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Development of a curriculum for emergency physicians to teach transesophageal echocardiography use during cardiac arrests: a Kern 6-step model

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Abstract

The primary aim of this proposal is to design a best practice curriculum to teach focused transesophageal echocardiography (TEE) skills during cardiac arrest to emergency physicians (EPs) consistent with the American College of Emergency Physicians (ACEP) guidelines. The fundamental assumption of this proposal is that EPs with prior training in transthoracic echocardiography (TTE) can proficiently acquire three standard TEE views and correctly interpret common cardiac arrest pathologies in real time after a short didactic and simulation-based curriculum. This curriculum development is predicated on a 6-step Kern model that links it to existing health care needs.

Background:
Focused TEE represents a point-of-care ultrasound technique wherein a limited number of TEE views are used to guide patient resuscitation. The value of this technique in the management of emergency room cardiac arrest situations is well established [1]. For these reasons, the ACEP has formulated guidelines for the use of TEE in emergency medicine for cardiac arrest [2] that include completion of:

- 2-4 hours of TEE-specific didactic training;
- A minimum of 10 proctored complete TEE examinations either on patients or via simulation that involved a minimum of three imaging views midesophageal four chamber view (ME4C), midesophageal long-axis view (MELAX), and transgastric short-axis view (TGSAX); and
- A standardized assessment by a credentialed TEE provider. [3]

Because of the utility of TEE in the management of cardiac arrests, there has been a concerted effort to teach this skill set to EPs in recent years. Several studies have demonstrated the feasibility of teaching TEE image acquisition skills to EPs [4], but none either have been shown to effectively teach acquisition and identification skills of views consistent with ACEP guidelines or followed a stepwise, systematic approach to medical curriculum development.

Methods/Learning Strategies: Congruent, sequential educational methods will be employed to meet ACEP recommendations that involve:

Step 1: Acquisition of lower-level knowledge from asynchronous, online modules and allow for step 2;

Step 2: Reverse classroom didactic teaching employing problem-based exercises that highlight cognitive issues of TEE image acquisition and interpretation during cardiac arrests associated with common precipitating adverse events; and

Step 3: Simulation-based learning of procedural psychomotor skills using case-based sessions on a CAE Vimedix 3.0 TEE simulator. This step will include 10 proctored, completed TEE examinations involving the ME4C, MELAX, and TGSAX views.

Results/Impact: Widespread training of EPs to use TEE effectively in cardiac arrest and peri-arrest situations is an ACEP goal focused on improving emergency healthcare delivery that can best be achieved through the systematic design of a curriculum to achieve the necessary cognitive and psychomotor skills. The Kern 6-step model represents precisely such a template, and use of this construct for this purpose improves the likelihood of a successful educational outcome. Evaluation of the effectiveness of this curriculum development is the next step in the evolution of this process that can provide information to fine-tune its application.

Learning Objectives

1. To evaluate the need to teach focused TEE for cardiac arrests to emergency physicians
2. To choose useful learning objectives for emergency physicians associated with a focused-TEE-for-cardiac-arrest curriculum
3. To judge the value of different educational strategies designed to teach focused TEE for cardiac arrests to emergency physicians
4. To design ways to evaluate the effectiveness of a didactic and simulation-based curriculum to teach focused TEE for cardiac arrests to emergency physicians
5. To assess the utility of a 6-step Kern model to design a curriculum to teach focused TEE for cardiac arrests to emergency physicians

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