

Retention of knowledge of and skills in cardiopulmonary resuscitation among healthcare providers after training

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Abstract

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This study assesses the retention of core knowledge and skills among healthcare providers (HCPs) who attended a Basic Life Support (BLS) course. The format for teaching this course changed in 2006 and a review of the effectiveness and acceptability of the new course was considered vital.

Studies indicate that early and effective cardiopulmonary resuscitation improves the chances of survival in cardiac arrest victims; however, the knowledge and skills of HCPs in basic life support vary. International recommendations on the BLS course were that HCPs repeat the course every two years. However, no studies have been conducted in South Africa to determine the ideal time when HCPs should be re-evaluated to ensure that they retain adequate knowledge and skills.

This study was conducted at a training centre in a hospital in KwaZulu-Natal, where a new format for training was introduced in 2006. Participants were HCPs who had completed a BLS course. The sample was taken sequentially from half of the annual intake of a BLS course three months after completion of the course. Data were collected using the accredited American Heart Association written test and the Critical Skills Checklist, and a further questionnaire was developed to collect variables such as demography and profession.

Results indicate that skills retention was good and, although there was some fall-off in skills and knowledge, there was no significant difference between the scores at the end of the course and retest scores. Staff working in accident and emergency departments had more practical experience and their knowledge and skills retention was better than that of staff working in other areas of the hospital. Nurses performed nearly as well as doctors and are an important skills resource in the management of patients who need to be resuscitated. All participants were satisfied with the new format and had no suggestions on how to improve it.

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Background

Studies indicate that early and effective cardiopulmonary resuscitation (CPR) improves the chances of survival in cardiac arrest victims.¹⁻⁴ CPR skills and knowledge vary amongst healthcare professionals (HCPs), even in countries where emergency services are well developed.^{2,5} Effective resuscitation involves effective technique (breaths and compressions) and the early use of defibrillation.^{2,3} Many victims of cardiac arrest do not receive CPR and, even when it is given by trained HCPs, the technique may be inadequate or incorrect.⁶

The American Heart Association (AHA) is recognised as the world leader in training in CPR. The Basic Life Support (BLS) course, designed and implemented by the AHA, is considered essential training for all health personnel and

those who may be involved in CPR.² Following extensive research and a consensus-reaching conference, the format of the BLS course was changed to a video-based format facilitated by trained and accredited experts.^{2,7-9} This format was introduced in America and then worldwide in 2006. Those working in America who undertake the BLS programme are required to be recertified every two years.⁹

A Durban-based hospital has been an AHA-accredited training site since 1996 and, when the new format for BLS was introduced in 2006, trainers were retrained and recertified for the new format. On average, 40 students are trained per year and there are three trainers based at the hospital. During the training, all students are informed that they could be re-evaluated to assess retention of knowledge and skills.

In South Africa, little is known about retention of BLS skills, and it is also uncertain whether the two-year recertification period is adequate or whether shorter periods should be recommended. This study re-evaluated knowledge and skills retention among students trained at the hospital training centre three months after initial training.

Method

This was a descriptive, quantitative study conducted in 2008 at a Durban-based training centre in which the knowledge and skills of HCPs on completion of a BLS course were compared to their knowledge and skills three months after completion of the course. A sample of 50% was considered representative of those trained. Twenty HCPs were sequentially selected from the list of HCPs trained at the hospital (half of the yearly intake) after those trained by the researcher had been excluded from the study to exclude bias. All HCPs selected for the study agreed to participate. Participants were evaluated and re-evaluated using the current accredited AHA written test and the Critical Skills Checklist examination. Eighty-four per cent is the AHA pass mark for the written test and all critical skills must be passed in the critical skills examination. A closed-ended questionnaire was used to capture the demographic profile of the participants at the end of the re-evaluation. Data were analysed using the SPSS computer

software programme. Associations between scores achieved and variables such as demographics, education and further training were analysed.

Ethical permission was obtained from the University of KwaZulu-Natal Research and Ethics Committee and the Department of Health, KwaZulu-Natal. Signed consent was obtained from all participants.

