PRECOURSE LEARNING

4 studies: 8 randomised and 4 observational

4 neonatal, 2 paediatric, 6 adult

5 medical students, 3 nursing students, 3 hospital residents, 2 hospital doctors and nurses

1 OOHCA, 1 IHCA

3 systematic reviews (neonatal 4 studies, paediatric 8 studies, all ages 182 studies)

Positive effect	No effect
Patient outcomes • Mundrell et al. 2013 - systematic review (n=182 studies) of the effect of technology enhanced simulation training (vs no intervention): $\uparrow$ skills (process, product, time skills)	Patient outcomes •
Resuscitation performance	Resuscitation performance • Perkins et al. 2010
	Knowledge • Perkins et al. 2010
	Skills • Perkins et al. 2010
	Assessment performance • Perkins et al. 2010

PRE-COURSE LEARNING

Study	Study features	Type of pre-course learning	Outcomes	Major finding
Pre-course learning				
Perkins, G. D., J. N. Fullerton, N. Davis-Gomez, R. P. Davies, C. Baldock, H. Stevens, I. Bullock and A. S. Lockey (**2010**). "**The effect of pre-course e-learning prior to advanced life support training: a randomised controlled trial.**" <u>Resuscitation</u> **81**(7): 877-881. BACKGROUND: The role of e-learning in contemporary healthcare education is quickly developing. The aim of this study was to examine the relationship between the use of an e-learning simulation programme (Microsim, Laerdal, UK) prior to attending an Advanced Life Support (ALS) course and the subsequent relationship to candidate performance. METHODS: An open label, multi-centre randomised controlled study was conducted. The control group received a course manual and pre-course MCQ four weeks prior to the face to face course. The intervention group in addition received the Microsim programme on a CD. The primary outcome was performance during a simulated cardiac arrest at the end of the course. Secondary outcomes were performance during multiple choice exams, resuscitation skills assessments and feedback to Microsim programme. RESULTS: 572 participants were randomised (287 Microsim, 285 control). There were no significant differences in the primary outcome (performance during a standard cardiac arrest simulation) or secondary outcomes. User evaluations were favorable. 79% would recommend it to colleagues. 9% stated Microsim could replace the entire ALS course, 25% parts. Over 70% of participants' perceived that Microsim improved their understanding of the key learning domains of the ALS course. CONCLUSION: Distributing Microsim to healthcare providers prior to attending an ALS courses did not improve either cognitive or psychomotor skills performance during cardiac arrest simulation testing. The challenge that lies ahead is to identify the optimal way to use e-learning as part of a blended approach to learning for this type of training programme.	• open label, multi-centre randomised controlled study • manikin • ALS course participants	• e-learning (CD) versus • course manual and MCQs	• simulated resuscitation performance • knowledge – MCQs • resuscitation skills • assessments • feedback to e-learning programme	No difference • simulated resuscitation performance • knowledge – MCQs • resuscitation skills • assessments • feedback to e-learning programme • user evaluations of e-learning were favorable • ** no user evaluation of manual presented

