



Gulliver's Travels in the Pediatric Radiology Department, the Tale of the Upgrade of an Upper GI Fluoroscopy Simulator for Resident Education

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Background/Problem Being Solved

There are a limited number of fluoroscopic studies performed for infants with bilious emesis during radiology residency training. The pediatric radiology department acquired a simulator for resident education that is part of the curriculum including simulations, lectures and experience during the pediatric radiology rotation. The simulator software and hardware were upgraded for increased user functionality.

Interventions

The simulator consists of a baby doll "Gulliver" that has hardware that detects positioning and a toggle switch that simulates a fluoroscopic exposure. The hardware sends signals to a PC via an analog to digital converter. The software that manages the simulator was developed in MATLAB. The user is able to navigate through various scenarios including normal studies and pathologic cases such as malrotation with volvulus and duodenal web. Each scenario is stored in an individual PowerPoint presentation file with multiple sets of radiographs. The user is able to proceed through a simulated fluoroscopic examination to make diagnoses. The images displayed match the position of the simulator doll and display progression of oral contrast. The first version of the software had a DOS prompt interface with limited options. The software was upgraded with MATLAB 2017a and the sensor and triggers were replaced to provide improved functionality. The hardware accelerometer was replaced with the same model due to variable display of the correct position of the doll. The toggle switch was replaced with a generic residential grade doorbell for improved user feedback with a tactile response for each click. The software was nearly completed recoded to include a new windows interface, added functionality and replacement of code no longer supported by the current version of MATLAB. There is a new configuration file that can be modified by the end user to include additional scenarios. The user interface includes stepwise point and click menus for initialization. At the end of the simulation the user can immediately start a new scenario. The timer lockout function that prevents unnecessary radiation exposure is now displayed in the corner during the simulation.

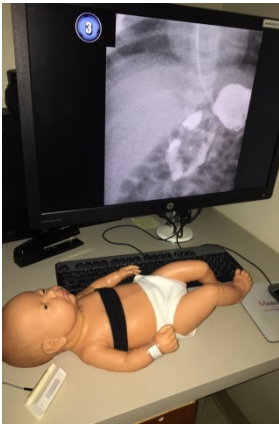


Fig 1. Simulator

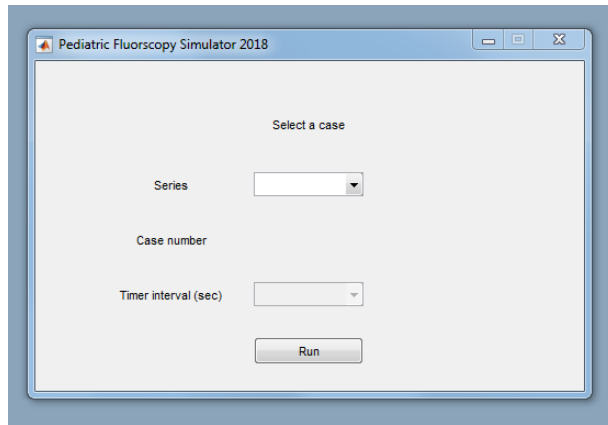


Fig 2. Windows interface



Fig. 3 Scenario with timer

Outcome

Successful upgrade of hardware and software to improve usability of pediatric gastrointestinal fluoroscopic simulator for resident education.

Conclusion

Successful implementation of hardware and software upgrades for the pediatric radiology upper gastrointestinal fluoroscopy simulator. Simulator is ready to be evaluated for improved functionality.

Statement of Impact

Improving resident education with upgraded hardware and software of a pediatric radiology upper gastrointestinal fluoroscopy simulator.

Keywords

pediatric radiology, upper gastrointestinal fluoroscopy, simulator, resident education, bilious, emesis, malrotation