

# Introduction

- Effective cardiopulmonary resuscitation (CPR) is critical for improving survival outcomes in cardiac arrest.
- End-tidal carbon dioxide (ETCO<sub>2</sub>), the concentration of  $CO_2$  at exhalation, has emerged as a real-time, noninvasive indicator of cardiac output during resuscitation, with higher ETCO<sub>2</sub> levels correlating with improved perfusion and return of spontaneous circulation (ROSC).
- Algorithm-guided ETCO<sub>2</sub>-based CPR introduces a datadriven approach to optimize chest compression depth, rate, and ventilation in real time, maximizing physiological effectiveness and potentially transforming current CPR practices.

Method	Chest Compression Rate (compressions/min)	Epinephrine Administration Rate (minutes between doses)
Standard CPR	100	every 4 min
ETCO <sub>2</sub> - Guided Algorithm CPR	Initially 100; <u>If ETCO<sub>2</sub>&lt;30 torr,</u> <u>increase by 10;</u> (Note: Up to max 150)	Initially every 4 min; <u>If ETCO<sub>2</sub>&lt;30 torr,</u> increase to every 2 min

**Table 1:** The difference between standard CPR and ETCO<sub>2</sub>-guided CPR.

# Objectives

### Hypothesis

- Use of an ETCO2-guided resuscitation algorithm will improve rates of return of spontaneous circulation (ROSC) as compared with standard CPR.
- Use of an ETCO2-guided resuscitation algorithm will improve intra-arrest hemodynamics.

#### **Specific Aims**

- Enhance the analysis of CPR physiological waveform data by implementing advanced data preprocessing, evaluation, hypothesis-driven statistical and comparative analysis.
- Apply statistical tests, including 2-way ANOVA, to assess the impact of data aggregation intervals on analytical outcomes.
- Compare findings to the initial study to evaluate whether increased experimental granularity yields comparable or novel insights. If so, use to motivate future clinical trials.

# **Comparative Analysis of Standard vs. End-Tidal Carbon Dioxide-Guided Pediatric Cardiopulmonary Resuscitation**

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![](_page_0_Picture_20.jpeg)

- No apparent significance was found in MVP and ITP between
- Analysis supports future clinical trials to validate and optimize