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

Worksheet author(s)

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Clinical question.

In emergency treatment education in developing countries (P), does the inclusion of any specific educational strategies (I) compare with existing strategies (including none) (C) improve any outcomes (O)?

Is this question addressing an intervention/therapy, prognosis or diagnosis? Yes, educational 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? No

Search strategy (including electronic databases searched).

Cochrane Review:

ID	Search	Cochrane Reviews
#1	MeSH descriptor Developing Countries explode all trees reviewed by title and all excluded	13
#2	MeSH descriptor Education explode all trees reviewed by title and 6 identified (see below)	95
#3	MeSH descriptor Emergency Treatment explode all trees reviewed by title and all excluded	52
#4	((#1 AND #2) OR (#1 AND #3))	7

PubMed:
1. ((("Education"[Mesh] OR "Learning"[Mesh]) OR "Teaching"[Mesh]) OR "Training Support"[Mesh]) AND "Developing Countries"[Mesh] AND "Therapeutics"[Mesh] AND ("Motor Skills"[Mesh] OR "Clinical Competence"[Mesh] OR "Professional Competence"[Mesh] OR "Cost-Benefit Analysis"[Mesh] OR "Self-Evaluation Programs"[Mesh])

2. Developing countries[ALL] AND Resuscitation Education[ALL]:

Google Scholar:
Search strategy: Resuscitation education[ALL] and Developing Countries[TI] and 2004-2009[DP]:

Embase:
Search Strategy: ('resuscitation'/exp OR 'resuscitation') AND ('education'/exp OR 'education') AND 'developing countries' AND [humans]/lim AND [1990-2008]/py

AHA Endnote library:
Searched 'Developing Countries' AND Resuscitation Education:

Additional articles EIT group aware of that were not identified by initial search or through references of above articles; Carlo, 2009, 504; Couper, 2005, 459; Enweronu-Laryea, 2009, PAP; Husum, 2003, 142;Husum, 2003, 1188; Kimura, 2008, 511; McClure, 2007, 1135 O'Hare, 2006, 376 ; Olutu, 2009, p 69; Zafar, 2009, 449

- State inclusion and exclusion criteria: None

Exclusion: Articles whose title or abstract that did not describe emergency medical training (Trauma, Newborn Resuscitation, Basic Life Support, Pediatric Advanced Life Support, Adult Cardiac Life Support, First Aid), WHO ENC. (128 Articles, 7 Cochrane reviews).

Exclusion: Studies were not performed in developing countries (as defined by World Bank, extracted from website http://web.worldbank.org/WBSITE/EXTERNAL/DATASTATISTICS/0,,contentMDK:20421402~pagePK:64133150~piPK:64133175~theSitePK:239419,00.html on July 30th, 2009) (1 Article, 0 Cochrane review)

- Number of articles/sources meeting criteria for further review: 31. Of these 1 were LOE 1, 1 LOE 2, 12 LOE 3, 2 LOE 4, and 15 LOE 5.

Summary of evidence

Evidence Supporting Clinical Question

Good	**Capone, 2000, E**		**Kumar, 1995, B** **Carlo, 2009 E** **McClure, 2007, E**		**Ali 1998 E** **Ali 1993 C** **Bergman, 2008, E** **Husum H, 2003 C** **Husum H, 2003 C** **Tchorz, 2007, E**
Fair		**Arreola-Risa, 2004 B**	**Couper, 2005, E** **Opiyo, 2008, E** **Enweronu-Laryea, 2009 E** **Ergenekon, 2000, E** **Jabir, 2009 E**	**Zafar, 2009, E**	**Aboutanos, 2007, E** **Ali, 1997 E** **Ali, 1994 E** **Arreola-Risa, 2007 B** **Arreola-Risa, 2004 B**
Poor			**Trevisanuto, 2007, E**	**Young, 2008, E**	**Smith, 1997, E** **Tennant, 2000, E** **Tortella, 1996, E**
	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					
Poor			**Bhat, 1993 E**		
	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			**Deorari, 2001, C** **O'Hare, 2006, C**		
Poor					**Ariyanayagam, 1992, B**
	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:

Course independent research of educational strategies for emergency treatment education in developing countries:

