

# Evidence-Based Recommendations for Some Non-Cardiopulmonary Resuscitation First Aid Applications

*Kardiopulmoner Resusitasyon Dışı Bazı İlk Yardım Uygulamalarında Kanıta Dayalı Öneriler*

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## Özet

Ülkemizde her yıl hastalık, afet, trafik kazaları, iş ve ev kazaları nedeniyle binlerce insan hayatını kaybetmekte veya sakat kalmaktadır. Yapılan araştırmalara göre ölümlerin %50'lik bölümü ilk yarım saat içerisinde oluşmaktadır. Bu ölümlerin artmasının önüne geçmek için ilk yardım bilgisine sahip olunması gerekmektedir. Bu bağlamda ilk yardımın temel ilke ve uygulamalarından hasta/yaralının hastanede bakımına kadar her süreçte kanıta dayalı uygulamalara yer verilmelidir. Amerikan Kalp Cemiyeti (American Heart Association-AHA) ve Red Cross tarafından 2020 yılında yayınlanan rehberde, inmeyi tanıma ve tedavisi, hipoglisemi yönetimi, travmatik olmayan göğüs ağrısında uygulanacak antikoagülan tedavi, ciddi kanamalar, travmalarda uygulanacak kompresyonların kullanımı, sıcak çarpmalarındaki tedaviler üzerinde durulmuştur. İlk yardım uygulamalarında kanıta dayalı uygulamalara yer vererek en kısa sürede bilinçli, kaliteli ve doğru ilk yardım ile mortalite ve morbidite oranlarının azaltılması mümkündür. Bu bağlamda zarar risklerini azaltmak, afetlere hazırlık çalışmaları kapsamında toplumu harekete geçirmek, sağlık bilincinin gelişimine katkıda bulunmak, kişilerin hayatlarını kurtarmada yeterli olmalarını sağlamak ve ilk yardım uygulamalarını standardize etmek amacıyla rehberlerin önerileri dikkate alınmalıdır.

**Anahtar kelimeler:** İlk yardım, Kanıta dayalı öneriler, Tıbbi aciller, Travma acilleri

## Abstract

Thousands of people die or become disabled every year due to illness, disaster, traffic accidents, work and home accidents. According to the researches, 50% of the deaths occur within the first half an hour. In order to prevent the increase in these deaths, first aid knowledge is required. Therefore, evidence-based practices should be included in whole process, from the basic principles and practices of first aid to hospital care of the patient/injured. In the guide published by American Heart Association (AHA) and Red Cross in 2020, the stroke recognizes and cures, the management of hypoglycaemia, anti-coagulant treatment for non-traumatic chest pain, life-threatening bleeding, the use of compressions to be applied in trauma, hyperthermia or heatstroke treatments are emphasized. Including evidence-based practices in first aid possibly reduce mortality and morbidity rates with conscious, quality first aid as soon as possible. Therefore, in order to reduce the risk of harm, to mobilize the society within the scope of disaster preparedness, to contribute to the development of health awareness, to ensure that people are competent in saving their lives and standardizing first aid practices. The recommendations of the guides should be taken into consideration in this process.

**Keywords:** Evidence-based recommendations, First aid, Medical emergencies, Trauma emergencies

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**Geliş tarihi:** 31.03.2021

**Kabul tarihi:** 29.04.2021

**DOI:** 10.17517/ksutfd.907345

## INTRODUCTION

Every year in our country, thousands of people die or become disabled as a result of injuries due to illness, disasters, traffic accidents, work and home accidents (1,2). In addition to causing loss of workforce, this situation also causes psychological problems for injured individuals and their families. For this reason, it is extremely important to qualify first aid practices as multidimensional and to understand their physiological and psychosocial dimensions well (3). Guidelines have been developed by clinicians for the correct application of first aid (4-8). These guidelines are designed to regulate physical and psychosocial health through the best available evidence-based practices (3-5). In this context, evidence-based practices should be included in every process from the basic principles and practices of first aid to hospital care of the patient/injured. According to the literature, approximately 50% of deaths in accidents and disasters occur within the first 30 minutes (9,10). Including evidence-based practices in first aid possibly reduce mortality and morbidity rates with conscious, quality first aid as soon as possible. In this context, the recommendations of the guides should be included in order to reduce the risk of harm, to prepare the society for disaster, to ensure the development of health awareness, to ensure that people are competent in saving their lives, and to standardize first aid practices (9).

