Review / *Derleme* DOI: 10.62111/ybhd.1470833

Basic Life Support in Earthquake with Simulation Supported Training

Simülasyon Destekli Eğitim ile Depremde Temel Yaşam Desteği

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Geliş Tarihi/Received: 20.04.2024 • Kabul Tarihi/Accepted: 18.06.2024 • Yayın Tarihi/Publication Date: 24.08.2024

Cite this article as: Gümüş Şekerci Y, Özkan S, Gür S. Basic Life Support in Earthquake with Simulation Supported Training. *J Intensive Care Nurs*. 2024;28(2):126-132.

Abstract
Earthquakes are frequent natural disasters that can cause significant harm and loss of life. In recent years, there have been numerous major earthquakes worldwide. Nurses are crucial members of disaster response teams during earthquakes, providing vital interventions and basic life support to patients and the injured. This study aims to help learn basic life support skills through simulation training to increase survival rates and reduce injuries in natural disasters and emergencies. Nurses involved in the whole cycle of disasters, including mitigation, preparedness, response and recovery, should be at the forefront to promote health and protect public health, and provide basic life support to the community to improve the safety and capacity of the community. Simulation can be used during the training of disaster nurses as it creates opportunities for repeated practice in a safe and educational environment and facilitates different learning strategies.
Keywords: Basic life support, disaster, eartquake, nurse, simulation training.

Öz
Depremler sıklıkla görülen, büyük çapta ciddi yaralanmalara ve can kayıplarına neden olan doğal afetler arasında yer alır. Son zamanlarda dünyada birçok büyük deprem felaketi yaşanmaktadır. Hemşireler, deprem sırasında, hasta/yaralıya müdahale edilmesi ve temel yaşam desteğinin uygulanmasında afet müdahale ekiplerinin önemli üyeleridir. Bu çalışma, doğal afetler ve acil durumlarda hayatta kalma oranını artırmak ve yaralanmaları azaltmak için temel yaşam desteği becerilerinin simülasyon eğitimi ile öğrenilmesine yardımcı olmayı amaçlamaktadır. Zarar azaltma, hazırlık, müdahale ve iyileştirme olmak üzere afetlerin tüm döngüsünde yer alan hemşireler, sağlığı teşvik etmek ve halk sağlığını korumak için ön saflarda yer almalı, toplumun güvenliğinin ve kapasitesinin geliştirilmesi için topluma temel yaşam desteği sunmalıdır. Simülasyon, güvenli ve eğitici bir ortamda tekrarlı uygulamalara yönelik fırsatlar yaratması ve farklı öğrenme stratejilerini kolaylaştırması nedeniyle afet hemşirelerinin eğitimi sırasında kullanılabilir.
Anahtar Kelimeler: Temel yaşam desteği, Afet, deprem, hemşire, simülasyon eğitimi

INTRODUCTION

Natural disasters impact millions of people annually and cause significant damage. Recent studies suggest that among the most devastating natural disasters, earthquakes are increasing globally.[1] Disasters can be triggered by natural phenomena, such as earthquakes, hurricanes, or floods.[2] They can occur suddenly and significantly impact society or a community.[3] Disasters result in physical, psychological, spiritual, environmental, and economic losses, displacement of people, and social disruptions.[4] Türkiye is frequently susceptible to natural disasters due to its location on earthquake belts, its young and sloping landforms, various climatic conditions, lack of vegetation, abundant rainfall.[5]

Earthquakes can result in a wide range of physical, mental, social, psychological, economic, and cultural losses. Those trapped under rubble may suffer injuries to the head, neck, spine, thorax, abdomen, and extremities, as well as crush syndrome[6-9] which can lead to increased mortality rates in the first few hours after the earthquake

due to organ ruptures and bleeding. Asphyxia caused by dust inhalation, chest compression, hypothermia, and hypovolemic shock can lead to death.[10] Dehydration, hypothermia, hyperthermia, and Crush syndrome can cause death in those who have been buried for days.[11] Individuals who have experienced extreme trauma may be at risk of developing infections and compartment syndrome. In cases where fasciotomy[11] or amputation[10] is necessary, all individuals rescued from under rubble should be treated as having multiple traumas and approached accordingly. It is essential to recognize multiple trauma patients in the prehospital period and intervene with basic life support (BLS) protocols, as this can significantly increase patient survival.[12]

