Learning outcome, instructions for completing the evaluation, and statements of disclosure can be found on page 114.

Tracheostomy Education for Parents Utilizing Simulation: A New Paradigm In Parental Education

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The number of families caring for children with tracheostomies at home increases each year as clinical indications shift from acute infection to chronic disease (Lawrason & Kavanagh, 2013). Approximately 5,000 pediatric tracheostomies are performed each year in the United States for diverse indications (Funamura, Durbin-Johnson, Tollefson, Harrison, & Senders, 2014). The most common indications include hypotonia secondary to neurologic disorders, prolonged ventilator dependence, and upper airway obstruction (Lawrason & Kavanagh, 2013). Children who receive tracheostomies for acute indications remain as inpatients until they can be decannulated when infection resolves. On the other hand, children who receive tracheostomies for chronic disease are often decannulated in an outpatient setting (Funamura et al., 2014). As the number and complexity of pediatric patients going home with tracheostomies grow, the importance of parental understanding of how to manage emergencies at home increases.

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Easing the transition from hospital to home after a tracheostomy with discharge planning is a goal of family-centered patient care in pediatric settings. Proper tracheal tube maintenance and emergency management improves outcomes and reduces re-admissions. We hypothesized that family members caring for children with new tracheostomies will report greater knowledge, confidence, and preparedness after simulated training with high-fidelity mannequins. Parents (*N*=29) of children pending discharge with new tracheostomies were offered simulation training after didactic and hands-on bedside training was complete. Simulation-enhanced training consisted of four scenarios escalating in difficulty of session (training exercises and didactics) with a high-fidelity simulator most closely matching their own child's age. Post-training surveys were collected from January 2014 to January 2016. Caregivers agreed strongly with nine of 10 statements regarding preparedness, confidence, and emergency management, and 97% would recommend simulation training to other parents before discharge. Responses to open-ended questions were varied. First, describing what participants appreciated and learned, 28% noted simulation experience itself, 24% noted general tracheostomy care, and 7% noted emergency management. Second, 76% offered no topics for greater focus and improvement, and 24% suggested specific improvements. Third, general comments about training were positive (80%). Overall, caregivers favorably reported greater preparedness, confidence, and knowledge of emergency management. For unknown reasons, caregivers endorsed simulation training for other parents without consensus on additional training for themselves.

Key Words: Simulation, parental education, pediatrics, tracheostomy.

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The family's transition from hospital to home requires skillful tracheostomy care. Many hospitals have systematic training programs teaching families how to provide suction, stoma care, and tube changes prior to discharge under the supervision of healthcare professionals (Szondy, Morton, Parrott, Bazzy-Asaad, & Tolomeo, 2014). Although families are often overwhelmed at the onset of their training, parents are able to comfortably manage routine tasks needed to care for their child at the time of discharge (Flynn, Carter, Bray, & Donne, 2013; Kirk, 2001; Szondy et al., 2014).

Yale-New Haven Children's Hospital has implemented a systematic training program that includes written scenarios designed to promote critical thinking skills in emergency settings, which decreased time to completion (Szondy et al., 2014). Although parents are comfortable with routine tracheostomy care, they often feel unprepared for emergencies (Hopkins, Whetstone, Foster, Blaney, & Morrison, 2009; Kirk & Glendinning, 2002). Many parents express concern about their child's physical and emotional health, especially their ability to breathe despite feeling comfortable with changing and suctioning the tube (Hopkins et al., 2009). Parents prefer having easily accessible advice and professional support when emergencies arise. This support is inconsistently available (Kirk & Glendinning, 2002).