Based on the protocols of American Heart Association (AHA) and Red Cross in 2020, in this review includes the evidence-based practices to be made by first aiders in other basic principles and practices of first aid other than Cardiopulmonary Resuscitation (CPR).

### Levels (Quality) of Evidence (LOE) and Class (Strength) of Recommendation (COR)

Levels of evidence vary depending on what is considered evidence and the way the evidence is used. It also determines the strength and effectiveness of the evidence and demonstrates the quality of the research that provides the evidence (5). The classification of recommendation is a consensus that is recommended or not recommended according to the benefit-harm relationship of the treatment or intervention (4-8). Various systems have been developed for grading evidence, and the class of recommendation and level of evidence applying to clinical strategies, interventions, treatments, or diagnostic tests in patient care are detailed in the table below (Table 1).

### Evidence-Based Recommendations in First Aid Applications

The guide published by AHA and Red Cross in 2020 includes recommendations under the headings of first aid in medical emergencies, trauma emergencies and emergencies related to environmental factors. The content of these recommendations includes the recognition

**Table 1. Applying class of recommendation and level of evidence to clinical strategies, interventions, treatments, or diagnostic testing in patient care (<https://cpr.heart.org/en/resuscitation-science/cpr-and-ecc-guidelines/tables/applying-class-of-recommendation-and-level-of-evidence>)**

Classes Of Recommendations (COR)		
Classes of Recommendations	Definition	Suggested Wording to Use
<b>Class I</b>	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.	Is recommended/ is indicated
<b>Class II</b>	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.	
<b>Class IIa</b>	Weight of evidence/opinion is in favour of usefulness/efficacy.	Should be considered
<b>Class IIb</b>	Usefulness/efficacy is less well established by evidence/opinion.	May be considered
<b>Class III</b>	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.	Is not recommended
Levels of Evidence (LOE)		
<b>Level of Evidence (A)</b>	Data derived from multiple randomized clinical trials or meta-analyses.	
<b>Level of Evidence (B)</b>	Data derived from a single randomized clinical trial or large non-randomized studies.	
<b>Level of Evidence (C)</b>	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.	

and treatment of stroke, hypoglycemia management anticoagulant therapy for non-traumatic chest pain, severe bleeding, the use of compressions to be applied in traumas, and treatments for heat stroke (5) (Table 1).

### First Aid in Medical Emergencies

**Recognizing Stroke:** The patient who has had a stroke should be observed under close follow-up. During the observation, blood glucose level, oxygen saturation, Electrocardiography (ECG) changes, neurological findings and vital signs should be followed up. In order to recognize stroke in first aid, the following recommendations should be considered (5-8):

Recommendation	LOE	COR
1. The person administering first aid should perform a neurological examination of the patient/injured in order to identify possible symptoms and signs of stroke. The neurological examination includes consciousness, speech disorders, pupillary changes, movements of the extremities and the grip strength.	C	Ila

According to studies, an average of 15% (11,12) of patients die from the onset of stroke to treatment, and 25% of them experience neurological damage 24-48 hours after stroke (13). Therefore, early diagnosis of stroke is very important in these patients. While the most common early symptoms in stroke patients are restriction of limb movements (14), in a study emphasizes that speech disorders are also involved in addition to motor losses (15).

