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

Worksheet author(s)

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Clinical question: For healthcare professionals (P), do briefings (prior to) and/or debriefings (after a learning or patient care experience) (I), when compared to no briefings or debriefings (C), improve the acquisition of content knowledge, technical skills and behavioral skills required for effective and safe resuscitation (O)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? intervention (target population = healthcare professionals)
State if this is a proposed new topic or revision of existing worksheet. new topic

Conflict of interest specific to this question. I am a: 1) consultant to Laerdal Medical, Inc., and Advanced Medical Simulation, Inc., and a 2) grant recipient of the Laerdal Foundation and the U.S. Agency for Healthcare Research and Quality.
Do any of the authors listed above have conflict of interest disclosures relevant to this worksheet? See above.

Search strategy (including electronic databases searched).

Databases explored:

the Cochrane Library for Systematic Reviews
Medline via PubMed
AHA Endnote database
Google Scholar

In addition a manual search of pertinent non-healthcare sources likely to contain seminal works (such as those describing human factors and human performance in high-risk domains such as aerospace, aviation, nuclear power, the military and emergency rescue fields such as rescue swimming, fire fighting, and law enforcement) was conducted to provide appropriate context. Pertinent references of retrieved manuscripts were also reviewed.

Keywords (followed by database searched and number of "hits"):

briefing AND resuscitation (Cochrane 0, Medline 3, Google Scholar 19,700)
debriefing AND resuscitation (Cochrane 0, Medline 42, Google Scholar 3,820)
training AND resuscitation (Cochrane 107, Medline 266, Google Scholar 67,100)
education AND resuscitation (Cochrane 29, Medline 226, Google Scholar 65,500)
learning AND resuscitation (Cochrane 30, Medline 537, Google Scholar 42,400)
team training AND resuscitation (Cochrane 107, Medline 497, Google Scholar 32,900)
crew resource management AND resuscitation (Cochrane 0, Medline 6, Google Scholar 2,960)
crisis resource management AND resuscitation (Cochrane 0, Medline 8, Google Scholar 16,900)

- State inclusion and exclusion criteria.

Inclusion Criteria:

Intervention: briefing or debriefing
Subjects: all healthcare professionals or trainees in adult or pediatric domains
Outcome: performance during resuscitation of humans or simulated humans in real or simulated clinical environments

Exclusion Criteria:

Studies of training or learning interventions where briefing or debriefing were not specifically mentioned
Descriptive (non-experimental) studies
Animal studies
Non-English manuscripts
Non-peer reviewed publications/presentations

- Number of articles/sources meeting criteria for further review.

Extensive review of the literature produced 12 studies and 1 pertinent review article examining the effects of briefing and/or debriefing on the performance of healthcare professionals conducting resuscitation in real or simulated clinical environments.

Summary of evidence

Evidence Supporting Clinical Question

Good	Savoldelli, Naik et al. 2006 (E)				
Fair	Mayo, Hackney et al. 2004 (E)		Edelson, Litzinger et al. 2008 (E)	DeVita, Schaefer et al. 2005 (E); Wayne, Butter et al. 2005 (E); Clay, Que et al. 2007 (E); Dine, Gersh et al. 2008 (E); Falcone, Daugherty et al. 2008 (E); Goffman, Heo et al. 2008 (E); Mikrogianakis, Osmond et al. 2008 (E)	Ireland, Gilchrist et al. 2008 (E); Salas, Klein et al. 2008 (E)
Poor					
	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
E = Other endpoint
Italics = Animal studies

Evidence Neutral to Clinical question

Good					
Fair				Blum, Raemer et al. 2005 (E)	
Poor					
	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
E = Other endpoint
Italics = Animal studies

Evidence Opposing Clinical Question

Good					
Fair					
Poor					
	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
E = Other endpoint
Italics = Animal studies

