

A survey of nurses' basic life support knowledge and training at a tertiary hospital

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It is well known that in the event of a person suffering a cardiac arrest, successful outcome is dependent on the time taken for resuscitation to commence.¹ In cases of in-hospital cardiac arrest the most important predictor of a successful outcome is the 'time to defibrillation' interval.²

Although all health care providers in contact with patients should be proficient at basic life support (BLS), nurses in particular should be competent at BLS, being the health care providers most likely to be the first respondents to an in-hospital cardiac arrest.³

BLS proficiency includes the use of an automated external defibrillator (AED)⁴ and it is therefore expected that nurses trained in BLS should be able to use this device. BLS knowledge and skills tend to degrade and regular refresher training and practice is recommended.⁵

Despite these international guidelines, studies have shown that, in the developed world, nurses' BLS skills can be surprisingly poor.^{6,7} No studies in the South African environment have yet been published with regard to BLS competency among nursing staff.

We decided to investigate BLS competence among nursing staff at our hospital – a tertiary level teaching hospital – as a precursor to the implementation of a cardiac arrest team for this institution. For the cardiac arrest team to be effective, it was vital that the first respondents, i.e. the nursing staff, were BLS competent. If lack of competence were to be shown, then further education and training would be required to improve the chances of survival after cardiac arrest at this hospital.

Method

Approval for the study was obtained from the Ethics Committee of the Faculty of Health Sciences, University of the Free State, and from the clinical head of Universitas Hospital, Bloemfontein. The study was a cross-sectional survey and participation was voluntary and confidential.

A questionnaire was designed by the authors and consisted of 19 questions divided into two sections: The first section (questions 1 - 10) dealt with the individual's level of experience and access to BLS training. The second section (questions 11 - 19; Table I) tested their clinical

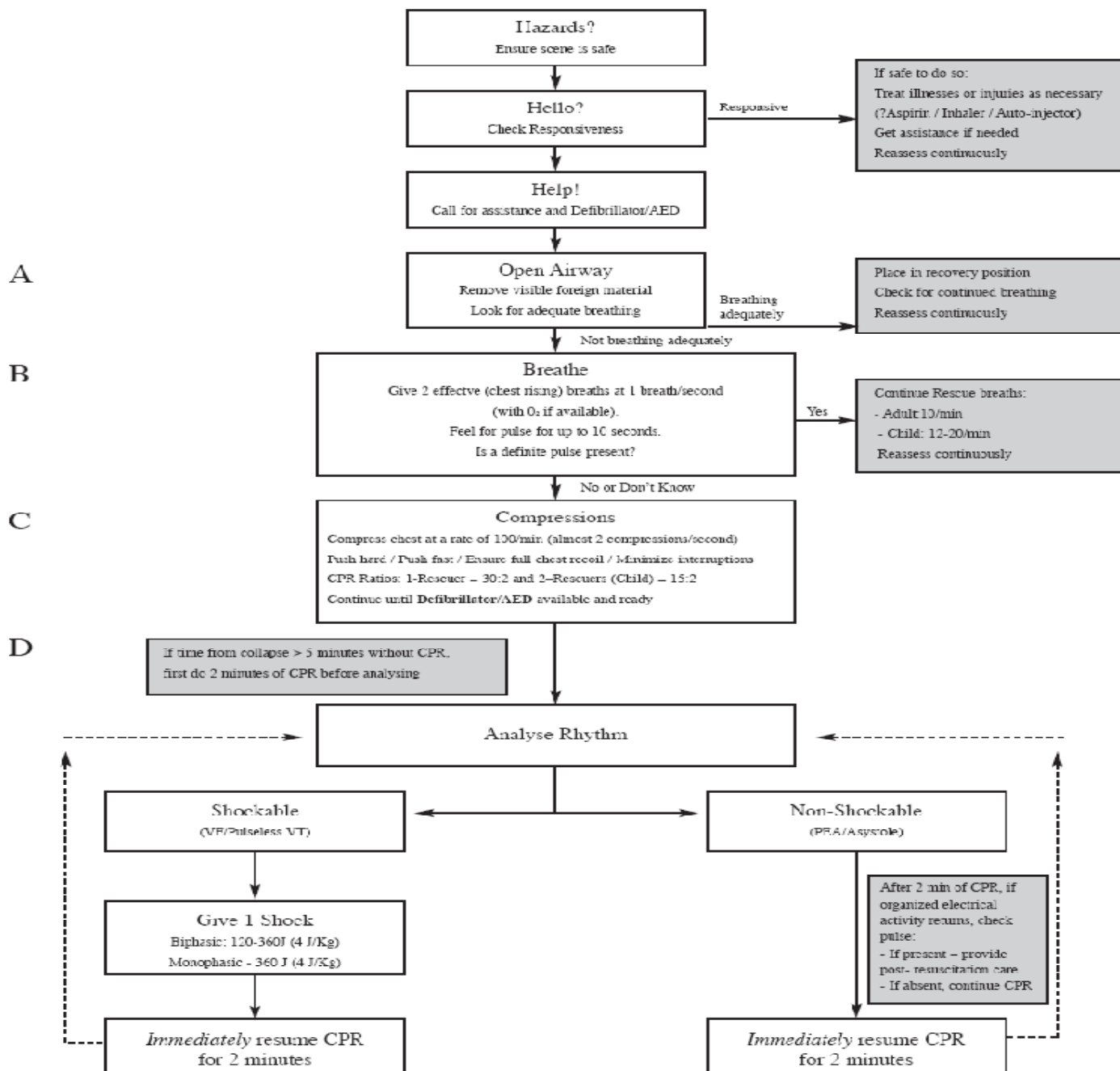
Table I. Questions used in the clinical knowledge section of the questionnaire