Results

Twenty participants were retested three months after completing the BLS course at the training centre in Durban.

Eleven were medical doctors:

Principal medical officers (PMO)	5
Senior medical officers (SMO)	4
Medical officers (MO)	2

Nine were nurses:

Chief professional nurses (CPN)	4
Senior professional nurses (SPN)	3
Registered nurses (RN)	2

The results of an initial (post-course) and follow-up evaluation are summarised in Table I.

Ten were male and 10 were female. The average age was 28 (range 22 to 48).

Table I: Results on completion of the BLS and after three months

Participant	Position	Work station	Knowledge score initial	Knowledge score at three months	Skills test initial	Skills test at three months	CPR frequency	No of times manual read	Age and gender
1	PMO	A + E	100%	95%	Passed	Passed	3	0	32 F
2	SMO	A + E	100%	95%	Passed	Passed	3	2	26 F
3	PMO	A + E	100%	95%	Passed	Passed	2	0	35 M
4	SMO	A + E	95%	100%	Passed	Passed	2	2	28 M
5	CPN	A + E	95%	85%	Passed	Passed	3	2	27 F
6	CPN	SOPD	95%	85%	Passed	Passed	2	2	35 F
7	PMO	MOPD	95%	90%	Passed	Failed	3	0	36 M
8	RN	A + E	90%	85%	Passed	Passed	1	1	23 F
9	MO	A + E	85%	90%	Passed	Passed	2	2	26 M
10	MO	A + E	90%	95%	Passed	Passed	2	2	26 M
11	SMO	A + E	85%	100%	Passed	Passed	2	3	28 F
12	RN	Ward	90%	80%	Passed	Failed	2	1	22 F
13	SMO	A + E	95%	90%	Passed	Passed	2	2	28 M
14	CPN	Ward	85%	85%	Passed	Passed	2	2	38 M
15	CPN	A + E	90%	95%	Passed	Passed	3	3	38 M
16	SPN	A + E	85%	90%	Passed	Passed	2	3	27 F
17	PMO	A + E	95%	90%	Passed	Passed	3	0	48 M
18	SPN	A + E	100%	85%	Passed	Failed	2	3	24 F
19	SPN	OPD	90%	85%	Passed	Passed	2	2	23 F
20	SMO	A + E	95%	100%	Passed	Passed	2	3	30 M

Note: CPR frequency as reported by participants: 0 – never, 1 – rarely, 2 – often, 3 – very often

All the participants passed the initial test. Three participants (15%) failed the retest. Two failed the skills test only and one failed both the written and the skills test. Of concern was that these participants indicated that they had been involved in CPR resuscitations either often or very often in their normal practice. Only 12/20 (60%) had participated in CPR since completing the course, despite the fact that 19/20 (95%) reported to be involved in CPR often or very often. The 12 who had participated in CPR worked in the Accident and Emergency (A + E) Unit. None of the participants had used their CPR skills outside their jobs, but felt better skilled to cope if such a situation arose.

Forty-five per cent (9/20) of the participants were nurses, 77% (7/9) of whom retained their skills and were competent in CPR three months after completing BLS training. Fifty-five per cent (11/20) of the participants were doctors, of whom 91% (10/11) retained their skills and knowledge three months after completing the BLS training.

The mean value of the initial test was 92.5% and for the retest it was 90.8%. Although the initial test marks were on average higher than those for the test written three months later, the difference between the test mean values is not statistically significant (p-value 0.297).

Most participants (15/20: 3 PMOs, 5 SMOs, 2 MOs, 2 CPNs, 2 SPNs and 1 RN) were working in Accident and Emergency department and had used their skills on a number of occasions. Working in an A + E Department appeared to be associated with success in the post-test assessment: 93% of those working in the A + E Department passed as against 60% of those in other departments; however, this did not reach statistical significance.

Gender was not associated with a statistical difference in terms of knowledge and skills retention although men scored slightly higher, on average, than women. There was no correlation between age and knowledge and skills retention.

