Knowledge and Skill after Brief ACLS Training

Polpun Boonmak MD*, Suhattaya Boonmak MD*,
Somyong Srichaipanha BSc*, Sujettana Poomsawat BSc*

** Department of Anesthesiology, Faculty of Medicine, Khon Kaen University*

Objectives : *To determine the knowledge level and skill base in nurse anesthetists before and after brief ACLS training, and again three months later.*
Method : *Thirty nurse anesthetists were tested for knowledge and skill before ACLS training comprising1-hr lecture and handout, and 1-hr simulation training. Concepts included ABCD, primary and secondary survey, management, medications, and algorithms for common problems. Skill practice comprised airway management, chest compression and practice with equipment. After the training, the nurse anesthetists were immediately tested and again three months later.*
Results : *Age of participants averaged 39.33 ± 3.14 years and working experience 10.04 ± 3.23 years. The knowledge and skill scores pre- vs post-training vs three-months-later was 50.32 ± 15.24 vs 75.40 ± 10.29 ($p < 0.001$) vs 60.48 ± 11.80 ($p < 0.001$) and 65.00 ± 16.07 vs 79.67 ± 10.80 ($p < 0.001$) vs 75.67 ± 14.53 ($p < 0.001$), respectively. The pre-training vs three-months-post-training skill scores was not statistically different ($p = 0.255$).*
Conclusion : *After the brief ACLS training knowledge and skills were significantly improved, but knowledge was not retained at the post-training test levels until the 3-month check, albeit skills had persisted. More frequent ACLS education is necessary.*

Keywords : *Cardiopulmonary resuscitation, Nurse anesthetist, Knowledge, Skill, ACLS training*

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Cardiac arrest is an emergency condition requiring urgent intervention, since delayed CPR can be fatal or result in brain damage. All hospital personnel should be trained in cardiopulmonary resuscitation (CPR), and physicians and nurses in basic life support (BLS) and advanced cardiac life support (ACLS). Anesthesia Department, Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, had 16 incidents of cardiac arrest in 2003[1]: the peri-operative incidence being between 0.046 and 0.082%[2,3]. The causes of cardiac arrest included: massive blood loss, hypoxia and severe illness[1-3]. ACLS concepts and guidelines were changed in 2000 (American Heart Association): personnel need to be made aware of the new concepts. Basic ACLS training requires at least one day to adequately cover all the concepts. Participants are then expected to attend a refresher course; however, most had not done so within 1 to 2 years.

During anesthesia cardiopulmonary arrest is a real risk. So, most Thai hospitals have nurse anesthetists who must have a working knowledge of ACLS. During CPR, a lack of familiarity with equipment and misconceptions vis- -vis ACLS were observed[1]. The present study, therefore, set nurse anesthetists to represent hospital personnel. The authors, therefore, developed a brief, easy-to-learn ACLS training program which included a lecture and simulation practice. The aim of the present study was to determine the ACLS knowledge and skill of nurse anesthetists before and after brief ACLS training and then again three months after training.

Subjects and Method

Subjects

The authors enrolled 30 nurse anesthetists from Srinagarind Hospital, Faculty of Medicine, Khon Kaen University, between July and December, 2003.

Correspondence to : Boonmak P, Department of Anesthesiology, Faculty of Medicine, Khon Kaen University, Khon Kaen 40002, Thailand.

Method

After protocol approval from the institutional ethics committee, 30 nurse anesthetists were enrolled. Nurse anesthetists were assigned to one of six groups (5 persons/group).

Nurse anesthetists were tested in ACLS knowledge and skill before attending the training. The test included 20 questions based on the 2000 Guidelines for CPR and Emergency Care[4]: ABCD, primary and secondary survey, management, medications and protocols for common problems. (The pre-, post-, and *post-three-months* training tests had the same objectives and level of difficulty.) The skills test evaluated airway establishment, assisted ventilation, effectiveness of chest compression and defibrillation.

The actual ACLS training consisted of lecture and handout, simulation for ACLS training (Heart Sim and Anne Manikin, Laerdal). The one-hour lecture covered ABCD, primary and secondary survey, management, medications, and algorithms for common problems. The workshop included one-hour practicing airway management, chest compression and practice with equipment.

After the training, all nurse anesthetists were immediately tested for knowledge and skill. Three months later, the nurse anesthetists were re-tested.

