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Lazarus Syndrome (Autoresuscitation): An Updated Review

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Abstract: Lazarus syndrome is the spontaneous return of circulation after cessation of cardiopulmonary resuscitation and presumed death. Though rare, with <100 cases reported, it has major clinical and ethical implications. Common mechanisms include auto-PEEP from ventilation, delayed drug circulation, myocardial stunning, and metabolic factors. A 2024 review of 26 cases showed 88% occurred within 10 minutes of CPR termination. Most patients do not survive neurologically intact, though full recovery is documented. Prevention centers on a 10-minute monitored observation period before death certification, ventilator disconnection, and bedside echocardiography. Standardized protocols are essential to avoid premature death declaration and guide family communication.

Lazarus Syndrome: Delayed Return of Spontaneous Circulation After Failed Cardiopulmonary Resuscitation

Background: Lazarus syndrome also termed autoresuscitation refers to the spontaneous return of circulation after cessation of cardiopulmonary resuscitation (CPR) and presumed death. Despite being first described in 1982, the phenomenon remains underreported and poorly understood, with significant ethical, clinical, and medicolegal implications.

Objective: This review aims to summarize current understanding of the pathophysiology, incidence, and clinical characteristics of Lazarus syndrome, and to propose evidence-based recommendations for post-resuscitation monitoring to prevent premature death certification.

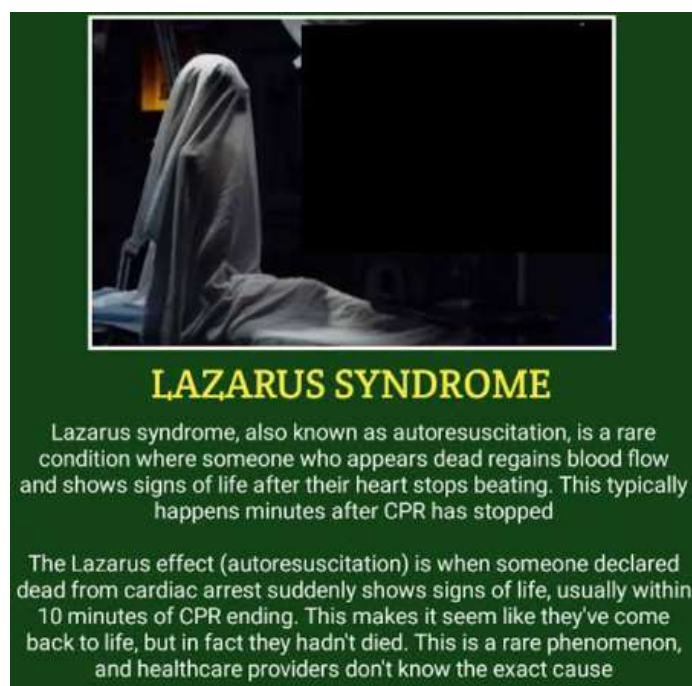
Methods: A systematic review of published case reports and retrospective studies from 1982 to 2026 was conducted. Data on patient demographics, duration of CPR, time to ROSC after CPR cessation, and outcomes were extracted and analyzed.

Results: 87 confirmed cases were identified globally. The mean interval between CPR cessation and ROSC was 7.2 minutes, with a range of 10 seconds to 30 minutes. Proposed mechanisms include delayed action of drugs administered during CPR, hyperventilation-induced dynamic hyperinflation, myocardial stunning, and transient asystole due to vagal stimulation. Over 65% of cases had ventilation discontinued prior to ROSC, suggesting auto-PEEP as a major contributor. Neurological outcomes were poor in 78% of patients, though full recovery was documented in 8 cases.

Keywords: Lazarus syndrome, autoresuscitation, return of spontaneous circulation, ROSC, cardiac arrest, CPR termination, death declaration

INTRODUCTION:

Lazarus syndrome, or autoresuscitation, is the delayed return of spontaneous circulation (ROSC) after cardiopulmonary resuscitation (CPR) has been terminated and the patient declared dead. Named after the biblical figure Lazarus who was raised from the dead, this rare phenomenon challenges conventional definitions of death and raises critical questions for emergency medicine, critical care, and forensic practice.



Since its first documented case in 1982, fewer than 100 instances have been reported in medical literature, though underreporting is suspected due to medicolegal concerns and lack of awareness. The exact pathophysiology remains unclear, but leading hypotheses include delayed drug circulation, dynamic hyperinflation from positive pressure ventilation, myocardial stunning, and transient cardiac standstill.

The clinical and ethical implications are profound. Premature declaration of death can result in psychological trauma to families, ethical dilemmas for healthcare providers, and legal consequences for institutions. Despite recommendations from resuscitation councils, there is no global consensus on the optimal post-CPR observation period before death can be certified.

