

Simulation-Based Evaluation of ACGME Competencies Using High Fidelity Simulation of a Venous Air Embolism

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Background

With the advent of ACGME requirements for competency based education and evaluation, the simulation community has focused on how to incorporate simulation into these new requirements. Venous air embolism (VAE) is a rare, but potentially lethal, intra-operative event that requires prompt diagnosis and management, but no standardized method of educating residents regarding this complication exists. We present a VAE simulation, incorporating the ACGME competency framework.

Methods

An interactive scenario on intra-operative diagnosis and management of VAE during a craniotomy in the sitting position was created. A PubMed literature review was performed to determine the current standard of care for a VAE. Task expectations and endpoints were linked to each of the ACGME competencies with some endpoints linked to more than one competency. Validation of the simulation was accomplished by observing the amount of assistance required for successful completion compared to level of training using 13 anesthesiology residents. The debriefing session included a review of the pathophysiology, diagnosis, and management of VAE and participant evaluation of the simulation.

Results

Videotape of 13 residents' performances was reviewed. Recognition of a change in character of the precordial Doppler sound was noted by 8 of 13 residents (61.5%). Despite variations in the order of interventions, some consistencies were observed. Senior residents required less prompting (no more than 2 prompts), were more apt to implement the necessary tasks for completion of the simulation, and less inclined to call for assistance. Junior residents required a minimum of 4 prompts to continue with the simulation, and none were able to complete the scenario without assistance. Juniors consistently administered vasopressors as the first intervention and none identified the need to flood the surgical field with saline. It was typically noted during the debriefing session that this was the first time a precordial Doppler had been used during the resident's training and all felt that the scenario was an effective teaching tool.

Discussion

As expected, a higher level of training correlated inversely with the amount of assistance needed for successful completion. This was especially evident when comparing junior residents with little subspecialty training to other participants. In conjunction with the debriefing, the differences in performance that correlated with level of training were primarily associated with tasks associated with the competencies of Patient Care and Medical Knowledge. Tasks / endpoints associated with other competencies did not show as much variation when compared to level of training. This does not suggest that other competencies can not be measured using simulation, but rather that these competencies may not progress in the same linear fashion as Medical Knowledge and Patient Care. Only by expanding the pool of participants, and correlating simulation performance against clinical practice, can some of these less quantitative questions be answered.