

2025 Korean Guidelines for Cardiopulmonary Resuscitation: Part 5. Cardiac arrest in special circumstances.

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2025 Korean Guidelines for Cardiopulmonary Resuscitation: Special Circumstances Study Guide

This study guide provides a comprehensive overview of the 2025 Korean Guidelines for Cardiopulmonary Resuscitation (CPR) in special circumstances. It covers modifications to standard Basic Life Support (BLS) and Advanced Life Support (ALS) protocols based on specific patient etiologies and environmental factors.

I. Key Concepts and Clinical Recommendations

The 2025 guidelines emphasize etiology-directed interventions and the early correction of reversible causes.

1. Metabolic and Electrolyte Imbalances

- **Hyperkalemia:** For cardiac arrest caused by acute hyperkalemia, intravenous (IV) administration of **insulin and glucose** is recommended. Current evidence is insufficient to recommend for or against the routine use of sodium bicarbonate or calcium in this specific setting.
- **Hypokalemia:** Characterized by U waves and flattened T waves on ECG. Treatment involves slow IV infusion of potassium. In imminent cardiac arrest, potassium may be infused at 2 mmol/min for 10 minutes.
- **Hypermagnesemia:** Treatment includes IV administration of 10% calcium chloride (5–10 mL) or 10% calcium gluconate (15–30 mL) over 2 to 5 minutes.
- **Hypomagnesemia:** Associated with Torsades de Pointes. Treatment involves 2 g of 50% magnesium sulfate.

2. Respiratory and Allergic Conditions

- **Asthma/COPD:** The primary cause of arrest is hypoxia. Immediate **endotracheal intubation** is recommended because high peak airway pressures increase the risk of gastric inflation and

regurgitation. Mechanical ventilation should use a lower respiratory rate and tidal volume (6–8 mL/kg) to avoid auto-PEEP.

- **Anaphylaxis:** Early **intramuscular (IM) epinephrine** (0.2 to 0.5 mg) is the priority. Rapid fluid resuscitation (at least 500 mL of crystalloid) is necessary due to vasodilation. Advanced airway management should be established early due to potential laryngeal edema.

3. Obstetric Emergencies (Pregnancy)

- **Aortocaval Compression:** In gestations ≥ 20 weeks, the uterus must be manually **displaced to the left** to improve venous return during CPR.
- **Resuscitative Hysterotomy:** If spontaneous circulation is not achieved within 4 minutes of CPR, a cesarean section should be performed to achieve delivery within **5 minutes** of the arrest.
- **Airway:** Early intubation is favored due to high hypoxia risk and difficult airway probability.

4. Circulatory and Toxicological Causes

- **Pulmonary Embolism (PE):** Thrombolytics may be administered for suspected PE. For confirmed PE, options include thrombolysis, surgical embolectomy, or percutaneous mechanical thrombectomy.
- **Opioid Toxicity:** Standard ALS is the priority. Naloxone is recommended to prevent arrest in patients with respiratory depression, but there is no evidence it improves outcomes *during* active cardiac arrest. It may be used if the rescuer is unsure if the patient is in true arrest.

5. Positional and Environmental Circumstances

- **Prone CPR:**
 - **Intubated patients:** Prone CPR and defibrillation may be attempted if repositioning is unsafe. Use ETCO₂ and invasive arterial pressure to monitor efficacy.
 - **Non-intubated patients:** Immediate supination (turning the patient face-up) is strongly recommended.
 - **Drowning:** All victims requiring resuscitation must be transported to a hospital. Noninvasive ventilation may be used if the Glasgow Coma Scale (GCS) score is ≥ 12 .
 - **Severe Hypothermia ($<30^{\circ}\text{C}$):** CPR should be continued until the body is rewarmed. Rewarming methods include warm IV fluids, thoracic lavage, and extracorporeal circulation (ECMO).
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II. Summary Table: Intervention Modifications

