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EVALUATION OF THE SATISFACTION AND SUCCESS LEVELS OF BASIC LIFE SUPPORT, ADVANCED CARDIAC LIFE SUPPORT, AND TRAUMA TRAININGS PROVIDED TO SIXTH-YEAR STUDENTS OF MEDICAL FACULTY KARADENIZ TECHNICAL UNIVERSITY

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Abstract

Aim. To evaluate the success and satisfaction levels of sixth-year medical students who received Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and Advanced Trauma Life Support (ATLS) training during their emergency medicine internship.

Materials and Methods. This descriptive retrospective study included sixth-year medical students who completed their emergency medicine internship at the Karadeniz Technical University (KTU) Faculty of Medicine between 2019 and 2020. A total of 120 students were included in the study. Questionnaire forms containing socio-demographic characteristics were prepared. Before and after the trainings, assessment tests were administered to measure students' knowledge levels. Following the trainings, satisfaction questionnaires were conducted. Data were analyzed using the IBM SPSS 23 statistical package program.

Results. The mean pre-test and post-test scores of those who received BLS and ACLS training were 60.44 ± 11.84 and 87.93 ± 10.57, respectively ($p < 0.05$). Similarly, the mean pre-test and post-test scores of participants who received trauma training were 62.35 ± 13.73 and 78.41 ± 9.38, respectively ($p < 0.05$). There was no statistically significant difference between the pre-test and post-test scores of students who had previously received BLS or ACLS training and those who had not such training. Likewise, there was no significant difference between students who aimed to specialize in emergency medicine and those who did not ($p > 0.05$). Interestingly, students who were satisfied with studying at the Faculty of Medicine had significantly higher pre-test scores in trauma training compared to those who were dissatisfied ($p < 0.05$).

Conclusion. Basic, advanced cardiac, and trauma life support represent some of the most critical and essential medical interventions. In our study, it was demonstrated that these simulation-based trainings significantly improved the knowledge and skills of pre-graduation medical students and had a positive impact on their satisfaction levels.

***Key words**: Basic Life Support, Advanced Cardiac Life Support, Advanced Trauma Life Support, training, internship, satisfaction.*

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Резюме

ОЦЕНКА УРОВНЯ УДОВЛЕТВОРЕННОСТИ И УСПЕШНОСТИ ПРОВЕДЕНИЯ ОБУЧЕНИЯ ПО БАЗОВОЙ И РАСШИРЕННОЙ СЕРДЕЧНО-ЛЕГОЧНОЙ РЕАНИМАЦИИ И РАСШИРЕННОЙ ТРАВМАТОЛОГИЧЕСКОЙ РЕАНИМАЦИИ ДЛЯ СТУДЕНТОВ ШЕСТОГО КУРСА МЕДИЦИНСКОГО ФАКУЛЬТЕТА ТЕХНИЧЕСКОГО УНИВЕРСИТЕТА КАРАДЕНИЗ

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Цель. Оценка уровня успешности и удовлетворенности студентов шестого курса медицинского факультета, прошедших обучение по базовой сердечно-легочной реанимации (БСЛР), расширенной сердечно-легочной реанимации (РСЛР) и расширенной травматологической реанимации (РСТЛР) во время интернатуры по неотложной медицине.

Материалы и методы. В это описательное ретроспективное исследование были включены студенты шестого курса медицинского факультета, завершившие интернатуру по неотложной медицине на медицинском факультете Караденизского технического университета (КТУ) в период с 2019 по 2020 год. В исследование было включено 120 студентов. Были подготовлены анкеты, содержащие социально-демографические характеристики. До и после обучения проводились оценочные тесты для измерения уровня знаний студентов. После обучения проводились анкеты для оценки удовлетворенности. Данные были проанализированы с помощью статистического пакета IBM SPSS 23.

Результаты. Средние баллы до и после тестирования у тех, кто прошел обучение по базовой и расширенной сердечно-легочной реанимации, составили 60,44 ± 11,84 и 87,93 ± 10,57 соответственно ($p < 0,05$). Аналогично, средние баллы до и после тестирования у участников, прошедших обучение по оказанию травматологической помощи, составили 62,35 ± 13,73 и 78,41 ± 9,38 соответственно ($p < 0,05$). Статистически значимой разницы между баллами до и после тестирования у студентов, ранее прошедших обучение по базовой или расширенной сердечно-легочной реанимации, и у тех, кто такого обучения не проходил, не было. Также не было значимой разницы между студентами, стремящимися специализироваться в неотложной медицине, и теми, кто этого не делает ($p > 0,05$). Интересно, что студенты, удовлетворенные обучением на медицинском факультете, показали значительно более высокие баллы до тестирования по травматологической помощи по сравнению с теми, кто был недоволен ($p < 0,05$).

Заключение. Базовая, расширенная сердечно-легочная реанимация и реанимация при травмах представляют собой одни из наиболее важных и необходимых медицинских вмешательств. В нашем исследовании было показано, что эти тренировки на основе симуляции значительно улучшили знания и навыки студентов-медиков, готовящихся к завершению обучения в медицинском вузе, и оказали положительное влияние на уровень их удовлетворенности.

