BACKGROUND
Flexible bronchoscopy is a common and fundamental procedure in anesthesia and critical care medicine. Learning this procedure is a complex task, which encompasses heterogeneous and multifaceted components. The use of simulation-based training provides significant advantages that include enhanced patient safety, and it has been proven to be superior to non-simulation-based training. Interestingly, even low fidelity simulators proved to be effective, and in certain areas such as basic bronchoscopy tasks they may be superior to high fidelity computerized simulators. Unfortunately, access to a bronchoscopy simulator may be limited in low resources settings. We developed a low cost, highly portable model for bronchoscopy training, using a 3D printout of a normal trachea-bronchial tree from a CT scan image set.

AIM
The aim of this mannequin study was to test the validity of a newly developed bronchoscopy training model.

METHODS
Institutional board review approval was obtained. A parametric airway model was derived from an online medical model repository. The parametric airway was separated into seven distinct regions: trachea, bifurcation, left & right bronchi and primary bronchi to upper left, lower and middle right lobes. Anatomical regions were printed with different colours using a fused deposition modelling 3D printer. Participants were physicians with self-reported no previous experience with bronchoscopy. They received an introductory 30 minutes lecture on flexible bronchoscopy, and were then administered a 15-items questionnaire on bronchoscopy derived from previously published modules of bronchoscopy training. Following this pre-test questionnaire, participants were separately invited to use flexible bronchoscopy on the designated model, and instructed to perform a series of predetermined tasks in 4 consecutive occasions. The time to perform the tasks and the quality of the performance (based on a standardized score assessing ability to identify bronchial anatomy, technique and dexterity, lack of trauma) were recorded. After completion of the mannequin tests, participants were administered again the 15 items questionnaire (post-test). Participants’ satisfaction data on the perceived usefulness and accuracy of the model were collected. Statistical analysis was performed using t-Test. Data are reported as mean (± standard deviation).

RESULTS
The time to complete all the requested tasks was 152.9 (± 71.5) sec on the 1st attempt vs 98.7 (± 40.3) sec on the 4th attempt (p=0.03). The quality of performance score improved from 8.3 (± 6.7) on the 1st attempt to 18.2 (± 2.5) (p

CONCLUSIONS
We developed 3D-printed model for bronchoscopy training. This model improved trainees’ performance, and may represent a valid, low-cost adjunct to the teaching of bronchoscopy.

References: