Establishing the role of simulation-based training in existing interventional radiology curricula

The potential risks of training high stakes medical skills, together with a reduction of available time to train, has led to great interest in the use of simulations that employ computers and models. Simulator models can provide non-clinical, validated, risk free environments to train skills, and would be applicable to certain tasks and concepts that are regularly taught in, and others that are essential to, interventional curricula. Identification of tasks most suited to simulation is a key goal of the simulation strategy of the Cardiovascular and Interventional Radiological Society of Europe (CIRSE), the Radiological Society of North America (RSNA), and the Society of Interventional Radiology (SIR)[1]. These 'curriculum insertion sites', for simulator-based training will be first identified by subject matter experts appointed by the Societies and credentialing organisations. Subsequent implementation may be possible using validated elements of existing simulations, or may require specific new simulations to be developed and validated.

1. Criteria for identifying curricular elements where simulation based training is particularly desirable.

1.1 *Fundamental (entry-level) skills/tasks*, where the opportunity to train is diminishing through:

a) decreased trainee duty hours
b) non-invasive diagnostic imaging algorithms
c) other factors, such as competing disciplines

Examples include ultrasound guided needle placement, vascular access and vascular branch selection

1.2 *High risk tasks*, where traditional master-apprentice model (MAM) training poses an unacceptable risk to patients. Placement of an endoluminal stent or retrieval of foreign body from the heart are two such examples.

1.3 *Adverse events*, where the skills to recognise and avoid or manage error, risk and complications (minor and major) may not be evenly acquired, even at the end of a defined programme of training, due to their infrequent occurrence and / or variation in the case-mix experience between trainees. Simulation compensates for such heterogeneous experience by ensuring that each trainee attains the relevant training objectives. In other words, it serves to standardise the training curriculum. The concept is useful across all specialties, e.g.: in anaesthesia, recognition and management of malignant hyperthermia; in cardiothoracic surgery, recognition and management of protamine reactions in the immediate post-pump patient; aviation training is replete with examples.

2. Implementation

Implementation of simulation in interventional curricula is an objective of the Joint Simulation Task Force[1]. Specific considerations in regard to curricular insertion sites include:

2.1 *Cognitive task analysis*, which identifies the domains of learning.

2.2 *Fidelity of the simulation.* The outcomes of task analysis, and the curriculum's objectives for change in observed behaviours, should provide an indication of the level of sensory fidelity required in a simulation. Hence cues and ensuing psychomotor actions should be respectively, recognisable and measurable: e.g. haptics may only need to be sufficient to trigger cues; visuals may comprise just simple geometry.

2.3 *Existing opportunities.* Has an existing simulation (or module thereof) been validated as appropriately replicating (face, content), assessing (concurrent, construct) and training (skills transfer) the required training objective(s)? If not, is a new simulation required?

2.4 *Dependencies.* Is proficiency in a lower level skill set recommended before training in a particular (validated) simulation. Is this curricular element itself a component of another (higher level) task?

2.5 *Mentorship.* Training of curricular elements using validated simulations should comprise a mentorship, within a curriculum for acquiring knowledge, skills and professionalism.

2.6 *Review of IR Syllabus,* is required to ascertain where such needs exist and will arise.

[1] http://www.cirse.org/_files/contentmanagement/CIRSE_SIR_Joint_Strategy.pdf.

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