

2025 Korean Guidelines for Cardiopulmonary Resuscitation: Part 3. Adult basic life support

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Yong Soo Jang¹ , Gyu Chong Cho¹ , Youngsuk Cho¹ ,
Sun Gyoung Na² , Do Kyun Kim³ , Tae-Youn Kim⁴ , Youdong Sohn¹ ,
Gyuhong Shim⁵ , Young Hwa Jung⁶ , Yunhee Oh⁷ , Chun Song Youn⁸ ,
Mi Jin Lee⁹ , Jisook Lee¹⁰ , Chang Hee Lee¹¹ , Youngbin Jang¹² ,
Sung Phil Chung¹² , Kyoung-Chul Cha¹³ , Ju Sun Heo⁶ ,
Sung Oh Hwang¹³ 

¹Department of Emergency Medicine, Hallym University College of Medicine, Chuncheon, Korea

²Department of Emergency Medicine, Samsung Medical Center, Seoul, Korea

³Department of Emergency Medicine, Seoul National University College of Medicine, Seoul, Korea

⁴Department of Emergency Medicine, Inha University Hospital, Inha University College of Medicine, Incheon, Korea

⁵Department of Pediatrics, Inje University Sanggye Paik Hospital, Seoul, Korea

⁶Department of Pediatrics, Seoul National University College of Medicine, Seoul, Korea

⁷Design and Contents Team, Asan Medical Center, Seoul, Korea

⁸Department of Emergency Medicine, College of Medicine, The Catholic University of Korea, Seoul, Korea

⁹Department of Emergency Medicine, St. Vincent's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea

¹⁰Department of Emergency Medicine, Ajou University School of Medicine, Suwon, Korea

¹¹Department of Paramedicine, Namseoul University, Cheonan, Korea

¹²Department of Emergency Medicine, Yonsei University College of Medicine, Seoul, Korea

¹³Department of Emergency Medicine, Yonsei University Wonju College of Medicine, Wonju, Korea

The 2025 Korean basic life support guidelines are evidence-based treatment recommendations for basic cardiopulmonary resuscitation (CPR). The 2025 guidelines recommend that after checking the response of a patient suspected of cardiac arrest, call 119 (emergency medical services) immediately and request an automated external defibrillator (AED) before performing procedures to confirm cardiac arrest, such as checking breathing. There is currently insufficient evidence into the clinical effectiveness of dispatcher actively instructing individuals who report an emergency to retrieve and use an AED, but one observational study reported an increase in some survival rates. The guidelines recommend that lay rescuers and emergency medical personnel who have been trained in and are willing to perform artificial ventilation should apply standard CPR including artificial ventilation, and that lay rescuers who are not trained in or do not want to perform artificial ventilation should perform compression-only CPR. The guidelines emphasize high-quality CPR, including effective chest compressions and ventilation. The application of a rapid AED is continuously emphasized, and the anterolateral positioning method is recommended as a priority for ease of application. Healthcare workers are recommended to perform standard CPR with a compression to ventilation ratio of 30:2 for patients suspected of having a high-risk pathogen infection and to wear appropriate personal protective equipment, including a mask or respirator appropriate for the suspected pathogen, gloves, a gown, and eye protection.

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Correspondence to:

Gyu Chong Cho

(emdrcho@naver.com)



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2025 ADULT BASIC LIFE SUPPORT GUIDELINES

The 2025 Korean basic life support (BLS) guidelines provide evidence-based treatment recommendations for basic resuscitation. Based on the 2025 International Liaison Committee on Resuscitation (ILCOR) Consensus on Science with Treatment Recommendations [1], we reviewed published research papers in the field of basic resuscitation. For revisions considered clinically important and requiring further consideration, the evidence was reviewed using either an adaptation or hybrid format, using a systematic review or a scoping review.

KEY SUMMARIES OF 2025 ADULT BLS

Emphasis of call-first

Since 2020, the Korean BLS guidelines have recommended that, after checking for responsiveness in a patient suspected of cardiac arrest, the rescuer should immediately call 119 (the universal emergency call number in Korea) and request an automated external defibrillator (AED) before performing assessments to confirm cardiac arrest, such as assessing breathing. This recommendation remains unchanged in the 2025 guidelines.

Request of an AED: emphasis on dispatcher guidance

Insufficient research has been conducted into the clinical effectiveness of 119 dispatchers actively instructing individuals who report an emergency to secure and use an AED [2]; however, one before-and-after observational study reported an increase in survival rates [3]. The ILCOR recommends that 119 dispatchers instruct laypersons to procure and use an AED (low certainty). The 2025 Korean BLS guidelines agree with this recommendation, considering the low prehospital use rate of AED in Korea (strong recommendation, low certainty of evidence) [1].

CPR including artificial ventilation

Since 2020, the Korean BLS guidelines have recommended that lay rescuers and emergency medical personnel who have been trained in and are willing to perform artificial ventilation should apply standard cardiopulmonary resuscitation (CPR) including ventilation, and that lay rescuers who are not trained in or do not want to perform mouth-to-mouth ventilation should perform chest compression-only CPR. Although no difference has been reported in the survival rate between chest compression-only and standard CPR in the prehospital stage, some studies have reported that standard CPR has a higher survival rate in select groups such as children, adults of advanced age, individuals with drug

overdose or poisoning, and in individuals with a prolonged cardiac arrest period [4].

