University of Colorado
Anschutz Medical Campus
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Children's Hospital Colorado

High Fidelity Airway Trainer Teaches Novice Learners Flexible Bronchoscopy Skills

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Disclosures

- Airway trainer made with support from Schramm and LaGuardia Foundations
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How did you learn flexible bronchoscopy?

Background

- Fellows learn flexible bronchoscopy (FB) primarily through supervised patient experiences
- Complications during pediatric FB are low
- Trainees have decreasing opportunities to learn procedural skills
- Simulated practice improve skills and confidence in endoscopy, laparoscopy, and bronchoscopy
- Teaching via models has not been widely adopted by Pediatric Pulmonology programs due to cost, time, and applicability to pediatrics

DeBoer *Annals* 2016
Stather *Respiration* 2013
Nagendran *Cochrane Database* 2014
Erst *Chest* 2015
Leong *Ped Pulm* 2014

Hypothesis & Aims

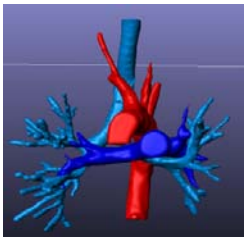
- **We hypothesize that with less than 2 hours of training with our model, novice learners will be able to accurately identify lobar bronchi in significantly decreased time compared to residents without training.**
- Aim 1) Estimate amount of training required for novice learners to accurately identify 6 areas of the airway model.
- Aim 2) Determine if trainees retain airway anatomy knowledge and basic FB manual skills 2-3 months after training
- Secondary outcome: Confidence

Methods

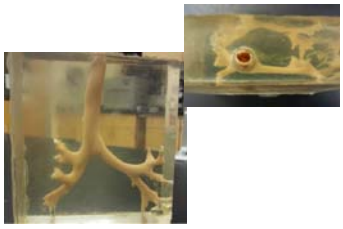
- IRB approved
- Subjects: 2nd year pediatric residents, randomized to training or control
- All participants:
  - 12 minutes of orientation to bronchoscopy
  - Pre-test and post-test bronchoscopy assessment and survey
  - 2 month retention bronchoscopy assessment
- Training:
  - 4 hands-on 15-minute practice sessions each followed by interval bronchoscopy assessments
  - Feedback from a Pediatric Pulmonologist during one of the sessions

Methods

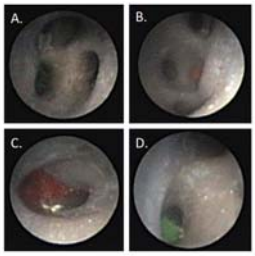
- Assessments: manipulate a pediatric bronchoscope to 6 areas of the lungs (5 lobes and lingula) and identify an exchangeable colored marker located in a segmental airway of each lobe
- Primary Outcomes: Accuracy, Time
- Secondary Outcome: Confidence



3D computer model based on real patient CT

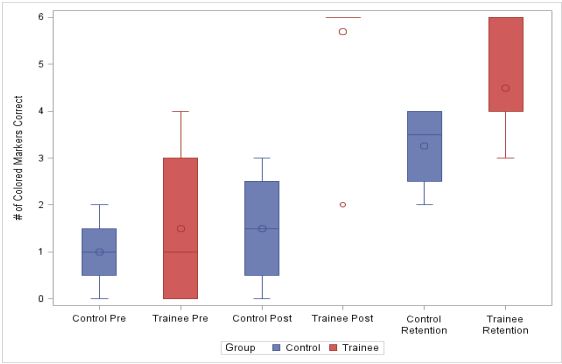


Hollow airway trainer Vasculature and exchangeable markers added for training



Exchangeable colored markers in 6 areas of the lung

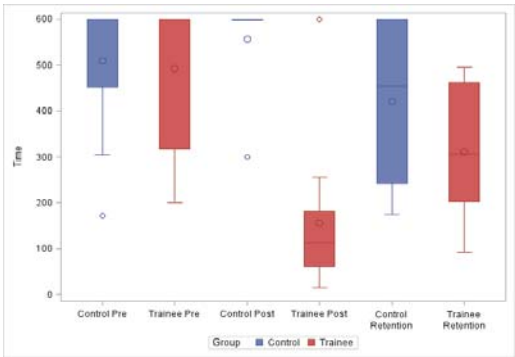
Accuracy (score out of 6) Increases in Trainees



	N	Min	Max	Median	p-value
Control Pre	8	0	2	1	
Trainee Pre	18	0	4	1	0.4439
Control Post	8	0	3	1.5	
Trainee Post	13	2	6	6	0.0009
Control Retention	4	2	4	3.5	
Trainee Retention	6	3	6	4	0.2027

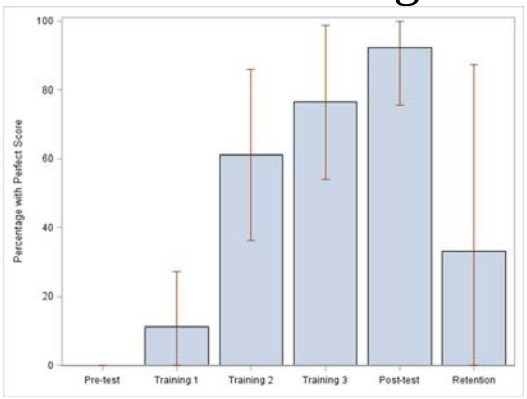
Time (seconds) Decreases in Trainees

6 faculty and fellows perform accurate assessment in 20-90 seconds (median 35 seconds)



	N	Min	Max	Median	p-value
Control Pre	8	171	600	600	
Trainee Pre	18	201	600	600	0.5523
Control Post	7	300	600	600	
Trainee Post	13	15	600	112.9	0.0042
Control Retention	4	175	600	454.5	
Trainee Retention	6	91	495	307.32	0.4733

92% Trainees with Perfect Score After Training



Increased Confidence

- "I can reliably reach each lobe of each lung using a bronchoscope in a pediatric patient:"
- 0% Trainees (Pre)
- 92% Trainees (Post)

Conclusions

- Pediatric resident trainee skill, anatomy knowledge, and confidence significantly increased over 1 month
- 92% of trainees identified all lobes successfully in less than 2 hours of training
- A short amount of self-directed learning improves basic FB skills with limited faculty time
- Practice on this trainer may decrease procedural time and anesthesia time

Next Steps

- ***We hypothesize that trainees can progress to advanced FB skills sooner and more safely***
- Further studies are needed to validate that FB skills transfer from the trainer to patients
- Coordination with a simple checklist to classify bronchoscopy skills with multisite validation
- We want to collaborate!

Thank you!

Bronchoscopy Education Team
- Matt Rustici
- Catherine Chen
- Robin Deterding
- Ricky Mohon

Airway Trainer Team
- Jennifer Wagner
- Joe Albietz
- Stephen Humphries

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- Jill Marks
- Lisa Connell

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Questions?

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Please contact us!

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Poster Discussion D102-Figuring out what we don't know: Advances in Medical Education

Wednesday 5/18/16 1:30 – 3:30 pm