, 6 were found to be statistically significant for the Labor and Delivery nurse participants. Use of the T-piece, oxygen requirement and methods of heat lost showed the most significant improvement in Cycle 1.

JIT Cycle 2 Results

Question	Pre-Education Mean	Post-Education Mean	% Change	P Value
How to Adjust T-piece	3.43	3.95	15%	0.016
4 Q NRP	2.95	3.86	31%	0.0007
Starting PPV	3.05	3.86	27%	0.0003
Rising HR	3.29	3.86	17%	0.02
Phrase Chest Rise	2.95	3.9	32%	0.0002
Phrase HR	3.05	3.9	28%	0.0004
Troubleshoot	2.9	3.86	33%	0.00002
SBAR	3.1	3.81	23%	0.0019
Intubation prior to chest compressions	2.86	3.86	35%	0.00025

Similar data analysis was conducted during for JIT cycle 2. Of the 11 items evaluated, 9 were shown to be statistically significant. Standardized phraseology, troubleshooting ineffective PPV and performing intubation prior to initiation of chest compressions demonstrated the most change in skill confidence and knowledge.

Similar results were noted with Couplet Care staff in cycle 1 and cycle 2. NICU nurses also participated but did not show any statistical significance during cycles 1 and 2.

Conclusion

Just in Time simulations can be a useful methodology to provide rapid-fire, targeted education. By providing multiple opportunities for learning with directed feedback, confidence and skill level improved. Follow up evaluations were conducted to assess for knowledge retention with plans for subsequent follow up JIT simulations based on the knowledge gaps identified. Further simulations are needed to demonstrate translation to retained skill with the incorporation of additional members of the resuscitation team.

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