Question number	Question	Correct answer
11	You are walking past a patient's room during visiting hours and are called by a relative who says that the patient has just collapsed. What should you do first?	Check the patient for responsiveness
12	If the patient is found to be unconscious, what should you do?	Send someone for help while you open the airway of the patient
13	How can you establish if the patient is breathing?	Look for chest expansion and feel for movement of air against your face
14	Once you realise that the patient is unresponsive and not breathing, what should the next step be?	Give 2 effective breaths
15	While giving rescue breathing, which of the following indicates that an adequate breath is received by the patient?	The chest rises while you are giving the breath
16	When are chest compressions indicated?	When the patient has no pulse
17	Where is the best site to assess the pulse?	The carotid pulse
18	What is the ratio of chest compressions to breaths that should be given to an adult in cardiac arrest if you are alone during the resuscitation?	30 compressions to 2 breaths
19	What is the most important determinant of survival in cardiac arrest patients?	Time from collapse to defibrillation



Basic Life Support for Healthcare Providers

(Adult and Child)



Do not interrupt chest compressions unless absolutely necessary

Resuscitation Council of Southern Africa
www.resuscitationcouncil.co.za

Fig. 1. Adult BLS health care provider algorithm, Resuscitation Council of South Africa.⁸

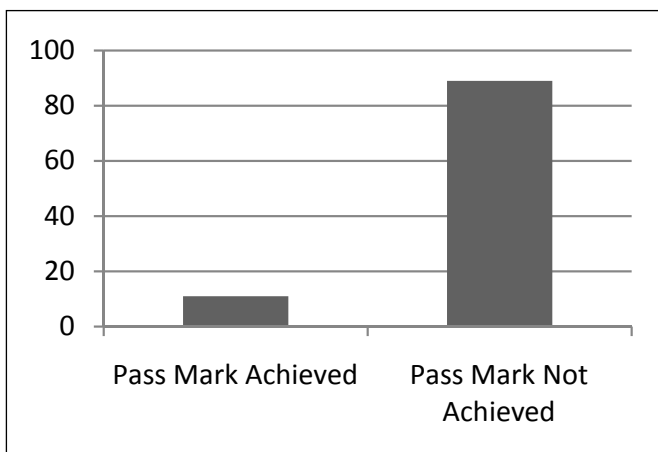


Fig. 2. Percentage of respondents to achieve a pass mark.

