

**EXPLORING THE POWER OF PREHOSPITAL DUAL SEQUENTIAL
DEFIBRILLATION IN OVERCOMING REFRACTORY CARDIAC ARREST**

Supplementary File

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CHARACTERISTICS OF A META-ANALYSIS CONDUCTING PROCESS

The Preferred Publishing Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [1] and the MOOSE standards for publishing systematic reviews and meta-analyses of observational studies [2] were followed in this systematic review and meta-analysis. Before beginning the study, all authors agreed on the analysis methodologies as well as the inclusion and exclusion criteria that would be used. This meta-analysis study's protocol has not been registered.

Search strategy

PubMed, EMBASE, and Scopus, Web of Science and Cochrane Library databases were searched for relevant papers since the inception of these databases. The most recent search was conducted on April 15, 2023. "cardiac arrest" OR "out of hospital cardiac arrest" OR "OHCA" OR "ventricular fibrillation" OR "VF" OR "ventricular tachycardia" OR "VT" OR "CPR" OR "cardiopulmonary resuscitation" OR "sudden cardiac death" OR "survival rate" OR "mortality" OR "return of spontaneous circulation" AND "dual sequence defibrillation" OR "dual sequence shock" OR "dual sequential defibrillation" OR "dual sequential shock" OR "DSED". Furthermore, we manually reviewed the reference lists of the most relevant items (original studies and reviews) to discover additional suitable studies that were not found in the first literature search.

Inclusion criteria and exclusion criteria

Studies included in this meta-analysis fellfield the following criteria (PICOS): (1) participants, patients with cardiac arrest due to any causes 18 years or older; (2) intervention, double sequence defibrillation; (3) comparison, standard defibrillation; (4) outcomes, detailed information for survival; (5) study design, randomized controlled trials, quazi-randomized or observational studies comparing resuscitation effects in patients with cardiac arrest.

Studies were excluded if they were reviews, case reports, conference or poster abstracts or articles not containing original data or comparator group.

Data extraction

Three authors (M.D., M.P., and L.S.) will independently conduct data abstraction using a data extraction form developed by all the review authors. The data extraction form contains study authors, year of publication, country, study design, number of participants, age, sex, type of cytokine, and cytokines levels.

Quality assessment

Three reviewers (L.S., F.C. and N.L.B.) independently extracted individual study data and evaluated studies for risk of bias using a previously piloted standardized form and the Newcastle-Ottawa scale [3].

Statistical analysis

Data synthesis and statistical meta-analysis (when possible) were carried out using Cochrane Review Manager software v.5.4 (The Cochrane Collaboration, Oxford, Copenhagen, Denmark). Outcomes were summarized using the Mantel-Haenszel Risk Ratios (RRs) or Mean Differences (MDs). All results are presented with their 95% confidence interval (CI). When the continuous outcome was reported in a study as median, range, and interquartile range, we estimated means and standard deviations using the formula described by Hozo et al. [4]. Heterogeneity

was assessed statistically using I^2 (no heterogeneity, $I^2 = 0-25\%$; moderate heterogeneity, $I^2 = 25-50\%$; large heterogeneity, $I^2 = 50-75\%$; extreme heterogeneity, $I^2 = 75-100\%$) [5]. The random effects model was used for $I^2 > 50\%$; otherwise, the fixed effects model was employed. $P < 0.05$ was taken to indicate statistical significance. Statistical testing was 2 tailed.

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Supplementary Table 1. Characteristics of included studies

| Study | Country | Study design | Double sequential external defibrillation | | | Standard defibrillation | | |
|---------------------------|-------------------|---------------------------------------------------------------|-------------------------------------------|-------------|-----------|-------------------------|-------------|-----------|
| | | | No. | Age | Sex, male | No. | Age | Sex, male |
| Beck et al., 2019 [1] | USA | Retrospective study | 71 | 62.2 (14.1) | 61 | 239 | 62.3 (14.3) | 174 |
| Cheskes et al., 2019 [2] | Canada | Retrospective cohort analysis of prospectively collected data | 51 | 61.8 (14.3) | 43 | 201 | 63.8 (15.7) | 170 |
| Cheskes et al., 2022 [3] | Canada | RCT | 144 | 63.8 (13.2) | 127 | 136 | 64.0 (14.4) | 109 |
| Emmerson et al., 2017 [4] | United Kingdom | Retrospective, observational study | 45 | 59.8 (13.8) | 42 | 175 | 62.5 (16.5) | 144 |
| Kim et al., 2020 [5] | Republic of Korea | Retrospective pilot study | 17 | 60 (18-83) | 14 | 21 | 65 (18–93) | 17 |
| Ross et al., 2016 [6] | USA | Retrospective cohort analysis of prospectively collected data | 50 | 59.4 | 38 | 229 | 61.4 | 168 |

References

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Supplementary Table 2. Pooled results among DSED and standard defibrillation.

| Outcome | No. of studies | Event / Participants | | Events | | Heterogeneity between Trials | | p value for Differences across Groups |
|--------------------------------|----------------|----------------------|--------------------|--------|---------------|------------------------------|---------------------------|---------------------------------------|
| | | DSED | Standard defib. | OR | 95%CI | p-value | I ² statistics | |
| ROSC at any time | | | | | | | | |
| <i>RCT</i> | 1 | 58/125 (46.4%) | 36/136 (26.5%) | 2.40 | 1.43 to 4.04 | NA | NA | <0.001 |
| <i>N-RCT</i> | 4 | 68/216 (31.5%) | 334/840 (39.8%) | 0.65 | 0.47–0.91 | 0.15 | 43% | 0.01 |
| Survival to hospital admission | | | | | | | | |
| <i>RCT</i> | – | – | – | – | – | – | – | – |
| <i>N-RCT</i> | 4 | 65/182 (35.7%) | 238/660 (36.1%) | 1.24 | 0.53 to 2.87 | 0.003 | 78% | 0.62 |
| Survival to hospital discharge | | | | | | | | |
| <i>RCT</i> | 1 | 38/125 (30.4%) | 18/135 (13.3%) | 2.84 | 1.52 to 5.31 | NA | NA | 0.001 |
| <i>N-RCT</i> | 4 | 23/182 (12.6%) | 101/660 (15.3%) | 0.72 | 0.43 to 1.19 | 0.13 | 48% | 0.20 |
| SHD with CPC 1-2 | | | | | | | | |
| <i>N-RCT</i> | 1 | 3/50 (6%) | 26/229 (11.4%) | 0.50 | 0.14 to 1.72 | NA | NA | 0.27 |
| CPC 1-2 at 12mo | | | | | | | | |
| <i>N-RCT</i> | 1 | 5/17 (29.4%) | 2/21 (9.5%) | 3.96 | 0.66 to 23.76 | NA | NA | 0.13 |