Study	Study features	Type of pre-course learning	Outcomes	Major finding
Pre-course learning				
Perkins, G. D., P. K. Kimani, I. Bullock, T. Clutton-Brock, R. P. Davies, M. Gale, J. Lam, A. Lockey, N. Stallard and C. Electronic Advanced Life Support (**2012**). "**Improving the efficiency of advanced life support training: a Randomised , controlled trial.[Summary for patients in Ann Intern Med. 2012 Jul 3;157(1):I-36; PMID: 22751777]**." <u>Annals of Internal Medicine</u> **157**(1): 19-28. BACKGROUND: Each year, more than 1.5 million health care professionals receive advanced life support (ALS) training. OBJECTIVE: To determine whether a blended approach to ALS training that includes electronic learning (e-learning) produces outcomes similar to those of conventional, instructor-led ALS training. DESIGN: Open-label, noninferiority, Randomised trial. Randomization, stratified by site, was generated by Sealed Envelope (Sealed Envelope, London, United Kingdom). (International Standardized Randomised Controlled Trial Number Register: ISCRTN86380392) SETTING: 31 ALS centers in the United Kingdom and Australia. PARTICIPANTS: 3732 health care professionals recruited between December 2008 and October 2010. INTERVENTION: A 1-day course supplemented with e-learning versus a conventional 2-day course. MEASUREMENTS: The primary outcome was performance in a cardiac arrest simulation test at the end of the course. Secondary outcomes comprised knowledge- and skill-based assessments, repeated assessment after remediation training, and resource use. RESULTS: 440 of the 1843 participants randomly assigned to the blended course and 444 of the 1889 participants randomly assigned to conventional training did not attend the courses. Performance in the cardiac arrest simulation test after course attendance was lower in the electronic advanced life support (e-ALS) group compared with the conventional advanced life support (c-ALS) group; 1033 persons (74.5%) in the e-ALS group and 1146 persons (80.2%) in the c-ALS group passed (mean difference, -5.7% [95% CI, -8.8% to -2.7%]). Knowledge- and skill-based assessments were similar between groups, as was the final pass rate after remedial teaching, which was 94.2% in the e-ALS group and 96.7% in the c-ALS group (mean difference, -2.6% [CI, -4.1% to 1.2%]). Faculty, catering, and facility costs were $438 per participant for electronic ALS training and $935 for conventional ALS training. LIMITATIONS: Many professionals (24%) did not attend the courses. The effect on patient outcomes was not evaluated. CONCLUSION: Compared with conventional ALS training, an approach that included e-learning led to a slightly lower pass rate for cardiac arrest simulation tests, similar scores on a knowledge test, and reduced costs. PRIMARY FUNDING SOURCE: National Institute of Health Research and Resuscitation Council (UK).	• Open-label, noninferiority, Randomised trial • Manikin • Health professionals	• 1-day course supplemented by e-learning versus • 2 day instructor-led course	• Simulated resuscitation performance • Knowledge & skills-based assessments • repeated assessment after remediation training • resource use	**Mixed** -ve • e-learning ↓ resuscitation performance No difference • knowledge- and skill-based assessments • final pass rate after remedial teaching • resource use & cost was lower in e-learning group

Study	Study features	Type of pre-course learning	Outcomes	Major finding
Pre-course learning				
Onan, A., N. Simsek, M. Elcin, S. Turan, B. Erbil and K. Z. Deniz (**2017**). "**A review of simulation-enhanced, team-based cardiopulmonary resuscitation training for undergraduate students**." <u>Nurse Education in Practice</u> **27**: 134-143. Cardiopulmonary resuscitation training is an essential element of clinical skill development for healthcare providers. The International Liaison Committee on Resuscitation has described issues related to cardiopulmonary resuscitation and emergency cardiovascular care education. Educational interventions have been initiated to try to address these issues using a team-based approach and simulation technologies that offer a controlled, safe learning environment. The aim of the study is to review and synthesize published studies that address the primary question "What are the features and effectiveness of educational interventions related to simulation-enhanced, team-based cardiopulmonary resuscitation training?" We conducted a systematic review focused on educational interventions pertaining to cardiac arrest and emergencies that addressed this main question. The findings are presented together with a discussion of the effectiveness of various educational interventions. In conclusion, student attitudes toward interprofessional learning and simulation experiences were more positive. Research reports emphasized the importance of adherence to established guidelines, adopting a holistic approach to training, and that preliminary training, briefing, deliberate practices, and debriefing should help to overcome deficiencies in cardiopulmonary resuscitation training.	• Systematic review - ? belongs in simulation group			
Sullivan, N. (**2015**). "**An integrative review: instructional strategies to improve nurses' retention of cardiopulmonary resuscitation priorities**." <u>International Journal of Nursing Education Scholarship</u> **12**: 01. Recognizing and responding to a cardiac arrest in the hospital setting is a high stress, high anxiety event for all healthcare providers. It requires the performance of several basic, but extremely important cardiopulmonary resuscitation (CPR) skills and response priorities. If not executed correctly and in a timely manner, a bad outcome may result. Poor retention of cardiopulmonary resuscitation skills and priorities is well documented in the literature. An integrative review of the evidence was conducted to answer the question, "**Is there a more effective training method to improve nurses' retention of CPR priorities during an in hospital cardiac arrest as compared to traditional American Heart Association training?**"This review evaluated high fidelity and low fidelity simulation training, online or computer-based training and video instruction as potential teaching strategies focusing on CPR priorities. The role of deliberate practice is discussed. The strongest evidence suggests that a teaching plan employing brief, frequent, repetitive or deliberate practice used in collaboration with low fidelity or high fidelity simulation may be a potential strategy to improve nurses' retention of CPR priorities over time.				