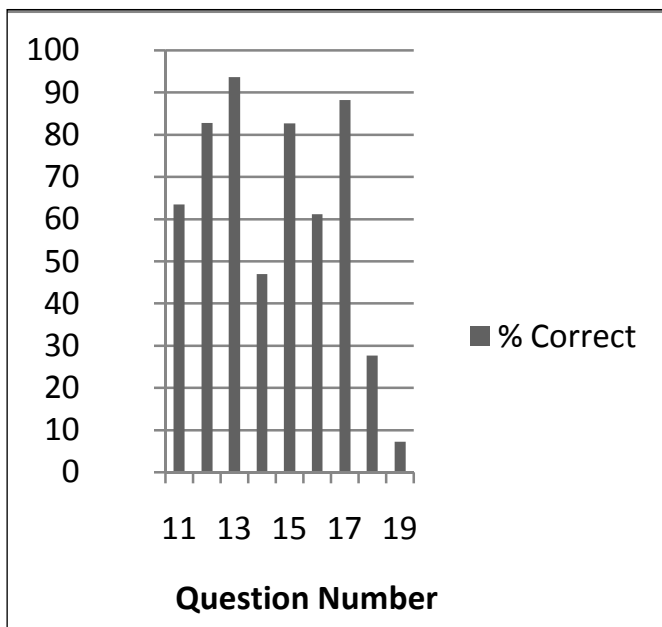


Fig. 3. Percentage of correct answers for each clinical question.

knowledge of BLS techniques. This section was presented as actual clinical scenarios and was based on information presented in the handbook *BLS for Healthcare Providers* published by the American Heart Association (AHA) in 2006.³ The BLS algorithm for health care providers as published by the Resuscitation Council of South Africa in 2006 was also used for reference, as shown in Fig. 1 (reproduced without alteration with permission from the Resuscitation Council).⁸

The questionnaire was distributed on a single day to all nurses working in the wards, theatres and outpatient departments via the relevant unit managers. Participation in the survey was completely voluntary and anonymous, and respondents were asked to complete it by ticking the most correct answer for each question. The completed questionnaires were collected later the same day by the researcher.

Results were summarised using frequencies and percentages. Sub-groups were compared using the chi-squared or Fischer's exact test as appropriate.

Table II. Nursing qualifications of participants

Staff qualification	Respondents	
	Number	Percentage
Chief professional nurse	86	30.3
Senior professional nurse	32	11.3
Professional nurse	39	13.7
Enrolled nurse	39	13.7
Auxiliary nurse	88	30.8

Results

Questionnaires were completed by 338 of the 405 nursing personnel on duty that day (83.4% response rate). Administrators, student nurses and incomplete questionnaires were excluded, leaving a final sample size of 286 nurses.

Table II shows the categories of nursing staff who participated in the study as determined by their qualification. For analysis the participants were divided into junior and senior staff based on their qualification. Junior staff members included enrolled and auxiliary nurses and senior staff members included professional nurses, senior professional nurses and chief professional nurses.

Of the total sample group, 15.8% nurses indicated that they worked in a ICU/high-care setting. This was of particular relevance in our setting as an ICU sister will be allocated as one member of the cardiac arrest team. In the ICU setting the staff consisted of 93.2% senior staff (i.e. professional nurse or higher qualification) and 6.8% junior staff. In the other areas there were almost equal numbers of junior and senior staff.

A mark of at least 80% is the pass mark for the BLS training course accredited by the AHA. Correct answers to 80% of the clinical resuscitation questions were given by 11% of respondents (Fig. 2).

As shown in Fig. 3, four questions in the clinical knowledge section (i.e. questions 11 - 19 of the questionnaire) were answered particularly poorly. These were questions 14, 16, 18 and 19 respectively.

One hundred and thirty-four nurses (47.0%) answered question 14, 'Once you realise that the patient is unresponsive and not breathing what should the next step be?', correctly. The most common incorrect answer chosen was 'start chest compressions immediately'.

One hundred and seventy-two nurses (61.2%) answered question 16, 'When are chest compressions indicated?', correctly. The most common incorrect answer chosen was 'when the patient is unresponsive'.

Seventy-eight nurses (27.7%) answered question 18, 'What is the ratio of chest compressions to breaths that should be given to an adult in cardiac arrest if you are alone during the resuscitation?', correctly. The most frequently chosen incorrect answer was '15 compressions to 2 breaths'.

Twenty of the nurses (7.3%) answered question 19 correctly. This question dealt with the significance of defibrillation in a resuscitation. The most common incorrect answer was 'time from collapse to starting chest compressions'.

The outcomes for the clinical knowledge questions of the staff working in ICU/high care were compared with those outcomes of the staff working in others areas of the hospital (Fig. 4).