***Ключевые слова**: базовая сердечно-легочная реанимация, расширенная сердечно-легочная реанимация, расширенная реанимация при травмах, обучение, удовлетворенность.*

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Түйіндеме

МЕДИЦИНА ФАКУЛЬТЕТІНІҢ АЛТЫНШЫ КУРС СТУДЕНТТЕРІ ҮШІН НЕГІЗГІ ЖӘНЕ КЕҢЕЙТІЛГЕН ЖҮРЕК-ӨКПЕ РЕАНИМАЦИЯСЫ ЖӘНЕ КЕҢЕЙТІЛГЕН ТРАВМАТОЛОГИЯЛЫҚ РЕАНИМАЦИЯ БОЙЫНША ОҚЫТУДЫ ӨТКІЗУДІҢ ҚАНАҒАТТАНУ ДЕҢГЕЙІ МЕН ТИІМДІЛІГІН БАҒАЛАУ КАРАДЕНИЗ ТЕХНИКАЛЫҚ УНИВЕРСИТЕТІ

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Мақсат. Шұғыл медицина интернатурасы кезінде негізгі жүрек-өкпе реанимациясы (БСДР), кеңейтілген жүрек-өкпе реанимациясы (РСДР) және кеңейтілген травматологиялық реанимация (рстдр) бойынша оқудан өткен медицина факультетінің алтыншы курс студенттерінің табыстылығы мен қанағаттану деңгейін бағалау.

Материалдар мен әдістер. Бұл сипаттамалық ретроспективті зерттеуге 2019-2020 жылдар аралығында Караденiз техникалық университетінің (КТУ) медицина факультетінде шұғыл медицина бойынша интернатураны аяқтаған медицина факультетінің алтыншы курс студенттері енгізілді. Зерттеуге 120 студент қатысты. Әлеуметтік-

демографиялық сипаттамалары бар сауалнамалар дайындалды. Оқудың алдында және одан кейін студенттердің білім деңгейін өлшеу үшін бағалау тестілері өткізілді. Оқудан кейін қанағаттанушылықты бағалау үшін сауалнамалар жүргізілді. Деректер IBM SPSS 23 статистикалық пакеті арқылы талданды.

Нәтижелер. Негізгі және кеңейтілген жүрек-өкпе реанимациясы бойынша оқығандардың тестілеуге дейінгі және кейінгі орташа ұпайлары сәйкесінше 60,44 ± 11,84 және 87,93 ± 10,57 құрады ($p < 0,05$). Сол сияқты, травматологиялық көмек көрсету бойынша оқудан өткен қатысушылардың тестілеуге дейінгі және кейінгі орташа балдары тиісінше 62,35 ± 13,73 және 78,41 ± 9,38 ($p < 0,05$) құрады. Бұрын негізгі немесе кеңейтілген жүрек-өкпе реанимациясы бойынша оқыған студенттерде тестілеуге дейінгі және кейінгі ұпайлар арасында статистикалық маңызды айырмашылық болған жоқ. Сондай-ақ, жедел медициналық көмекке мамандағысы келетін студенттер мен оны жасамайтындар арасында айтарлықтай айырмашылық болған жоқ ($p > 0,05$). Бір қызығы, медицина факультетінде оқуға қанағаттанған студенттер қанағаттанбағандармен салыстырғанда травматологиялық көмекке тестілеуден бұрын айтарлықтай жоғары балл жинады ($p < 0,05$).

Қорытынды. Негізгі, кеңейтілген жүрек-өкпе реанимациясы және жарақат реанимациясы ең маңызды және қажетті медициналық араласулардың бірі болып табылады. Біздің зерттеуіміз бұл модельдеу негізіндегі жаттығулар медициналық университетте оқуды аяқтауға дайындалып жатқан медицина студенттерінің білімі мен дағдыларын айтарлықтай жақсартқанын және олардың қанағаттану деңгейіне оң әсер еткенін көрсетті.

Түйінді сөздер: *Негізгі жүрек-өкпе реанимациясы, кеңейтілген жүрек-өкпе реанимациясы, кеңейтілген жарақат реанимациясы, оқыту, қанағаттану.*

Дәйексөз үшін:

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Introduction

Sudden cardiac arrest is one of the leading causes of death worldwide [10]. «Cardiopulmonary Arrest (CPA)» refers to the sudden cessation of spontaneous respiration and/or circulation due to any cause. “Cardiopulmonary Resuscitation (CPR)” consists of a series of simple yet knowledge- and experience-dependent sequential procedures performed to provide adequate respiration and circulation and to restore life in a person whose breathing and/or circulation has stopped [3].

In 2018, a total of 421,164 deaths were reported in Turkey. Among these, 161,920 were due to cardiovascular diseases, while 18,462 were trauma-related [16]. Several studies have shown that medical students’ knowledge and skills regarding cardiac life support are not at a sufficient level [2]. Effective and high-quality CPR can significantly reduce not only mortality but also morbidity rates. Similarly, the training of pre-hospital medical care providers and emergency service personnel plays a crucial role in reducing trauma-related deaths.

The purpose of this study is to evaluate and assess the success and satisfaction levels of sixth-year medical students who received Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and Advanced Trauma Life Support (ATLS) training.

Resuscitation practices have evolved and undergone rapid changes, particularly over the last two centuries [16]. In 1732, William Tossach performed the first mouth-to-mouth ventilation on a coal miner [8]. In 1773, a method known as the “barrel method” was developed. A barrel was placed under the chest of a presumed CPA victim and rolled back and forth to apply pressure on the lungs and heart, in an attempt to revive the patient [4].

In 1803, another method known as the “Russian method” involved placing victims under snow or ice to slow down metabolism, aiming to protect the brain and heart [7]. Historical records from 1812 indicate that some drowning victims were placed on horses and revived by galloping, which aimed to expel aspirated water from the lungs and provide a form of cardiac massage through the rhythmic movement [4].

