Development and Testing of a Neonatal Intubation Checklist for an Aeromedical Transport Team

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Introduction: Neonatal intubation is a high acuity and very often a low volume event for most aeromedical transport teams. The procedure of intubation requires not only procedural skills to accomplish the intubation procedure, but also teamwork skills and care practices designed to improve performance and ensure patient safety. To aid in the success and safety of the neonatal intubation procedure, a comprehensive neonatal intubation checklist was developed to standardize the procedure, the process, and guard the safety of the practice. Our goal was to improve the preparation, efficiency, and safety of neonatal intubation by utilizing the neonatal intubation checklist without increasing the time it takes to complete the procedure with a checklist.

Methods: A novel call and response neonatal intubation checklist was created specifically for this study. The checklist was developed utilizing a modified Delphi method, based on expert flight nurse opinion collected over a series of four separate sessions. The study followed a time series design. To begin each training session, teams of two flight nurses performed neonatal intubation in accordance with their current practice, without the aid of the checklist, in order to establish a baseline level of performance. After baseline skill evaluation, the teams were provided instruction in the use of a standardized neonatal intubation checklist, and watched a demonstration video which showed a team of flight nurses using the checklist in a mock transport scenario. After the baseline evaluation, instruction and video demonstration, the training continued with two subsequent simulation session in which the teams practiced using the standardized neonatal intubation checklist. The neonatal intubation checklist was used as the scoring tool during the baseline, practice, and testing sessions, and for each simulation session an intubation checklist score was tabulated and compared. Global rating score (GRS), and times to successful intubation were evaluated using a Kruskal–Wallis one-way analysis of variance by ranks.

Results: Eighteen flight nurses, divided into 9 teams of two participated in the initial training session. Significant improvements in checklist scores and GRS scores were noted after the practice sessions. In addition, a significant decrease in intubation time was also noted. Large educational effect sizes were found in checklist score ($\eta^2 = 0.89$), GRS scores ($\eta^2 = 0.6$), and time to successful intubation ($\eta^2 = 0.52$).

Discussion: The intubation checklist improved overall global performance of the set up and team work involved in neonatal intubation. Furthermore, the time to intubation was decreased with the use of the neonatal intubation checklist and a standardized method for the procedure of neonatal intubation. The neonatal intubation checklist is now a standard of practice in our institution. The checklist provides a platform for drilling, improved preparation, teamwork, and safety.

Limitations: This study has several limitations. First, the subject number is small. Second, the observers scoring the intubation simulations were not blinded, which may introduce
bias. Finally, this study did not include clinical outcomes data. Further studies will be necessary to determine long term achievement of the goals aimed to improve patient outcomes, including an increase in neonatal first pass intubation success rates for our team, and a decrease in adverse effects of multiple intubation attempts, or failed intubation attempts.

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