Statistical analysis

'Repeated measures ANOVA' was used to test for any significant difference ($p < 0.05$) within the parametric data using SPSS Version 11.5 (SPSS Inc., Chicago, USA). 95% confidence interval (95% CI) was tested for mean difference between group.

Results

Thirty nurse anesthetists (means: age, 39.33 $\pm$ 3.14; experience 10.04 $\pm$ 3.23 years) were included in the study.

Discussion

The mean, post-training knowledge score was 75.40 $\pm$ 10.29 ($p < 0.001$), which represents a significant increase over the pre-training score (*i.e.* 50.32 $\pm$ 15.24). The retention of knowledge three months after the training was nominal (*i.e.* 60.48 $\pm$ 11.80) ($p < 0.001$).

Before the ACLS training, the number of participants with a knowledge score > 80% was 3.3% and between 60-80% just 16.67%. After the training, those with a score over 80 percent rose to 26.7% *vs* 66.7% with a score between 60-80%. After three months, however, those over 80 percent had dropped back to 3.33

Table 1. Knowledge score before, after and 3 months after ACLS training

Timing	Knowledge Score (100)	P-Value
Before ACLS training (K1)	50.32 $\pm$ 15.24	< 0.001*
After ACLS training, immediately (K2)	75.40 $\pm$ 10.29	
After ACLS training, 3 months (K3)	60.48 $\pm$ 11.80	

* Mean difference between K1 and K2 was -25.08 (95%CI -34.09, -16.08)
Mean difference between K2 and K3 was 14.92 (95%CI 8.16, 21.68)
Mean difference between K1 and K3 was -10.16 (95%CI -18.21, -2.11)

Table 2. Skill score before, after, 3 months after ACLS training

Timing	Skill score (100)	P-value
Before ACLS training (S1)	65.00 $\pm$ 16.07	< 0.001*
After ACLS training, immediately (S2)	79.67 $\pm$ 10.80	
After ACLS training, 3 months (S3)	75.67 $\pm$ 14.53	

* Mean difference between S1 and S2 was -14.67 (95%CI -21.65, -7.68)
Mean difference between S2 and S3 was 4.00 (95%CI -3.04, 11.04)
Mean difference between S1 and S3 was -10.67 (95%CI -16.71,-4.63)

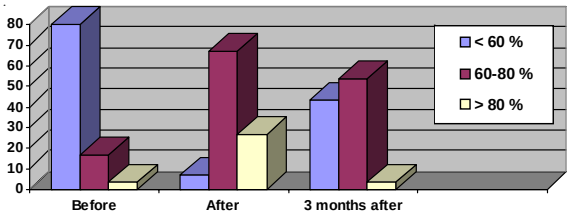

Fig. 1 Knowledge score level < 60%, 60-80% and > 80% before, after, 3 months after ACLS training

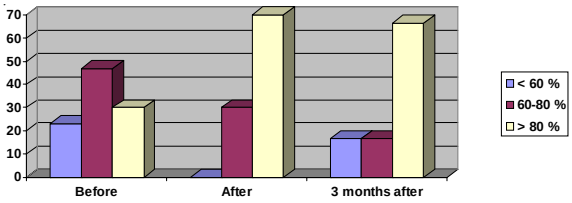

Fig. 2 Skill score level < 60%, 60-80% and > 80% before, after, 3 months after ACLS training

percent and those with a score between 60-80% was double the pre-training levels (53.3%). Though only a minority of nurse anesthetists had and retained an excellent level of ACLS knowledge, a majority retained a passing level. Despite a potential daily need for such knowledge, nurse anesthetists experienced fairly rapid knowledge erosion, so continuous learning is needed.

ACLS training significantly improved the mean skills score from 65.00 $\pm$ 16.07 to 79.67 $\pm$ 10.80 ($p < 0.001$). Importantly, the skills score three months after training remained 'high' (*i.e.* 75.67 $\pm$ 14.53) ($p < 0.001$); but not significantly different ($p = 0.255$) between training immediates and after 3 months. Before the training, 30% *vs* 46.7% of nurse anesthetists had a skills score > 80% *vs* 60-80%; After the training, 70% *vs* 30% had a skills score of > 80% *vs* 60-80%; and, 3 months later, 66.7% *vs* 16.7% had a skills score of > 80% *vs* 60-80%, respectively. Evidently physical skills are retained significantly longer than the knowledge.