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

Briefings (conducted prior to an event) and debriefings (after an event) encompass encounters ranging from short, focused discussions to lengthy, detailed, interactive sessions involving audiovisual recordings of the event(s) of interest and other sources of objective feedback (as from the patients or patient simulators involved in clinical training). Briefings and debriefings are grounded in sound adult learning theory, supported by rational conjecture, and felt to be essential for achieving expert performance. Adult learning theory predicts that the majority of learning occurs not during an event but rather after an event when the learner has the opportunity to reflect on his/her performance (as during a facilitated debriefing). Briefings and debriefings have been used for decades in other domains where the risk to human life is high and are a core component of maintenance of certification/competency programs in those domains. While objective data exists in some of those domains to support the use of briefings and debriefings it is far from being definitive in nature or comprehensive across all domains. Despite the paucity of objective evidence the use of briefings and debriefings remains standard operating procedure in commercial aviation, aerospace, the military, etc. and no one working in those domains would consider conducting a prospective, randomized, controlled trial where subjects (and those for whose safety they bear responsibility) are randomized to the "no briefing/debriefing" group.

The use of briefings and debriefings is a relatively recent phenomenon in healthcare. Briefings and debriefings may be conducted in association with either simulated or real clinical events and the reasons they are utilized vary. Given their novelty in healthcare the literature has very few actual studies of their use and utility; the vast majority of the literature consists of discussions of the theoretical soundness of the techniques based on principles of adult learning and "how to" descriptions. Evidence from two prospective randomized controlled (LOE 1) studies (Salvodelli 2006, 279; Mayo 2004, 2422) and ten other studies (LOE 3 – 5) of briefings and debriefings document improvement in the acquisition of the content knowledge, technical skills and/or behavioral skills required for effective and safe resuscitation. Salvodelli et al compared the effects of debriefing vs no debriefing on performance in a simulated crisis scenario and found that debriefing produced a statistically significant improvement in behavioral skills. Mayo et al examined the effect of simulation + debriefing vs clinical experience as a resident on emergency airway management and determined that simulation + debriefing resulted in statistically significant improvement in skill immediately and four weeks after the experience. Of the studies cited in this review only two of thirteen (Mayo 2004, 2422; Edelson 2008, 1063) included an analysis of performance while caring for real patients in the actual clinical domain. The other eleven studies (Blum 2005, 1375; DeVita 2005, 518; Wayne 2005, 202; Savoldelli 2006, 279; Clay 2007, 738; Dine 2008, 2817; Falcone 2008, 1065; Goffman 2008, 294; Ireland 2008, 328; Mikrogianakis 2008, 761; Salas 2008, 518) examined the performance of the healthcare professionals while working with simulated patients. A total of twelve of the thirteen studies indicated that briefings and/or debriefings resulted in improved human performance during simulated or real resuscitation activities; only a single study (Blum 2005, 1375) revealed equivocal results.

So what can be said about the effectiveness of briefings and/or debriefings in healthcare where the emphasis is clearly on evidence-based practice and historically the gold standard of evidence has consisted of the prospective, randomized, controlled, sufficiently powered clinical trial where the outcomes focus on patients? In some ways this situation is similar to the debate that is currently taking place regarding the extent of evidence necessary to accept the results of quality assurance/improvement work. At one end of the spectrum are investigators who insist that quality initiatives must be subject to the same rigorous testing that precedes the introduction of new pharmacologic therapies and medical instrumentation in order to prove that they actually improve quality of care and ensure patient safety. Alternatively, others note that requiring randomized controlled trials to assess the safety of innovations with high face validity may unduly place humans at risk and therefore prove impossible to conduct. Thus we are left with a situation where the need for more definitive evidence, while desirable, is felt by at least some members of the healthcare education and training community to be neither necessary nor practical.

As an additional note, it should be stated that debriefings and feedback are actually two separate activities. A debriefings is, by definition, a series of questions asked about a prior sequence of events; thus the emphasis is on solicitation of information from those who were present during the events, requiring their active engagement. Feedback, on the other hand, refers to the provision of information to others about a prior event or series of events. Thus, conducting a debriefing is technically much different, for both the instructor and the learner(s), than simply providing feedback.

