Utilization of Toyota Production System and Job Instruction
Training in Standardization of Umbilical Catheter Placement in the Neonatal Intensive Care Unit Among Pediatric Residents

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Introduction
Umbilical venous and arterial catheters are often essential to the NICU admission process\(^1\) • Placement of umbilical catheters can be time consuming and intimidating for residents, with multiple complications\(^2\)
Simulation training for invasive procedures has been found to have mixed results in long-term skill development and application to live patients\(^3\)
• Longitudinal procedural curriculum greatly improved resident comfort in ACGME required procedures\(^4\)
The Toyota Production System (TPS) is a model to improve efficiency and eliminate of errors in manufacturing
• Improve safety, decrease cost, and bolster patient and staff satisfaction\(^5,6,7\)
• Has been adopted at CHKD using bedside Job Instruction manuals

Methods
Residents to complete a Likert-type survey to assess experience and comfort in umbilical catheter placement before and after intervention
Residents will receive standardized umbilical catheter placement training on a simulation premature infant before first nursery rotation with a refresher training before their second or third rotation

Primary outcome: resident comfort with umbilical catheter placement

Results
PDSA Cycle 1:
• Time for one training with standard five part model too long
• Training modified to last 1.5 hours with limit of 2 trainees per session
PDSA Cycle 2:
• Observed benefit of experienced trainee providing additional teaching
• One experienced trainee with a novice for each session

Resident surveys pending at time of presentation

Discussion
The standard TPS model is too long when applied to umbilical catheter placement training
A modified approach with less repetition is engaging and effective
Simulation training is an effective tool in pediatrics residency to increase comfort in umbilical catheter placement

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