Recommendation	LOE	COR
2. If the patient/injured is suspected of having a stroke, the blood glucose level should be checked.	C	Iib

Blood sugar fluctuations are known to be an independent risk factor for ischemic stroke. Especially in people with insulin resistance, as the plasma insulin level increases, it has a negative effect on lipoprotein cholesterol and increases the formation of atherosclerosis (16). Cigsar and User found Diabetes Mellitus (DM) as the highest risk factor for stroke in their study with acute stroke patients admitted to the emergency department (16).

Recommendation	LOE	COR
3. The routine oxygen therapy by first-aiders is not recommended for persons with suspected stroke.	C	III Medium

In the literature, there are no studies comparing routine oxygen therapy with room air during first aid in acute stroke patients, but there are Randomized controlled trials (RCT) that compare oxygen and room air in a hospital environment. According to these studies, it was found that supplemental oxygen therapy generally does not provide benefit in patients with stroke (18-22). However, although the benefit of oxygen therapy is discussed, there are some studies showing that it is frequently used (23-27).

Stroke recognition tools that reduce the duration are used for diagnosis and definitive treatment in individuals with suspected acute stroke. Various tools have been developed to be used in the early diagnosis of stroke. First aiders should be trained on the use of these tools. Among these tools, there are the most commonly used Face Arm Speech Tool (FAST) or Cincinnati Pre-hospital Stroke Scale (Cincinnati Pre-hospital, Stroke, Scale-CPSS) (28).

**Hypoglycemia Management:** In the case of hypoglycemia, with the brain deprivation of glucose, a picture that can progress to loss of consciousness and coma occurs in individuals. In addition, prolonged hypoglycemia can cause permanent brain damage. In this case, symptoms related to hypoglycemia should be tried to be corrected quickly. To prevent developing hypoglycemia, the following recommendations should be considered (5-8):

Recommendations	LOE	COR
4. Patients/injured who are conscious and have swallowing reflex should be given glucose supplements such as tablets or sugar water, orange juice or jelly beans orally. In cases where hypoglycemic symptoms persist 10 minutes after glucose supplementation, the patient/injured should be referred to emergency services.	C	I
5. For pediatric patients who are conscious but do not want to take anything by mouth, foods with powdered sugar and sugar water slurry (approximately 1 teaspoon) can be given sublingually. Sugar mixed with water acts faster than solid sugar.	C	Iib

6. Glucose should not be given orally to patients who are unconscious or who do not have a swallowing reflex, and patients should be directed to emergency services immediately.	C	III Loss
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In an RCT with children with moderate hypoglycemia symptoms, sublingual application of 2.5 g of sugar water was compared with oral solid sugar application, and it was found that sugar water reduced hypoglycemia symptoms more rapidly than solid sugar after 20 minutes (29).

**Aspirin Application for Non-Traumatic Chest Pain:** Ideal treatment of acute myocardial infarction (AMI) is possible with early hospital care. However, the most unstable and dangerous period of the disease is the pre-hospital period. The following recommendations should be taken into account in order to control developing AMIs early (5-8):

Recommendation	LOE	COR
7. If there is no aspirin allergy or contraindication in a patient with suspected chest pain due to AMI, aspirin should be administered as soon as possible.	C	IIb

In two observational studies conducted with patients with AMI, early and late aspirin treatments were compared, and it was found that the survival rate of aspirin administered in the early period was higher. However, according to the results of these studies, it was found that there was no significant difference in the risk of developing complications in both applications (30,31). In another observational study abroad, it was determined that aspirin administered in the early period compared to late application increased the survival rate in patients for a longer period of one year (32).

### First Aid in Trauma Emergency

Today, in developed or developing societies, trauma is considered in the third place after cancers and cardiovascular diseases among the causes of death all over the world and constitutes 10% of deaths. Especially among the young population between the ages of 0 and 44, it ranks 1st in the most common causes of death (33,34).

