

WORKSHEET for Evidence-Based Review of Science for Emergency Cardiac Care

Worksheet author(s)

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Clinical question.

EIT-020B – “In participants undergoing ALS courses (P), does the use of non-traditional scheduling formats such as random scheduling (introducing station cases in a random manner) or modular courses (I), as opposed to traditional scheduling (C), improve outcomes (eg. skills performance, etc.) (O)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? Intervention

State if this is a proposed new topic or revision of existing worksheet: New topic

Conflict of interest specific to this question

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet?

None

Search strategy (including electronic databases searched).

Rodgers search strategy

Utilizing a university library master search engine, the following databases were searched:

Academic Search Premiere

CINAHL

ERIC

Health Source: Nursing/Academic Edition

MEDLINE (EBSCO)

PsycARTICLES

PsycINFO

An independent search of Google Scholar was also performed

Because of the variety of potential topics in this question, a very broad search strategy was devised.

Search terms were:

Education AND “BLS” (309)

Education AND “ACLS” (176)

Education AND “ALS” AND Advanced OR Paediatric (135)

Education AND “PALS” AND Pediatric (44)

PubMed was also searched through the EndNote reference management software.

PubMed searches were done with MeSH major topic heading Education and the following keyword searches (indicates hits): ACLS (82), ALS (72), PALS (36), BLS (86), CPR (349), and cardiac arrest (387), and heart arrest (301).

A total of 810 unique articles were identified. Initial review of abstracts reduced the number for detailed review to 31.

EMBASE search still needs to be performed.

Bullock search strategy

Medline (OVID)

Search from 1950 to present

17th September 2009

No.	Search terms	Results
1	advanced cardiac life support/ed	126
2	cardiopulmonary resuscitation/ed	1112
3	resuscitation/ed	664
4	1 or 2 or 3	1868
5	advanced.hw,ti,ab. and 4	378

6 mt.fs. and 5 146
 7 limit 6 to english language 139

Inclusion criteria were:

1. Papers dealing with adult training resuscitation training in courses dealing with all targeted populations in resuscitation courses (Adults, Paediatrics, and Neonates)
2. Papers looking at mode or style of course delivery and reporting course outcomes (knowledge and skill acquisition, knowledge and skill retention, improved outcomes from cardiac arrest)
3. Papers using randomization, quasi experimental design or prospective cohort methodologies

Result: 10 papers

Exclusion Criteria were:

1. Papers not related to mode or style of training delivery
2. Papers not reporting outcomes form training interventions
3. Commentary's, opinion papers or survey methodologies
4. Not

Result: 128 Papers

• State inclusion and exclusion criteria

All articles that covered ALS (including AHA ACLS and PALS and ERC or other resuscitation council equivalents) course agendas, station scheduling, or delivery formats that compared an experimental format with a traditional format were included.

• Number of articles/sources meeting criteria for further review:

11

Summary of evidence

Evidence Supporting Clinical Question

Good					
Fair					
Poor			Dyche ³ (1983) 208 E3 Polglase ⁵ (1989) 997 E5		
	1	2	3	4	5
Level of evidence					

E – Other outcomes (Post-intervention learning evaluation)

- ¹ Compared interactive computer-based instruction
² Compared case-based content presentation
³ Compared course incorporated in overall curriculum
⁴ Compared other non- computer-based self directed education
⁵ Compared problem-based learning sessions
⁶ Compared combining with another course (ATLS)

Evidence Neutral to Clinical question

Good					
Fair					
Poor		Christenson ¹ (1998) 702 E Gerard ¹ (2006) 649 E	Herrin ⁴ (1980) 742 E4	Crocco ² (2003) 229 E2 Dagnone ³ (2008) 49 E3 Darr ⁴ (2000) 142 E4 Kim ⁵ (2006) 1308 E5 Mehne ⁶ (1987) 666 E6 Wayne ³ (2006) 251 E3	
	1	2	3	4	5
Level of evidence					

Evidence Opposing Clinical Question

Good					
Fair					
Poor					
	1	2	3	4	5
Level of evidence					

REVIEWER'S FINAL COMMENTS AND ASSESSMENT OF BENEFIT / RISK:

No studies have been conducted that focused solely on alternative scheduling or agendas of ALS course content in comparison to the traditional –two-day provider course agenda.

