Perspective/Viewpoint

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Intubation in cardiac arrest: a routine or rational lifesaving act?

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Cardiac arrest is defined as the cessation of cardiac action, which results in unresponsiveness, absence of normal breathing, and lack of signs of circulation.[1] A study by Hessulf et al. (2023) found the prevalence of out-of-hospital cardiac arrest (OHCA) among people younger than 30 years, totaling 4804 instances. Despite major breakthroughs in the understanding and treatment of cardiac arrest, survival rates remain low.[2]

Among the many interventions integrated into Advanced Cardiovascular Life Support (ACLS) algorithms, endotracheal intubation plays a prominent yet controversial role. According to the American Heart Association ACLS guidelines, advanced airway management aims to secure a patent airway, provide effective ventilation, and minimize the risk of aspiration.[3] Theoretically, endotracheal intubation guarantees the establishment of a secure airway and facilitates optimal oxygenation and ventilation during the resuscitation phase. In patients with compromised airways or inadequate bag-valve-mask ventilation, endotracheal intubation is considered the gold standard for airway control.[4]

However, the role of endotracheal intubation during cardiac arrest has recently been reconsidered. Several studies have reported that patients who underwent intubation during resuscitation had lower survival rates than those who did not.[5,6] Emerging evidence suggests that, despite its advantages, intubation during ongoing chest compressions may paradoxically contribute to delays in the delivery of high-quality cardiopulmonary resuscitation (CPR), particularly if performed by providers with limited experience in airway management.[7]

Studies have demonstrated that interruptions in chest compression, known as "no-flow" intervals, are associated with reduced coronary perfusion pressures and impaired chances of return of spontaneous circulation (ROSC). Another critical aspect is the potential complications associated with endotracheal intubation during cardiac arrest.[8] Moreover, in resource-limited settings or prehospital environments, the availability of skilled airway providers and advanced airway equipment may be inconsistent, compounding the risk of adverse events and limiting the feasibility of intubation.[9]

In Fig. 1, our proposed algorithm illustrates a comprehensive and structured approach to manage in-hospital cardiac arrest (IHCA). This algorithm emphasizes the importance of immediate action upon recognition of cardiac arrest, beginning with the initiation of a CPR bundle. This bundle included essential simultaneous interventions. In cases where the patient's airway was confirmed to be patent, resuscitation efforts continued without interruption. However, when the airway is compromised, the next steps are determined based on the clinical competency and experience of the provider. Once ROSC is achieved, the algorithm mandated a systematic postresuscitation evaluation. This involves thorough clinical and laboratory assessments to identify and treat any reversible causes, including hypoxia, hypovolemia, electrolyte imbalance, or coronary ischemia. The availability of health care resources plays a pivotal role in guiding subsequent steps.

Intubation can postpone definitive management and introduce risks, including exacerbation of arrhythmias and potential hemodynamic instability. Prioritizing hemodialysis effectively corrects hyperkalemia, addresses the underlying cause, and stabilizes the patient. This highlights the importance of cause-directed treatment, as opposed to aggressive interventions, leading to improved outcomes and reduced complications.[10]

Cardiopulmonary resuscitation bundle approach

The "CPR bundle" approach highlights the importance of 4 essential interventions performed simultaneously during cardiac arrest: (1) initiation of oxygen therapy, (2) establishment of intravenous (IV) access, (3) blood sample collection, and (4) attachment of cardiac monitoring. These interventions aim to optimize the initial support for perfusion and ventilation, while preparing diagnostic data to identify reversible causes. This simultaneous approach is considered more effective than the conventional sequential strategy because it enables the early detection of arrhythmias, electrolyte disturbances, and hypoxia.

Adequate oxygenation during CPR plays a pivotal role in achieving ROSC. Insufficient cellular oxygen delivery leads to a shift toward anaerobic metabolism, which, if prolonged, may result in irreversible cellular injury, multiorgan failure, and ultimately death.[11] The establishment of IV access offers multiple advantages during cardiac arrest management, including the administration of emergency medications, fluid resuscitation, and acquisition of blood samples for diagnostic purposes. The IV route remains the primary recommended route of drug delivery during resuscitation.[12] However, in situations where IV access cannot be promptly secured, alternative routes, such as intraosseous (IO) or central venous access, may be considered. These alternatives should be selected after careful evaluation of their respective benefits and limitations in a clinical setting.[13]

All data generated or analyzed during this study are included in this published article.