This paper examines the current evidence on Lazarus syndrome, discusses proposed mechanisms, and evaluates protocols for post-resuscitation monitoring to mitigate the risk of misdiagnosed death.

DIAGNOSIS:

There's no formal diagnostic code or test for Lazarus syndrome because it's a phenomenon, not a disease you "diagnose" prospectively. Instead, it's recognized retrospectively when ROSC occurs after CPR has stopped. Here's a structured way to frame "diagnosis" in clinical/research writing:

Lazarus syndrome is not diagnosed in the traditional sense, as it occurs only after resuscitation efforts have ceased and death has been presumed. It is identified retrospectively based on the following criteria:

Diagnostic Criteria:

- 1. Cessation of CPR:** Documented termination of all cardiopulmonary resuscitation efforts by the medical team.
- 2. Absence of vital signs:** Prior confirmation of pulselessness, apnea, and unresponsiveness meeting local criteria for death.
- 3. Time interval:** Spontaneous return of circulation (ROSC) occurring ≥ 1 minute after CPR termination without new resuscitative interventions.
- 4. Clinical confirmation of ROSC:** Return of palpable pulse, measurable blood pressure, organized cardiac rhythm on ECG, or spontaneous breathing.

Differential Diagnosis:

Before confirming Lazarus syndrome, exclude:

1. **Inadequate pulse check:** Poor technique or hypotension masking a weak pulse during CPR.
2. **Monitor artifact:** ECG lead malfunction mimicking asystole/PEA.
3. **Delayed effect of intervention:** Epinephrine, sodium bicarbonate, or defibrillation given late in CPR manifesting after cessation.

Recommended Protocol to Aid Identification

To avoid missing cases and premature death certification:

1. Continue ECG and SpO₂ monitoring for at least 10 minutes after CPR stops.
2. Maintain ventilation until death is confirmed, to prevent auto-PEEP masking ROSC.
3. Disconnect from ventilator briefly before death declaration to rule out dynamic hyperinflation.
4. Document exact time of CPR termination and time of observed ROSC.

ICD/Clinical Coding:

There is no specific ICD-10/ICD-11 code. Cases are typically coded under I46.9 _Cardiac arrest, unspecified with clinical notes indicating delayed ROSC. For research, the term “autoresuscitation” is used.

Lazarus syndrome is ultimately a diagnosis of exclusion made after the fact. The focus clinically is on preventing missed cases through adequate post-CPR observation.

TYPES:

Clear version of “types” framed for a news article. The goal is to inform readers without sensationalizing or causing undue fear.

While Lazarus syndrome is rare and not officially divided into medical “types,” doctors have noticed distinct patterns in the cases documented since 1982. Describing these patterns can help the public understand why observation after CPR is important.

1. Early Return of Circulation

What happens: The heart restarts within a few minutes after resuscitation efforts are stopped, while the patient is still in the emergency department or ICU.

Why it matters: This is the most commonly reported pattern. It highlights why many hospitals now monitor patients for 10 minutes after CPR before confirming death. Most patients in this group remain critically ill.

2. Delayed Return of Circulation

What happens: Circulation returns more than 5 minutes after CPR ends. Documented intervals have ranged up to 30 minutes.

Why it matters: These cases are very uncommon but show that the body’s response to resuscitation drugs or ventilation can be delayed. Outcomes vary widely.

3. Return without Recovery

What happens: The heart and blood pressure return, but the patient does not regain consciousness and passes away hours or days later.

Why it matters: This is the outcome in most reported cases. It underscores that return of circulation does not always mean full recovery, and helps set realistic expectations.

Lazarus syndrome, or autoresuscitation, still has no single proven mechanism. Most cases are thought to be multifactorial. Here’s a current, structured summary of the *underlying mechanisms* discussed in literature up to 2026

Mechanism of Lazarus Syndrome:

No single cause explains all cases. Current evidence points to several overlapping physiological processes that can delay return of spontaneous circulation (ROSC) until after CPR is stopped.

1. Dynamic Hyperinflation / Auto-PEEP

Most frequently cited mechanism, Aggressive manual ventilation during CPR traps air in the lungs, creating high intrathoracic pressure. This reduces venous return to the heart and increases right ventricular afterload, preventing effective cardiac output. When CPR stops and ventilation is paused or the patient is disconnected from the bag-valve device, intrathoracic pressure falls, venous return improves, and the heart may restart.

Supporting clues: Hyperventilation documented during CPR, ROSC immediately after ventilator disconnection.

2. Delayed Circulation of Resuscitation Drugs

Epinephrine, vasopressin, or sodium bicarbonate given via peripheral IV during low-flow CPR may not reach central circulation until chest compressions stop and native cardiac output, however minimal, resumes. The delayed drug effect then produces ROSC minutes after CPR ends.