In 1740, the Académie des Sciences de Paris (Paris Academy of Sciences) recommended mouth-to-mouth ventilation for drowning victims [13]. Later, Kouwenhoven, Knickerbocker, and Jude introduced the first definition of “modern CPR” in medical literature, which emphasized the combination of mouth-to-mouth ventilation and external chest compressions for effective resuscitation [8]. External defibrillation, first described by Kouwenhoven in 1957, was subsequently incorporated into Basic Life Support (BLS) guidelines [23]. The American Heart Association (AHA) officially endorsed CPR in 1963 and, in 1966, established standardized CPR guidelines for non-professional rescuers [23].

Sudden cardiac death accounts for approximately 15% of all deaths in the United States and other industrialized countries [5]. In 1999, the estimated number of sudden cardiac deaths in the United States was reported to be around 450,000 [15].

During advanced life support interventions, rescuers must be able to identify reversible causes of cardiac arrest and perform the necessary corrective actions [11]. It is also critical for lay rescuers in the community to recognize cardiac arrest early in the absence of medical personnel, promptly call local emergency services, initiate high-quality CPR without delay, use an automated external defibrillator (AED) correctly if available, and perform defibrillation when indicated, all of which are vital steps before the arrival of well-equipped healthcare professionals [19].

Training in Basic and Advanced Life Support emphasizes correct procedural performance, teamwork, and labor distribution, all of which have been shown to significantly improve participants skills [9].

Materials and Methods

This descriptive and retrospective study was conducted at the Karadeniz Technical University (KTU) Center for Good Medical Practice and Simulation. Ethical approval for the study was obtained from the KTU Clinical Research Ethics Committee (Decision No. 152, dated 2020) and the Directorate of the Center for Good Medical Practice and Simulation.

The study population consisted of 124 sixth-year medical students who were undergoing their emergency medicine internship at KTU Faculty of Medicine between September 2019 and February 2020. No sampling method was employed, as it was planned to include the entire population. A total of 120 students who agreed to participate in the study and successfully completed the simulation-based Advanced Cardiac Life Support (ACLS), Basic Life Support (BLS), and Trauma Life Support (TLS) trainings were included in the final analysis. Students who did not complete all training modules, did not provide appropriate data, or did not volunteer to participate were excluded.

Data were collected retrospectively from the records of the KTU Center for Good Medical Practice and Medical Simulation. The study included students who participated in BLS, ACLS, and trauma training sessions during the 2019–2020 academic year within the Department of Emergency Medicine internship block. Each participant completed a multiple-choice knowledge test both before and after the training sessions to assess their cognitive knowledge levels. Additionally, a post-training satisfaction questionnaire was administered to evaluate their satisfaction with the courses.

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 23. The normality of data distribution was assessed using the Kolmogorov–Smirnov test. Parametric tests were used for normally distributed variables, and non-parametric tests were used for data that did not meet normality assumptions.

Results

This study was conducted to evaluate the success and satisfaction levels of sixth-year medical students at Karadeniz Technical University Faculty of Medicine who received BLS, ACLS, and Trauma training during the 2019–2020 academic year. Table 1 presents the socio-demographic characteristics of the participants. Accordingly, 76.7% (n = 92) of participants were between 20–25 years of age. The majority were female (60%, n = 72), while males comprised 40% (n = 48) of the group. In terms of marital status, 98.3% (n = 118) were single.

Table 1.

Sociodemographic Data.

Features		n	%
Age	20-25 years old	92	76,7
	26-30 years old	27	22,5
	31-35 years old	0	0
	35 years and older	1	0,8
Gender	female	72	60
	Male	48	40
Marital status	Single	118	98,3
	Married	2	1,7
Previous education status	Yes	78	65
	No	42	35
Nationality	Turkish	118	98,3
	Foreigner	2	1,7
Satisfaction with being at the Faculty of Medicine	Yes	95	79,2
	No	25	20,8
Wanting to become an Emergency Medicine Specialist	Yes	12	10
	No	53	44,2
	Undecided	55	45,8

Among the students, 65% (n = 78) reported having previously received BLS and ACLS training, 79.2% (n = 95) stated that they were satisfied with studying at the Faculty of Medicine, and 10% (n = 12) expressed their intention to specialize in emergency medicine.

Cardiopulmonary Resuscitation

After the BLS/ACLS trainings, a satisfaction questionnaire consisting of 19 items (rated as: very poor, poor, fair, good, very good) was administered. The results are presented in Table 2.

According to the findings, 73.4% (n = 88) of the participants rated the training duration as good (n = 44) or very good (n = 44). 43.3% (n = 52) evaluated the scheduling and timing of the course as good (n = 25) or very good (n = 27).

86.7% (n = 104) considered the course content appropriate and sufficient (good n = 54; very good n = 50). 81.7% (n = 98) rated the teaching methods, techniques, and comprehensibility as good (n = 56) or very good (n = 42).

86.7% (n = 104) found the adequacy of tools, equipment, and materials used during training to be good (n = 42) or very good (n = 62).

98.3% (n = 118) found the training venue appropriate (good n = 40; very good n = 78).

Table 2.

BLS/ACLS Training Satisfaction Survey Data.