Using a backboard

Regarding the effectiveness of using a backboard during CPR, some studies have reported that positioning a patient on a backboard improves chest compression depth; however, sufficient evidence has not been accumulated to confirm efficacy [5,6]. Introducing a backboard into hospital CPR protocols would require significant education and training and would not be cost-effective. The 2025 guidelines state that the use of backboards in existing in-hospital CPR procedures can be maintained; however, the introduction of new backboard applications is not recommended (weak recommendation, very low certainty of evidence).

High-quality CPR

The 2025 BLS guidelines emphasize the use of high-quality chest compressions and rescue ventilation and continue the 2020 recommendations for hand positioning, chest compression rate, complete chest relaxation, minimizing interruptions in chest compressions, rotating compressions, and maintaining appropriate breathing and rescue ventilation. The guidelines state that rescuers should place their dominant hand against the sternum when performing chest compressions (weak recommendation, very low certainty of evidence) [7], and recommended that the chest compression fraction be maintained as high as possible (at least 60%; strong recommendation, low certainty of evidence) [8]. In addition, to simplify the basic resuscitation guidelines, the recommendations indicate that spontaneously breathing patients who require respiratory assistance should receive one artificial breath every 6 seconds (10/min; expert consensus).

Application of AED

The rapid application of an AED is continuously emphasized, and the anterolateral positioning method, in which the two pads are attached below the right clavicle and below the mid-axillary line of the left nipple, respectively, is recommended as a priority for ease of application. The recommendations emphasize that the AED pads should be attached to the bare chest. In female cardiac arrest patients, the AED pads should be attached to the bare chest without loosening or removing the brassiere, avoiding breast tissue (expert consensus) [9,10]. Some drowning patients require defibrillation; therefore, when possible, an AED should be applied after performing CPR (expert consensus) [11,12].

Foreign body airway obstruction

The 2020 BLS guidelines, which prioritize five back blows for patients with severe airway obstruction due to a foreign body and five abdominal thrusts when back blows are ineffective, have been maintained in the 2025 guidelines. The application of suction-based devices, which have been experimentally applied in some patients with airway obstruction, is not recommended for routine use, considering the cost and time required to prepare and apply the equipment. Moreover, some research has indicated that the use of these devices could lead to adverse effects or complications (weak recommendations, very low certainty of evidence) [13].

CPR for drowning victims

If a rescuer is trained in and willing to perform rescue breathing, standard CPR, including rescue breathing, is recommended for patients in cardiac arrest due to drowning, as per the 2020 BLS guidelines. In situations wherein lay rescuers are not trained in or are unwilling to perform rescue breathing, the recommendation remains for chest compression-only CPR [14]. For consistency and simplicity of the guidelines, lay rescuers are recommended to begin CPR with chest compressions, whereas trained first responders and emergency medical personnel should begin CPR with rescue breathing (good practice statement).

CPR in patients suspected of high-risk pathogen infection

Healthcare workers are recommended to perform standard CPR at a ratio of 30:2 even for patients suspected of being infected with a high-risk pathogen. Healthcare workers are recommended to perform standard CPR with a compression to ventilation ratio of 30:2 for patients suspected of having a high-risk pathogen infection and to wear personal protective equipment, including a mask or respirator such as an N95 respirator, disposable gloves, a disposable waterproof long-sleeved gown, and eye protection such as goggles or a face shield (strong recommendation, low certainty of evidence) [15].

ADULT BLS ALGORITHMS

Adult out-of-hospital cardiac arrest algorithm for lay rescuers

Lay rescuers encountering a patient suspected of having cardiac arrest should ensure that the scene is safe, approach the patient, and check for responsiveness. If the patient is unresponsive, the rescuer should call 119, request an AED, and follow the advice of the 119 dispatcher. For cases in which the breathing is normal,

the rescuer should observe the patient for changes and wait for an ambulance or emergency medical personnel. If the patient is not breathing or breathing abnormally, chest compressions should be initiated. If the rescuer is instructed to perform artificial ventilation and is willing to do so, chest compressions and artificial ventilation are performed at a ratio of 30:2. If defibrillation is not required or has been immediately administered, CPR should be performed for 2 minutes followed by an analysis of the cardiac rhythm using the AED. CPR should be continued until emergency medical personnel arrive, the patient moves, or breathing normalizes (Fig. 1).

Adult out-of-hospital cardiac arrest algorithm for healthcare providers

After a rescuer calls for help for an unresponsive patient, they should simultaneously check for pulse and breathing within 10 seconds. If there is no pulse or breathing is abnormal or absent, chest compressions and artificial breaths should be performed at a ratio of 30:2. When an AED is procured, the cardiac rhythm should be analyzed every 2 minutes and defibrillation applied as needed. If direct medical guidance is available, that guidance should be followed, and the patient should be transported to a hospital after 6 minutes of on-site CPR (Fig. 2).

Algorithm for adult in-hospital cardiac arrest

Recognizing early warning signs of cardiac arrest such as abnormal vital signs, is important for the prevention of cardiac arrest in hospital settings. If cardiac arrest is suspected, the patient should be checked for responsiveness; if the patient is unresponsive, an emergency code should be activated which notifies the hospital's advanced life support team. The subsequent steps are identical to those of the healthcare provider algorithm, and CPR is continued until the advanced life support team arrives (Fig. 3).