BLS refers to interventions that do not involve drugs, performed to ensure blood is pumped from the heart through chest compressions and oxygen is supplied to the lungs with artificial respiration after ensuring airway patency. The practitioner should ensure airway patency to give breaths without using medical equipment. BLS applications traditionally did not involve any equipment, but today, automatic external defibrillators and balloon valve masks may also be used if available.[13]

Simulation-supported training methods are used in addition to traditional methods for BLS training, especially in preparing for natural disasters.[14] Simulation is crucial in developing individuals' cognitive, psychomotor, and behavioral knowledge and skills by creating realistic environments. Simulation-supported education and learning strategies aim to bridge the gap between theory and practice. To significantly reduce the impact of disasters on affected populations, nurses must be fully equipped and trained to intervene using cutting-edge technology. They should take an active role before, during, and after the disaster.[15,16]

Aim

This review aims to help individuals learn the basic life support knowledge and skills necessary to increase survival rates and minimize injuries during natural disasters and emergencies through simulation training.

BASIC LIFE SUPPORT IN AN EARTHQUAKE

Ensuring environmental safety before entering a damaged building after an earthquake is crucial. First, assess the patient's vital signs and general condition and check for any life-threatening injuries or bleeding. Additionally, evaluate their hydration status and any other complaints. It is important to note that earthquake victims who are stable under rubble may experience rapid deterioration after being rescued, a phenomenon known as 'rescue death.' The restoration of blood flow to an injured limb can cause the passage of tissue breakdown products into the systemic circulation. It is important to note that this phenomenon is related to the reperfusion of the traumatized limb. Therefore, earthquake victims who have emerged from the rubble, during transportation, and while being monitored in medical facilities should be closely monitored and evaluated.[10] BLS is necessary during an earthquake.[17,18]

BLS ensures the victim's survival and prevents renal and other systemic complications during an earthquake. BLS involves early recognition of sudden cardiac arrest, activation of the emergency response system, early cardiopulmonary resuscitation (CPR), and early defibrillation with an automatic external defibrillator. These practices are essential in reducing mortality and morbidity following an earthquake.[19] The actions and procedures taken immediately after an earthquake will determine the condition of the victims. Implementing these interventions based on scientific methods and without error is crucial. Adhering to standards and ensuring quality can increase an individual's likelihood of survival by 2 to 3 times, according to Panchal et al. and Çetin Karabacak.[17,18] Based on Gültekin's research, the survival rate is 29% when BLS is initiated within the first four minutes.[12] On the other hand, if BLS is initiated after four minutes, the survival rate drops to 7%. If cardiopulmonary resuscitation (CPR) is not initiated within 10 minutes, the death rate is reported to be 99%.[20]

Additionally, failure to initiate BLS practices at the scene reduces the chance of survival by 10% every minute.[21] Nurses have a critical role in disaster response[22] and must possess knowledge of BLS. During an earthquake, conscious disaster nurses must intervene and initiate the first steps of the life-saving chain.[23] The steps for applying BLS should be followed, as shown in Figure 1.

