DESIGN OF A VIRTUAL COACH FOR TRAINING CRITICAL CARE AIR TRANSPORT TEAMS

Anastasia Axiopoulou, Jada Day, Chloe Topolski, Don Hoang, William Aue*, Caroline G.L. Cao
Department of Biomedical, Industrial, and Human Factors Engineering, Wright State University, Dayton, OH USA
*Parallax Advanced Research, Dayton, OH USA
Contact: caroline.cao@wright.edu

Introduction

- Traumatic brain injury (TBI) has been identified as the most common and critical injury from military operations. Soldiers suffering from TBI must be monitored for changes in their intracranial pressure (ICP) as a standard of care. Critical Care Air Transport Team (CCATT) personnel are expected to maintain competency in ICP management, yet there are few military medical facilities that provide this high acuity service so practical experience is limited.
- A virtual coach for Intracranial Pressure (ICP) Monitoring was designed to provide just-in-time learning re-enforcement within the Critical Care Air Transport Team's ICP management course.

Objectives

- Evaluate the effectiveness of a virtual coach based on users' level of training and performance while using the system.

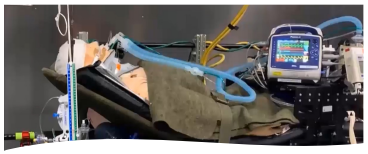

Figure 1: Mannequin used to train critical air transport team.

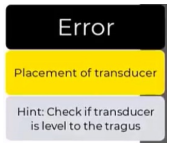

Figure 2: Three levels of just-in-time feedback provided to guide user learning within virtual coach system.

Methods

- A task analysis and cognitive task analysis were conducted based on observations and interviews of expert CCATT trainers. A prototype of the virtual coach was developed and validated by two expert CCATT trainers, and three human factors engineers.
- The virtual coach consists of three components: a pretest, a video-based interactive training module, and a post-test. In the interactive module, three different levels of just-in-time feedback (error detection, error reveal, remediation hint; see Fig. 2) provide increasing guidance to assist the trainees' learning.
- Three CCATT cohorts (each with 15 trainees for a total of 45), each divided into 3 groups according to training level (novice, intermediate, and expert), used the virtual coach.
- Learning was measured by performance changes between pretest and post-test.

Results

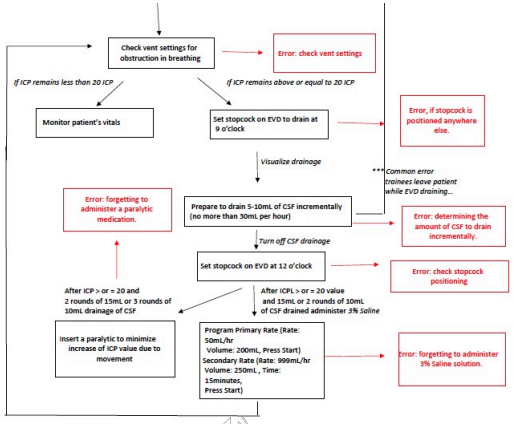

Figure 3: Snap-shot of cognitive task analysis of ICP management procedure.

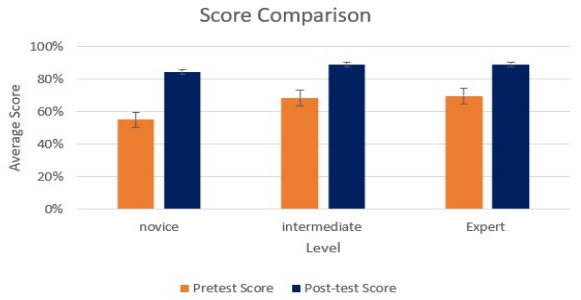

Figure 4: Average pretest and post-test scores. All participants, regardless of experience level, showed significant improvement in ICP management procedural knowledge after using the virtual coach interaction tool ($p<0.01$), as measured by pretest and post-test scores. ANOVA results showed no significant interaction between performance and levels of training ($p=0.48$).

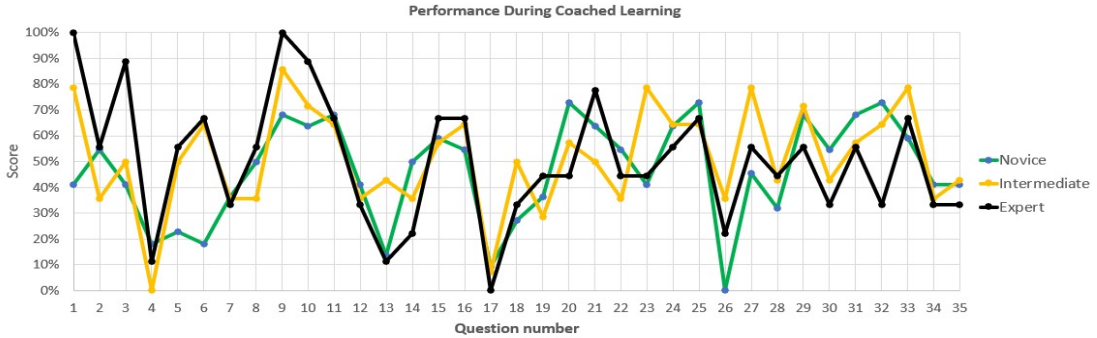

Figure 5: Visual representation of percentage of correct answers for participants in the thee training levels. Coincidence of peaks and troughs in the graphs indicate agreement amongst the trainees across training levels, suggesting areas of improvement in instruction or VC design.

Conclusion

- Regardless of level of training, all trainees benefited from the interactive virtual coach (VC) training. Post-test scores significantly improved compared to pretest scores.
- Performance during the interactive VC module provided insight into common errors, suggesting needed modifications in instruction or VC design and implementation.

Acknowledgements

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