During the past decade, simulation has been a prevalent and often successful method of teaching healthcare professionals at all stages of their education (Ojha, Liu, Rai, & Nanan, 2015). Growing acceptance of simulation as an educational tool has led many to apply its usefulness in teaching beyond the classic healthcare team. Interestingly, some hospitals have begun using simulation to train patients' parents and caregivers (Arnold & Diaz, 2016; Sullivan-Bolyai et al., 2014; Tofil et al., 2013). This practice is still new and needs further investigation, but initial studies of its use appear promising. Simulation-based education of parents is valuable in acute settings, such as recognition and management of fever, and in the management of chronic diagnoses, such as diabetes mellitus type 1 (Chang, Lee, Guo, & Huang, 2016; Ramchandani et al., 2016). Simulation for caregiver education has garnered mostly positive feedback from parents, engendering confidence in their abilities to care for patients outside of the hospital. Our group has recently shown that parents of patients on home ventilators feel more comfortable in their abilities following simulation-based education (Tofil et al., 2013). Our hypothesis is that parents of children getting ready to be discharged home will report increased knowledge, confidence, and preparedness after training with simulation-based emergency tracheostomy scenarios.

Methods

Parents of children pending discharge to home with new tracheostomies were offered simulation training to improve management of these new critical airways. All parents accepted training, and simulation staff prioritized scheduling around parent availability. Most could be scheduled within 24 hours of the final phase of training. This training occurred after the traditional didactic and hands-on bedside training was complete. This study period was from January 2014 to January 2016. Simulation-enhanced training consisted of a single simulation session with a high-fidelity simulator most closely matching their own child's age. Each training session covered four common tracheostomy emergencies. These included

- *Vomiting:* Suctioning due to vomiting with coughing and aspiration.
- *Difficult reinsertion:* During a tracheostomy change, difficult reinsertion is encountered. Caregivers have to demonstrate the technique of threading the smaller tracheal tube over the suction catheter.
- *Cardiac arrest:* Occluded tracheostomy that cannot be suctioned or changed; caregivers demonstrate attempting placement of smaller tracheal tube that is unsuccessful. At this point, the child requires chest compressions and bag-valve-mask with suction catheter in the tracheostomy stoma.
- *Situational awareness:* Decannulation of tracheal tube that falls on the floor, requiring the tube to be replaced. Caregiver supplies are some distance away, and they have to decide to either put in a dirty tracheal tube or leave the room to get a clean tracheal tube. Advice is given to use a dirty tube, establish a stable airway, and then change to a new, clean tracheal tube.

These sessions were attended by one to two caregivers and generally took about 60 minutes to complete.

Prior to training, a standard pre-brief was given to all parents about the simulator's features, the ability to make mistakes and learn from them, and the psychological safety of the training environment. After each emergency scenario, debriefing occurs at the bedside. The "plus/delta" model was used for debriefing, where positive actions were reviewed and incorrect actions were corrected. The "plus/delta" debriefing technique focused discussion around learners' perceptions of what they believed they did well; thus, "plus" comments. Next, the discussion addressed items/feelings that participants believed were not done well or parts of the case where they were not sure of the next step or treatment. Therefore, they wanted to change, or "delta," in future cases. The motto taught to all parents with all scenarios is, "When in doubt, change it out."

After the course, caregivers completed a 10-statement Likert-style survey and answered three open-ended questions eliciting levels of preparedness, confidence, knowledge, and satisfaction with simulation training. The 10 statements were analyzed descriptively. Responses to open-ended questions were thematically grouped and descriptively presented. The Institutional Review Board at the University of Alabama at Birmingham approved this study. Statistics were done using SPSS Version 21 (Chicago, IL) to gather frequency data.

Results

Twenty-nine caregivers participated in this training over 24 months, all of whom completed the post-survey. Table 1 shows the breakdown of survey responses. Caregivers consistently strongly agreed with nine of 10 statements regarding preparedness, confidence, and emergency management ($N = 29$). Interestingly, the only question parents scored negatively was further simulation training: 13 (44%) would decline further simulation training, 13 (44%) would welcome it, and 3 (12%) were not sure. Notably, 28 (97%) would recommend simulation training to other parents before discharge.

