

WORKSHEET for Evidence-Based Review of Science for Emergency Cardiac Care**Worksheet author(s)**

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Date Submitted for review: October 1, 2009**Clinical question.**

"Does the use of a checklist during adult and pediatric advanced life support as opposed to no checklist improve outcomes (e.g. compliance with guidelines, other outcomes)?"

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

Conflict of interest specific to this question

Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? No

Search strategy (including electronic databases searched).

Databases searched:

Pubmed, Embase (1980 to wk 21 2009), AHA endnote library and Cochrane library.

Pubmed (May 25th 2009)

#	Searches	Hits
1	"Resuscitation"[Mesh]	58528
2	Checklist* (text word limit)	11746
3	Check list* (text word limit)	1771
4	2 or 3	13448
5	1 and 4	67

Embase (May 25th 2009)

#	Searches	Hits
1	Resuscitation/ (subject heading)	24881
2	checklist* or check list*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]	11768
3	1 and 2	48

Pubmed (May 26th 2009)

#	Searches	Hits
1	"Surgery" [subheading] or "surgical procedures, operative" [Mesh]	2351317
2	Checklist* (text word limit)	11746
3	Check list* (text word limit)	1771
4	2 or 3	13448
5	1 and 4	788

Embase (May 26th 2009)

#	Searches	Hits
1	surgical.mp.	527060
2	Surgery/	35164
3	1 or 2	550709
4	(checklist* or check list*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]	11768
5	4 and 3	381

Pubmed		
#	Searches	Hits
1	Resuscitation/ (subject heading)	24881
2	Memory aid*	1
3	1 and 2	1

Embase		
#	Searches	Hits
1	Resuscitation/ (subject heading)	24881
2	Memory aid*	124
3	1 and 2	1

Pubmed		
#	Searches	Hits
1	Anesthesiology [Mesh]	13585
2	Cheklist* or check list* (test)	13448
3	1 and 2	52

Embase		
#	Searches	Hits
1	Anesthesia/ (subject heading)	35122
2	(checklist* or check list*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer name]	11768
3	1 and 2	50

AHA Endnote Master Library (as of May 24th 2009))

Searched for keywords: checklist and resuscitation

Cochrane library (May 18th 2009)

Searched for checklist and resuscitation

• State inclusion and exclusion criteria

Inclusion criteria:

- 1) Studies using checklists in order to prompt medical healthcare personnel to perform resuscitation tasks during a resuscitation event
- 2) Adult and pediatric data considered
- 3) Real or simulated resuscitation settings considered
- 4) Data regarding uses of checklists in crisis operative settings to be considered as “extrapolated data”

Exclusion Criteria:

- 1) Studies in which checklists were used to prompt correct preparation for an event (e.g. checklists for anesthesia machines pre-op), or to address mechanical or technical issues during an event (e.g. checklists to review anesthetic gas delivery)
- 2) Briefing or debriefing checklists prior to or after a medical event
- 3) All studies using checklists exclusively as an assessment tool after a real or simulated medical event

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

Pubmed: 908 hits

Embase: 480 hits

AHA database: No articles pertaining to ILCOR question

Cochrane: no reviews related to ILCOR question

Summary of evidence

Evidence Supporting Clinical Question

Good					Ward 1997 E1
Fair					
Poor					Bacon 2005 E2 Currie 2005 E2 Ludbrook 2005 E2 Morris 2005 E2 Myburgh 2005 E2 Runciman 1993 E2 Szekely 2005 E2 Visvanathan 2005 E2 Visvanathan 2005 E2 Watterson 2005 E2 Watterson 2005 E2 Westhorpe 2005 E2 Willamson 2005 E2
	1	2	3	4	5
Level of evidence					

A = Return of spontaneous circulation
 B = Survival of event

C = Survival to hospital discharge
 D = Intact neurological survival

E1 = Performance of simulated BLS
 E2 = Expert opinion analysis of checklist algorithm

Italics = Animal studies

Reviewer's Final Comments

The above search strategy discovered no publications directly addressing this particular ILCOR question. Extrapolated data assessed either layperson performance using checklists in simulated basic life support (BLS), or retrospectively analyzed a checklist algorithm's theoretical ability to diagnose or address crisis situations in anesthetic settings.

The study that most closely addressed the current ILCOR worksheet question analyzed the use of either a long, short or no checklist during simulated basic life support by 169 randomly assigned undergraduate students (Ward, 1997, 221). The long checklist group performed procedural variables (e.g. call 911, first pulse check, compression rate) correctly 33% of the time compared to either 13% or 14% of the time in the short or no checklist groups ($p < 0.02$ and < 0.01 respectively). The three groups did not show differences in the quality of compressions or ventilations as registered by a recording manikin. In addition, the long checklist group performed at least as well in all measured aspects of BLS (procedural or quality of compressions and ventilations), suggesting no detrimental effects of using a checklist. This study is a well-designed RCT, but of limited applicability to the current ILCOR question as it evaluated only lay rescuers performing simulated BLS.