ACLS training is necessary for all healthcare personnel; consequently, most have at least one exposure to the training, but evidently are not able to retain the knowledge. Among anesthesia personnel, knowledge of CPR protocols was not related to the level of training in anesthesiology. Annual re-training in resuscitation is strongly recommended for anesthetists and anaesthesia trainees[5]. Noordergraff et al suggested trainees be motivated to take part in a standardized, intensive, recognized ALS course emphasizing BLS and requiring re-certification[6].

One study in a teaching hospital showed that physician skill and knowledge of resuscitation algorithms were deficient. Resuscitation education should be compulsory for all physicians responsible for on-call hospital duties and hospitals should have staff available for this duty at all times[7]. Among non-physicians, several studies of registered nurses showed a sharp decline in ACLS knowledge and skill within a few months[8-10]. Wolfram et al concluded re-certification should be compulsory[11].

Most ACLS training takes several days. Repeated ACLS training has proven invaluable. Repeated short courses may help to maintain knowledge. Simulated ACLS training improved knowledge retention[12] and some studies indicate multimedia education also improves knowledge retention[13]. Importantly, continuing education allows physicians, nurses and other healthcare personnel the opportunity to learn without endangering patients[14].

Conclusion

Knowledge retention among nurse anesthetists having undergone brief ACLS training declined to pre-training levels by three months; notwithstanding, skill levels persisted intact. Repeated ACLS training is recommended.

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ความรู้และทักษะภายหลังการฝึกอบรมการช่วยฟื้นคืนชีพขั้นสูงระยะสั้น

พลพันธ์ บุญมาก, สุหัทยา บุญมาก, สมยงค์ ศรีชัยปัญหา, สุเจตนา ภูมิสวาสดิ์

วัตถุประสงค์ *: ศึกษาระดับความรู้และทักษะด้านการช่วยฟื้นคืนชีพขั้นสูงภายหลังการอบรมการช่วยฟื้นคืนชีพขั้นสูงระยะสั้น*

วิธีการศึกษา *: ศึกษาในวิสัญญีพยาบาล 30 คน ที่ปฏิบัติงานที่ภาควิชาวิสัญญีวิทยา คณะแพทยศาสตร์ มหาวิทยาลัยขอนแก่น โดยก่อนอบรมมีการทดสอบความรู้และทักษะในการช่วยฟื้นคืนชีพ หลังจากนั้นจึงอบรมโดยการบรรยาย 1 ชั่วโมง ร่วมกับฝึกฝนทักษะ 1 ชั่วโมง โดยใช้หุ่นช่วยสอน เมื่อเสร็จสิ้นการอบรมทำการทดสอบความรู้และทักษะในการช่วยฟื้นคืนชีพหลังอบรมทันที และหลังอบรม 3 เดือน*

ผลการศึกษา *: ผู้เข้าร่วมการวิจัยอายุเฉลี่ย 39.33 $\pm$ 3.14 ปี ประสบการณ์ในการปฏิบัติงานด้านวิสัญญี 10.04 $\pm$ 3.23 ปี คะแนนความรู้ก่อนอบรมน้อยกว่าหลังอบรมทันที ($p < 0.001$) คะแนนความรู้ก่อนอบรมน้อยกว่าหลังอบรม 3 เดือน ($p < 0.001$) แต่คะแนนความรู้หลังอบรมทันทีมากกว่าหลังอบรม 3 เดือน ($p < 0.01$) คะแนนทักษะก่อนอบรมน้อยกว่าหลังอบรมทันที ($p < 0.001$) คะแนนทักษะก่อนอบรมน้อยกว่าหลังอบรม 3 เดือน ($p < 0.001$) แต่คะแนนทักษะหลังอบรมทันทีไม่แตกต่างจากหลังอบรม 3 เดือน ($p = 0.255$)*

สรุป *: หลังจากอบรมการช่วยฟื้นคืนชีพระยะสั้น ความรู้ไม่สามารถคงอยู่ได้ถึง 3 เดือน แต่ทักษะในการช่วยชีวิตสามารถคงอยู่ได้ ดังนั้นการอบรมการช่วยฟื้นคืนชีพเป็นประจำจึงเป็นสิ่งจำเป็น*