

A Scoping Review of Training for Rare, Time-Critical Procedures in Emergency Medicine

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How can doctors working in the Emergency Medicine gain and maintain procedural skills for life-saving procedures which are performed rarely?

This scoping review sought to answer this question through a review of the published literature.

A scoping review of literature published between 2009 and 2019 was performed using Ovid MEDLINE, EMBASE, Web of Science and Scopus databases. A further review of papers published 1974-2008 was performed.

1546 papers were screened, 40 papers included in the study.



The educational techniques described are listed in the table below, 'Simulation' included in-situ simulation, simulation for assessment and rapid cycle deliberate practice.

Educational technique or technology	Number of papers
Simulation	17
Live tissue	3
Gaze-tracking	1
Cadaveric	1
Virtual or mixed reality	4
Spaced v massed format	1
Mental Practice	1
Game cards	1
Just-in-time video	1
Multiple techniques / Other	11

From the literature, key themes were identified to be investigated:

Current Practice	Issues with current practice	Ideas for future
Simulation	Limited trainee experience	Virtual / Mixed Reality
Live Tissue	Skill decay	High-fidelity simulation
Cadaver-based training	Procedural Competency	Live Tissue
Formal Training Courses	High stakes, infrequently performed procedures	Just-in-time training
	Lack of evidence/ research for education	Rapid-cycle Deliberate Practice
	Cost	Mental Practice
	Safe education / debrief	Game cards
	System errors / latent safety threats	Massed verses spaced
	Ethics	Exchange between countries
	Group training / teamwork	Surgical skilled for non-surgeons
	No ideal training model	Simulation for assessment
		Ideas
		Human Factors

Conclusions

- Regular practice of skills in a simulated scenario can help clinicians to maintain skills.
- Many forms of simulation training have been used, this study did not find a consensus as to which is best for specific procedures. There is a lack of evidence, particularly regarding clinical outcomes after training.
- Skill decay was a frequently described problem, training likely to be required more frequently than once/year.
- Newer models including spaced learning, rapid cycle deliberate practice, mental practice and just-in-time training can help to overcome skill decay and maintain skills for longer.
- In-situ simulation and high-fidelity simulation were found to be helpful for providing training in teamwork, human factors as well as procedural skills.

Where further research is needed:

- Clinical outcomes following various types of simulation training to find which type of training is best for specific procedures.
- Outcomes using expensive high-fidelity simulators versus cheaper low-fidelity simulators in order for budgets to be spent wisely
- Duration of skill maintenance following training for planning of repeat or refresher training
- Perceived competence and log-book evidence does not equal maintained competence, further work to find a universally accepted metric of procedural competence is required