There were several studies that examined barriers and suggested strategies for optimizing implementation of developed nation emergency medical education programs. Prevalent themes were that scenarios should be tailored to the local clinical setting (Smith, 1997, 15; Tennant, 2000, 10; Young, 2008, 271), having sufficient functioning equipment for adequate practice(Couper, 2005, 459; Tennant, 2000, 10; Young, 2008, 271), rationalizing and using only essential equipment, anticipating higher degree of maintenance requirements to keep the equipment functioning(Young, 2008, 271), enlisting local counterparts in local modification of course to maintain overarching themes, while adapting to local cultural settings(Bhat, 1993, 87; Smith, 1997, 15), increasing allotted time for course to incorporate local cultural norms(Bhat, 1993, 87; Smith, 1997, 15), minimizing comparison of practice in local setting to developed country setting(Smith, 1997, 15), utilizing dual language slides for didactics(Smith, 1997, 15;Young, 2008, 271). Also reported in the literature is the use of logbooks to document operational performance and patient outcomes after training. (Zafar, 2009, 449)

Most studies reported positive outcomes in knowledge acquisition using cognitive assessments pre- and immediately post-training intervention (Couper, 2005, 459; Ergenekon, 2000, 225; Enweronu-Laryea, 2009, 1308 ; Jabir, 2009,1265; Ali, 1998, 1192). Baseline scores were around 50-60%, and were often lower when compared to repeat course participants (Aboutanos, 2007, 714) and developed country subjects(Ali, 1994, 695; Trevisanuto, 2007, 28). Interestingly, multiple studies showed that after training all subjects had similar cognitive scores (overall ranging from 70-88%).(Aboutanos, 2007, 714; Ali, 1994, 695) Where specified, subject knowledge acquisition was best in the areas of basic trauma (Aboutanos, 2007, 714) and worst in CPR(Capone, 2000, 259).

Course specific research of educational strategies for emergency treatment education in developing countries:

1. **Trauma:**
   a. **Studies comparing 2 different specific educational strategies:**

      Arreola-Risa looked at pre-hospital provider (EMT) training in three communities Intervention: PHTLS/BTLS vs. BTLS + ACLS + local advanced airway course vs. no training. The training was effective for both intervention services, with increases in basic airway maneuvers for patients in respiratory distress in PHTLS/BTLS group (16% before versus 39% after) and BTLS + ACLS + local Airway group (14% versus 64%). The role of endotrachal intubation for patients with respiratory distress increased only in BTLS + ACLS+ local Airway (5% versus 46%), however mortality decreased only in PHTLS/BTLS, where it had been the highest (8.2% before versus 4.7% after) and where the simplest and lowest cost interventions were implemented (USD 150 vs. 400/medic trained). There was no change in process or outcome in the control site (Arreola-Risa, 2004, 318).

   b. **Studies comparing specific educational strategies to no existing training:**

      There have been conflicting studies when examining the efficacy of ATLS in resource limited settings. When Ariyanayagam et al, compared 6-hour mortality pre ATLS training to post ATLS training implementation, they found no change (Ariyanayagam, 1992, 72), but during the same time period at the same hospital in Trinidad and Tobago, there was a 100% decrease in in-hospital mortality among patients with Injury Severity Score (ISS) > or = to 16 after the introduction of the ATLS program(Ali, 1993, 890). In two studies Husum et al compared trauma patient mortality in Cambodia and Northern Iraq pre to post a low-cost modified ATLS training intervention, finding a decrease in the annual mortality rate from 23.9 % to 8.8%(Husum, 2003, 142; Husum, 2003, 1188).

      Pre-hospital life support (PHTLS) has demonstrated improvements in several studies. Following the successful demonstration on the impact of ATLS on trauma patient survival, Ali and his colleagues examined impact of PHTLS in Trinidad and Tobago and demonstrated a reduction in mortality with either penetrating (8.6% pre-PHTLS, 5.6% post-PHTLS) or blunt (18% pre-PHTLS and 12.8% post-PHTLS) injuries, as well as major disability (40% pre-PHTLS vs. 8.6% post-PHTLS) and length of stay (14.6 days pre-PHTLS vs. 8.9 days post-PHTLS)(Ali, 1997, 1018). A 3-month EMT course taken by pre hospital personnel in Santa Catarina, Nuevo Leon, Mexico demonstrated a 45% reduction in severity-adjusted risk of pre-hospital death (at scene with treatment attempted, died en route, in the ED of the receiving hospital) when compared to pre-training control group. Patient overall mortality was reduced from 6.3% to 2.5%, the PHI-adjusted odds ratio for death in the after period was 0.55 (95%CI 0.30–0.99) compared

with the before period (Arreola-Risa, 2007, 914). Interestingly, there was no change in cervical or thoracic immobilization (61%), airway maneuvers (4.4 vs 2/7 for intubated for respiratory distress), or IV fluid resuscitation (9.6 to 5.0%) use of any iv fluids for Adults with SBP < 100) or scene time, between the pre and post intervention groups. After trauma team training in Tanzania, participants demonstrated high scores in scenario testing, but this result was mitigated as this checklist was not validated to assess competence (Bergman, 2008, 879). Tchorz implemented a modified ATLS course in India and required competence in ultrasound and airway management for passing, but was limited by utilization of subjective criteria (instructor observation)(Tchorz, 2007, 373). Additionally, this study was limited in that it eliminated other technical skills requirements such as although tube thoracostomy, central line placement and splinting due to costs, despite these being common procedures required of study subjects.