While there were two LOE 3 (Dyche 1983 208, Polgase 1989 997) studies supporting and two LOE 2 (Christenson 1998 702, Gerard 2006 649) and one LOE 3 (Herin 1980 742) studies that were neutral in their comparison of different scheduling agendas from the traditional course agenda, these studies were confounded by including different educational interventions from the standard course.

Six additional case studies (LOE 4: Crocco (2003) 229, Dagnone (2008) 49, Darr (2000) 142, Kim (2006) 1308, Mehne (1987) 666, Wayne (2006) 251] were identified that showed alternative course formats achieved advanced life support program objectives.

However in all 11 studies due to the inability to isolate the findings to the impact of the alternative course agenda itself, they could only be classified as poor in relation to directly answering the question at hand.

Ten of the studies specifically examined ACLS. One study [Gerard (2006) 649] examined PALS.

In addition to the alternative course scheduling formats, six content delivery mechanisms were identified:

Interactive computer-based instruction: Two LOE2 studies examined self-directed interactive multi-media computer-based instruction as an alternative to traditional classroom instruction for portions of an ALS program [Christenson (1998) 702 & Gerard (2006) 649]. These two studies were the only LOE2 studies identified. An important finding from these studies was the need to include adequate hands-on practice time to supplement the computer-based instruction.

Case-based content presentation: One LOE4 study described the use of case-based content presentations to deliver stroke instruction [Crocco (2003) 229]. Important to their findings was the content could be facilitated equally by either a physician or a non-physician ACLS instructor.

Incorporated into overall curriculum: One LOE 3 [Dyche (1983) 208] and two LOE4 [Dagnone (2008) 49, & Wayne (2006) 251] studies provided examples of integrating ACLS being integrated into the main education curriculum of undergraduate nursing or medical students. In each of these cases, rather than deliver the ACLS content in a standard two-day provider course format, content was broken up into several short educational sessions over a multi-week time frame.

Self-directed (not computer-based): One LOE3 [Herrin (1980) 742] and one LOE4 [Darr (2000) 142] study detailed a non-computer-based self-directed learning program that replaced key components of an ACLS course. Important among the findings was reduced course costs compared to traditional instruction.

Problem-based learning scenarios: Two studies, one LOE 3 [Polglase (1989) 997] and one LOE 4 [Kim (2006) 1308], examined Problem-Based Learning (PBL) as an alternative to traditional ACLS instruction. These studies were similar to the format that incorporated ACLS content into the overall curriculum with the difference being a specific PBL approach to the content.

Combined with another course (ATLS): One LOE4 study reported the outcome of merging the ACLS course agenda with that of an Advanced Trauma Life Support (ATLS course [Mehne (1987) 666]. The combined course showed pass rates of 95% for ACLS and 92% for ATLS.

KNOWLEDGE GAPS:

There is a need for well-designed randomised trials that compare methods of course delivery focusing on scheduling of learning in comparison to traditional course agendas, reporting outcomes such as improved learning (measurement of cognitive and psychomotor performance) and impact on outcomes from cardiac arrests.

Acknowledgements:

