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Retention Of Basic Life Support Knowledge Among Nursing Students: A Descriptive Study

Hemşirelik Öğrencileri Arasında Temel Yaşam Desteği Bilgisinin Kalıcılığı:
Tanımlayıcı Bir Çalışma



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Abstract

Background: Cardiac arrest or sudden cardiac death (SCD) can occur in anywhere in adults, pediatric and infants. Nursing students who have undergone basic life support (BLS) learning, need to be evaluated whether they retain the knowledge acquired after the learning process.

Objective: This study aims to investigate BLS knowledge retention after following of a BLS course and practice.

Methods: A descriptive cross-sectional design was employed in this study. Data were collected from nursing students at one of the largest universities in Indonesia. Demographic data, academic-related data, and BLS knowledge were gathered. BLS knowledge was measured using 15 items according to the latest American Heart Association. Higher scores indicate higher BLS knowledge. The data were analyzed using both univariate and bivariate analyses. The bivariate analysis conducted using t-test and ANOVA.

Results: A total of 83.3% of respondents exhibited low BLS knowledge scores, with a mean score of 9.08 (SD = 1.54). Students with a science major in high school had higher scores of BLS knowledge (F = 3.16, p < .05). Most students failed to answer questions related to emergency responses correctly.

Conclusion: Despite completing both theoretical and practical BLS learning, nursing students demonstrated poor retention of BLS knowledge.

Keywords: Basic life support (BLS), Knowledge retention, Nursing student

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Öz

Giriş: Kardiyak arrest veya ani kardiyak ölüm (AKÖ) yetişkin, pediatrik ve bebeklerde her yerde meydana gelebilir. Temel yaşam desteği (TYD) eğitimi alan hemşirelik öğrencilerinin, öğrenme süreci sonrasında edindikleri bilgileri koruyup korumadıklarının değerlendirilmesi gerekmektedir.

Amaç: Bu çalışma, BLS kursu ve uygulaması sonrasında BLS bilgisinin kalıcılığını araştırmayı amaçlamaktadır.

Yöntem: Bu çalışmada tanımlayıcı kesitsel bir tasarım kullanılmıştır. Veriler Endonezya'nın en büyük üniversitelerinden birindeki hemşirelik öğrencilerinden toplandı. Demografik veriler, akademik veriler ve BLS bilgisi toplandı. BLS bilgisi, en son Amerikan Kalp Derneği'ne göre 15 madde kullanılarak ölçülmüştür. Daha yüksek puanlar daha yüksek BLS bilgisini göstermektedir. Veriler hem tek değişkenli hem de iki değişkenli analizler kullanılarak analiz edilmiştir. İki değişkenli analiz t-testi ve ANOVA kullanılarak gerçekleştirilmiştir.

Bulgular: Katılımcıların toplam %83,3'ü, ortalama 9,08 puan (SD = 1,54) ile düşük BLS bilgi puanları sergilemiştir. Lisede fen bölümü okuyan öğrencilerin BLS bilgi puanları daha yüksektir (F = 3.16, p < .05). Öğrencilerin çoğu acil durum müdahaleleriyle ilgili soruları doğru yanıtlayamamıştır.

Sonuç: Hemşirelik öğrencileri hem teorik hem de pratik BLS öğrenimini tamamlamalarına rağmen, BLS bilgilerinin kalıcılığının zayıf olduğunu göstermişlerdir.

Anahtar Kelimeler: Temel yaşam desteği (TYD), Bilgi kalıcılığı, Hemşirelik öğrencisi

INTRODUCTION

Sudden cardiac death (SCD) can occur in unexpected locations; approximately 70% of cases happen outside the hospital (Goyal et al., 2017). The global incidence of cardiac arrest has increased in the last decade, contributing to higher fatality rates (Wong et al., 2019). This increase is primarily due to the rising prevalence of cardiovascular disease in recent years (Wong et al., 2019). Cardiopulmonary resuscitation (CPR) is critical in helping victims and improving oxygenation and circulation during the event (Goyal et al., 2017). Effective CPR can double or triple a victim's chances of survival (Almesned et al., 2014). It serves as the cornerstone of care in preventing morbidity associated with cardiac arrest (Chaudhary et al., 2023).

A recent study in India found that healthcare

professionals, including nurses, midwives, and health assistants have limited awareness of BLS (Chaudhary et al., 2023). This finding aligns with research on BLS knowledge levels among health sciences and medical students (Tadesse et al., 2022). The students had previously received BLS training, but nearly half of the respondents demonstrated inadequate knowledge. However, the study did not account for the respondent's characteristics, particularly the time elapsed since their training. Previous research on BLS knowledge retention has shown that scores decline after one year (de Ruijter et al., 2014), but knowledge can be retained for up to six weeks following training (Spooner et al., 2007). This study aims to evaluate the nursing student's BLS knowledge after receiving BLS training over 8 to 10 weeks.