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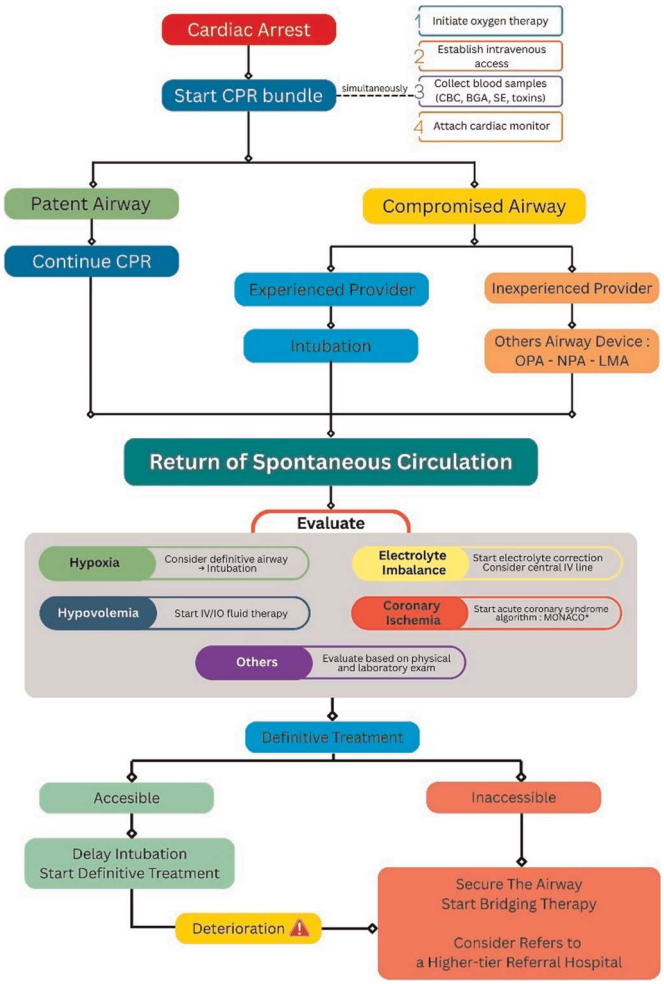

Figure 1. Proposed algorithm for in-hospital cardiac arrest. BGA, blood gas analysis; CBC, complete blood count; IO, intraosseus; IV, intravenous; LMA, laryngeal mask airway; MONACO, morphine, oxygen, nitrate, aspirin, and clopidogrel; NPA, nasopharyngeal airway; OPA, oropharyngeal airway; SE, serum electrolytes.

Evaluation of the airway status

During ongoing CPR, it is essential to evaluate airway status. If the airway is patent, resuscitation efforts continue uninterrupted to achieve known as "no-flow" intervals.[14] In case of a compromised airway, the management approach depends on the experience of the provider. An experienced provider should proceed with endotracheal intubation to secure the airway, whereas an inexperienced provider should use alternative airway adjuncts such as an oropharyngeal airway, nasopharyngeal airway, or laryngeal mask airway.

The study demonstrated that the proportion of patients with favorable neurological outcomes at 30 days was comparable between the 2 groups, showing that the choice between supraglotic airway and endotracheal tube did not result in a statistically significant difference in patient outcomes at 30 days (95% confidence interval, −1.6% to 0.4%).[15] Evidence suggests that when used appropriately, these basic tools and supraglottic devices can provide airway support comparable to endotracheal intubation in certain emergency contexts.[15] However, if a skilled provider is available, endotracheal intubation remains the preferred method to ensure a definitive airway and reduce the risk of aspiration.

Post-ROSC evaluation and referral

Upon achieving ROSC, the patient must be systematically evaluated to allow prompt initiation of definitive treatment. This algorithm identifies 4 primary categories of reversible causes: (1) hypoxia, which may necessitate definitive airway management; (2) hypovolemia, addressed through IV or IO fluid resuscitation; (3) electrolyte imbalances, managed through immediate correction with consideration of central IV access; and (4) coronary ischemia, which requires implementation of acute coronary syndrome protocols such as MONACO (morphine, oxygen, nitrates, aspirin, clopidogrel, and other indicated agents). Further evaluation should be guided by physical examination and laboratory results. These 4 categories are prioritized based on the principles of airway, breathing, and circulation (ABC); their incidence; and the feasibility of intervention, even in resource-limited or rural settings.[1]

This structured approach enhances clinical decision-making and has been associated with improved long-term outcomes in patients after cardiac arrest. If definitive treatment is accessible, it should be initiated promptly, with the decision to delay intubation based on patient stability. However, if definitive treatment is not immediately accessible, or if the condition worsens after definitive treatment, the focus should shift to securing the airway, initiating bridging therapy to sustain circulation and oxygenation, and considering referral to a higher-tier referral hospital for advanced care. If the patient's condition worsened, the patient was immediately referred to a higher-tier referral hospital.

This systematic approach underscores the importance of adapting resuscitation strategies to provide expertise and available resources, while continuously reassessing airway management, reversible causes, and treatment pathways to improve outcomes in patients with IHCA.

Conflict of interest statement

The authors declare no conflict of interest.

Author contributions

The study was conceptualized and supervised by Semedi BP. Utami NP conducted data analysis and drafted the manuscript. Both authors contributed to critical revision of the manuscript and approved the final version for submission.

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Ethical approval of studies and informed consent

Not applicable.

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