2. Newborn Resuscitation:

a. Studies comparing 2 different specific educational strategies:

Three studies were identified that examined different effects of training interventions. Bhat et al found no difference in post training intervention cognitive scores when the compared a half-day neonatal resuscitation course taught to final year medical students prior to the start of labor room rounds to a multi-day course taught as part of the curriculum independent of the temporal relationship to their rotation in the labor ward and delivery room (historical controls) (Bhat, 1993, 87). Participants expressed a high degree of approval this just-in-time type of training, but was not compared to control group's perceptions.

b. Studies comparing specific educational strategies to no existing training:

In 1990, the AAP's Neonatal Resuscitation Program was rolled out to 14 hospitals via a train the trainer methodology and taught to doctors and nurses responsible for care of delivery room. While there was a 33% reduction in asphyxial related deaths after the training, there was no demonstrable difference in neonatal mortality rates (3.7% vs. 3.5%) between the 7,070 births prior to training and the 25,713 births after the health care staff was trained. (Deorari, 2001, 29) A significant shift towards more rational resuscitation practices was indicated by a decline in the use of chest compression and medication ($p < 0.001$ for each), and an increase in the use of bag and mask ventilation ($p < 0.001$). (Deorari, 2001, 29) Similarly, when nurses in delivery ward of teaching hospital, in Uganda were taught a self-developed course, there was no significant improvement in overall neonatal mortality, but there was improved outcomes of babies greater than 2 kg. Subgroup analysis demonstrated a reduced incidence of asphyxia as well as asphyxial related deaths. (O'Hare, 2006, 376)
Conversely, when neonatal resuscitation was incorporated into Traditional Birth Attendant training in Rapiur Rani Community Development Block of India, there was 20% reduction in perinatal mortality in intervention group (49.4/1000 vs. 61.0/1000). (Kumar, 1995, 29) Although Kumar demonstrated higher proportion of resuscitation techniques utilization, the overall mortality decrease could be not attributed to a decrease in asphyxia-related deaths. (Kumar, 1995, 29).

Carlo et al found that NRP training of midwives working in low-risk maternity clinics in Zambia significantly improved cognitive and psychomotor skills immediately after training, but while cognitive skills returned to baseline at 6 months, psychomotor skills persisted. Surprisingly, it was the participants with lower self efficacy score that best maintained their skills during the follow-up period.(Carlo, 2009, 504) After doctors and nurses in large maternity hospital in Nairobi, Kenya were trained in a modified version of the UK resuscitation councils' Neonatal Life Support Course, they demonstrated higher "perfect" and "adequate" resuscitation practice (defined by observed checklist) than control (24 and 66% vs. 10 and 27% respectively). (Opiyo, 2008, e1599)

3. Basic Life Support/CPR:

a. **Studies comparing 2 different specific educational strategies:**

None.

b. **Studies comparing specific educational strategies to no existing training:**

After brief videotape exposure about CPR, skills performance of factory workers in Brazil was very poor in both groups (Capone, 2000, 259).

4. **Advanced Pediatric Life Support:**
   a. **Studies comparing 2 different specific educational strategies:**

      None.

   b. **Studies comparing specific educational strategies to no existing training:**

      None.

5. **Advanced Cardiac Life Support:**
   a. **Studies comparing 2 different specific educational strategies:**

      Arreola-Risa looked at pre-hospital provider (EMT) training in three communities Intervention: PHTLS/BTLS vs. BTLS + ACLS + local advanced airway course vs. no training. The training was effective for both intervention services, with increases in basic airway maneuvers for patients in respiratory distress in PHTLS/BTLS group (16% before versus 39% after) and BTLS + ACLS + local Airway group (14% versus 64%). The role of endotracheal intubation for patients with respiratory distress increased only in BTLS + ACLS+ local Airway (5% versus 46%), however mortality decreased only in PHTLS/BTLS, where it had been the highest (8.2% before versus 4.7% after) and where the simplest and lowest cost interventions were implemented (USD 150 vs. 400/medic trained). There was no change in process or outcome in the control site (Arreola-Risa, 2004, 318).

   b. **Studies comparing specific educational strategies to no existing training:**

      None.