Despite being informed that students could be re-evaluated after the training, none of the participants specifically

prepared for the re-evaluation. The results show that some of the participants who had read the manual between the initial test and the retest scored better than those who had not reread the manual. However, this difference was not statistically significant (p-value is 0.101). It was of concern to note that despite one participant's rereading the training manual three times, she failed the reassessment.

The PMOs did not read their manual between the tests and they dropped five points from the original test. The SMOs and MOs read their manuals at least twice and they improved in retest scores. With the doctors there appeared to be a correlation between reading the manual several times and obtaining an increased test score. However, this correlation was not noted for the nursing staff.

Most doctors who had completed the BLS course (9/11 or 81%) went on to study further and do the Advanced Cardiac Life Support and/or Paediatric Advanced Life Support courses. The BLS is a prerequisite for these accredited advanced courses for HCPs. Most nurses (8/9 or 88%) had done the BLS only.

All candidates indicated that they would recommend the BLS course to others.

Most participants (16 or 80%) felt that the Automated External Defibrillator (AED) section was the most beneficial section in the new format. Participants indicated that they felt more confident about using the AED after watching the video while practising on the model and they better understood how the AED is incorporated into the CPR sequence.

Just over half of the participants (11 or 55%) had done or had been aware of the old BLS format. They felt that the new format was more comprehensive than the older format, the course layout was more user friendly and the course had a more practical focus and concentrated on skills development.

No participant had suggestions on how the format could be improved. However, some thought that information on regular updates should be sent from the training centre to all HCPs who had completed the BLS programme. They also suggested that a database of those completing the course should be kept at the training site.

Discussion

This was a small local study that included medical and nursing professionals. Participants ranged from senior doctors at the PMO level to junior nurses. Men and women were equally represented. The study showed that the new video-based instruction for skills development and practice is able to provide high-quality training in BLS and that skills retention is similar to that in other methods of teaching.¹⁰⁻¹²

Table II: Initial test and retest compared to frequency of reading training manual

Group title	Group initial average	Group retest average	No of times participant had read the manual
PMO	0.98	0.93	0
SMO	0.94	0.97	3(2)/2(3)
MO	0.88	0.93	2(2)
CPN	0.91	0.88	3(2)/1(3)
SPN	0.92	0.87	2(3)/1(2)
RN	0.90	0.83	2(1)

Note: The final column is the number of people in that title group who have read the manual x number of times. For example, for SMOs, three SMOs read the manual twice and two SMOs read the manual three times.

Video-based instruction, as has been shown in other studies, is an effective means of teaching as it allows HCPs to watch the instructions on the video while practising on the manikin.^{10,13}

Student age, psychomotor skills, course content, instructor training, digression of instructors from course content, insufficient time to practise, poor supervision and poor feedback have all been shown to be associated with skill loss.³ This study did not show any correlation between loss of skills and student age or gender. The course content is strictly controlled in keeping with the AHA format and instructors are not allowed to digress from the course content, thus limiting the effect that different instructors this might have on results.

Some studies show that skills and knowledge decline rapidly, even days after a course is completed.^{3,7} This study showed that although there was some decline in skills and knowledge, this was not statistically significant and that knowledge and skills retention remained good after three months. It was encouraging to note that despite the decline in knowledge, 17/20 HCPs were still considered competent.

Regular updates and simulation training in CPR skills have been shown to help HCPs remain competent and knowledgeable.¹⁴⁻¹⁷ A literature review of CPR training for professional nurses concluded that CPR training should be based on hospital scenarios and evidence-based guidelines.¹³ In keeping with these studies it is interesting to note that those participants based in A + E departments, where regular CPR updates are conducted and where HCPs regularly practise CPR in real-life situations, did better than those who work in the wards or in the Outpatients Department.

Most of the participants thought that the BLS course should become a basic prerequisite for everyone working in emergency care and should be taught as part of the initial orientation to this department.

Conclusion

The study has demonstrated that the new method of video-based training is effective in teaching BLS skills and that core BLS knowledge and skills are retained by HCPs three months post course completion. The study has also highlighted the important skills base among nursing staff who have the BLS qualification and the skills to initiate CPR. In a resource-limited environment such as South Africa, nursing skills must be recognised and utilised optimally.

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