Questions		n	%
1	2	3	4
Was the course duration sufficient?	very poor	5	4,2
	poor	6	5,0
	fair	21	17,5
	good	44	36,7
	very good	44	36,7
Was the date (timing) of the course suitable?	very poor	17	14,2
	poor	29	24,2
	fair	22	18,3
	good	25	20,8
	very good	27	22,5
Was the content of the course appropriate and sufficient for the training?	very poor	1	0,8
	poor	2	1,7
	fair	13	10,8
	good	54	45,0
	very good	50	41,7
Were the training methods and techniques appropriate for understanding the subject?	very poor	3	2,5
	poor	1	0,8
	fair	18	15,0
	good	56	46,7
	very good	42	35,0
Were the course materials (tools/equipment/documents) sufficient?	very poor	1	0,8
	poor	2	1,7
	fair	13	10,8
	good	42	35,0
	very good	62	51,7
Was the venue where the course was held suitable for training?	very poor	0	0
	poor	0	0
	fair	2	1,7
	good	40	33,3
	very good	78	65,0
Did the educators have sufficient knowledge and expertise on their subject?	very poor	2	1,7
	poor	4	3,3
	fair	13	10,8
	good	42	35,0
	very good	59	49,2
Has the topic been presented using appropriate methods and techniques?	very poor	1	0,8
	poor	3	2,5
	fair	12	10,0
	good	55	45,8
	very good	49	40,8
Was time used effectively and efficiently?	very poor	6	5,0
	poor	7	5,8
	fair	40	33,3
	good	44	36,7
	very good	23	19,2
Were the topics covered clearly, understandably, and appropriately for your level?	very poor	1	0,8
	poor	6	5,0
	fair	17	14,2
	good	51	42,5
	very good	45	37,5
Was it possible to ensure active participation of all participants in the training?	very poor	1	0,8
	poor	1	0,8
	fair	16	13,3
	good	57	47,5
	very good	45	37,5

Continuation of Table 2.

1	2	3	4
Were visual and audio aids used effectively in presentations?	very poor	3	2,5
	poor	7	5,8
	fair	10	8,3
	good	50	41,7
	very good	50	41,7
Did the course contribute positively to your professional development?	very poor	1	0,8
	poor	2	1,7
	fair	4	3,3
	good	42	35,0
	very good	71	59,2
Did the course contribute positively to your personal development?	very poor	1	0,8
	poor	7	5,8
	fair	7	5,8
	good	40	33,3
	very good	65	54,2
Did the course provide new knowledge and skills?	very poor	1	0,8
	poor	1	0,8
	fair	13	10,8
	good	41	34,2
	very good	64	53,3
Did the course increase your motivation?	very poor	2	1,7
	poor	3	2,5
	fair	22	18,3
	good	37	30,8
	very good	56	46,7
Did the course provide new professional knowledge and skills that you can share with your colleagues?	very poor	1	0,8
	poor	1	0,8
	fair	10	8,3
	good	46	38,3
	very good	62	51,7
Did the course increase your interest in the subject?	very poor	2	1,7
	poor	2	1,7
	fair	9	7,5
	good	44	36,7
	very good	63	52,5
How would you evaluate the course in general?	poor	2	1,7
	fair	4	3,3
	good	34	28,3
	very good	68	56,7
	Excellent	12	10,0

84.2% (n = 101) rated the instructors' knowledge and subject mastery as good (n = 42) or very good (n = 59).

86.6% (n = 104) evaluated the methods and techniques used in instruction as good (n = 55) or very good (n = 49). 55.9% (n = 67) believed that the allocated time was used efficiently (good n = 44; very good n = 23).

80% (n = 96) stated that the topics were explained clearly and at an appropriate level for students (good n = 51; very good n = 45).

85% (n = 102) reported that active student participation in the courses was good (n = 57) or very good (n = 45).

83.4% (n = 100) stated that visual and auditory materials were effectively used in the presentations (good n = 50; very good n = 50).

94.2% (n = 113) believed that the course positively contributed to their professional development (good n = 42; very good n = 71).

87.5% (n = 105) stated that the course contributed positively to their personal development (good n = 40; very good n = 65).

87.5% (n = 105) evaluated the acquisition of new knowledge and skills as good (n = 41) or very good (n = 64).

77.5% (n = 93) reported that the training significantly increased their motivation (good n = 37; very good n = 56). 90% (n = 108) indicated that the course provided new knowledge and skills they could share with colleagues (good n = 46; very good n = 62).

89.2% (n = 107) stated that the trainings increased their interest in the subjects (good n = 44; very good n = 63). Finally, 95% (n = 114) of the participants evaluated the overall BLS/ACLS training as good (n = 34), very good (n = 68), or excellent (n = 12).

In conclusion, the aspect participants were most satisfied with was the suitability of the training venue (98.3%, n = 118). Furthermore, 94.2% (n = 113) reported that the courses had a positive impact on their professional development. The lowest satisfaction rate was related to the scheduling and timing of the courses, with 43.3% (n = 52) rating this aspect as good or very good.

Trauma Training Satisfaction Survey and Achievement Findings

Following the trauma trainings, a 19-item satisfaction questionnaire (rated as: very poor, poor, fair, good, very good) was administered to the students. The results of the trauma training satisfaction survey are presented in Table 3. According to this survey, 77.5% (n = 93) of participants stated that the training duration was very good (n = 41) or good (n = 52). 41.7% (n = 50) characterized the scheduling and timing of the course as good (n = 29) or very good (n = 21). 84.1% (n = 101) reported that the appropriateness and adequacy of the course content were good (n = 67) or very good (n = 34). 80% (n = 96) rated the training methods, techniques, and comprehensibility as good (n = 71) or very good (n = 25), and 80% (n = 96) evaluated the adequacy of the tools, equipment, and documents used during training as good (n = 59) or very good (n = 37).

93.4% (n = 112) of the trainees rated the suitability of the training venue as good (n = 65) or very good (n = 47). 84.2% (n = 101) assessed the instructors' command of the subject and adequacy of knowledge as good (n = 57) or very good (n = 44).