6. **First Aid:**
   a. **Studies comparing 2 different specific educational strategies:**

      None.

   b. **Studies comparing specific educational strategies to no existing training:**

      After brief videotape exposure about live saving skills and first aid, Over 50% factory workers in Brazil performed correctly 5 of the eight first aid skills, including positioning and hemorrhage control, and increased correct airway control performance from 5 to 25% of trainees (3% in the control group)(Capone, 2000, 259).

Acknowledgements:
Nil

Citation List

M. B. Aboutanos, E. B. Rodas, S. Z. Aboutanos, F. E. Mora, L. G. Wolfe, T. M. Duane, A. K. Malhotra and R. R. Ivatury. *Trauma education and care in the jungle of ecuador, where there is no advanced trauma life support. The Journal of trauma 2007;62:714-9*

Notes: Selected. Trauma. Population: Rural Physicians in Ecuador. Intervention: Self-made Trauma Course (Non-ATLS) Comparator: None Outcome: mean mcq overall test score improved from 72-79%, best categories were: head injury, abd trauma, pelvic injury. Greatest improvement in scores were extremity injury, prehospital care, adjuncts to physical examination. Worst performing were airway and abd trauma. Repeat course takers (from 2 years previous) had higher overall mean scores (both pre and post), but less improvement (incr 4% vs. 18%) from course naive counterparts. Level of Evidence: 4. Methodological Quality: Fair - semi-objective (checklists and mcq tests not validated, confounders such as degree of relevant previous training not controlled for (except the previous course), only immediate cognitive and OSCE evaluated). Magnitude of Any Effect: None measured.

J. Ali, R. Adam, A. K. Butler, H. Chang, M. Howard, D. Gonsalves, P. Pitt-Miller, M. Stedman, J. Winn and J. I. Williams. *Trauma outcome improves following the advanced trauma life support program in a developing country. J Trauma 1993;34:890-8; discussion 898-9*

Selected. Trauma. Taken from Ali J Trauma 1997 References. Population: Trauma patients served by Port of Spain General Hospital in Trinidad and Tobago. Intervention: ATLS . Comparator: Trauma patients in 4 year period prior to ATLS training. Outcome: Patient Outcomes: 50% reduction in overall mortality, 4.2-4.5 x propensity for survival (ORs) if in the post ATLS group compared to pre for lower and mid Injury Severity Score, and no differnce with ISS 41+ (both groups 100% mortality). Level of Evidence:3. Methodological Quality: Good. Magnitude of Any Effect: 100% reduction of patient mortality.

J. Ali, R. Adam, D. Josa, I. Pierre, H. Bedsaysie, U. West, J. Winn, E. Ali and B. Haynes. *Effect of basic prehospital trauma life support program on cognitive and trauma management skills. World J Surg 1998;22:1192-6*

This study demonstrates improved cognitive and trauma management skills performance among prehospital paramedical personnel who complete the basic PHTLS program.

J. Ali, R. Adam, M. Stedman, M. Howard and J. Williams. *Cognitive and attitudinal impact of the advanced trauma life support program in a developing country. The Journal of trauma 1994;36:695-702*

Notes: Selected. Trauma. Outcomes: Cognitive and attitudinal assessment. Population: Physicians in Trinidad and Tobago 1986-1990. Intervention: ATLS. Comparator: precourse self, post course Nebraska physicians taking ATLS. Outcome: 22% improvement in Cognitive scores pre vs. post. No difference in mean post course cognitive score between Neb and T+T docs, T+T had higher % of passing scores comp to Neb. T+T coworkers (docs and nurses) had high degree of differentiation between docs who had taken ATLS and those that didn't with respect to resuscitation and trauma C/S. Level of Evidence: 2. Methodological Quality: Good (comparison groups defined, outcomes measured objectively, confounders not identified, follow-up sufficient. Magnitude of Any Effect: Not able to be assessed.

J. Ali, R. U. Adam, T. J. Gana and J. I. Williams. *Trauma patient outcome after the prehospital trauma life support program. The Journal of trauma 1997;42:1018-21; discussion 1021-2*

Notes: Selected. Taken from references from Arreola-Risa "cost effectiveness..." Population: Pre hospital paramedics in Trinidad and Tobago. Intervention: PHTLS. Comparator: No training (historical controls. Outcome: the mortality (in percent, with n values in parenthesis) for blunt and penetrating injuries was significantly lower in the post-PHTLS period compared with the pre-PHTLS period with an 18.6% (n = 43) mortality pre-PHTLS for blunt injury compared with 12.8% post-PHTLS (n = 31). The mortality for penetrating injuries in the pre-PHTLS period was 8.9% (n = 9) compared with 5.6% (n = 61) for the post-PHTLS group. Clearly, mortality was, therefore, higher in the pre-PHTLS group for both blunt and penetrating injuries. Level of Evidence: 3. Methodological Quality: Fair . Magnitude of Any Effect: Not able to be assessed.