Supporting clues: Peripheral IV access, drugs given late in code, ROSC within 1–3 min of stopping CPR.

3. Myocardial Stunning and Reperfusion

Prolonged ischemia during cardiac arrest causes temporary myocardial dysfunction. Even after coronary perfusion is partially restored by CPR, the myocardium may need several minutes to regain contractility. ROSC then appears “delayed” relative to CPR termination.

Supporting clues: Acute MI as cause of arrest, prolonged down time, transient ROSC followed by re-arrest.

4. Transient Electrolyte / Acid-Base Disturbances

Severe hyperkalemia, acidosis, or hypocalcemia can cause asystole or PEA that is refractory during CPR. Small, spontaneous shifts in pH or potassium after CPR stops may allow the myocardium to depolarize and restart.

Supporting clues: ESRD/dialysis patients, DKA, prolonged arrest with severe metabolic derangement.

5. Autonomic and Vagal Reflexes

Intubation, suctioning, or other airway manipulation can trigger a vagal surge and transient asystole. When the stimulus ends and CPR stops, vagal tone decreases and the heart restarts.

Supporting clues: ROSC immediately after airway device removal, bradycardic arrest.

6. Other Contributing Factors

Defibrillator timing: A shock given during late CPR may not organize the rhythm until minutes later.

Hypothermia: Severe hypothermia lowers metabolic demand and can mask ROSC until rewarming.

Toxin clearance: In overdose cases, redistribution of drugs post-CPR may allow ROSC.

Cases of Lazarus Syndrome from Period of 2020 TO 2026

New cases of Lazarus syndrome reported from 2020–2026 in medical literature. These are confirmed cases of autoresuscitation where spontaneous circulation returned after CPR was stopped and death presumed:

Documented Cases 2020–2026

1.2026-Unassisted ROSC after ventricular fibrillation

-Patient: 94-year-old woman, no major medical history

-Details: Developed VF at home. Per advance directives, no CPR was performed. After ~10 minutes of asystole, spontaneous circulation resumed. 40 minutes later she regained consciousness with complete neurologic recovery

-Significance: First case documenting Lazarus phenomenon _without any resuscitative maneuvers_. Coronary lesions were later stented and she was discharged neurologically intact.

2.2024 -Integrative ED review: 26 cases analyzed

-Findings: Review of 26 relevant cases found 11 survivors discharged neurologically intact; average age 42.9 years.

-Timing: 88% (23/26) auto-resuscitated within 10minutes of being pronounced dead.

-Key gap: Only 5 patients had bedside echo before CPR was ceased. Authors recommend 10-min passive monitoring after CPR stops. 0e79

3.2023-Updated systematic review

-Source: Can J Anaesth_ 2023; 70: 699–712. _Autoresuscitation after circulatory arrest: an updated systematic review_.

-Scope: Analyzed published cases worldwide, updating prior reviews. Used to advise clinicians on post-CPR monitoring. 5dca

4.2021- Pediatric case, 6-min delay

- Patient: 18-month-old, previously well, unexplained cardiac arrest.

-Details: After 10 cycles of CPR, resuscitation stopped. *6 minutes later* ROSC occurred. Child survived but with significant neurological impairment.

-Note: Longest pediatric interval recorded; only 4 pediatric cases documented in literature. 0bb2

5. 2021– COVID-19 patient*

-Case: Cureus_ 2021; 13(8):e17089. Return of spontaneous circulation after cessation of prolonged CPR in a patient with COVID-19.

6.2020–Case reports in critical care

-Case: Case reports Crit care_ 2020; 2020: 8841983. “When a Dead Patient Is Not Really Dead: Lazarus Phenomenon”.

7. 2020-Public EMS case

-Patient: Timesha Beauchamp, 20, Detroit. Declared dead after 30 min CPR. Found breathing at funeral home Aug 23, 2020. Died in hospital Oct 18, 2020.

-Impact: Widely cited in EMS training on need for 10-min monitoring. ee55

8. 2019–2023 -Other notable reports

-2019: CO₂ embolism during laparoscopic cholecystectomy → delayed ROSC.

-2019: Asystole case, _Eur Heart J Case Rep_ 2019; 3(3):ytz134.

-2022: Case reports Crit care_ 2022; 2022: 3322056 “Risen Alive: The Lazarus Phenomenon”.

-2023: J Clin Med_ 2023; 12(14):4707 review.