METHODS

Type of Research

This was a descriptive cross-sectional study.

The place of the research

The place of research was done in the largest private universities in Tangerang, Indonesia. Every year, this university recruits nursing students from various islands across Indonesia who can represent nursing students in Indonesia.

The Universe/Sample of the Research

The respondents were third-year nursing students that enrolled in emergency and critical care nursing care courses and had completed BLS theoretical and practical learning, and a BLS practice exam several weeks prior. The sampling method used is total sampling, which accounts for 262 respondents. However, a total of 242 respondents participated in this study. The study was conducted from March to April 2024.

Data Collection Instrument-Validity and Reliability Information

First, the nursing students received theoretical learning, followed by practical learning in BLS. One week after the learning, they underwent a practical examination on BLS. Eight to ten weeks after learning, the researcher approached the respondents. After their in-person class ended, the researcher contacted prospective respondents. Prior to this, the researcher explained the purpose of the study and requested the respondents' time and willingness to participate. The researcher then provided a barcode link to the questionnaire, which included an explanation of the study, informed consent, and a research questionnaire. Participation in the study was entirely voluntary. The estimated time to complete the questionnaire was between 10 and 15 minutes.

Personal Information Form

This study employed a questionnaire for data collection. This study collected demographic data, including gender, last educational background in senior high school, and place of origin. Academic-related data, such as nursing interest, BLS exam results, and previous grade point average (GPA), were also included.

Basic Life Support Knowledge

A BLS survey with 15 multiple-choice questions was used to measure BLS knowledge. Previous research (Almesned et al., 2014) used this question and modified it based on the latest American Heart Association BLS update. In the previous study, the questionnaire contained 20 items; however, five questions related to performing cardiopulmonary resuscitation on infants and children were removed from this study. The score ranged from 0 to 15. The higher the BLS score obtained, the higher the level of knowledge regarding BLS.

Evaluation of the Data

The data in this study were analyzed using statistical software for data science (SPSS) version 29. All variables were evaluated using descriptive analysis. Categorical data were analyzed using percentages, while numerical data were analyzed using mean and standard deviation. The normal distribution was assessed for bivariate analysis to ensure that it met the assumptions of parametric analysis. The normality test indicated that the dependent variable followed a normal distribution based on graphical analysis (histogram). However, the Kolmogorov-Smirnov and Shapiro-Wilk tests showed that the data were not normally distributed. Based on these results, the bivariate analysis used in this study utilized t-tests and ANOVA. The alpha value for all tests was set at

.05).

Variables

Independent variables: socio-demographic of the respondents

Dependent variables: score from BLS knowledge

Ethical Aspect of the Research

After obtaining permission from the Department of Nursing, the researcher conducted data collection. The Internal Review Board of Universitas Pelita Harapan Ethical granted ethical approval for this study. The ethical approval number is 033/IRB-UPH/III/2024. Each respondent was asked to complete the informed consent form via the link provided in the questionnaire.

RESULTS

Demographics and their association with BLS Knowledge

Table 1 presents the demographic data and bivariate analysis of the relationship between demographic characteristics and BLS knowledge. A total of 242 students participated in this study. The majority of the participants, comprising 87.6%, were female, and their senior high school educational background was primarily focused on science majors. More than 50% of the respondents were from Sumatra and Java Island. During this study, 30.6% of respondents strongly preferred an emergency and critical care course, with a mental health course being the second most popular. Most of the respondents passed the BLS practice examination. More than half of the respondents had academic achievement with a GPA lower than 3.3.

In the bivariate analysis, only the senior high school major was found to be associated with BLS knowledge. Nursing students with a science background showed higher BLS scores compared

to those with other majors ($F = 3.16, p < 0.05$). Other characteristics, including gender, origin, nursing interest, BLS examination, and grade point average (GPA), showed no significant association with BLS knowledge.

BLS Knowledge Response

Table 2 displays students' correct and incorrect responses for each BLS knowledge question. No respondents achieved a score of 100%. The items with the highest correct responses were item number one, "the abbreviation of BLS," and item number two, "first response when meeting the unresponsive victim," with over 95% of respondents answering these two questions correctly.

The item with the highest percentage of incorrect answers was item number six, "give rescue breaths to infants," with approximately 95% of respondents answering incorrectly. It was followed by item number 13, "first response of adult victim with spontaneous breathing but is unresponsive," at 85.1%, and item number 12, "first response to infants choke," at 76.4%.

More than half of the respondents answered item number eight, "correct ratio CPR for adult," incorrectly (55.8%), and item number four, "location for chest compression," (54.1%). Over one-third of the respondents answered incorrectly in item number 10, "abbreviation of EMS," incorrectly, (39.7%), and item number 11, "first response of adult choking," incorrectly (38.4%).