Table 1.
Caregivers' Responses to Statements Assessing Their Experience

Statement	*n*	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree	Total
1. I am prepared to care for my child when he/she goes home.	28	92.9%	7.1%	0.0%	0.0%	0.0%	100%
2. I feel confident in changing my child's trach.	29	93.1%	6.9%	0.0%	0.0%	0.0%	100%
3. I feel confident in knowing the signs and symptoms of breathing trouble.	29	93.1%	6.9%	0.0%	0.0%	0.0%	100%
4. I know when and who to call for help.	29	86.2%	13.8%	0.0%	0.0%	0.0%	100%
5. I know what to do if an emergency happens.	28	92.9%	7.1%	0.0%	0.0%	0.0%	100%
6. I know how to take care of my child's trach on a daily basis.	29	93.1%	6.9%	0.0%	0.0%	0.0%	100%
7. Simulation training was helpful in preparing me to care for my child at home.	29	96.6%	3.4%	0.0%	0.0%	0.0%	100%
8. Simulation teaching was well done.	26	96.2%	3.8%	0.0%	0.0%	0.0%	100%
9. I would have like more simulation training.	**25**	**28.0%**	**16.0%**	**12.0%**	**32.0%**	**12.0%**	**100%**
10. I would recommend simulation training to other parents before they go home.	29	96.6%	3.4%	0.0%	0.0%	0.0%	100%

Figure 1.
Comments Post-Training

General Positive

Training was very good.
Great activity.
I feel that you are all doing a great job!
The simulation lab is awesome.
Thanks, very helpful.
Excellent, thank you for being so thorough.

Specific Positive

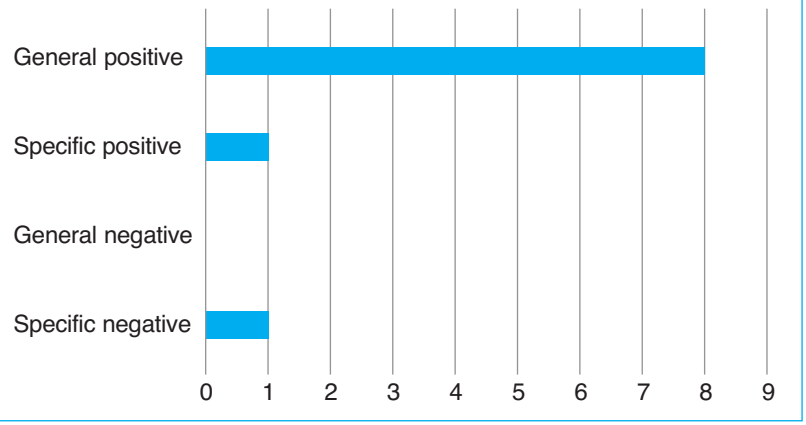
Good communication with parents.

General Negative

None.

Specific Negative

Keep the same interpreter throughout education.



Responses to open-ended questions varied. First, describing what participants appreciated and learned, 8 (28%) commented on the simulation experience itself, 7 (24%) noted general tracheostomy care, and 14 (7%) discussed emergency management. Second, 22 (76%) offered no topics for greater focus and improvement, and 7 (24%) suggested specific improvements. Third, general comments about training were 23 (80%) positive. The number of positive- and negative-specific suggestions were equal, at 10% each.

Caregivers offered 36 responses about what each liked and/or learned. Responses were thematically sorted into seven groups (see Figure 1). A plurality of comments identified general tracheostomy care (25%) and emergency preparedness (22%). Nearly half reported benefit from training for emergency simulations, and the most learning was ascribed to those simulations. Caregivers consistently reported liking the overall experience. Participants noted that the mannequin was "just like a human" and praised the "depth of training to make sure I understand situations," especially ones with "difficult trach changes."

Discussion

Overall, caregivers for children going home with tracheostomies reported greater preparedness, confidence, and knowledge of emergency management. Interestingly, and for unknown reasons, caregivers endorsed simulation training for other parents without consensus on additional training for themselves. Open-ended feedback indicates that parents could express not only specific skills and benefits of simulation training, but the majority also appreciated the experience. We found simulation training a valuable tool for educating parents as

Instructions For Continuing Nursing Education Contact Hours

Tracheostomy Education for Parents Utilizing Simulation: A New Paradigm in Parental Education

Deadline for Submission: **June 30, 2020** **PED 1803**

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Learning Outcome

After completing this learning activity, the learner will be able to describe the effect of simulation training on caregivers' preparedness, confidence, and emergency management of pediatric tracheostomies.