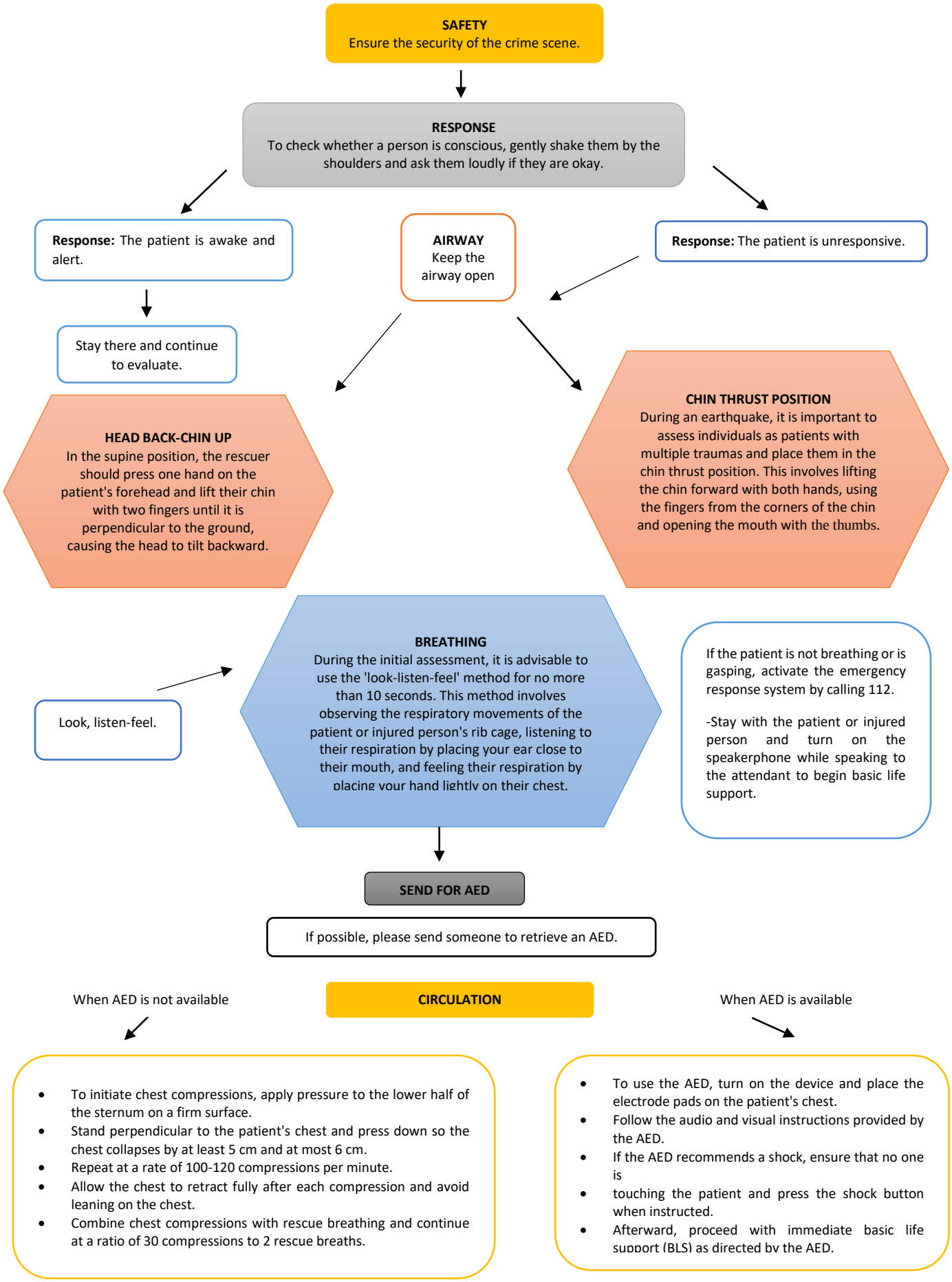

Figure 1. Algorithm for BLS in Adults at Earthquake[13,37]
BLS: Basic Life Support, AED: Automatic External Defibrillator

USING SIMULATION FOR BASIC LIFE SUPPORT TRAINING IN EARTHQUAKE

Simulation is an interactive training method in disaster nursing education. Participating in simulation-supported training is one of the best methods for disaster preparedness due to the suddenness, high risk, complexity, and unpredictability of disaster events. Simulation allows disaster nurses to train quickly and effectively in disaster settings without compromising patient safety.[25] Simulation is one of the most accessible and cost-effective techniques in disaster training.[26] During disaster simulations, participants learn to manage care services for injured individuals, triage patients, research cases more effectively, make informed decisions, and develop procedures.[27] These skills explain why simulations are commonly utilized in disaster training, and it is widely believed that simulations enhance trainees' knowledge, skills, and performance.[28]