Table 3.

Post-Trauma Training Satisfaction Survey.

Questions		n	%
1	2	3	4
Was the course duration sufficient?	very poor	4	3,3
	poor	11	9,2
	fair	12	10,0
	good	52	43,3
	very good	41	34,2
Was the date (timing) of the course suitable?	very poor	31	25,8
	poor	19	15,8
	fair	20	16,7
	good	29	24,2
	very good	21	17,5
Was the content of the course appropriate and sufficient for the training?	very poor	1	,8
	poor	3	2,5
	fair	15	12,5
	good	67	55,8
	very good	34	28,3
Were the training methods and techniques appropriate for understanding the subject?	very poor	1	,8
	poor	5	4,2
	fair	18	15,0
	good	71	59,2
	very good	25	20,8
Were the course materials (tools/equipment/documents) sufficient?	very poor	1	,8
	poor	6	5,0
	fair	17	14,2
	good	59	49,2
	very good	37	30,8
Was the venue where the course was held suitable for training?	very poor	0	0
	poor	2	1,7
	fair	6	5,0
	good	65	54,2
	very good	47	39,2
Did the educators have sufficient knowledge and expertise on their subject?	very poor	0	0
	poor	4	3,3
	fair	15	12,5
	good	57	47,5
	very good	44	36,7
Has the topic been presented using appropriate methods and techniques?	very poor	0	0
	poor	7	3,3
	fair	10	12,5
	good	67	47,5
	very good	36	36,7

Continuation of Table 3.

1	2	3	4
Was time used effectively and efficiently?	very poor	7	5,8
	poor	14	11,7
	fair	25	20,8
	good	46	38,3
	very good	28	23,3
Were the topics covered clearly, understandably, and appropriately for your level?	very poor	1	,8
	poor	4	3,3
	fair	13	10,8
	good	66	55,0
	very good	36	30,0
Was it possible to ensure active participation of all participants in the training?	very poor	1	,8
	poor	10	8,3
	fair	33	27,5
	good	40	33,3
	very good	36	30,0
Were visual and audio aids used effectively in presentations?	very poor	2	1,7
	poor	3	2,5
	fair	26	21,7
	good	49	40,8
	very good	40	33,3
Did the course contribute positively to your professional development?	very poor	0	0
	poor	3	2,5
	fair	16	13,3
	good	46	38,3
	very good	55	45,8
Did the course contribute positively to your personal development?	very poor	0	0
	poor	6	5,0
	fair	14	11,7
	good	51	42,5
	very good	49	40,8
Did the course provide new knowledge and skills?	very poor	0	0
	poor	2	1,7
	fair	11	9,2
	good	50	41,7
	very good	57	47,5
Did the course increase your motivation?	very poor	3	2,5
	poor	4	3,3
	fair	29	24,2
	good	45	37,5
	very good	39	32,5
Did the course provide new professional knowledge and skills that you can share with your colleagues?	very poor	1	,8
	poor	3	2,5
	fair	11	9,2
	good	49	40,8
	very good	56	46,7
Did the course increase your interest in the subject?	very poor	1	,8
	poor	4	3,3
	fair	21	17,5
	good	45	37,5
	very good	49	40,8
How would you evaluate the course in general?	poor	1	,8
	fair	11	9,2
	good	39	32,5
	very good	61	50,8
	Excellent	8	6,7

84.2% (n = 103) described the methods and techniques used in instruction as good (n = 67) or very good (n = 36).

61.6% (n = 74) evaluated the efficient and effective use of the allocated time as good (n = 46) or very good (n = 28). 85% (n = 102) rated the clarity of the topics and their suitability for the student level as good (n = 66) or very good (n = 36). 63.3% (n = 76) considered active participation in the trainings to be good (n = 40) or very good (n = 36). 74.1% (n = 89) stated that visual and auditory media were effectively used in the presentations (good n = 49; very good n = 40). 84.1% (n = 101) indicated that the course had a positive effect on their professional development (good n = 46; very good n = 55), while 83.3% (n = 100) reported a positive effect on personal development (good n = 51; very good n = 49).

89.2% (n = 107) evaluated the acquisition of new knowledge and skills as good (n = 50) or very good (n = 57). 70% (n = 84) stated that the course increased their motivation at good (n = 45) or very good (n = 39) levels. 87.5% (n = 105) rated the gains in new knowledge and skills that could be shared with colleagues as good (n = 49) or very good (n = 56). 78.3% (n = 94) reported that the trainings increased their interest in the topics (good n = 45; very good n = 49). Ultimately, 90% (n = 108) evaluated the trauma trainings overall as good (n = 39), very good (n = 61), or excellent (n = 8). Based on the trauma course satisfaction survey, 93.4% (n = 112) reported being most satisfied with the suitability of the training venue. Additionally, 87.5% (n = 105) stated that they had gained new knowledge and skills they could share with colleagues. The least satisfactory aspect was the course date and scheduling, with 41.7% (n = 50) reporting satisfaction in this dimension.

The participants' mean pre-test and post-test scores for BLS and ACLS were 60.44 ± 11.84 and 87.93 ± 10.54, respectively, indicating a statistically significant difference between the pre- and post-test mean scores. The post-test mean scores were significantly higher ($p < 0.05$) (Table 4). As indicated in the table, the minimum score observed in the pre-test was 12, while the minimum score in the post-test after training was 48. The maximum pre-test score was 86, whereas the maximum post-test score was 100.

Table 4.

Comparison of BLS and ACLS Course Pre-Test-Post-Test Scores Averages.