SEQUENCES OF BLS

Checking on-site safety and patient responsiveness

Before approaching a patient, rescuers should ensure that the situation or the environment is safe and free of the risk of infection or other safety issues. Conscious patients will respond by answering questions, moving, or moaning. If the patient is unresponsive, the emergency medical system should be contacted immediately (119 in Korea). If the patient is responsive but hospital treatment is deemed necessary, rescuers should call 119, frequently check the patient's condition, and follow the dispatcher's instructions [2,16,17].

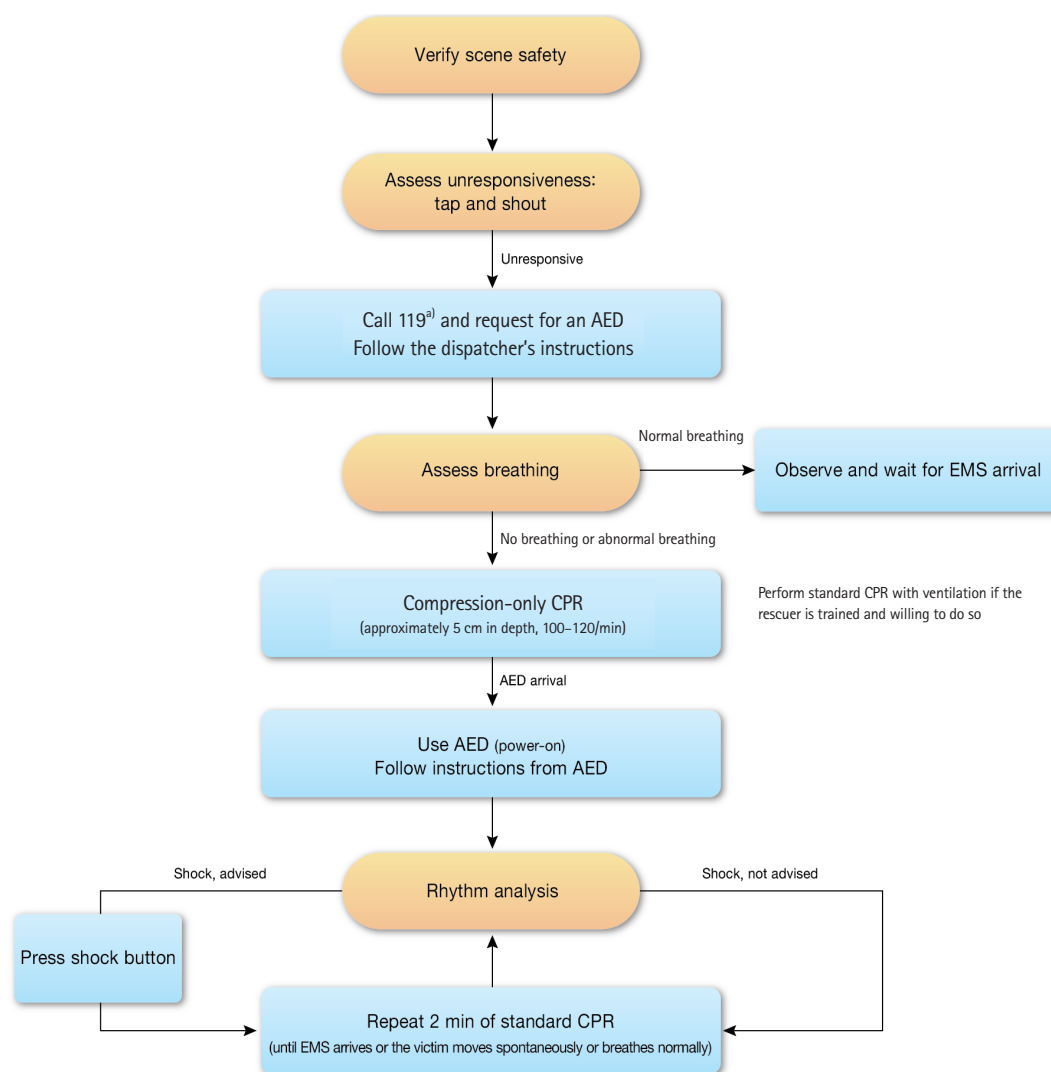


Fig. 1. The 2025 basic life support algorithm for adult out-of-hospital cardiac arrest for lay rescuers. AED, automated external defibrillator; EMS, emergency medical services; CPR, cardiopulmonary resuscitation. ^{a)}Korean EMS dispatcher number.

Activation of emergency medical services

An unresponsive person may have collapsed and experienced cardiac arrest; therefore, the rescuer should immediately call 119 (or broadcast the hospital's cardiac arrest code) and request an AED. If a rescuer witnesses a patient suddenly collapsing into cardiac arrest, help should be sought and a bystander urged to call 119 and procure an AED such that rescue attempts can be initiated. If no bystander is available, the rescuer should call 119.

Accurately assessing the breathing status of an unresponsive person is difficult for lay rescuers; therefore, lay rescuers should call 119 before checking for patient breathing to receive help and guidance from the dispatchers. This enables the rescuer to more accurately check the respiratory status and ascertain whether the breathing is normal or abnormal (agonal gasping) [18–20]. If car-

diac arrest is suspected, the dispatcher should immediately instruct rescuers in performing CPR [21]. Because seizure-like reactions may be observed in some cardiac arrest patients, dispatchers must be aware of the signs of abnormal breathing and myoclonus that may occur and accurately describe them to the rescuers [22].