D. C. Ariyanayagam, V. Naraynsingh and I. Maraj. *The impact of the atls course on traffic accident mortality in trinidad and tobago. West Indian Med J 1992;41:72-4*

Notes. Selected. Taken from Aboutanos 1995 ref list. Population: Trauma victims in Trinidad and Tobago. Intervention: ATLS training. Comparator: pre training. Outcome: no difference in rate of decline of 6 hour mortality or injuries. Persistence of higher mortality during nights and weekends . Level of Evidence: 4. Methodological Quality: Poor (doesn't describe efficacy or penetrance of ATLS education in Health care system). Magnitude of Any Effect: Not able to be assessed.

C. Arreola-Risa, C. Mock, A. J. Herrera-Escamilla, I. Contreras and J. Vargas. *Cost-effectiveness and benefit of alternatives to improve training for prehospital trauma care in mexico. Prehospital and disaster medicine : the official journal of the National Association of EMS Physicians and the World Association for Emergency and Disaster Medicine in association with the Acute Care Foundation 2004;19:318-25*

Notes: Selected. Trauma. Outcomes: patient care delivery and patient outcome. Take away: Basic Trauma instruction appears to impact trauma mortality in training naïve provider population, ACLS in current form not well suited for same training population.
Population: Pre-Hospital EMTs in Mexico. Intervention: #1 PHTLS/BTLS, #2 BTLS+ACLS+Airway course. Comparator: no training. Outcome: decreased overall mortality, increased use of spinal stabilization, increased use of IV fluids and large bore IV in #1, higher use of airway in #1 and #2, higher use of advanced airway in #2. Level of Evidence: 2. Methodological Quality: Fair (self-reporting of medics, incomplete follow up (only fu on high risk), poor passing rate of ACLS, unknown passing/competency with local derived airway course, lack of equipment as confounder not controlled. Magnitude of Any Effect: Not able to be assessed.

C. Arreola-Risa, J. Vargas, I. Contreras and C. Mock. *Effect of emergency medical technician certification for all prehospital personnel in a latin american city. The Journal of trauma 2007;63:914-9*

Notes. Selected. Trauma. Outcome: Patient care delivery, Patient Mortality. Population: prehospital personnel (medics) working for the 2 of the 3 ambulance EMS services in Santa Catarina, Nuevo Leon, Mexico. Intervention: Basic EMT certification 3-month programs (2-3hours/day). Comparator:

Historical controls (before and during training). Outcome: mortality (at scene with treatment attempted, died enroute, in the ED of the receiving hospital) reduction from 6.3% to 2.5%), but confounded by lower PHI in post training group, (adj OR has interval that includes 1). No change in cervical or thoracic immobilization (61%), airway maneuvers (4.4 vs 2/7 for intubated for respiratory distress), or IV fluid resuscitation (9.6 to 5.0%) use of any iv fluids for Adults with SBP < 100) or scene time. Level of Evidence: 3. Methodological Quality: Fair (clear defined group, standard reporting form but not blinded, not all confounder controlled for (and one that did negated outcome), follow-up did NOT include hospital mortality. Magnitude of Any Effect: Not able to be assessed.

S. Bergman, D. Deckelbaum, R. Lett, B. Haas, S. Demyttenaere, V. Munthali, N. Mbembati, L. Museru and T. Razek. *Assessing the impact of the trauma team training program in tanzania. The Journal of trauma 2008;65:879-83*

Notes: Selected. Trauma. Outcome: cognitive assessment, skills assessment - simulation, satisfaction survey. Population: 7 doctors and 13 nurses in Tanzania. Intervention: Trauma Team Training (not PHTLS, BHTLS, ATLS). Comparator: None. Outcome: cognitive test improved from 9/15 to 13/15 (85% of students passed the test). Level of Evidence: 4. Methodological Quality: Good. Magnitude of Any Effect: Not able to be assessed.

B. V. Bhat, N. Biswal, B. D. Bhatia and P. Nalini. *Undergraduate training in neonatal resuscitation -- a modified approach. Indian journal of maternal and child health : official publication of Indian Maternal and Child Health Association 1993;4:87-8*

Notes: Selected. Neonatal Resuscitation: Population: Final Year Medical Students, Pondicherry India, 1993. Intervention: Single day classes, NALS (AHA, 1987) immediately prior to rotation with high need for areas for skill (labor room rotation). Comparator: historical controls, training over several days as part of overall medical curriculum. Outcome: cognitive assessment (differences in pre-post), qualitative review from study subjects. Level of Evidence: 3 (historical controls. Methodological Quality: Poor (poor description of comparison groups, no description intervention training, no attempt to control for confounding). Magnitude of Any Effect: Not able to be assessed.