Acknowledgements:

Citation List

Blum RH, Raemer DB, et al. (2005). "A method for measuring the effectiveness of simulation-based team training for improving communication skills." Anesth Analg **100**(5): 1375-80, table of contents.

Comment: LOE 4, Quality Fair, Neutral. In this observational study (pre/post intervention, no controls) debriefing had no effect on individual and team performance in communication.

Clay AS, Que L, et al. (2007). "Debriefing in the intensive care unit: a feedback tool to facilitate bedside teaching." Crit Care Med **35**(3): 738-54.

Comment: LOE 4, Quality Fair, Supporting. The authors state that the debriefing encouraged residents "to reflect on their performance, making note of what they did well and what they could have done better"; thus it is clear that this was more than simply the provision of feedback. In this observational study (pre/post intervention, no controls) increased frequency of debriefing was associated with improved performance.

DeVita MA, Schaefer J, et al. (2005). "Improving medical emergency team (MET) performance using a novel curriculum and a computerized human patient simulator." Qual Saf Health Care **14**(5): 326-31.

Comment: LOE 4, Quality Fair, Supporting. In this observational study (pre/post intervention, no controls) repeated simulated emergency situations followed by debriefings resulted in sequentially improved performance in technical and behavioral skills during simulated resuscitations and improved simulated patient outcomes.

Dine CJ, Gersh RE, et al. (2008). "Improving cardiopulmonary resuscitation quality and resuscitation training by combining audiovisual feedback and debriefing." Crit Care Med **36**(10): 2817-22.

Comment: LOE 4, Quality Fair, Supporting. In this observational study (pre/post intervention, no controls) the combination of objective information regarding performance (feedback) and facilitated debriefing was found to be superior to either alone in producing improvement in human performance.

Edelson DP, Litzinger B, et al. (2008). "Improving in-hospital cardiac arrest process and outcomes with performance debriefing." Arch Intern Med **168**(10): 1063-9.

Comment: LOE 3, Quality Fair, Supporting. This study using retrospective controls indicates that the combination of provision of objective information regarding performance (feedback) and facilitated debriefing is superior to feedback alone in producing improvement in the technical skills of healthcare professionals conducting resuscitation and in the rate of return of spontaneous circulation in real human patients undergoing CPR by said trainees.

Falcone RA, Jr, Daugherty M, et al. (2008). "Multidisciplinary pediatric trauma team training using high-fidelity trauma simulation." J Pediatr Surg **43**(6): 1065-71.

Comment: LOE 4, Quality Fair, Supporting. In this observational study (pre/post intervention, no controls) repeated simulated emergency situations followed by debriefings resulted in sequentially improved performance.

Goffman D, Heo H, et al. (2008). "Improving shoulder dystocia management among resident and attending physicians using simulations." Am J Obstet Gynecol **199**(3): 294 e1-5.

Comment: LOE 4, Quality Fair, Supporting. In this observational study (pre/post intervention, no controls) repeated simulated obstetric emergency situations followed by debriefings resulted in sequentially improved performance in technical and behavioral skills.

Ireland S, Gilchrist J, et al. (2008). "Debriefing after failed paediatric resuscitation: a survey of current UK practice." Emerg Med J **25**(6): 328-30.

Comment: LOE 5, Quality Fair, Supporting. Based on subjective survey data the authors indicate that debriefings after real-life emergencies are common in the United Kingdom and felt to be generally helpful. However it appears that in this context debriefings were most frequently focused on the psychological wellbeing of the healthcare professionals rather than their performance or patient outcome, limiting its relevance to the question at hand.

Mayo PH, Hackney JE, et al. (2004). "Achieving house staff competence in emergency airway management: results of a teaching program using a computerized patient simulator." Crit Care Med **32**(12): 2422-7.

Comment: LOE 1, Quality Fair, Supporting. This study shows that simulation and debriefing focused on airway management resulted in improved performance in intubation skill (in simulated patients) compared to clinical experience during residency and successful completion of an ACLS post-test.

Mikrogianakis A, Osmond MH, et al. (2008). "Evaluation of a multidisciplinary pediatric mock trauma code educational initiative: a pilot study." J Trauma **64**(3): 761-7.