Circumstance	Primary Modification / Key Intervention	Specific Dosage or Metric
Hyperkalemia	Insulin + Glucose	8-12 IU Insulin
Anaphylaxis	IM Epinephrine (Anterolateral thigh)	0.2-0.5 mg (1:1,000)
Asthma	Immediate Endotracheal Intubation	Tidal Volume: 6-8 mL/kg
Pregnancy	Manual Left Uterine Displacement	Delivery within 5 mins
PE	Thrombolysis / Mechanical Thrombectomy	Considered in confirmed cases
Hypothermia	Aggressive Rewarming	Body Temp $<30^{\circ}\text{C}$
Prone CPR	Prone compressions if intubated	Monitor ETCO2 and Arterial Pressure

III. Short-Answer Practice Quiz

- True or False:** The 2025 guidelines strongly recommend the routine use of sodium bicarbonate for hyperkalemia-induced cardiac arrest.
- What is the recommended timeframe** for performing a cesarean section if ROSC is not achieved in a pregnant patient (>20 weeks)?
- Why is early endotracheal intubation** specifically emphasized for cardiac arrest caused by asthma?
- In a drowning victim**, what is the minimum Glasgow Coma Scale (GCS) score required to consider noninvasive ventilation?
- What monitoring tools** are suggested to guide the timing of repositioning a patient from the prone to the supine position during CPR?
- Where should an epinephrine autoinjector** be administered in a case of anaphylaxis?
- What is the suggested initial fluid volume** for a patient in shock due to anaphylaxis?
- Under what condition** can naloxone be administered to a patient suspected of opioid toxicity according to the "good practice statement"?

IV. Essay Questions for Deeper Exploration

- Comparative Analysis of Positional CPR:** Discuss the clinical rationale for the different approaches to prone CPR in intubated versus non-intubated patients. Why does the presence of an advanced airway change the recommendation for immediate supination?

2. **Maternal Resuscitation Priorities:** Explain the physiological basis for manual left uterine displacement and resuscitative hysterotomy. How do these interventions address the unique circulatory challenges presented by a gravid uterus during cardiac arrest?
 3. **Etiology-Specific ALS:** The 2025 guidelines move toward "cautious, etiology-directed interventions." Contrast the resuscitation priorities of a patient in cardiac arrest due to lightning strike versus a patient in arrest due to acute pulmonary embolism.
 4. **Evidence-Based Limitations:** Many recommendations in Part 5 are noted as having "very low certainty of evidence." Discuss the challenges of conducting high-quality research in "special circumstances" cardiac arrest and how clinicians should balance guideline recommendations with real-time clinical judgment.
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V. Glossary of Important Terms

- **Aortocaval Compression:** The compression of the abdominal aorta and inferior vena cava by the gravid uterus when a pregnant woman lies supine, reducing venous return and cardiac output.
 - **Auto-PEEP (Dynamic Hyperinflation):** Air trapping in the lungs that occurs when the expiratory time is insufficient, commonly seen in asthma and COPD; it can impede venous return and circulation.
 - **ECPR (Extracorporeal Cardiopulmonary Resuscitation):** The use of extracorporeal membrane oxygenation (ECMO) to provide circulatory support during cardiac arrest when standard CPR fails.
 - **End-tidal Carbon Dioxide (ETCO₂):** The partial pressure of carbon dioxide at the end of an exhaled breath; used in the guidelines to monitor the quality of chest compressions and perfusion.
 - **Good Practice Statement:** A recommendation made by experts when there is a high level of certainty regarding the benefit of an intervention, despite a lack of formal systematic evidence.
 - **PEA (Pulseless Electrical Activity):** A clinical condition where the heart's electrical rhythm is present, but there is no effective mechanical contraction or palpable pulse.
 - **ROSC (Return of Spontaneous Circulation):** The resumption of sustained heart rhythm and pulse after cardiac arrest.
 - **Resuscitative Hysterotomy:** An emergency cesarean section performed during maternal cardiac arrest to improve the chances of successful resuscitation of the mother and survival of the fetus.
 - **Thrombolytic Therapy:** The use of pharmacological agents (e.g., tissue plasminogen activator) to dissolve blood clots, specifically considered in cases of pulmonary embolism.
 - **Torsades de Pointes:** A specific type of polymorphic ventricular tachycardia associated with a prolonged QT interval, often caused by electrolyte imbalances like hypomagnesemia.
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