Tests	$\bar{x}$ ± S.S.	Min-Max	Test Statistics	p value
Pre-Test	60,44±11,84	12-86	Z=-9,417	0,000
Post-Test	87,93±10,54	48-100		

**$\bar{x}$: Arithmetic Mean, S.D.: Standard Deviation, Min: Minimum, Max: Maximum, Z: Wilcoxon Test.*

For trauma training, the participants' mean pre-test and post-test scores were 62.35 ± 13.73 and 78.41 ± 9.38, respectively, with a statistically significant difference between the two ($p < 0.05$). The post-test mean scores were significantly higher (Table 5). In the table, the minimum pre-test score was 28, while the minimum post-test score after training was 59. The maximum pre-test score was 90, and the maximum post-test score was 100.

Table 5.

Comparison of Trauma Course Pre-Test-Post-Test Mean Scores.

Tests	$\bar{x}$ ± S.S.	Min-Max	Test Statistics	p value
Pre-Test	62,35±13,73	28-90	Z=-8,944	0,000
Post-Test	78,41±9,38	59-100		

Z: Wilcoxon Test, Min: Minimum, Max: Maximum.

Comparisons of BLS and ACLS pre- and post-test results according to the socio-demographic characteristics of the final-year medical students are provided in Table 6. Accordingly, female participants had a mean pre-test score of 61.83 ± 11.68, while male participants had 58.35 ± 11.89; the difference was not statistically significant ($p = 0.060$). For the post-test, females scored 88.45 ± 10.21 on average and males 87.14 ± 11.08, with no statistically significant difference ($p = 0.480$). Based on these findings, gender did not exert a statistically significant effect on scores in either the pre- or post-test.

When pre- and post-test results were compared according to whether participants had previously received BLS and ACLS training, those with prior training had a mean pre-test score of 60.41 ± 11.94, while those without prior training had 60.50 ± 11.79, with no statistically significant difference ($P = 0.654$). In the post-test, the mean score was 88.23 ± 10.55 for those with prior training and 87.38 ± 10.62 for those without, again with no statistically significant difference ($P = 0.660$). Thus, in our study, prior training did not produce a statistically significant effect on the average scores obtained in either the pre- or post-test.

Regarding satisfaction with studying at the Faculty of Medicine, the pre-test mean score was 59.87 ± 11.59 among those satisfied and 62.60 ± 12.73 among those not satisfied; the difference was not statistically significant ($P = 0.198$). In the post-test, however, the mean score was 86.90 ± 10.88 for those satisfied and 91.84 ± 8.18 for those not satisfied, indicating a statistically significant difference ($P = 0.038$). Accordingly, a significant difference in mean exam scores between satisfied and dissatisfied students was observed only in the post-test.

For the intention to specialize in emergency medicine, the BLS/ACLS pre-test mean scores were 55 ± 16.37 among those who wished to specialize, 61.75 ± 10.40 among those who did not, and 60.36 ± 11.91 among those undecided, with no statistically significant difference ($P = 0.301$).

In the post-test, the mean scores were 85 ± 7.26 (wish to specialize), 89.39 ± 11.63 (do not wish), and 87.16 ± 9.95 (undecided), with no statistically significant difference ($P = 0.051$).

When the undecided group was excluded and a pairwise comparison was made between those who wished to specialize in emergency medicine and those who did not, the post-test mean scores for BLS/ACLS were, contrary to expectations, significantly higher among those who did not wish to specialize in emergency medicine ($p = 0.029$).

Table 6.

Comparison of socio-demographic characteristics and BLS and ACLS pre-test-post-test mean scores.

Features		Pre-Test	Post-Test
Gender	female	61,83±11,68	88,45±10,21
	Male	58,35±11,89	87,14±11,08
Test statistics		U=1378,500	U=1597,500
p		p=0,060	p=0,480
Previous education status	Yes	60,4103±11,94	88,23±10,55
	No	60,5000±1179	87,38±10,62
Test statistics		U=1557,000	U=1559,000
p		P=0,654	P=0,660
Satisfaction with being at the Faculty of Medicine	Yes	59,87±11,59	86,90±10,88
	No	62,60±12,73	91,84±8,18
Test statistics		U=989,000	U=870,500
p		P=0,198	P=0,038
Wanting to become an Emergency Medicine Specialist	Yes	55±16,37	85±7,26
	No	61,75±10,40	89,39±11,63
	Undecided	60,36±11,91	87,16±9,95
Test statistics p		χ^2=2,399	χ^2=5,954
		P=0,301	P=0,051

χ^2: :Kruskal Wallis test statistic, U:Mann Whitney U test statistic

In summary, based on the data obtained in our study, there were no statistically significant differences between gender, prior BLS/ACLS training, or the desire to specialize in emergency medicine with respect to BLS/ACLS pre- and post-test mean scores. However, there was a statistically significant difference between satisfaction with studying in the Faculty of Medicine and post-test mean scores for BLS/ACLS: post-test scores of students not satisfied with studying in the Faculty were significantly higher than those who were satisfied (P = 0.038).

Comparisons of trauma pre- and post-test mean scores according to participants' socio-demographic characteristics are provided in Table 7. Female participants had a mean pre-test score of 63.20 ± 12.74, while males scored 61.06 ± 15.13; this difference was not statistically significant (p = 0.410). In the post-test, females scored 78.81 ± 9.92 on average and males 77.81 ± 8.59, with no significant difference (p = 0.647). Thus, gender did not produce a statistically significant effect on trauma scores in either the pre- or post-test.

Table 7.

