Unique Use of Simulation to Teach Rigid Bronchoscopy Skills and OR Teamwork

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Introduction: Rigid bronchoscopy is a highly stimulating procedure that can significantly impact the patient’s hemodynamics and ventilation. In pediatric patients who may be very small or critically ill, rigid bronchoscopy can be difficult. To perform rigid bronchoscopy safely, trainees must master the technique and tools involved in the procedure as well as learn to communicate closely with the anesthesiologist. This study evaluated whether joint anesthesia/surgery simulation training was an effective training tool.

Methods: Training was provided in a one-day workshop. Rigid bronchoscopes, graspers, video towers and a manikin with bronchoscopy-quality bronchi were obtained. A high fidelity patient simulator was used to replicate the patient’s physiology. OR environment was simulated.

After 30 min of practice with instruments (goal 1) and 60 min of manikin work (goal 2), each surgical trainee had the opportunity to perform in the high fidelity simulation (goal 3), as the surgeon, and then as scrub tech for an additional 3 h. Each scenario was followed by a debriefing.

This year, 11 trainees answered a short survey before and after the workshop regarding their level of comfort performing rigid bronchoscopy and their effectiveness to function in a team. Ratings were compared with Mann-Whitney rank sum test. Significance was assumed for P<0.05.

Simulation Goals:
1. Assembly and use of bronchoscopes and graspers with low-fidelity simulation (retrieval of objects inside a box).
2. Removal of 5 objects of different number, size, and shape.
3. Different scenarios of foreign objects in the airway with particular focus on communication between anesthesiologist and surgeon and treatment of complications with high-fidelity simulation.
4. Practice being the scrub tech for the bronchoscope under high-stress conditions

Results:

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<th>Pre</th>
<th>Post</th>
<th>Significance</th>
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<tr>
<td>Comfortable using the Rigid Bronchoscope Independently</td>
<td>4.02</td>
<td>3.009</td>
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<td>Comfortable using the Rigid Bronchoscope using the Rigid Bronchoscope Independent</td>
<td>4.24</td>
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Key Points:
1. Course Rated 5 (4.25-5)
2. Comfort using rigid bronchoscope increased from 2 (1-3-3) to 4 (3-5) with simulation.
3. All but one trainee professed being more comfortable using a rigid bronchoscope. All values median (25-75%).

Scenarios:
1. Child has fallen into corn silo – hypoxic & requires the removal of multiple pieces of corn
2. Toddler placed “something” in his mouth – loose object in airway after being lost at vocal cords
3. Child inhaled marble – difficult extraction, consider a balloon catheter
4. Child aspirated a seed that is enlarging – possible cricothyrotomy or tracheostomy
5. Child with phonation problems & difficult induction – loss of airway

Discussion: Simulation training significantly improved the trainees’ comfort level at performing rigid bronchoscopy. There was also a trend towards improved team dynamics although the higher starting value suggests that this skill is practiced more frequently in other settings. We believe that this training greatly contributes to technical expertise as well as interdisciplinary teamwork skills.