Call first regardless of patient age

The leading cause of nontraumatic cardiac arrest in adults is ventricular fibrillation, and the most effective treatment is defibrillation. Conversely, primary respiratory arrest due to airway or ventilatory problems is the most common cause of cardiac arrest in infants and children. Witnesses who discover an adult suspected of having a cardiac arrest should call 119 first to ensure that an AED arrives at the scene as quickly as possible (i.e., call first).

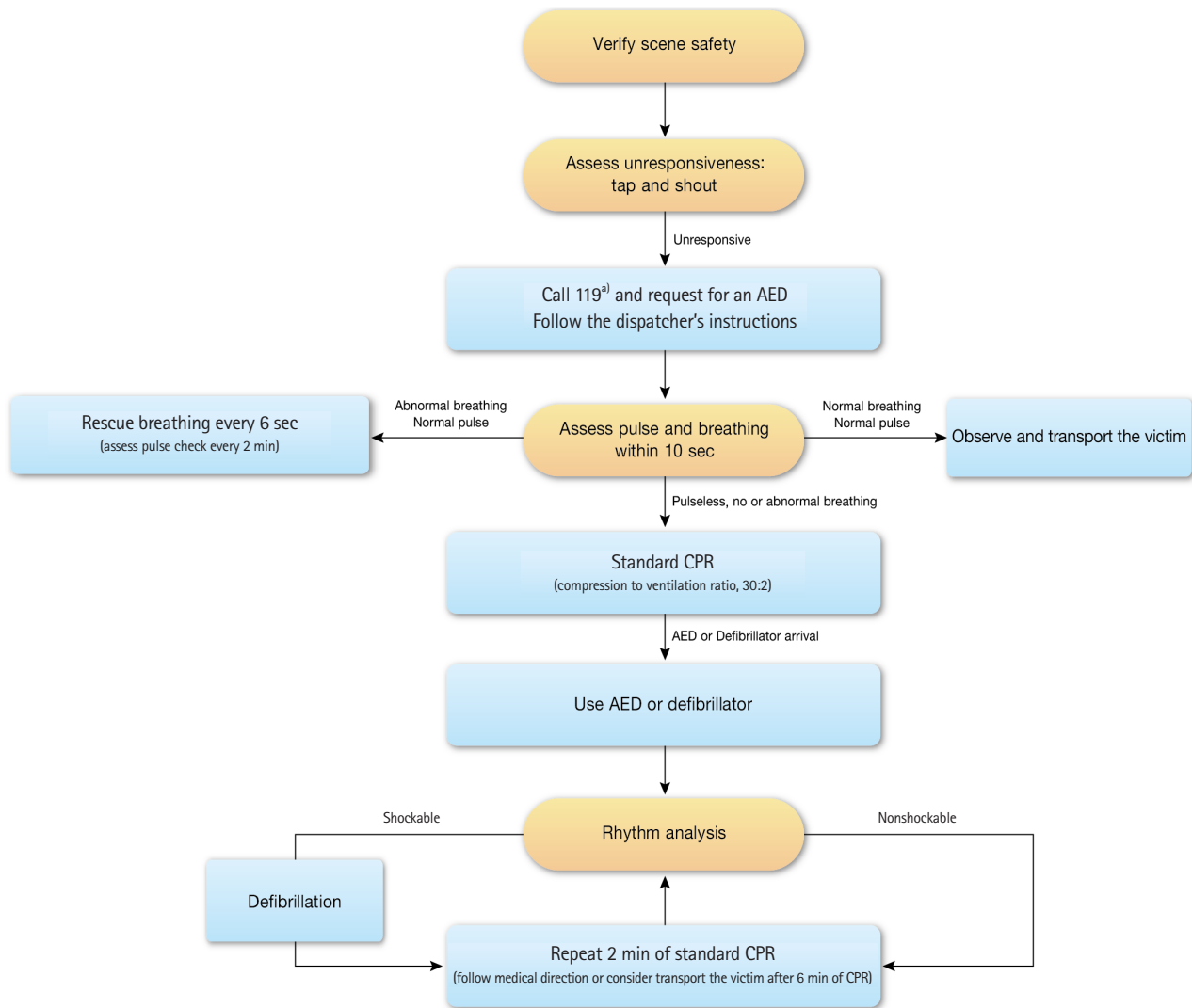


Fig. 2. The 2025 basic life support algorithm for adult out-of-hospital cardiac arrest for healthcare providers. AED, automated external defibrillator; CPR, cardiopulmonary resuscitation. ^{a)}Korean EMS dispatcher number.

Calling 119

When reporting to the 119 dispatcher, the rescuer must explain the location of the patient(s), the circumstances of the event, the number of patients, the condition, and the emergency treatment being performed [23]. If the rescuer has never learned CPR or has forgotten the techniques, they should follow the instructions of the dispatcher. To communicate efficiently, the dispatch personnel should advise the rescuer to use the speaker phone option. Therefore, if a rescuer is alone and has a mobile phone, the speaker phone option should be used or the rescuer should activate the hands-free function. The rescuer should then immediately begin CPR, seeking assistance from the dispatcher as needed.