Comparison of Socio-Demographic Characteristics and Trauma Pre-Test-Post-Test Mean Scores.

Features		Pre-Test	Post-Test
Gender	Female	63,20±12,74	78,81±9,92
	Male	61,06±15,13	77,81±8,59
Test statistics		U=1574,500	U= 1643,000
P		p=0,410	p=0,647
Previous education status	Evet Yes	62,12±13,17	78,35±8,42
	No	62,76±14,86	78,52±11,06
Test statistics		U=1536,500	U=1574,500
P		P=0,576	P=0,725
Satisfaction with being at the Faculty of Medicine	Yes	63,65±13,43	79,18±9,03
	No	57,40±13,99	75,48±1028
Test statistics		U=876,500	U=905,500
P		P=0,044	P=0,067
Wanting to become an Emergency Medicine Specialist	Yes	68,83±15,78	80,83±5,37
	No	63,05±12,03	77,94±8,60
	Undecided	60,25±14,52	78,34±10,75
Test statistics		χ^2=3,751	χ^2=0,920
P		P=0,153	P=0,631

χ^2: Kruskal Wallis test statistic, U:Mann Whitney U test statistic

When trauma pre- and post-test results were compared based on prior training status, those with prior training had a mean pre-test score of 62.12 ± 13.17, while those without had 62.76 ± 14.86, with no statistically significant difference (P = 0.576). In the post-test, the mean score was 78.35 ± 8.42 for those with prior training and 78.52 ± 11.06 for those without, again not statistically significant (P = 0.725). Therefore, prior training did not produce a statistically significant effect on trauma test scores in either assessment.

Regarding satisfaction with studying at the Faculty of Medicine, the trauma pre-test mean score was 63.65 ± 13.43 among those satisfied, and 57.40 ± 13.99 among those not satisfied — a statistically significant difference (P = 0.044). In the post-test comparison, the mean scores were 79.18 ± 9.03 (satisfied) and 75.48 ± 10.28 (not satisfied), with no significant difference (P = 0.067). Thus, a statistically significant difference between satisfied and dissatisfied students was observed only in the pre-test for trauma.

In this comparison, the pre-test mean scores were 63.05 ± 12.03 for those who wished to specialize in emergency medicine, 63.05 ± 12.03 for those who did not, and 60.25 ± 14.52 for the undecided; no statistically significant difference was found (P = 0.153). In the post-test, the mean scores were 80.83 ± 5.37 (wish to specialize), 77.94 ± 8.60 (do not wish), and 78.34 ± 10.75 (undecided), with no significant difference.

In summary, in the present study there were no statistically significant differences in trauma pre- and post-test mean scores with respect to gender, prior training, or the desire to specialize in emergency medicine. The only statistically significant difference observed was between satisfaction with studying in the Faculty of Medicine and trauma pre-test mean scores: students who were satisfied had significantly higher trauma pre-test scores than those who were not.

Discussion

Resuscitation has been practiced throughout human history and continues to evolve today. Basic Life Support (BLS), Advanced Cardiac Life Support (ACLS), and Advanced Trauma Life Support (ATLS) can be defined as standardized, algorithm-based efforts implemented worldwide to restore life to a victim or casualty. BLS aims to sustain circulation and breathing with fundamental interventions until advanced life support conditions are available, with the goals of saving life and preventing clinical deterioration [9]. Because BLS constitutes the first step in the treatment of patients with cardiac arrest, it is a sequence of procedures that must be known and competently performed by physicians, nurses, and other healthcare professionals working in high-risk settings. There is a direct relationship between adequate training of healthcare personnel in this field and reductions in mortality and morbidity.

Çelik O.G. et al. conducted a survey study examining the educational needs of nurses working in emergency departments. The study included 199 nurses employed in university, state, and private hospitals within a single province. Of these nurses, 64.6% (n = 128) reported receiving in-service training; however, 62.8% (n = 123) considered these programs insufficient [6].

Consistent with these findings, in our study the majority of students reported that the trainings were good or very good, contributed substantially to their knowledge and skills, and markedly increased their motivation.

In a study by *Laco R.B. and colleagues* involving 18 participants consisting of physicians, nurses, and medical technicians, BLS skills and team strategies were evaluated through simulation-based training. The mean BLS score increased from 45.42 before simulation to 89 afterward; this difference was statistically significant (p = 0.000) [14]. While our study encompassed three modular trainings - BLS, ACLS, and trauma - *Laco R.B.* et al. focused exclusively on BLS skills. Similar to their results, we found a statistically significant difference between pre- and post-test scores for BLS and ACLS among our participants.

In another study by *Lima S.G. et al.* including 213 healthcare workers (nurses, nursing assistants, and technicians), the effects of theoretical and practical BLS/ACLS trainings on knowledge levels were evaluated [18]. The mean score increased from 4.1 before the course to 7.26 after the course. In our study, post-test scores were likewise significantly higher (p = 0.000). In addition to BLS and ACLS, trauma training was also provided. Furthermore, a post-training satisfaction questionnaire demonstrated that participants were generally satisfied with all trainings.

Passali C. et al. evaluated knowledge of BLS and ACLS guidelines among 216 participants (nurses and physicians) and demonstrated knowledge gaps regarding current guidelines [21]. In that study, participants who had previously received BLS/ACLS training answered significantly more questions correctly than those without prior training (p < 0.0001). In contrast, in our study there was no statistically significant difference between those with and without prior training in either pre- or post-test mean scores.