P. L. Capone, J. C. Lane, C. S. Kerr and P. Safar. *Life supporting first aid (lsfa) teaching to brazilians by television spots. Resuscitation 2000;47:259-65*

Notes: Selected. First Aid and BLS. Outcome: Skills assessment in simulated scenarios. Population: auto part industrial plant employees in Brazil. Intervention: 116 exposed to brief LSFA skill demonstrations on TV. Comparator: 86 controls without TV exposure to LSFA. Outcome: Brief Videotape training of laypersons can be effective in some, but not all life saving skills, with some degree of knowledge retention at 13 months. Simulated skill performance on the evaluating nurse or manikin was tested at 1 week, 1 month, and 13 months. Over 50% of the television group performed correctly 5 of the eight skills, including positioning and hemorrhage control. Television viewing increased correct airway control performance from 5 to 25% of trainees, while it remained at 3% in the control group. CPR – ABC performance, however, was very poor in both groups. Level of Evidence: 1. Methodological Quality: Good (subjects not blinded to group (no control TV watching). Magnitude of Any Effect: Not able to be assessed.

W. A. Carlo, L. L. Wright, E. Chomba, E. M. McClure, M. E. Carlo, C. M. Bann, M. Collins and H. Harris. *Educational impact of the neonatal resuscitation program in low-risk delivery centers in a developing country. J Pediatr 2009;154:504-508 e5*

Selected. Neonatal (NRP). Outcome: cogntive training improved from 57 to 80% but returned to baseline at 6 months. skills improved fro a score of 55 to 90%, and this was sustained at 6 months (80%). Self efficacy improved from 3.6 to 4.3/5 and was sustained as well. Surprisingly, it was the participants with poor self efficacy that maintained the best skills . Population: Nurse Midwives working in low-risk clinics in Zambia. Intervention: American Academy of Pediatrics Neonatal Resuscitation Program (NRP). Comparator: None. Outcome: Outcome: self-efficacy, cognitive and psychomotor skills. Level of Evidence: 3 (own historical control). Methodological Quality: Good. Magnitude of Any Effect: Not able to be assessed.

E. Chomba, E. M. McClure, L. L. Wright, W. A. Carlo, H. Chakraborty and H. Harris. *Effect of who newborn care training on neonatal mortality by education. Ambulatory pediatrics : the official journal of the Ambulatory Pediatric Association 2008;8:300-4*

Notes: Selected. Neonatal resuscitation. Outcome: Patient mortality. Population: Midwives in Zambian low risk deliveries. Intervention: revised essential newborn care (ENC) course. Comparator: Historical control. Outcome: overall reduction in mortality (11.2 to 6.2) with decrease in infection related deaths, no change in asphyxia- related death. Level of Evidence: 3. Methodological Quality: Fair. Magnitude of Any Effect: Not able to be assessed.

Couper, I D, Thurley, J D, Hugo, J F*. The neonatal resuscitation training project in rural South Africa. Rural and Remote Health (2005) vol. 5 (4) pp. 459*

Selected. neonatal resuscitation Population: Doctors nurses, paramedics and medical students.Intervention: Locally derived Neonatal resus course Outcome: Cognitive (pre/post), self efficacy (post only) Level of Evidence: 3. Methodological Quality: fair. Magnitude of Any Effect: Not able to be assessed. Additional Notes: Holding course at local facilities identified deficincies in local clinics in equipement for both training and clinical care

A. K. Deorari, V. K. Paul, M. Singh, D. Vidyasagar and M. C. Network. *Impact of education and training on neonatal resuscitation practices in 14 teaching hospitals in india. Annals of tropical paediatrics 2001;21:29-33*

Notes: Selected. Neonatal Resuscitation. Outcomes: Mortality, Skills assessment during patient care. Patient outcomes. Population: Newborns at 14 teaching hospitals in India. Intervention: NRP training of doctors and nurses responsible for care of delivery room. Comparator: historical controls. Outcome: No difference in neonatal death, slight decrease in asphyxia- related death, and increase in seizures. Comment: no data to support efficacy of training - what if the TOT ineffective/incorrect? Level of Evidence: 3. Methodological Quality: Fair. Magnitude of Any Effect: Not able to be assessed.