CPR instruction by dispatcher

Dispatchers are essential members of the initial emergency response team for cardiac arrest patients and act as a bridge between the patient and caller/rescuer. The dispatcher should confirm with the person reporting the emergency situation whether the patient is responsive and whether their breathing is normal or abnormal [24]. When the dispatcher determines that a cardiac arrest has occurred, the guidelines suggest that the rescuer should initiate chest compression-only CPR [25]. The dispatcher should ensure that the caller remains on the line to obtain more information about the emergency situation and continually advise the rescuer in appropriate first aid. In addition, if the caller initiates CPR, the dispatcher should ascertain whether an AED is available at the scene; if a device is available, the dispatcher

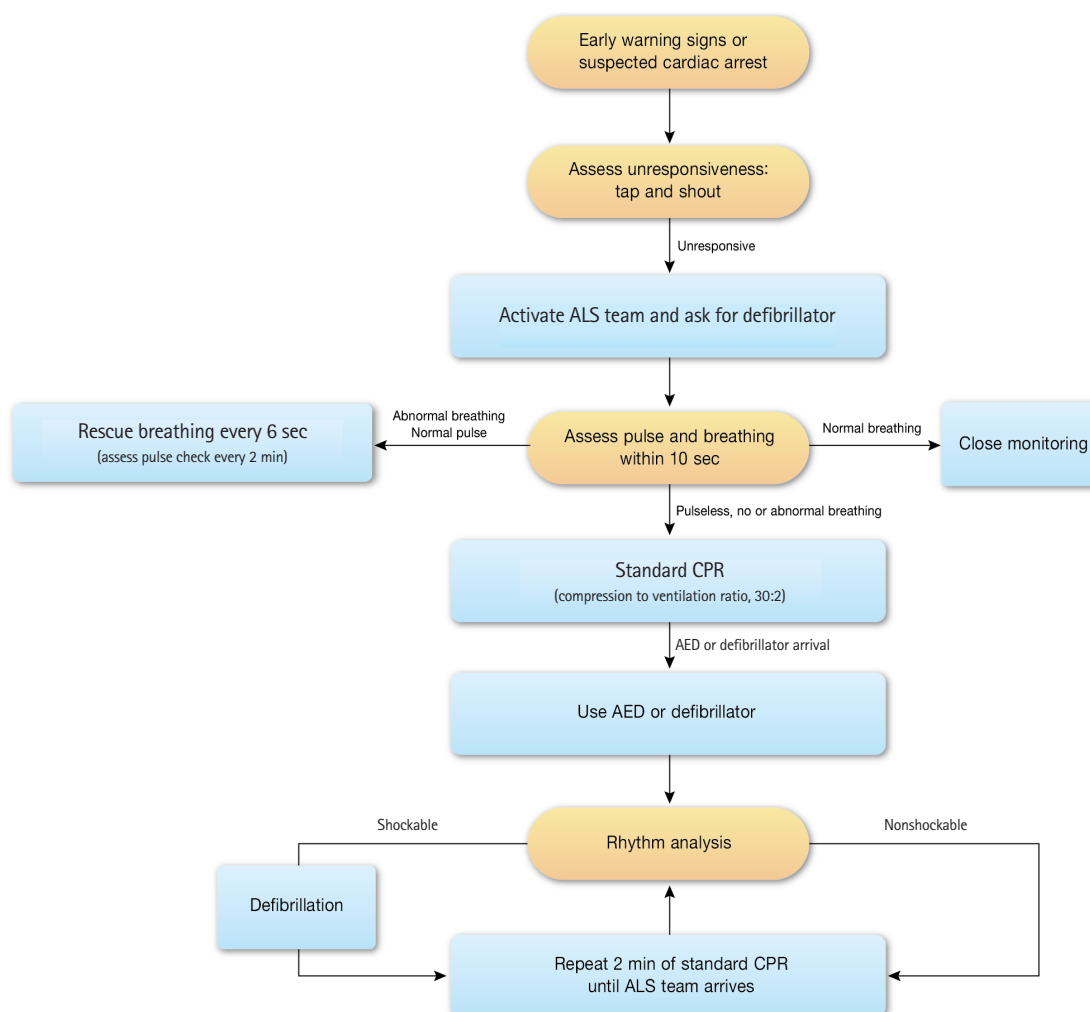


Fig. 3. 2025 Basic life support algorithm for adult in-hospital cardiac arrest. ALS, advanced life support; CPR, cardiopulmonary resuscitation; AED, automated external defibrillator.

should request that a bystander quickly retrieve the AED [2,3]. Once the AED arrives at the scene, it must be quickly and systematically applied to patients in cardiac arrest (strong recommendation, low certainty of evidence).

Check breathing and pulse

Check breathing

If the rescuer has ascertained that the patient is unresponsive, they should call 119 and request an AED. Breathing should be checked after 119 is called. The breathing assessment process can be difficult, and if agonal gasping is present, recognizing cardiac arrest is difficult, thereby delaying the initiation of chest compressions [26]. Subsequently, rescuers should follow the instructions of the dispatcher to determine whether the person is breathing normally. If the person is not breathing or is breathing

abnormally, the rescuer should immediately begin chest compressions [2,16,17]. Healthcare providers or emergency medical technicians (EMTs) must also check responsiveness; if the patient is unresponsive, 119 should be called and an AED should be requested. The healthcare rescuer must simultaneously determine the presence/absence of a pulse and breathing and whether these functions are abnormal within 10 seconds. If unresponsiveness and abnormal breathing are detected, cardiac arrest should be recognized, and CPR should be initiated.