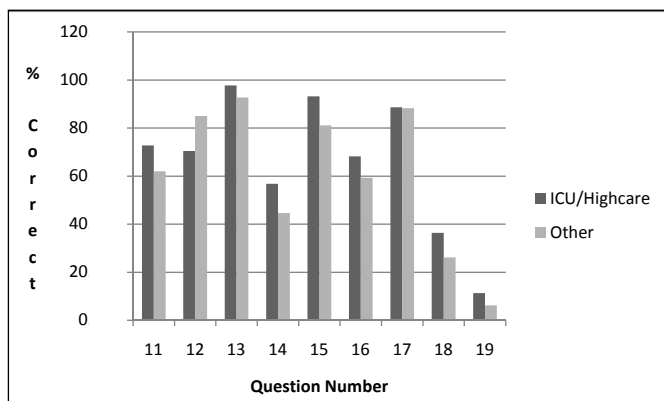


Fig. 4. Comparison of outcomes for each clinical question between staff working in ICU/high care and other areas.

Question 12, regarding the unresponsive patient, was answered worse by the staff from ICU compared with the staff in other areas; 70.5% v. 85% ($p=0.0196$). The most commonly chosen incorrect answer here was 'to begin chest compressions'.

In contrast, the ICU staff achieved better outcomes in question 15: 'While giving rescue breathing, which of the following indicates that an adequate breath is received by the patient?', compared with staff from other hospital areas; 93.2% v. 81.1% ($p=0.0505$). The most common incorrect answer chosen by staff working in other areas of the hospital was 'the pulse returns to normal'.

Both groups achieved similar outcomes for the remaining questions in the clinical knowledge section.

A total of 76.5% of the nurses reported that they had had access to BLS training before receiving their nursing qualification. There was a similar trend seen in access to BLS training received by nurses post qualification, with 77.5% reporting that they had access to courses. Of the 22.5% who reported no access to courses post qualification, 36 nurses also stated that they had not had access to BLS training before receiving their qualification. Hence, one may conclude that these 36 nurses (13.2%) have never been trained in basic resuscitation.

There were differences with regard to access to training courses. Of the junior nurses 73.6% had had access to BLS courses compared with 81.1% of the senior staff.

Of those nurses who had had access to BLS courses during their employment, 175 (93.1%) had attended, 60.9% within the last year.

The most common reason given for not attending a training course was that they had been too busy with their daily duties. Other reasons specified were staff shortages and one participant stated that only those qualified as professional nurses or more senior were eligible.

One hundred and ninety-one nurses (68%) said that they had received training in the use of a defibrillator or AED for a resuscitation. However, of this group, only 15 nurses (8.2%) answered the clinical defibrillation question correctly.

Discussion

This study gives insight into possible shortcomings in BLS knowledge levels and training at a tertiary-level hospital in South Africa. The practical aspect of BLS, i.e. the clinical skills of the participants, were not assessed, and further studies are needed to explore this area.

Other limitations include the fact that reference material may have been used and participants could have worked together to answer the clinical knowledge questions, thereby influencing the accuracy of the results. The questionnaire was made available on one morning only and collected the same day to limit this, and only the nursing managers were aware that the study was to take place.

We also did not determine whether participants had a degree or diploma in nursing. This should not be relevant as all nurses should be competent in BLS.

The study was anonymous and voluntary. However, those people who felt that their BLS knowledge was inadequate, may have felt too intimidated to complete a questionnaire. The questionnaire was distributed to all nursing staff on duty in order to obtain as large a sample group as possible.

The current pass mark for the BLS course accredited by the AHA, on which the clinical questions were based, is 80%. This course presents and tests up-to-date, evidence-based protocols and techniques. Only 11.0% of the participants in this study achieved a pass mark. This is alarming in view of international recommendations that stress the mandatory maintenance of competency in BLS skills for health care providers.^{2,3}

'Time from collapse to defibrillation' has been accepted internationally as the most important variable in improving patient outcome, and should be performed by the first responder.³ This was poorly understood by the staff surveyed. And, in addition, 88 nurses, or 32%, indicated that they had never received any training in the use of a defibrillator. In order to reduce the time delay to defibrillation it is essential to train all possible first responders in defibrillator use. With regard to nursing staff it should ideally become a routine skill and recognised as accepted nursing procedure.⁵

This study showed that the ICU staff scored worse than the general staff in question 12 in the clinical knowledge section that dealt with the correct response to an unresponsive patient. This problem with question 12 could be due to the majority of their patients already being sedated and intubated. However, in view of the severely ill nature of the patients that they are caring for, it was expected that the knowledge of BLS would be better than that of the general ward staff. Indeed, the hospital cardiac arrest team is to include an ICU nurse based on the presumption that they are more proficient in BLS.