Comment: LOE 4, Quality Fair, Supporting. Simulated emergencies followed by facilitated debriefings produced improvements in content knowledge and confidence. Perhaps most importantly it also increased self-awareness of areas of weakness; this is an important, yet often underappreciated, aspect of debriefing.

Salas E, Klein C, et al. (2008). "Debriefing medical teams: 12 evidence-based best practices and tips." Jt Comm J Qual Patient Saf **34**(9): 518-27.

Comment: LOE 5, Quality Fair, Supporting. This is the only descriptive manuscript included in this review. The elements described in this manuscript must be well understood by anyone charged with conducting professional debriefings.

Savoldelli GL, Naik VN, et al. (2006). "Value of debriefing during simulated crisis management: oral versus video-assisted oral feedback." Anesthesiology **105**(2): 279-85.

Comment: LOE 1, Quality Good, Supporting. This is a well-designed study (one of very few prospective, randomized controlled investigations) that documents the short-term benefit of debriefing: improvement of performance during subsequent simulated crisis situations.

Wayne DB, Butter J, et al. (2005). "Simulation-Based Training of Internal Medicine Residents in Advanced Cardiac Life Support Protocols: A Randomized Trial." Teach Learn Med **17**(3): 202-208.

Comment: LOE 4, Quality Fair, Supporting. This study shows that simulated emergencies followed by facilitated debriefings produced improvements in content knowledge and confidence when compared with clinical experience alone.

References

1. Blum RH, Raemer DB, et al. (2005). "A method for measuring the effectiveness of simulation-based team training for improving communication skills." Anesth Analg **100**(5): 1375-80
2. Clay AS, Que L, et al. (2007). "Debriefing in the intensive care unit: a feedback tool to facilitate bedside teaching." Crit Care Med **35**(3): 738-54.
3. DeVita MA, Schaefer J, et al. (2005). "Improving medical emergency team (MET) performance using a novel curriculum and a computerized human patient simulator." Qual Saf Health Care **14**(5): 326-31.
4. Dine CJ, Gersh RE, et al. (2008). "Improving cardiopulmonary resuscitation quality and resuscitation training by combining audiovisual feedback and debriefing." Crit Care Med **36**(10): 2817-22.
5. Edelson DP, Litzinger B, et al. (2008). "Improving in-hospital cardiac arrest process and outcomes with performance debriefing." Arch Intern Med **168**(10): 1063-9.
6. Falcone RA, Jr, Daugherty M, et al. (2008). "Multidisciplinary pediatric trauma team training using high-fidelity trauma simulation." J Pediatr Surg **43**(6): 1065-71.
7. Goffman D, Heo H, et al. (2008). "Improving shoulder dystocia management among resident and attending physicians using simulations." Am J Obstet Gynecol **199**(3): 294 e1-5.
8. Ireland S, Gilchrist J, et al. (2008). "Debriefing after failed paediatric resuscitation: a survey of current UK practice." Emerg Med J **25**(6): 328-30.
9. Mayo PH, Hackney JE, et al. (2004). "Achieving house staff competence in emergency airway management: results of a teaching program using a computerized patient simulator." Crit Care Med **32**(12): 2422-7.
10. Mikrogianakis A, Osmond MH, et al. (2008). "Evaluation of a multidisciplinary pediatric mock trauma code educational initiative: a pilot study." J Trauma **64**(3): 761-7.
11. Salas E, Klein C, et al. (2008). "Debriefing medical teams: 12 evidence-based best practices and tips." Jt Comm J Qual Patient Saf **34**(9): 518-27.
12. Savoldelli GL, Naik VN, et al. (2006). "Value of debriefing during simulated crisis management: oral versus video-assisted oral feedback." Anesthesiology **105**(2): 279-85.
13. Wayne DB, Butter J, et al. (2005). "Simulation-Based Training of Internal Medicine Residents in Advanced Cardiac Life Support Protocols: A Randomized Trial." Teach Learn Med **17**(3): 202-208.