Check pulse

Several studies have found that the process of checking for a pulse in a patient suspected of having a cardiac arrest is difficult and inaccurate for both lay rescuers and healthcare providers. Healthcare providers may spend excessive time checking for a

pulse during the process of confirming cardiac arrest [27–29]. When cardiac arrest is suspected or an unresponsive patient is breathing abnormally, lay rescuers are advised to immediately begin chest compressions without checking for pulse. Healthcare providers should check for a pulse at the carotid artery in adults experiencing cardiac arrest for no longer than 10 seconds [26].

Chest compressions

Location and position for chest compression

The rescuer's hands should be positioned on the "lower half of the sternum" during chest compressions [30,31]. The effectiveness of CPR is maximized when the patient is immediately placed in the supine position; the rescuer should kneel beside the patient (when hospital patients are in a bed, the rescuer stands beside the bed). Rescuers should position their dominant hand directly on the sternum (weak recommendation, very low certainty of evidence) [7].

Depth of chest compression

Several studies have confirmed that a chest compression depth of at least 5 cm improves treatment outcomes, such as survival to hospital discharge and defibrillation success rates, in cardiac arrest patients compared with those in patients who received compressions of less than 4 cm [32–34]. Chest compressions should be performed to a depth of approximately 5 cm for adult cardiac arrest patients. Compression depths exceeding 6 cm are likely to increase the incidence of complications. Approximately 40% of CPR attempts performed by lay rescuers or healthcare providers/EMTs at scenes of cardiac arrests are performed with insufficient chest compression depth.

Rate of chest compression

We reviewed 13 clinical trials related to chest compression rates in patients with cardiac arrest and found inconsistent results among the studies [35]. Three observational studies showed that faster chest compression rates improved outcomes [36–38]; however, one randomized controlled trial comparing chest compression rates of 100 and 120 compressions per minute found no difference [39]. The 2025 guidelines recommend chest compressions at a rate of 100 to 120 compressions per minute for adult cardiac arrest victims.

Full chest recoil

When performing chest compressions, rescuers are advised to avoid leaning on the patient's chest between compressions to allow the chest to fully expand. This is because incomplete chest

relaxation is known to increase intrathoracic pressure, thereby reducing coronary perfusion pressure [40,41]. Because complete chest recoil is an essential part of effective resuscitation, its importance must be emphasized during CPR courses.

Chest compression fraction

Chest decompression should be maximized after each chest compression to allow the heart to sufficiently refill with blood prior to the next chest compression [41]. Chest compression fraction (CCF) is defined as the ratio of time spent on chest compressions to the total time spent on chest compressions and decompressions. A clinical study of patients with out-of-hospital cardiac arrest due to ventricular fibrillation found that the mean operational fraction was 39%. Similarly, the mean CCF during pediatric CPR was 40%, confirming that the average CCF during CPR is lower than the recommended 50% [42,43]. As an ideal CCF value has not yet been determined, the current recommendation is that the time required for chest compression and decompression should be equal when performing chest compressions in patients with cardiac arrest.

Minimizing interruptions

Healthcare providers should minimize the time spent checking for pulse during CPR to no more than 10 seconds. If they are unsure whether a pulse is present, they are advised to begin chest compressions immediately regardless. For cardiac arrest patients with shockable rhythm, increasing CCF improves treatment outcomes, and shorter interruptions in chest compressions before and after defibrillation have been associated with higher rates of return of spontaneous circulation [8,33,44–46]. The CCF should be 60% or higher, and current recommendations suggest that it should be kept as high as possible (strong recommendation, low certainty of evidence).

Rotation of chest compressors

As the depth of chest compressions decreases between 1.5 and 3 minutes after the initiation of CPR, rotating the rescuer providing chest compressions every 2 minutes reduces rescuer fatigue and promotes high-quality CPR [26]. If rescuers performing chest compressions are rotated every 2 minutes, the quality of the chest compressions can be appropriately maintained while simultaneously enabling an analysis of the heart rhythm.

Firm or soft surface

When performing CPR on a soft surface such as a mattress, the depth of chest compressions can be reduced because the soft

surface prevents the ability to truly ascertain the depth of compressions [47]. If possible, chest compressions should be performed on a firm surface (weak recommendation, low certainty of evidence) [6]. If a mattress has a "stiffening" function, it should be activated (expert consensus). Moving the patient from the bed to the floor to improve the chest compression depth should be avoided, as this delays the initiation of CPR.

Complications of CPR

Performing chest compressions on a patient who is unconscious but not in cardiac arrest is unlikely to result in serious complications [35]. Pain at the site of chest compression (8.7%), fractures (1.7%), and rhabdomyolysis (0.3%) may occur; however, no intra-abdominal organ damage has been reported [35]. As performing CPR on someone who is not in cardiac arrest is unlikely to cause injury, the guidelines recommend that anyone who witnesses someone who is likely experiencing cardiac arrest should begin CPR immediately.

Compression-only CPR

The active promotion of compression-only CPR among lay rescuers has improved survival rates with favorable neurological outcomes in patients with out-of-hospital cardiac arrests, which is attributed to an increased rate of CPR provided by lay rescuers [48]. Several studies have compared the effectiveness of compression-only CPR with conventional CPR. Some observational studies have shown that conventional CPR, which combines chest compressions and rescue breathing, has better outcomes than those of compression-only CPR [4,48,49], whereas other studies have shown no difference in outcomes between the two methods [50,51].