Access to undergraduate BLS training was reported at 76.5%. This is unacceptably low as all health care providers should have this knowledge before graduating in their field. This is a finding that nursing educators need to investigate further. It also reiterates the need for continuing medical education. Training provided by the employer can supplement this. Especially concerning is that 36 of the nurses who indicated that they had not received BLS training after receiving their qualification also reported no BLS training during their studies. This highlights a possible major shortcoming in training that needs to be addressed.

Over three-quarters (77.5%) of the nurses indicated that they had had an opportunity to attend a postgraduate BLS training course. Of concern was the apparent discrepancy between the access to training with regard to level of seniority.

A high percentage of nurses who had had access to courses had actually attended. Yet only 60.9% of those had attended a course recently, i.e. within the last year. This is not in keeping with international recommendations. Retention of CPR skills has been shown to be poor⁵ and the need for frequent updates should be emphasised. Refresher training is recommended every 6-12 months.²

The most common reason given for not attending a BLS course was that the participant was too busy with their daily duties. This could also be an indication that the participants or their unit managers did not place BLS as a priority in their continuing medical education. Staff shortages were highlighted as another factor, as well as the failure to offer courses to junior staff members.

We compared our findings with a similar study published in *Nursing Standard* in 1993. It also used a questionnaire to test a group of UK nurses' theoretical knowledge of basic life skills, based on the Resuscitation Council of the UK recommendations at the time.⁶

This survey also found poor knowledge in the sample population, as well as poor access to training. Only 24% of their participants had received BLS training within the last year. It was encouraging to see that this compares favourably to our setting in which 60.9% of our respondents who had had access to training indicated that they had attended a course within the last year.

We hope that the introduction of a cardiac arrest team at this hospital will improve retention of BLS knowledge by our nursing staff. By actively participating in the team our nurses will be performing BLS more often and will gain the confidence and skills necessary to improve competence.

Conclusion

Despite a relatively good rate of attendance at recent BLS courses, a significant number of nurses remain without any such training. Although having received training, few nurses have retained the BLS knowledge required for competency. Action is needed to ensure all nurses receive

BLS training and practise this skill regularly in order to retain their knowledge.

Acknowledgements

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References

1. Cummins RO, Sanders A, Mancini E, Hazinski MF. In hospital resuscitation. A statement for healthcare professionals from the American Heart Association Emergency Cardiac Care Committee and the Advanced Cardiac Life Support, Basic Life Support, Pediatric Resuscitation, and Program Administration Subcommittees. *Circulation* 1997; 95(8): 2210-2212.
2. Colquhoun M, Gabbot D, Mitchell S. *Cardiopulmonary Resuscitation Guidance for Clinical Practice and Training in Primary Care*. UK: Resuscitation Council, July 2001: 2-4.
3. Coady EM. A strategy for nurse defibrillation in general wards. *Resuscitation* 1999; 42: 183-186.
4. Hazinski MF, Gonzales L, O'Neill L. *BLS for Healthcare Providers Student Manual*. American Heart Association 2006: 9-15.
5. Finn JC, Jacobs IG. Cardiac arrest resuscitation policies and practices: a survey of Australian hospitals. *MJA* 2003; 179: 470-474.
6. Crouch R, Graham L. Resuscitation. Nurses skills in basic life support: a survey. *Nursing Standard* 1993; 7(20): 28-31.
7. Nyman J, Sihvonon M. Cardiopulmonary resuscitation skills in nurses and nursing students. *Resuscitation* 2000; 47(2): 179-184.
8. Resuscitation Council of South Africa. Basic Life Support for Healthcare Providers (Adult and Child), 2006. <http://www.resuscitationcouncil.co.za/AlgPage3.pdf> (accessed 28 January 2009).