Over a quarter of respondents wrongly answered item number 7, "correct rate chest compression in adult and children," (30.2%), and item number 14, "recognition of stroke and appropriate response" (28.9%). Additionally, more than one-twelfth of respondents answered incorrectly in item number 5, "mouth to mouth giving CPR," (24.0%), item

number 2, “first action in doing BLS,” (21.1%), and item number 15, “recognition of acute coronary syndrome and appropriate response,” (21.1%). Lastly, item number 9, “abbreviation of AED,” received incorrect answers from 16.9% of respondents. (Table 2.)

Figure 1 shows that more than half of respondents achieved scores approximately equal to the mean (9.08 ± 1.54). One-third of the respondents demonstrated BLS knowledge below the average score, while only 16.12% of the respondents achieved a good BLS knowledge score (Figure 2.).

Table 1. Demographics and their Association with BLS Score (N = 242)

Characteristics	n	%	Mean (SD) BLS Score	t/F
Gender				
Male	30	12.4	8.73 (1.43)	1.32
Female	212	87.6	9.13 (1.56)	
Major in senior high school				
Science	202	83.5	9.20 (1.46)	3.16*
Social	12	5.0	7.92 (2.06)	
Nursing	17	7.0	8.71 (1.68)	
Other	11	4.5	8.82 (1.77)	
Origin				
Sumatra	97	40.1	9.23 (1.49)	.66
Java	57	23.6	8.79 (1.55)	
Kalimantan	18	7.4	9.11 (1.32)	
Sulawesi	40	16.5	9.13 (1.77)	
Nusa Tenggara	27	11.2	9.04 (1.55)	
Papua	3	1.2	9.67 (1.52)	
Nursing interest				
Anatomy and Physiology	4	1.7	8.75 (2.50)	.89
Basic Nursing	10	4.1	8.90 (2.18)	
Communication in Nursing	5	2.1	9.40 (1.51)	
Community Nursing	17	7.0	8.82 (1.55)	
Emergency and Critical Nursing	74	30.6	9.12 (1.48)	
Maternity	15	6.2	9.00 (1.92)	
Mental health	61	25.2	9.11 (1.42)	
Medical Surgical Nursing	44	18.2	8.98 (1.53)	
Palliative Nursing	4	1.7	8.25 (1.50)	
Paediatric Nursing	8	3.3	10.38 (1.06)	
BLS Exam				
Passed	234	96.69	9.11 (1.55)	1.74
Not passed	8	3.31	8.25 (1.03)	
GPA				
≤3.3	141	61.57	9.08 (1.49)	.29
>3.3	88	38.43	9.03 (1.60)	

Note: BLS = basic life support; GPA = grade point average

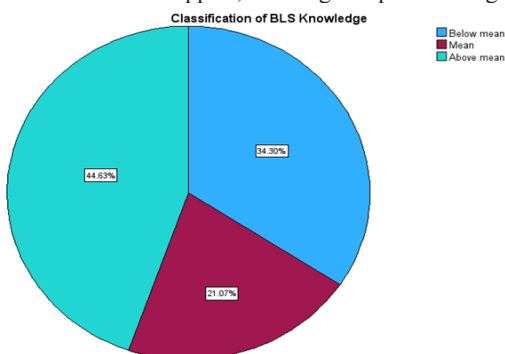


Figure 1: Classification BLS Knowledge based on Mean

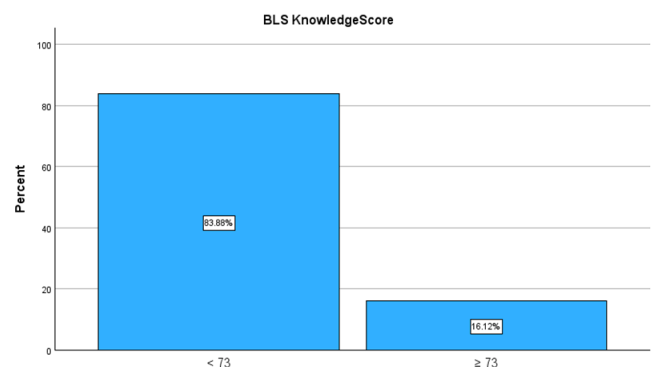


Figure 2: BLS Knowledge Score Categories

Table 2. Number of correct responses to each question on the Basic Life Support survey (N = 242)