Airway maintenance and ventilation

Ventilation is also an important component of CPR, and efficient airway maintenance and ventilation are essential factors for the survival of patients in cardiac arrest. In particular, trained first responders and healthcare providers are recommended to start with artificial ventilation rather than chest compressions in drowning patients with confirmed asphyxial cardiac arrest due to hypoxia (good practice statement).

Artificial ventilation should be administered over 1 second, with a tidal volume sufficient to visually confirm chest rise without hypoventilation. A normal person requires a tidal volume of 8 to 10 mL/kg of body weight to maintain oxygenation and eliminate carbon dioxide. CPR reduces cardiac output to approximately one-quarter to one-third of normal levels; thus, the oxygen-

carbon dioxide exchange in the lungs is reduced [52]. In adult CPR, the tidal volume should be maintained at 500 to 600 mL (6–7 mL/kg). During the first few minutes after ventricular fibrillation, cardiac arrest occurs and artificial ventilation is less important than chest compressions. This is because in sudden cardiac arrest, the oxygen content of arterial blood is maintained for several minutes before or after CPR has been initiated [53]. If cardiac arrest persists or if the exact time since the arrest is unknown, both ventilation and chest compressions are important. In addition, artificial ventilation should be performed in patients with asphyxial cardiac arrest caused by hypoxia or drowning.

Field resuscitation time and recovery position

The recommendation for lay rescuers is to perform BLS until the ambulance arrives; for in-hospital cardiac arrests, support should be performed until the hospital's advanced life support team arrives. EMTs may consider transporting the victim to a hospital if a victim remains unresponsive after 6 minutes of resuscitation at a scene. If advanced life support is possible, resuscitation can be attempted on-site for 10 minutes. If circulation does not improve thereafter, transfer should be considered; however, an extension may be considered at the discretion of the direct medical supervising physician [54]. If a patient is unresponsive, but has normal breathing and effective circulation, a recovery position is recommended. To position accordingly, the patient is turned to lie on their side with the top arm flexed and the bottom arm supporting the head. The supporting leg is extended, and the top leg is flexed with the knee at 90°.

AUTOMATED EXTERNAL DEFIBRILLATOR

Importance of AED

Most sudden cardiac arrests are caused by ventricular fibrillation, and the most important treatment for fibrillation is electrical defibrillation [55]. Defibrillation success rates decrease by 7% to 10% every minute immediately after the onset of ventricular fibrillation; therefore, defibrillation must be performed promptly at the scene of a cardiac arrest [56,57]. AEDs must be placed in congested public places such that they can be accessed quickly. A rescuer who discovers a patient in cardiac arrest must use an AED promptly. To increase the survival rate of patients with out-of-hospital cardiac arrest, public access defibrillation programs that install AEDs in public places and provide AED training to lay rescuers are being implemented worldwide [58].

How to use an AED

If an AED arrives while CPR is in progress, it should be placed in a location that does not interfere with CPR, and the unit should be turned on. After removing or opening the patient's top, the two pads are firmly attached to the chest as indicated on the packaging. While the AED analyzes the electrocardiogram of a cardiac arrest patient, rescuers should avoid contact with the patient to prevent faulty analysis. If defibrillation is required, the AED will automatically recharge its defibrillation energy accompanied by an audio or screen message stating, "shock required." When the audio or screen instruction states "press the defibrillation button," for safety, the rescuer should ensure that no one is in contact with the patient before pressing the button. After defibrillation, the cardiac rhythm of a patient in cardiac arrest often converts to a nonperfusing rhythm, such as asystole or pulseless electrical activity. Rescuers should immediately resume chest compressions after defibrillation to minimize interruptions. Similarly, if the AED determines that defibrillation is unnecessary, CPR should resume. The AED automatically analyzes the patient's electrocardiogram every 2 minutes to determine the need for defibrillation.

Research has shown that women feel uncomfortable with breast exposure during CPR owing to brassiere removal. Rescuers may fear that their efforts may be misinterpreted as inappropriate touching or sexual assault. Thus, lay rescuers may be less willing to use an AED for women in cardiac arrest [9]. Current standards do not recommend mandatory brassiere removal in female patients with cardiac arrest (expert consensus); however, research on this topic is lacking [2,59].

AED application in hospitals

In patients with in-hospital cardiac arrest, defibrillation should be administered within 3 minutes [60]. Even in hospitals, patients could experience cardiac arrest in a ward, outpatient clinic, or examination room where electrocardiogram monitoring is not performed, thereby delaying defibrillation. AED use allows for faster defibrillation for cardiac arrest patients in hospitals [61]. Hospitals should consider installing AEDs, particularly in areas where manual defibrillators are not frequently used or where medical staff lack the ability to conduct/read electrocardiograms [62].

Lay rescuer AED application in drowning patients

A literature review of studies investigating drowning patients found that only a small percentage of cardiac arrest cases after drowning had ventricular fibrillation or pulseless ventricular

tachycardia (2%–14%), and no evidence was found to suggest that drowning patients in cardiac arrest requiring defibrillation had an increased survival rate [11]. A study of the application of lay rescuer defibrillation for adults and children in cardiac arrest due to drowning reported that out-of-hospital defibrillation was rarely required (6%) and that early defibrillation was associated with survival to hospital discharge (adjusted odds ratio, 48.70; 95% confidence interval, 3.80–624.86) [12].