Learning Engagement Activity

Ask yourself the following questions:

- Do you think caregivers of the pediatric patient population in your work environment would accept simulation training?
- What other caregiver education could be done using simumlation training?

Fees — ***Subscriber:*** FREE ***Regular:*** $20

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caregivers, and future use of simulation in family-centered patient care for chronic conditions is promising.

This study is one of the first to investigate the effect of simulation-based education with education of parents in pediatric tracheostomy care. However, comparisons can be made to other simulation-based parental education studies. Sullivan-Bolyai and colleagues (2014) described their use of human patient simulation in the education of parents whose children had been diagnosed with diabetes mellitus type 1, in which some parents did not respond positively and reportedly found the human patient simulation to be "creepy." Similarly, some feedback from our study participants reflected negatively on the simulation-based educational approach, claiming it was effective. However, they did not necessarily believe they needed it for their own families. In a previous study performed by our group, investigating the use of high-fidelity simulator scenarios in parental education for home ventilator patient care, the inclusion of simulation favorably affected training (Tofil et al., 2013). Results of the tracheostomy education study indicate a similar effect on parental confidence and apparent knowledge levels. Overall, it appears the inclusion of simulation positively impacts parents' training, but consensus lacks on whether caregivers believe it should be used in additional training for themselves.

Parents were generally accepting of the simulator itself, often calling it by their child's name. Many parents demonstrated an emotional response to the mannequin during their simulation, and some would become increasingly distraught as the simulator deteriorated. In general, few parents had difficulty with the first case, but those who did struggled with determining the appropriate length of time to suction and indicated this was a side effect of simulation. Although many parents found it difficult to practice chest compressions on a mannequin representing their child, they all felt this was an important aspect of their training. Few studies have been completed regarding methods to educate parents caring for children with tracheotomies. Szondy and colleagues (2014) demonstrated how using a standardized training program with written scenarios decreased the amount of time it took to complete training in eight out of 10 families. Written scenarios were designed to test parents' knowledge of navigating emergency situations, such as continued low oxygen saturations, despite suctioning and hyper-oxygenating (Nightingale, Friedl, & Swallow, 2015). Our study evaluated training experiences of nearly three times as many families and offered hands-on experience with emergency situations by utilizing simulation.

The Children's Hospital of Alabama, the study site, includes patients from diverse socioeconomic and demographic backgrounds. Families ranged from rural locations, with little access to convenient support services, to urban areas more accessible to emergency services. Nightingale and colleagues (2015) described many barriers to parents learning how to share management of their child's condition, including a potential disconnect between ethnic minorities and low socioeconomic groups and healthcare educator support. For example, current nursing home health and standardization of care in Alabama does not adequately meet needs. As such, there is great variability in the level of competency needed, as well as the level of

support parents can expect. The implementation of nurse educators to aid parents may help bridge this gap by emphasizing details in caregiving that would otherwise be taken for granted and training parents to recognize emergencies beyond their abilities. Because nursing home health and at-home support lacks wide availability, parents must know when to call for help as their caregiving role expands. Simulation has great potential as a method to expand this role by increasing competence through low-risk, action-oriented training programs that can be adapted to fit the needs of all learners.

This study has some important limitations. This was conducted in a single institution, limiting its potential applicability to other centers. We neither assessed long-term retention nor administered a pre-test to any caregivers. Rather, we focused this pilot on the acceptability and feasibility of simulation with parents. We did not track clinical outcomes of families trained with simulation to compare re-admission rates, phone calls to physicians/tracheostomy nurses, or other clinical indicators of successful teaching.

Conclusion

In summary, simulation was accepted by most families for tracheostomy emergency training. Further efforts will focus on clinical outcomes of patients trained with simulation and expanding the use of simulation for other acute or chronic conditions.

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