No	Question	Correct		Incorrect	
		n	%	n	%
1	Abbreviation of BLS	241	99.6	1	0.4
2	Looking for safety	231	95.5	11	4.5
3	Emergency responses system activating	191	78.9	51	21.1
4	Location for chest compressions?	111	45.9	131	54.1
5	CPR without mouth to mouth	184	76.0	58	24.0
6	Rescue breaths to infants	12	5.0	230	95.0
7	Rate of CPR	169	69.8	73	30.2
8	Ratio of CPR on single rescue	107	44.2	135	55.8
9	Abbreviation of AED	201	83.1	41	16.9
10	Abbreviation of EMS	146	60.3	96	39.7
11	Chocking response in adult	149	61.6	93	38.4
12	Chocking response in infants	57	23.6	185	76.4
13	Recovery position	36	14.9	206	85.1
14	Stroke response	172	71.1	70	28.9
15	ACS response	191	78.9	51	21.1
Total score of BLS mean ± SD		9.08	1.54		

Note: BLS = basic life support; CPR = cardiopulmonary resuscitation; AED = automated external defibrillator; EMS = emergency medical services

DISCUSSION

SCD is a significant global burden, accounting for 15%-20% of all deaths in the 1990s (Hayashi et al., 2015). This number has continued to rise annually, primarily impacted by the increasing prevalence of coronary artery disease (CAD), which is also rising (Vähätalo et al., 2021). CAD is the common cause of SCD in people aged 45-50 years (Vähätalo et al., 2021). To our knowledge, this is the first study that examines BLS knowledge among nursing students with a large sample size. Recent research in Indonesia, which included a sample of 85 nursing students, found that BLS knowledge among third-year students was categorized as only sufficient (71.8%) (Barus et al., 2023). However, there is a lack of study about BLS knowledge after students have completed both theoretical and practical BLS.

This study found that most nursing students had low BLS knowledge scores several weeks after completing theoretical and practical learning.

This finding fits with earlier research showing that BLS knowledge dropped after a year follow-up (Abuejheisheh & Darawad, 2024; de Ruijter et al., 2014). Healthcare students in India have also reported similar results, with the majority of respondents demonstrating poor BLS knowledge (Chandrasekaran et al., 2010). Nursing students have limited opportunities to apply BLS in real-life situations and may struggle to develop their knowledge effectively. Retaining BLS knowledge is crucial for both nursing students and nurses. Even healthcare professionals have also observed challenges in maintaining BLS knowledge over time.

This study also found an association between students' high school major and their BLS knowledge scores. In Indonesia, there are several majors in senior high school, including science, social, nursing, and other vocational high schools. There is a lack of studies investigating the relationship between high school majors and academic achievement in Indonesia. However, studies have shown that students with a science

background achieve higher academic grades than those from social majors. A previous study reported that students with higher academic grades tended to have higher mean BLS knowledge (Alkarrash et al., 2023).

This study observed a variance in BLS knowledge response. Most respondents demonstrated adequate knowledge regarding the abbreviation of BLS and looked for safety before initiating it. This finding differs from a previous study, in which over 30% of respondents failed to answer these two questions correctly (Chandrasekaran et al., 2010). The relatively high accuracy in answering the BLS abbreviation among nursing students in this study may be attributed to their familiarity with the term, as it is frequently used and reinforced throughout their emergency and critical care nursing course over one semester.

Chandrasekaran et al. (2010) reported similar results regarding incorrect answers in India. Most of the students had poor knowledge related to emergency response, particularly in scenarios involving victims without a pulse or breath, choking victims, and cases of stroke and ACS (Chandrasekaran et al., 2010).

Even after several weeks of completing their theoretical and practical learning, nursing students still lacked sufficient BLS knowledge.

Limitations

This study has limitations in data collection, as nursing students in this setting do not practice BLS with infants and pediatric patients yet. This is because pediatric nursing courses do not include BLS in the Indonesian nursing curriculum. However, emergency and critical nursing courses teach the students how to administer BLS to adult patients. Additionally, the data was collected after the students had practiced in a clinical setting. Some students

may have applied the BLS in real conditions, while others may have not. Furthermore, the results of this study can be generalized to similar characteristics.

IMPLICATIONS FOR NURSING PRACTICE

The nursing curriculum must provide adequate time for teaching BLS to adults, pediatrics, and infants so that nursing students can remember the knowledge of BLS longer or demonstrate it correctly. Nursing institutions can also provide refresher BLS training for fresh graduates or final-year nursing students. candidates.

Information

The authors declare that they have no financial or personal relationships that could have influenced the outcomes or interpretation of this work. There are no conflicts of interest to disclose. The authors also stated that no funding support was received during data collection. The research permission was obtained from the Internal Review Board of Universitas Pelita Harapan. The ethical approval number is 033/IRB-UPH/III/20204. All respondents were asked to fill out the informed consent before answering the questionnaire.

Author Contributions

Conception and design: SM, MJ; Data collection: SM, MJ, EC, BA; Data analysis and interpretation: SM; Manuscript draft: SM, MJ, EC, BA; Critical revision of the manuscript: SM, MJ; Final approval of the manuscript: SM.

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