H. Husum, M. Gilbert and T. Wisborg. *Training pre-hospital trauma care in low-income countries: The 'village university' experience. Med Teach 2003;25:142-8*

Selected. Trauma (modified) . Outcome: trauma patient mortality. Population: healthcare workers from mine-infested rural communities in Cambodia and Northern Iraq. Intervention: low-cost trauma training program. Comparator: historical. Outcome: trauma patient mortality. Level of Evidence: 3. Methodological Quality: XXX. Magnitude of Any Effect: Not able to be assessed.
Additional Notes: .

H. Husum, M. Gilbert, T. Wisborg, Y. Van Heng and M. Murad. *Rural prehospital trauma systems improve trauma outcome in low-income countries: A prospective study from north iraq and cambodia. J Trauma 2003;54:1188-96*

Selected. Trauma (modified) . Outcome: trauma patient mortality. Population:paramedics and lay first responders in Cambodia and Northern Iraq. Intervention: in-field trauma care training program. Comparator: historical. Outcome: trauma patient mortality. Level of Evidence: 3. Methodological Quality: XXX. Magnitude of Any Effect: Not able to be assessed.
Additional Notes: .

M Jabir and N Doglioni and T Fadhil and V Zanardo and D Trevisanuto. *Knowledge and practical performance gained by Iraqi residents after participation to a neonatal resuscitation program course. Acta Paediatr (2009) vol. 98 (8) pp. 1265-8*

Notes: Selected. Neonatal. Population: OB(26) and Peds residents(2) at Bagdad Teaching Hospital in Iraq Intervention: AAP/AHA NRP course Outcome: Cognitive (pre/post), psychomotor (post only), self efficacy (post only) Level of Evidence: 3. Methodological Quality: good. Magnitude of Any Effect: Not able to be assessed. Additional Notes: Cognitive scores were significantly improved (pre vs post). post psychomotor skills were poor except for peds residents. psymotor skill checklist not validated.

R. Kumar. *Training traditional birth attendants for resuscitation of newborns. Tropical doctor 1995;25:29-30*

Notes: Selected from references from "Improved Neonatal Resuscitation by TBA (Duncan). Population: Traditional Birth Attendants in India. Intervention: Newborn Resuscitation Training incorporated into TBA training. Comparator: Traditional TBA training alone. Outcome: In TBAs that were taught resuscitation techniques, high proportion of utilization. Also, there was a high utilization of traditional techniques. Overall 20% reduction in perinatal mortality in intervention group, but could not attribute decrease to decreased asphyxia-related deaths. Level of Evidence: 2 (no randomization). Methodological Quality: Good (comparison groups adequately defined, control of confounders not described, objective measures, sufficient follow-up. Magnitude of Any Effect: Not able to be assessed.

O'Hare, B A, Nakakeeto, M, Southall, D P. *A pilot study to determine if nurses trained in basic neonatal resuscitation would impact the outcome of neonates delivered in Kampala, Uganda. J Trop Pediatr (2006) vol. 52 (5) pp. 376-9*

Notes: Selected. Neonatal. Population: Nurses in delivery ward of teaching hospital, in Kampala Uganda Intervention: self created course Control: Historical (no training) Outcome: mortality, asphyxial mortality Level of Evidence: 3. Methodological Quality: poor. Magnitude of Any Effect: none Additional Notes: No improvement in overall mortality, but The resuscitation team reduced the incidence of and mortality from asphyxia and improved the outcome of babies greater than 2 kg.

N. Opiyo, F. Were, F. Govedi, G. Fegan, A. Wasunna and M. English. *Effect of newborn resuscitation training on health worker practices in pumwani hospital, kenya. PLoS ONE 2008;3:e1599*

Notes: Selected. Neonatal Resuscitation. Outcomes: Skills assessment during patient care delivery. Population: Doctors and Nurses in Large Maternity Hospital in Nairobi, Kenya. Intervention: Early Newborn resuscitation training (modified UK resus council training to local environment). Comparator: No training (Newborn resuscitation training after study). Outcome: higher perfect, adequate resuscitation practice than control (24 and 66% vs. 10 and 27% respectively) level of resuscitation practices (perfect, adequate, not adequate). no affect on patient mortality (not powered to detect though). Level of Evidence: 3 (not true randomization). Methodological Quality: Fair (clearly defined comparison groups, outcome clearly defined (if not great - unclear how great practices were recorded vs. actually performed), confounders not controlled for (previous experience, previous training), follow up appears adequate. Note: not sure why early vs. late. Maybe failed to detect in each subgroup group so pooled, but unclear. Magnitude of Any Effect: Not able to be assessed.

M. K. Smith and C. Ross. *Teaching cardiopulmonary resuscitation in a developing country: Using nicaragua as a model. Critical care nursing quarterly 1997;20:15-21*

Notes: Selected. CPR. No outcomes. Descriptive (describes feasibility). Population: Health care providers, Nicaragua. Intervention: 3 classes: CPR training (introduction), CPR training (to level of CPR certification by AHA), CPR instructor training. Comparator: none. Outcome: completed training. Level of Evidence: 5. Methodological Quality: Poor (no objective measures of efficacy). Magnitude of Any Effect: Not able to be assessed.

