



Development and Implementation of a Pediatric Critical Care Transport Education Curriculum

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Background

The transport of critically ill pediatric patients to tertiary care centers requires teams with highly specialized training and skills. The use of specialized pediatric critical care transport teams has been associated with improved patient outcomes.¹ Orr et al demonstrated improved survival rates and fewer unplanned events during transport when patients were transported by a pediatric critical care specialized transport team compared to a nonspecialized team. In rural settings with limited resources, there may be no designated team in which members have specialized pediatric training. At the University of New Mexico, the Lifeguard Transport Team is composed of nurses, respiratory therapists, and paramedics whose backgrounds include primarily adult emergency medicine and critical care. Additionally, the transport of ill children is shared among other emergency transport services around the state further diluting the exposure the Lifeguard Team has to the pediatric population. With the limited exposure to pediatric patients, team members may have lower comfort levels as well as knowledge deficits pertaining to the care of this special population. Therefore, incorporating a robust continuing education curriculum to reinforce pediatric critical care concepts becomes imperative. Use of a standardized education curriculum including lectures, simulations, and skills laboratories has shown to improve short-term knowledge for pediatric transport team members.² Using similar methodology, we designed a pediatric intensivist-led education curriculum to reinforce pediatric critical care concepts for our non-pediatric specific hospital-based transport team. Our long-term goal is to improve team member knowledge and aid in the consistent delivery of best practices across the continuum of care from referring hospital, during transport, and at the referral center for critically ill pediatric patients.

Objectives

1. Identify transport team members' self-reported comfort levels with pediatric critical care concepts.
2. Assess current knowledge level of pediatric critical care concepts among the transport team members.
3. Design and implement a learning curriculum to introduce and reinforce pediatric critical care topics relevant to the transport of critically ill children.
4. Assess knowledge retention upon completion of the education curriculum.

Methods

- We designed a didactic curriculum with 12 topics relevant to the care and transport of critically ill pediatric patients. The target audience was our tertiary care hospital-based medical transport team.
- Members completed a survey on perceived comfort levels on 21 pediatric specific topics and a pre-assessment to evaluate current knowledge levels.
- Modules were delivered monthly via an online video lecture format. A post-test to evaluate knowledge retention was administered upon curriculum completion. Data was de-identified and collected using REDCap. Analytical comparisons between pre- and post-test scores were made upon curriculum conclusion. This project was deemed exempt by our local institutional review board (IRB 21-182).

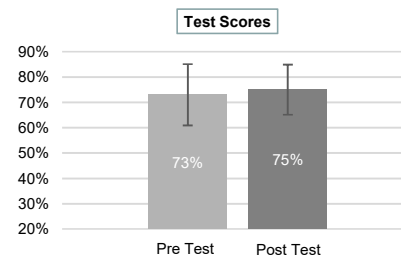
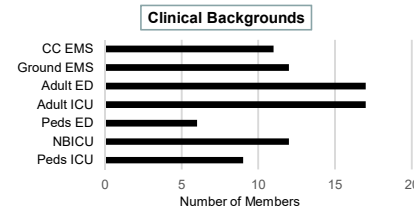
Methods

Education Modules:

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|---|---|
| 1. Pediatric Respiratory Distress and Failure | 7. Pediatric Cardiac Emergencies |
| 2. Pediatric Advanced Airway and Initial Mechanical Ventilation | 8. Pediatric Diabetic Ketoacidosis |
| 3. Pediatric Sedation Medications | 9. Pediatric Status Epilepticus |
| 4. Pediatric Trauma | 10. Pediatric Shock |
| 5. Pediatric Ingestions and Poisonings | 11. Pediatric Anaphylaxis |
| 6. Pediatric Traumatic Brain Injury and Stroke | 12. Children with Special Health Care Needs |

Results

A demographics survey was sent to 36 team members with a response rate of 69.4%. Only 24% of the team members reported having prior experience in a pediatric intensive care unit or pediatric emergency department setting. The topics with the most perceived discomfort included identification and management of pediatric ingestions/poisonings (45%), management of pediatric intracranial hypertension (50%), and management of pediatric stroke (64%). The pre-curriculum assessment response rate was 66.7% (n=24) and the mean correct score was 73% (SD=12.1%). The response rate for the post-curriculum assessment was 32.4% (n=11) and the mean correct score was 75% (SD=9.9%). Only 10 members completed all 12 modules with only 4 members completing both pre- and post-assessments.



Discussion

The majority of our hospital-based transport team members lack prior clinical experience in pediatric critical care areas but routinely transport these patients. While the members are required to have pediatric certifications (NRP, PALS, ENPC, STABLE), most do not have a clinical background in pediatric emergency medicine or critical care. Clinical experience in a pediatric-specific specialty gives the provider opportunities to learn pediatric physiology which has considerable variations from adults. The provider can also gain experience in the management of pediatric pathologies which can be encountered during transport of an ill pediatric patient. This may explain why team members expressed high levels of discomfort with the management of pediatric ingestions/poisonings, intracranial hypertension, and stroke. A majority of the management of these entities takes place in a pediatric critical care setting. While the pre-curriculum survey identified these areas of potential weakness, the members performed well overall on the pre-curriculum knowledge assessment (mean score = 73%). Prior knowledge acquisition may be attributed to required pediatric certifications, previous pediatric training, or information from pre-existing transport education. Members also performed well on the post-assessment (mean score = 75%), however, the response rate was 32.4% with only 4 of the team members completing both pre- and post-tests. With such a low rate of overlap in pre- and post-assessments, we cannot draw conclusions on knowledge acquisition or retention based on completion of the curriculum. Crew member-identified barriers to course completion include: video-based modules rather than in-person interactions, lack of time to complete modules, and prolonged duration of some lectures. Several strengths of the curriculum include easily accessible online modules, wide variety of pediatric critical care topics, and short duration for a majority of the lectures. Limitations of the curriculum include its lack of interactivity, crew member turnover, and failure to achieve a higher rate of pre- and post-test completion. Despite the low rate of completion, this education curriculum sets the stage for a more robust pediatric critical care transport education program including case-based didactics and high-fidelity simulations. The incorporation of a standardized, pediatric-specific education curriculum for a non-pediatric specialized transport team may serve to improve comfort levels and overall care of critically ill pediatric patients across the continuum of care, and specifically during medical transport.

References

1. Orr, R. et al. Pediatric Specialized Transport Teams Are Associated With Improved Outcomes. *Pediatrics*. Vol 124, No 1. July 2009.
2. Costabile, P. et al. Development and Implementation of a Standardized Education Curriculum for Pediatric Transport. *Pediatrics*. Vol 142, No 1. Meeting Abstract. May 2018.

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