Türkmen E. et al. assessed expectations from BLS training and the impact of a BLS course on knowledge, skills, and satisfaction among 125 nursing students [22]. Those with prior BLS training performed better on the pre-test, and post-course knowledge scores increased significantly compared with pre-course scores (pre-test mean 59.5 ± 17.9; post-test mean 97.9 ± 3.2; p < 0.05). They concluded that BLS training improved students' knowledge and skills, met expectations, and yielded high satisfaction. Unlike that study - conducted among nursing students - our study included final-year medical students in an emergency medicine internship, with both pre- and post-training knowledge assessments and comparisons. Similar to *Türkmen E. et al.* we observed significantly higher post-test compared with pre-test scores among participants who completed BLS and ACLS trainings (p = 0.000).

Aekka A. et al. evaluated the effectiveness of simulation- and video-based trauma trainings among 48 non-physician healthcare workers using pre- and post-training questionnaires [1]. They reported statistically significant improvements in knowledge and skills across all domains of trauma management. Relative to *Aekka A. et al,* our study involved a larger cohort of final-year medical students, which strengthens the reliability and validity of our findings. In our sample, the mean trauma pre-test score was 62.35 ± 13.73 and the post-test score was 78.41 ± 9.38, demonstrating a statistically significant improvement.

In a study by *Li Q. et al.* the impact of pre-training assessment and feedback on BLS knowledge and skills among third-year medical students was investigated [17]. Forty students were randomized equally into a control group and an assessment-and-feedback group. The control group received theoretical BLS instruction followed by practical training. The intervention group, after theoretical instruction, underwent a video-based pre-assessment using a simulated cardiac arrest scenario, followed by a 15-minute group debrief and BLS practice. Both groups were then

evaluated with a 3-minute simulated cardiac arrest scenario and a multiple-choice examination. The assessment-and-feedback group achieved significantly higher performance scores (82.9 ± 3.2% vs. 63.9 ± 13.4%; $p < 0.01$). Unlike our design, *Li Q. et al.* [17] randomized cohorts to classical training versus classical training plus video-based scenarios and group debriefing.

Overall, our findings align with the literature indicating that simulation-based resuscitation trainings - across BLS, ACLS, and trauma domains - significantly enhance knowledge and skills and are well-received by learners. The convergence of evidence across diverse healthcare learner populations (nursing students, non-physician providers, and medical students) underscores the educational value and generalizability of simulation-enhanced curricula for resuscitation education.

Özçete E. et al. conducted a study to evaluate the educational quality and the knowledge levels of intern doctors regarding resuscitation. The study included three hours of didactic instruction and one hour of simulated manikin-based training on BLS, ACLS, and arrhythmias. Pre- and post-training test results were compared [20]. In this prospective study, 185 interns participated in the pre-test and 128 in the post-test. The comparison showed that post-test scores on BLS, ACLS, and arrhythmia topics were significantly higher than pre-test scores.

In contrast, our study also provided both theoretical and practical training in trauma management, and participants' satisfaction levels were assessed through questionnaires. Overall, both studies demonstrate that, in addition to traditional medical curricula, simulation-based resuscitation training positively impacts medical students' knowledge and skills in BLS and ACLS. Furthermore, researcher-designed demographic information forms were completed by the participants.

Our study's single-center design limited the ability to evaluate larger intern groups. Additionally, due to scheduling differences, some interns received the training at the beginning of their emergency medicine rotation while others received it later, preventing full temporal standardization. This limitation hindered the design of a more structured and homogeneous study, rendering the results and subsequent analyses more open to interpretation. Complete standardization of instructors and educational materials was also not achieved. Moreover, the long-term theoretical and practical retention of participants after these courses could not be assessed, and no longitudinal progression curve could be established in this respect.

Conclusion

BLS and ACLS are among the most critical medical interventions, and the management of trauma patients also holds great clinical importance. These interventions must be performed by knowledgeable and experienced practitioners. However, they are not always implemented successfully worldwide. Numerous studies in the literature emphasize the importance of repeated training in these medical interventions. In many developed countries, such trainings are provided within nationally standardized frameworks, resulting in far more favorable outcomes compared to developing and underdeveloped nations. This is particularly significant for Turkey, a developing country.

Globally, medical education is undergoing a rapid transition from traditional, intensive, and exhausting models to digital, advanced, simulation-based approaches. Many physicians still graduate from medical schools without adequate training opportunities, direct patient exposure, or simulation-based skill acquisition. Consequently, new graduates or near-graduates often experience serious loss of self-confidence, occupational stress, adaptation difficulties, and increased vulnerability to medicolegal challenges. More importantly, such deficiencies can lead to preventable deaths, permanent disabilities, and conditions that impose substantial material and moral burdens on individuals, families, and society.

From this perspective, lifelong learning—particularly pre-graduation learning—teamwork, skill development, and new skill acquisition become invaluable. It is evident that suitable educational environments must be established and staffed with educators, technicians, and academics who are competent in modern teaching methodologies.

In our study, a simulation-based educational methodology was implemented for final-year medical students. Pre-tests, post-tests, and satisfaction surveys were administered, and the findings were shared with the medical literature. These trainings were found to produce high satisfaction among participants and significantly increase their knowledge levels. We believe that conducting similar studies on larger populations and among other healthcare professionals could contribute to the implementation of more advanced and effective training methods both in Turkey and worldwide. Moreover, further studies comparing video-based and online education, virtual reality (VR), and augmented reality (AR) modalities—as defined in the literature—are essential. Reviewing previous research and identifying the most accurate and applicable educational methods for healthcare professionals, particularly physicians, is of utmost importance to ensure that those entrusted with human health receive the highest possible quality of training.

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