None

Citation List

Christenson, (1998) 702	<p>Christenson, J., K. Parrish, et al. (1998). "A comparison of multimedia and standard advanced cardiac life support learning." <u>Acad Emerg Med</u> 5(7): 702-8.</p> <p>LOE2, Neutral, Poor quality End Point (Subject Matter) – Interactive computer-based instruction Compared an interactive multi-media ACLS computer program with standard ACLS course. Cognitive assessment proved equal. Psychomotor assessment favored standard course, but with remediation, both courses had similar pass rates. Authors note interactive multi-media ACLS computer-based training must be accompanied by hands-on practice time. This indicates computer-based learning could replace large portions of the ACLS standard course agenda.</p>
Crocco (2003) 229	<p>Crocco, T. J., R. Moreno, et al. (2003). "Teaching ACLS stroke objectives to prehospital providers: a case-based approach." <u>Prehosp Emerg Care</u> 7(2): 229-34.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Case-based content presentation Case series of an innovative presentation of ACLS course content specific to stroke. Study utilized case-based approach to content delivery. Also compared outcomes between content delivery by a physician or an ACLS instructor (non-physician). There was no difference in results between two presenters.</p>
Dagnone (2008) 49	<p>Dagnone, J. D., R. C. McGraw, et al. (2008). "Interprofessional resuscitation rounds: a teamwork approach to ACLS education." <u>Medical Teacher</u> 30(2): 49-54.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Incorporated into overall curriculum Weekly two-hour multi-disciplinary (nursing student, medical student, and junior resident) simulation-based sessions focusing on ACLS skills and knowledge. Did not report learning outcomes. Only reported self-reported value to learners.</p>
Darr (2000) 142	<p>Darr, L. R. (2000). "Advanced cardiac life support education: a self-directed, scenario-based approach." <u>J Contin Educ Nurs</u> 31(3): 116-20; quiz 142-3.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Self-directed (not computer-based) Case study of a self-directed scenario-based course format designed around adult learning principles.</p>
Dyche (1983) 208	<p>Dyche, W. J., J. H. Walsh, et al. (1983). "An ACLS laboratory rotation for undergraduate medical students." <u>Ann Emerg Med</u> 12(4): 208-11.</p> <p>LOE3, Support, Poor quality End Point (Subject Matter) – Incorporated in overall curriculum Included a substantial portion of self-directed learning which included readings, audio slide shows, and quizzes. Compared results with a traditional course on five area, reaching significance in two areas: airway management (NS), CPR (NS), dysrhythmia algorithms (NS), MegaCode (significant, <0.01), and written test (significant, < 0.01).</p>
Gerard (2006) 649	<p>Gerard, J. M., A. J. Scalzo, et al. (2006). "Evaluation of a novel Web-based pediatric advanced life support course." <u>Archives Of Pediatrics & Adolescent Medicine</u> 160(6): 649-655.</p> <p>LOE2, Neutral, Poor quality End Point (Subject Matter) – Interactive computer-based instruction This program replaced one-day of the traditional PALS course with interactive online content. Participants still attended a one-day skills day. Results showed equal outcomes in both the interactive computer-based instruction group and the traditional course group.</p>
Herrin (1980) 742	<p>Herrin, T. J., P. F. Norman, et al. (1980). "Modular approach to CPR training." <u>South Med J</u> 73(6): 742-</p>

	<p>4.</p> <p>LOE3, Neutral, Poor quality End Point (Subject Matter) – Self-directed (not computer based) Self-directed modular course design that compared both BLS and ACLS to traditional course formats. In ACLS, 208 out of 282 (74%) passed the course. The written test had a means core of 92%. In the modular course, 85% of nurses and 96% of medical students passed on the first try. All passed on the second try. Mean score on the written was 93%. Self directed methods included video tapes and slide sets focused on course content.</p>
Kim (2006) 1308	<p>Kim, H. S., S. Y. Hwang, et al. (2006). "Development and evaluation of a PBL-based continuing education for clinical nurses: a pilot study." <u>Taehan Kanho Hakhoe Chi</u> 36(8): 1308-14.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Problem-based learning sessions Combined PBL sessions with simulation in weekly sessions over a six week period. Did not measure learning outcomes. Only measured attitudes towards course format.</p> <p>Abstract only reviewed. Unable to obtain original article.</p>
Mehne (1987) 666	<p>Mehne, P. R., E. J. Allison, Jr., et al. (1987). "A required, combined ACLS/ATLS provider course for senior medical students at East Carolina University." <u>Ann Emerg Med</u> 16(6): 666-8.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Combined with ATLS ACLS and ATLS courses combined into single agenda. 41 hour course over six days. 39 subjects. Courses combined some overlapping content (such as airway management).</p>
Polgase (1989) 997	<p>Polglase, R. F., D. C. Parish, et al. (1989). "Problem-based ACLS instruction: a model approach for undergraduate emergency medical education." <u>Ann Emerg Med</u> 18(9): 997-1000.</p> <p>LOE4 (Case series), Support, Poor quality End Point (Subject Matter) – Problem-based learning sessions Included five clinical scenarios linked to ACLS content. Compared results with standard course. Course pass rate for the PBL course was 100%. Course pass rate for the traditional course was 75.8%. Making the results even more notable was that the PBL students were sophomore medical students while the traditional course students were senior students and residents.</p>
Wayne (2006) 251	<p>Wayne, D. B., J. Butter, et al. (2006). "Mastery learning of advanced cardiac life support skills by internal medicine residents using simulation technology and deliberate practice." <u>J Gen Intern Med</u> 21(3): 251-6.</p> <p>LOE4 (Case series), Neutral, Poor quality End Point (Subject Matter) – Integrated in overall curriculum Did not conduct an actual AHA ACLS course, but used ACLS scenarios and checklists.</p>