FOREIGN BODY AIRWAY OBSTRUCTION

How to confirm airway obstruction

First aid is required if a patient with sudden respiratory distress shows signs of airway obstruction. If the patient shows symptoms such as coughing, cyanosis, difficulty speaking or breathing, or the universal "C sign" while grabbing their neck, ask the patient, "Are you choking?" If the patient is unable to speak and nods their head, serious airway obstruction should be considered and immediate treatment should be initiated.

Treatment of airway obstruction

If an adult or child over 1 year of age shows signs of severe airway obstruction and is unable to cough effectively, back blows are immediately performed [63]. If five consecutive back blows are ineffective, five abdominal thrusts (Heimlich maneuver) are performed [64]. Cycles of five back blows and five abdominal thrusts should be repeated until signs of airway obstruction are resolved or the patient becomes unresponsive. If an adult patient loses consciousness, the rescuers should guide the patient to the floor and perform CPR. Previously, chest thrusts were recommended before CPR [65]. This is not the current standard procedure because chest thrusts are difficult to teach, and chest compressions can be expected to expel foreign bodies. However, in pregnant women and severely obese patients, if the foreign body has not dislodged after back blows, chest thrusts are performed instead of abdominal thrusts.

DROWNING

Bystander CPR

As the duration of hypoxia in drowning patients is the most important factor in determining prognosis, bystanders are recommended to perform CPR immediately after rescuing a patient from the water, provided there are no safety concerns. If the bystander is well-trained and comfortable with providing rescue breaths, they should provide both rescue breaths and chest com-

pressions. Recent studies have shown that bystander rescue breaths are associated with survival and improve neurological outcomes and survival to hospital discharge [66,67]. For drowning patients, standard CPR should be performed including ventilation; in situations wherein bystanders are not trained in or are unwilling to perform ventilation, chest compression-only CPR is recommended [14]. For consistency and simplicity in the guidelines, the lay rescuer is recommended to begin CPR with chest compressions, whereas trained first responders and healthcare providers are recommended to begin with rescue breaths (good practice statement).

Resuscitation in water

If two or more rescuers are present and a rescue flotation device is available, consideration can be given to administering artificial ventilation in the water for 1 minute before bringing the patient to the surface. Notably, experiments using manikins have revealed that resuscitation performed underwater is technically difficult and requires significant physical strength [68,69]. However, clinical studies have shown that performing ventilation for 1 minute before bringing an unconscious and nonbreathing patient to the shore resulted in good initial survival, survival discharge rate, and neurological outcomes. Therefore, initiating resuscitation in the water could be considered if a sufficiently trained rescuer uses appropriate equipment while ensuring the safety of the situation [70].

Boat resuscitation for drowning victims

Resuscitation on a boat can be considered if the boat is a safe environment and sufficient rescuers are available. Clinical studies have not shown an improvement in survival when resuscitation is performed on a boat after the rescue of adult or pediatric cardiac arrest victims [71]. However, a simulation using manikins showed that resuscitation could be performed if sufficient rescuers and space were available.

Legal aspects of CPR

No legal restrictions exist for healthcare providers performing CPR. The performance of basic resuscitation falls under the scope of not only first-class EMTs but also second-class EMTs and does not require specific instructions from a medical professional. For the lay rescuer, Article 5 of the Emergency Medical Care Act requires that "anyone who discovers an emergency patient must immediately report it to an emergency medical institution, etc." and that "anyone must actively cooperate if an emergency medical worker requests cooperation necessary for emergency medical care."

CPR IN PATIENTS WITH SUSPECTED HIGH-RISK PATHOGEN INFECTION

During the COVID-19 pandemic, decreased CPR and survival rates for cardiac arrest patients were reported owing to the risk of infection for rescuers [72]. In general, direct droplet transmission can be prevented by wearing a full-body gown, gloves, mask, and goggles. An N95 mask is necessary to block airborne particles smaller than droplets. Notably, during the COVID-19 pandemic, the risk of infection for rescuers performing CPR while wearing appropriate protective equipment was extremely low [13]. Healthcare workers are recommended to perform standard CPR at a ratio of 30:2 for patients suspected of being infected with a high-risk pathogen.

Simulation studies have shown that wearing an N95 mask increases rescuer fatigue and reduces the quality of chest compressions [73]. Therefore, if possible, a mechanical compression device should be used. Additionally, the rotating period between chest compressors can be shortened to less than 2 minutes. Artificial ventilation should be performed using a bag-mask; if possible, a high-efficiency particulate air filter should be added [74]. If rescuers are not familiar with using a bag-mask or do not wish to administer ventilation, compression-only CPR can be performed while holding an oxygen mask over the patient's face. When transporting a patient to a hospital, if available, a negative pressure ambulance or transport equipment that maintains negative pressure are recommended. After rescuers perform CPR and transport patients, infection prevention measures such as personal hygiene and ambulance disinfection should be implemented in accordance with national quarantine regulations. Personal protective equipment must be doffed carefully to avoid contamination.

ARTICLE INFORMATION

Author contributions

Conceptualization: SOH; Funding acquisition: SPC; Investigation: all authors; Project administration: SPC, YJ; Writing—original draft: SOH; Writing—review & editing: all authors. All authors read and approved the final manuscript.

Conflicts of interest

Chun Song Youn, Mi Jin Lee, Jisook Lee, Sung Phil Chung, and Sung Oh Hwang are editorial board members of this journal, but were not involved in the peer reviewer selection, evaluation, or decision process of this article. The authors have no other conflicts of interest to declare.

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Data availability

Data sharing is not applicable as no new data were created or analyzed in this study.

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