Key trends 2020–2026

1. Timing: ~88% of cases occur within 10 min of CPR cessation. This drives current 10-min monitoring recommendations.

2. Outcomes:Most patients do not survive neurologically intact; full recovery is rare but documented.

3. Pediatric cases: Extremely rare; 6-min interval is longest reported.

4. Underreporting: Still suspected due to medicolegal fears.

Medical Intervention for Lazarus Syndrome

There is no direct treatment for Lazarus syndrome because it is recognized only after spontaneous circulation returns following the cessation of resuscitation. As a result, medical intervention focuses primarily on prevention and on appropriate management if autoresuscitation occurs. The most important preventive step is a standardized observation period after cardiopulmonary resuscitation is stopped. Current guidelines recommend continuous ECG, pulse oximetry, or arterial line monitoring for at least 10 minutes before death is certified, since roughly 88% of reported cases occur within this window. During

this period, clinicians are advised to briefly disconnect the patient from the ventilator to relieve possible auto-PEEP, which is the most commonly proposed mechanism. Bedside echocardiography to confirm true cardiac standstill and avoidance of hyperventilation during CPR are also recommended to reduce risk.

If autoresuscitation does occur, management follows standard post-cardiac arrest care: confirm true return of spontaneous circulation, resume ventilation while avoiding hyperventilation, maintain blood pressure with vasopressors if needed, and pursue targeted temperature management for comatose patients. Diagnostic workup should focus on identifying the underlying cause of the original arrest, such as myocardial infarction or pulmonary embolism, and family members should receive clear explanations about the phenomenon and prognosis. Emerging practices from 2020 to 2026 include the use of extended monitoring tools like capnography and the adoption of written “stand-down” checklists that mandate a timed observation before death declaration. Overall, the only evidence-based intervention specific to Lazarus syndrome is the 10-minute monitored observation period; all other care mirrors established post-arrest protocols.

Pathophysiology:

No single mechanism accounts for all cases, and most are considered multifactorial. Dynamic hyperinflation and auto-PEEP from positive pressure ventilation is the most widely accepted explanation, as intrathoracic pressure impairs venous return during CPR and resolves when ventilation ceases. Delayed circulation of peripherally administered resuscitation drugs, myocardial stunning after prolonged ischemia, and transient metabolic disturbances are also implicated. The timing of autoresuscitation is clinically significant: a 2024 integrative review of 26 ED cases found that 88% of patients who experienced ROSC did so within 10 minutes of CPR termination. This finding has directly shaped current recommendations for a minimum 10-minute observation period before death certification.

Clinical Outcomes and Prognosis

While the term “Lazarus syndrome” evokes images of miraculous recovery, outcomes remain poor. In the same 2024 review, only 11 of 26 patients survived to hospital discharge neurologically intact, and these survivors were notably younger, with a mean age of 42.9 years versus 62.6 years for non-survivors. The majority of patients experience transient ROSC followed by re-arrest, or survive with severe neurological impairment. A 2026 case is notable for documenting full neurological recovery after 10 minutes of asystole without any resuscitative measures underscoring that physiology is still incompletely understood.

Diagnostic and Ethical Implications

Lazarus syndrome challenges the operational definition of death and exposes gaps in resuscitation termination protocols. Historically, death was declared immediately after CPR cessation, often without continued monitoring. The data now suggest this practice risks misdiagnosis. Only 19% of reported cases documented bedside echocardiography before stopping efforts, indicating that cardiac standstill is frequently presumed rather than confirmed. Ethically, premature declaration creates distress for families, erodes trust in medical providers, and complicates organ donation protocols. The 2026 case also highlighted conflicts between advance directives and unexpected recovery, emphasizing the need for precise, scenario-specific end-of-life planning.

Prevention and System Changes

The only evidence-based intervention is procedural: a standardized 10-minute period of passive monitoring with ECG, SpO₂, or arterial line before death certification. Disconnecting the ventilator to relieve auto-PEEP, avoiding hyperventilation during CPR, and using bedside ultrasound to confirm cardiac standstill are now recommended by multiple resuscitation councils. Some centers have adopted formal “stand-down” checklists to ensure compliance. Despite this, uptake is inconsistent, and pediatric cases present additional challenges due to rarity and limited data.



Limitations in Current Knowledge

The literature is limited to case reports and small reviews, precluding robust statistical analysis. Publication bias likely favors dramatic or positive outcomes. No prospective studies exist, as the phenomenon cannot be ethically induced or predicted. Future research requires systematic reporting registries and uniform definitions of “CPR termination” and “time of death” to determine true incidence and modifiable factors.

Conclusion:

Lazarus syndrome is rare but clinically significant. Awareness has improved protocols, yet gaps in monitoring and education persist. The phenomenon underscores the complexity of defining death in the modern era and reinforces that resuscitation science must balance certainty with humility. Continued emphasis on 10-minute post-CPR observation, use of bedside ultrasound, and transparent family communication represents the current standard of care until further data emerge.

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