**Life-Threatening Bleeding:** In case of severe bleeding in the extremities with vascular injury, it is life threatening and constitutes the majority of post-traumatic deaths. Uncontrolled bleeding is the primary cause of de-

ath in 35% of trauma patients and can occur before the arrival of emergency services. Because death can occur within minutes, first aid providers are essential in providing immediate care (35,36).

### Applying Pressure Points for Life-Threatening Bleeding, Compressed Dressing and Hemostatic Pressure:

Applying pressure to the compression point is the process of applying pressure to an upper artery area close to the bleeding area and is known as manual pressure. The compression point is where the pulse is felt in the area of the artery leading to the bleeding site. Hemostatic dressings are used to provide hemostasis, especially in non-compressible areas such as the neck, abdomen or groin. Hemostatic dressing is used when direct pressure cannot control bleeding (5,37). The recommendations of the guides on applying pressure to the pressure points with hemorrhage, pressure dressing and hemostatic pressure are as follows (5-8):

Recommendations	LOE	COR
8. Manual pressure application is the first procedure to be performed in patients for whom tourniquet application is contraindicated or who have severe bleeding.	C	I
9. If hemostatic dressings are available, they can be used as an auxiliary method to increase the effect of manual pressure.	C	II
10. In severe bleeding that is under control, it is useful to continue with pressure dressing to maintain hemostasis.	C	IIb
11. If there are mechanical compression devices that apply pressure, they can be used in patients where manual pressure is not possible.	C	IIb

In three different RCTs conducted abroad, it was determined that mechanical compression devices (Femo Stop device or a C-arm clamp device) used to stop bleeding provided hemostasis in a shorter time than patients who were applied manual pressure. Both hemostatic dressing and manual pressure were applied to the patients who came with penetrating cutting tool injuries in extremity (38-40). At the end of the application, it was found that the time to stop bleeding was shorter in both applications compared to manual pressure alone (41).

**Tourniquets for Life-Threatening Bleeding:** It is necessary to stop the bleeding by applying a tourniquet to the bleeding extremity region. Tourniquet is the last method of choice for bleeding that cannot be stopped

by other methods because it causes tissue damage (limb loss, gangrene, etc.) in the region where it is applied (37). This procedure should be applied in accordance with the following recommendations (5-8).

Recommendations	LOE	COR
12. Firstly, specially produced tourniquets should be used for bleeding. If there are, however, if there are no specially produced tourniquets available, a thick gauze bundle should be placed on the bleeding area and tightly wrapped.	C	I
13. Tourniquet or pressure dressing procedures should not be done randomly. In order for these procedures to be safe and effective on the patient/injured, they should be applied by specially trained people.	C	IIb

In a study conducted with the extremity trauma patients, it was found that the tourniquet reduced the mortality rate by stopping the bleeding in a short time (42). In another study conducted with the peripheral vascular injury patients, the mortality rate due to bleeding in patients using tourniquet was 3.9%, while this rate was 5.2% in patients not using tourniquet (43).

**Closed Extremity Joint Injuries-Sprains:** Sprains are tears or ruptures in the joint ligaments when exposed to a strain on the range of motion of the joint. Pain, tenderness, swelling, limitation of joint movements or, rarely, ecchymosis is observed (37). The recommendations of the guides regarding joint injuries and sprains are listed below (5-8):

Recommendation	LOE	COR
14. Without moving the joint area of the patient/injured with a sprain, it should be fixed with a compression dressing by trained people.	C	IIb

In a systematic review it was found that both pain and edema were reduced in patients using compression dressings (44). In other studies conducted with patients with ankle sprains, it was found that compression bandages gave positive results and patients returned to their daily lives earlier (45-47).