K. M. Tchorz, N. Thomas, S. Jesudassan, R. Kumar, R. Chinnadurai, A. Thomas, R. I. Tchorz, P. Murthy Chaturvedula, J. K. Parks and R. A. Naylor. *Teaching trauma care in india: An educational pilot study from bangalore. J Surg Res 2007;142:373-7*

Notes: Selected. Trauma. Outcome: Knowledge Assessment. Skills assessment in Airway management and Ultrasound. Population: Private and public GPs, residents with MBBS degree in Banglore, India. Intervention: 2 day Essential Principles and Practices of Trauma Care (ATLS-like). Comparator: None. Outcome: ATLS like programs should be targeted to non-surgeons and doctors in training. improvement in overall score of 20 question cognitive test (70% pre, 87.5 post). Greatest improvement in scores were GPs, junior residents (both medical and surgical) and senior non-surgical residents. Attendings had low improvement scores and lowest post test scores. Level of Evidence: 4. Methodological Quality: Good. Magnitude of Any Effect: Not able to be assessed.

C. Tennant. *Resuscitation training in uganda. Emergency nurse : the journal of the RCN Accident and Emergency Nursing Association 2000;8:10-4*

Notes: Selected. ALSG's NLS and APLS. Descriptive, No outcomes, (describes obstacles and feasibility). Population: medical and nursing staff in Uganda. Intervention: NLS and APLS. Comparator: None. Outcome: None. Level of Evidence: 5. Methodological Quality: Poor. Magnitude of Any Effect: Not able to be assessed.

B. J. Tortella, K. G. Swan, J. S. Donahoo, C. Tischler, J. A. Marangu, A. B. Orjiako, C. Sharples, B. C. Swan and D. W. Hill. *Trauma life support education: A didactic and caprine laboratory course for nigerian physicians. Injury 1996;27:329-31*

Notes: Selected. Trauma. Outcome: pre/post Cognitive test. Population: 156 Nigerian physicians. Intervention: Locally derived Trauma course (3 day, adapted from US course by local surgeons). Comparator: None. Outcome: improvement of pretest (49.3%) to post test score (69.5%). Level of Evidence: 4. Methodological Quality: Poor. Magnitude of Any Effect: Not able to be assessed.

D. Trevisanuto, S. A. Ibrahim, N. Doglioni, S. Salvadori, P. Ferrarese and V. Zanardo. *Neonatal resuscitation courses for pediatric residents: Comparison between khartoum (sudan) and padova (italy). Paediatric anaesthesia 2007;17:28-31*

Notes: Selected. Neonatal. Outcomes: Cognitive Assessment. Population: Pediatric residents. Intervention: NRP training in Sudan. Comparator: NRP training in Italy. Outcome: cognitive (pre and post test). Both groups significantly increased scores from baseline. Sudanese had lover pre and post scores compared to Italian residents, but slightly greater increase in score (pre-vs post). Level of Evidence: 3. Methodological Quality: Poor. Magnitude of Any Effect: Not able to be assessed.

S. Young, A. Hutchinson, V. T. Nguyen, T. H. Le, D. V. Nguyen and T. K. Vo. *Teaching paediatric resuscitation skills in a developing country: Introduction of the advanced paediatric life support course into vietnam. Emergency medicine Australasia : EMA 2008;20:271-5*

Selected. APLS. Outcome: none. descriptive (describes methods of modification and implementation). Population: Vietnam clinicians (doctors and Nurses). Intervention: APLS training implementation. Comparator: None. Outcome: course completion, numbers trained. Level of Evidence: 4. Methodological Quality: Poor. Magnitude of Any Effect: Not able to be assessed.

Zafar, S, Hafeez, A, Qureshi, F, Arshad, N, Southall, D. *Structured training in the management of emergencies in mothers, babies and children in a poorly resourced health system: logbooks to document skill use. Resuscitation (2009) vol. 80 (4) pp. 449-52*

Notes:Selected. Neonatal, Pediatric Population: Doctors and nurses at primary or secondary care level facitilities in Pakistan Intervention: ALSG ESS-EMCH course Outcome: Log book reporting on skills used for year following training in 2006 Level of Evidence: 4. Methodological Quality: good. Magnitude of Any Effect: Not able to be assessed. Additional Notes: novel use of logbooks to follow training as an audit and feedback mechanisms. Overall survival rates were 89%. No pre-training comparison.