A study conducted in Türkiye using earthquake scenarios found that nursing students' perceptions of disaster preparedness improved with simulation technology.[29] Various studies have shown that simulation-based training for earthquake scenarios can improve nursing students' and nurses' disaster preparedness knowledge and skills.[30,31] Additionally, nursing students have reported that simulation training is more effective than learning by reading, particularly when understanding the triage concept.[30] Opsahl et al. conducted a hurricane disaster simulation activity for nursing students in the USA.[32] The study found that the students were delighted with the teaching methods and learning materials, and their self-confidence increased after the training. Recent studies have reported that simulation can increase disaster knowledge among nursing students[33] improve communication skills more effectively than other training methods[34] enhance crisis management, problem-solving, and technical skills of nurses[31], and improve incident management skills and self-efficacy.[35] Despite the positive effects of simulation training in disaster management, some studies have reported adverse effects. For instance, Aluisio et al. found that simulation alone did not improve disaster knowledge scores.[36] Similarly, Digregorio et al. found that simulated disaster drills did not increase participants' initial knowledge of interprofessional cooperation.[37] The given information highlights the use of simulation training in disaster nursing. However, it is essential to note that insufficient evidence supports this claim.[25] Therefore, there is a need for more experimental and methodological research is required to establish its effectiveness.[15,25,38]

Rezaei et al. classified the professional competencies of nurses into four categories: clinical competence (professional knowledge and clinical skills), personal competencies (communication skills, resilience, creativity, and innovation in providing care), ethical competence (commitment to ethics and professional responsibility), and basic skills in the care of the injured (triage skills, bleeding control, airway management, shock treatment, debridement and dressing, bandaging and fixation, psychological care skills, and observation and monitoring skills).[39] Su et al. reported that nurses should possess professional competence in triage, observation and monitoring, psychological care, communication skills, and BLS.[22]

In Türkiye there are no clear legal regulations regarding the role of nurses in disasters. However, all nurses must know of and apply disaster management and intervention, regardless of their specialty in nursing. Disaster nursing is a specialty that involves providing emergency care and first aid services during and after disasters and being involved in every stage of disaster management.[40] Disaster nurses play a crucial role in enhancing educational effectiveness, enriching educational tools and content, and improving the suitability of emergency education for various types of natural disasters.[14]

CONCLUSION

Simulation applications are highly effective for mitigating, preparing for, intervening in, and recovering from earthquakes due to their sudden, high-risk, and complex characteristics. Simulations allow for quick and effective responses in challenging environments while ensuring the safety of patients and injured individuals. Additionally, simulation-based training can be an effective and engaging method for BLS training. In this direction,

- Disaster nurses must provide BLS to reduce the damage caused by earthquakes and improve societal safety and capacity. To achieve this, nurses - often among the first professionals to arrive at the scene - must possess the necessary knowledge, skills, and preparation for BLS.
- Nurses should receive disaster-oriented health services training through various courses, training, and exercises during and after their professional education.
- Simulation training should be integrated into nursing curricula. Further studies should evaluate the permanence of information after simulation training.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – Y.G.Ş., S.Ö., S.G.; Design – Y.G.Ş., S.Ö., S.G.; Supervision – Y.G.Ş., S.Ö., S.G.; Resources – Y.G.Ş., S.Ö., S.G.; Materials – Y.G.Ş., S.Ö., S.G.; Data Collection and/or Processing – Y.G.Ş., S.Ö., S.G.; Analysis and/or Interpretation – Y.G.Ş., S.Ö., S.G.; Literature Review – Y.G.Ş., S.Ö., S.G.; Writing – Y.G.Ş., S.Ö., S.G.; Critical Review – Y.G.Ş., S.Ö., S.G.

Declaration of Interests: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – Y.G.Ş., S.Ö., S.G.; Tasarım – Y.G.Ş., S.Ö., S.G.; Denetleme – Y.G.Ş., S.Ö., S.G.; Kaynaklar – Y.G.Ş., S.Ö., S.G.; Malzemeler – Y.G.Ş., S.Ö., S.G.; Veri Toplanması ve/veya İşlemesi – Y.G.Ş., S.Ö., S.G.; Analiz ve/veya Yorum – Y.G.Ş., S.Ö., S.G.; Literatür Taraması – Y.G.Ş., S.Ö., S.G.; Yazıyı Yazan – Y.G.Ş., S.Ö., S.G.; Eleştirel İnceleme – Y.G.Ş., S.Ö., S.G.

Çıkar Çatışması: Yazarlar çıkar çatışması bildirmemiştir.

Finansal Destek: Yazarlar, bu çalışma için finansal destek almadığını beyan etmiştir.

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