**Dental Avulsion:** Dental avulsion, which can be seen frequently in maxillofacial trauma patients, is the damage or rupture of the tooth following an accident. Immediate re-implantation requires intervention, but it

is often not possible to perform the procedure by first-aiders due to lack of training and skills (48-52). In this case, the steps to be applied to the tooth with avulsion are included in the following recommendations (5-8):

Recommendations	LOE	COR
15. If the tooth with avulsion cannot be re-implanted, it should be put in Hank Balanced Salt Solution or oral rehydration salt solution. Meanwhile, wrapping the tooth in cling film can make re-implantation easier. After the procedures, the patient/injured should be sent to the health institution as soon as possible.	C	IIa
16. If solutions or cling film are not available for avulsed teeth that cannot be re-implanted, the tooth should be stored in liquids such as cow's milk, salivary secretion, egg white, coconut oil.	C	IIb
17. The avulsed tooth should not be stored in tap water.	C	III Loss

In the studies conducted tooth vitality was compared with the preservation of avulsed teeth in Hanks' Balanced Salt Solution and cow's milk. According to the results of these studies, it was determined that the periodontal cell viability of the teeth waiting in salt solution was longer (48,50,53-55). In addition, tap water was used in Talebi et al. study and found that it harmed periodontal vitality (48). Zeissler-Lajtmán et al. showed that as a result of the study in which avulsed teeth were kept in milk and cling film, teeth kept in cling film preserved more periodontal cell viability compared to holding in milk (49). In studies investigating the effect of salivary secretion and keeping teeth in milk on vitality, it was found that both treatments preserve the vitality of the teeth at the same rate (51,56,57). Storing avulse teeth in castor oil, turmeric extract or buttermilk was found in cows with various oil concentrations found that it resulted in lower periodontal cell viability than storage in milk (58-60).

### First Aid in Emergencies Related to Environmental Factors

**First Aid in Heat Stroke and Hyperthermia:** Severe hyperthermia is a condition that requires urgent attention characterized by central nervous system dysfunction (e.g. confusion, seizures, coma). While there are studies in the literature on the effect of hyperthermia on mortality and organ damage with adult patients, there are a

limited number of studies in pediatric patients (5, 61-66). Therefore, recommendations for pediatric patients are explained based on these guidelines. First aid recommendations for heat stroke and hyperthermia are given below (5-8):

Recommendations	LOE	COR
18. At the time of heat stroke or hyperthermia, the patient should be removed from the hot environment by the first aid providers and the excess clothes removed.	C	I
19. Both adult and pediatric patients with heat stroke or hyperthermia should have their entire body (down the neck) immersed in cold water of 1°C-26°C [33.8°F-78.8°F]. The cooling process is continued until the patient's temperature <39°C (102.2°F). Meanwhile, the patient's neurological symptoms should also be checked.	C	IIa
20. In cases where both adult and pediatric patients with heat stroke or hyperthermia cannot be immersed in water, cooling vests and jackets, evaporation, ventilation, ice packs and other active cooling techniques should be used.	C	IIb

In a study examining the fever reduction rates of cold water immersion and ice packs in adult patients with hyperthermia, it was found that immersion in water reduced fever at a faster rate of 0.01°C/min (61-64). In studies investigating the effect rate of water with temperature between 2 and 20 on hyperthermia, no significant differences were found in terms of results (65, 66). According to the literature, there are various studies on the rate of reduction of hyperthermia, but no studies have been found about the effect of hyperthermia on mortality and organ damage (5-8).

## CONCLUSIONS

With new information constantly added, first aid providers need to choose the best information that benefits the patient. Various institutions and organizations are constantly updating their studies on first aid in order to increase the awareness of first aid in the society, to increase the number of people who have received first aid training and to show the necessary sensitivity to the issue. Thus, first aid providers should use the current evidence-based literature by integrating them into the practice.

**Funding:** This study was not financially supported by any organization.

**Ethical approval:** Institutional permission is not required as the patients are not studied.

**Conflict of Interest:** In this study, there is no conflict of interest among the authors on any subject.

**Author Contribution:** All authors contributed equally to the article.

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