A series of papers from researchers in Australia was also reviewed as extrapolated data. The first of this series (Runciman, 1993, 579) used consensus opinion to develop a mnemonic algorithm to focus attention on common anesthesia problems during times of crisis. The developed tool was applied retrospectively to a sample of 1,301 voluntarily reported anesthesia incidents. The method of analysis involved three investigators using their professional judgment to decide if the algorithm would have led to a better outcome during the reported incident. They determined that the algorithm would have diagnosed the underlying problem in 99% of the incidents and would have led to a better outcome in 12.6% of cases. A similar process was applied to various anesthetic complications requiring problem specific algorithms (e.g. the septic patient) with results favoring the use of these sub-algorithms (Bacon, 2005, e18; Chapman, 2005, e8; Currie, 2005, e19; Ludbrook, 2005, e13; Morris, 2005, e11; Myburgh, 2005, e22; Paix, 2005, e5; Runciman, 2005, e14; Szekely, 2005, e6; Visvanathan, 2005, e3; Visanathan, 2005, e2; Watterson, 2005, e9; Watterson, 2005, e10; Westhorpe, 2005 e7; Williamson, 2005, e17). While providing a useful framework for the development of a checklist for crisis situations, the tools have only been validated using expert opinion applied to a retrospective convenience sample of anesthetic events, significantly limiting its applicability to the current question.

References

[1] Bacon AK, Paix AD, Williamson JA, Webb RK, Chapman MJ. Crisis management during anaesthesia: pneumothorax. *Qual Saf Health Care*. 2005 June 1, 2005;14(3):e18-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[2] Currie M, Kerridge RK, Bacon AK, Williamson JA. Crisis management during anaesthesia: anaphylaxis and allergy. *Qual Saf Health Care*. 2005 June 1, 2005;14(3):e19-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and

treat clinical problems

- Retrospective, expert opinion analysis methodology described in Runciman 1993

[3] Ludbrook GL, Webb RK, Currie M, Watterson LM. Crisis management during anaesthesia: myocardial ischaemia and infarction. *Qual Saf Health Care*. 2005 June 1, 2005;14(3):e13-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[4] Morris RW, Watterson LM, Westhorpe RN, Webb RK. Crisis management during anaesthesia: hypotension. *Qual Saf Health Care*. 2005 June 1, 2005;14(3):e11-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[5] Myburgh JA, Chapman MJ, Szekely SM, Osborne GA. Crisis management during anaesthesia: sepsis. *Qual Saf Health Care*. 2005 Jun;14(3):e22.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[6] Runciman WB, Webb RK, Klepper ID, Lee R, Williamson JA, Barker L. Crisis management - validation of an algorithm by analysis of 2000 incident reports. *Anaesthesia and Intensive Care*. 1993;21:579-92.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Above "COVER ABCD, A SWIFT CHECK" mnemonic algorithm was developed after consultation with experts in the field and aviation psychologists
- This algorithm was retrospectively analyzed applied to incidents voluntarily reported to the Australian Incident Monitoring Study
- Investigators used their professional judgment to decide if the algorithm would have led to a better outcome during the reported incident.
- Determined that the algorithm would have diagnosed the underlying problem in 99% of the incidents and would have led to a better outcome in 12.6% of cases

[7] Szekely SM, Runciman WB, Webb RK, Ludbrook GL. Crisis management during anaesthesia: desaturation. *Qual Saf Health Care*. 2005 June 1, 2005;14(3):e6-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[8] Visvanathan T, Kluger MT, Webb RK, Westhorpe RN. Crisis management during anaesthesia: laryngospasm. Qual Saf Health Care. 2005 June 1, 2005;14(3):e3-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[9] Visvanathan T, Kluger MT, Webb RK, Westhorpe RN. Crisis management during anaesthesia: obstruction of the natural airway. Qual Saf Health Care. 2005 June 1, 2005;14(3):e2-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[10] Ward P, Johnson LA, Mulligan NW, Ward MC, Jones DL. Improving cardiopulmonary resuscitation skills retention: effect of two checklists designed to prompt correct performance. Resuscitation. 1997 Jun;34(3):221-5.

- LOE 5 : Favorable. RCT of lay rescuers using checklists in BLS
- Randomized controlled trial with 3 arms, no-checklist, short checklist and long checklist
- 169 lay rescuer undergraduate participants
- Long checklist group performed the following CPR procedures more frequently than both the no, and short checklist group: call 911, choose correct procedure for clinical scenario.
- The long checklist group performed the following procedures more frequently than the short checklist group : compression rate, first pulse check
- The long checklist group performed the following procedures more frequently than the no checklist group : head tilt
- Above comparisons were all significant at $p < 0.05$
- The long checklist group did not perform significantly worse in any variable.
- No difference between groups in technical performance of ventilation or compressions as measured by a recording manikin.
- Reported financial support from the Asmund S.Laerdal and the Laerdal Medical Corporation

[11] Watterson LM, Morris RW, Westhorpe RN, Williamson JA. Crisis management during anaesthesia: bradycardia. Qual Saf Health Care. 2005 June 1, 2005;14(3):e9-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[12] Watterson LM, Morris RW, Williamson JA, Westhorpe RN. Crisis management during anaesthesia: tachycardia. Qual Saf Health Care. 2005 June 1, 2005;14(3):e10-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems

- Retrospective, expert opinion analysis methodology described in Runciman 1993

[13] Westhorpe RN, Ludbrook GL, Helps SC. Crisis management during anaesthesia: bronchospasm. Qual Saf Health Care. 2005 June 1, 2005;14(3):e7-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993

[14] Williamson JA, Helps SC, Westhorpe RN, Mackay P. Crisis management during anaesthesia: embolism. Qual Saf Health Care. 2005 June 1, 2005;14(3):e17-.

- LOE 5 : Favorable. Expert opinion on theoretical efficacy of checklist algorithm to diagnose and treat clinical problems
- Retrospective, expert opinion analysis methodology described in Runciman 1993