Supplementary Online Content

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Supplement. Supplemental methods
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This supplementary material has been provided by the authors to give readers additional information about their work.

SUPPLEMENTAL METHODS

Systematic search – previous randomized clinical trials

We searched PubMed to identify randomized clinical trials performed in adult in-hospital cardiac arrest patients and published within the past 30 years (September 10, 1988 to September 10, 2018). We used a combination of search terms for "cardiac arrest" and "hospitalization" and adopted a search filter (the sensitivity- and precision-maximizing version) developed by the Cochrane Collaboration to identify randomized trials (Box S1).[1] The bibliographies of included articles were reviewed for additional citations. We only considered articles published in English. We included studies that used quasi-randomization (e.g., randomization by month). We excluded simulation studies as well as studies mainly including out-of-hospital cardiac arrest patients and only in-hospital cardiac arrest patients in the emergency department.

Box S1. Search strategy for identifying randomized clinical trials in PubMed

("heart arrest"[MH] OR cardiac arrest*[TW] OR "death, sudden, cardiac"[MH] OR cardiovascular arrests[TW] OR asystole[TW] OR pulseless electrical activity[TW] OR "ventricular fibrillation"[MH] OR pulseless ventricular tachycardia[TW] OR cardiopulmonary arrest*[TW] OR "cardiopulmonary resuscitation"[MH] OR CPR[TW])
AND
(in-hospital[TW] OR in-house[TW] OR ward[TW] OR "floor"[TW] OR ICU[TW] OR intensive care[TW] OR "intensive care units"[MH] OR critical care[TW] OR "critical care"[MH] OR hospitalized[TW] OR "hospitalization"[MH] OR emergency room[TW] OR emergency department[TW] OR "emergency service, hospital"[MH])
AND
(randomized controlled trial[PT] OR controlled clinical trial[PT] OR randomized[TIAB] OR placebo[TIAB] OR clinical trials as topic[MESH: NOEXP] OR randomly[TIAB] OR trial[TI])
AND
(English[LA])
AND
("1988/09/10"[PDAT]:"2018/09/10"[PDAT])
NOT
(letter[PT] OR comment[PT] OR editorial[PT])
NOT
(animals[MH] NOT humans[MH])

The search strategy (performed on September 10, 2018) identified a total of 836 articles of which 22 full-text articles were assessed for eligibility and included for data extraction. One additional study was included through review of article citations.

Systematic search – ongoing randomized clinical trials

We searched the International Clinical Trials Registry Platform (performed on October 11, 2018) for the term *cardiac arrest* and identified 846 unique records, of which 532 (63%) were registered as interventional

studies (randomized and non-randomized). Out of the 532 interventional studies, 7 (1.3%) were randomized clinical trials performed specifically in adult in-hospital cardiac arrest patients (not including trials including both in-hospital and out-of-hospital cardiac arrests, non-randomized or single-arm trials, and trials on mannikins or simulations). Three of the trials were listed as currently recruiting participants and four of the trials were listed as having an unknown recruitment status. To optimize sensitivity, we performed an additional search for the term *cardiac arrest* (filters: recruiting, interventional study type) on ClinicalTrials.Gov (performed on October 11, 2018). Out of 85 records (most of which were overlapping with the search on the International Clinical Trials Registry Platform) we identified one additional ongoing randomized clinical trial in adult in-hospital cardiac arrest patients.

Systematic search – registries

To identify existing registries, we searched PubMed to identify studies describing or using data from cardiac arrest registries within the past five years (September 19, 2013 to September 19, 2018) (Box S2). Informal searches (including the International Clinical Trials Registry Platform), review of selected citations[2], and consultation with experts within the field (including the basic life support and advanced life support task forces at ILCOR) were performed to identify additional registries. We only considered ongoing multicenter registries collecting data on adult in-hospital cardiac arrest patients. We excluded registries not specific to cardiac arrest patients, registries collecting data locally (i.e. at one or a few hospitals), and registries no longer collecting data as of September 2018.

Box S2. Search strategy for identifying national in-hospital cardiac arrest registries

(“heart arrest”[MH] OR cardiac arrest*[TW] OR “death, sudden, cardiac”[MH] OR cardiovascular arrests[TW] OR asystole[TW] OR pulseless electrical activity[TW] OR “ventricular fibrillation”[MH] OR pulseless ventricular tachycardia[TW] OR cardiopulmonary arrest*[TW] OR “cardiopulmonary resuscitation”[MH] OR CPR[TW])
AND
(in-hospital[TW] OR in-house[TW] OR ward[TW] OR “floor”[TW] OR ICU[TW] OR intensive care[TW] OR “intensive care units”[MH] OR critical care[TW] OR “critical care”[MH] OR hospitalized[TW] OR “hospitalization”[MH] OR emergency room[TW] OR emergency department[TW] OR “emergency service, hospital”[MH])
AND
(registries[MH] OR register*[TIAB] OR registry[TIAB] OR registries[TIAB])
AND
(English[LA])
AND
("2013/09/19"[PDAT]:"2018/09/19"[PDAT])
NOT
(letter[PT] OR comment[PT] OR editorial[PT])
NOT
(animals[MH] NOT humans[MH])

The search strategy (performed on September 19, 2018) identified a total of 542 articles from which 7 unique registries were included for further data extraction. Two additional registries were included through informal searches, review of citations, and expert consultation.

eTable 1. Overview of ongoing randomized clinical trials in in-hospital cardiac arrest

Title	ID	Country	Intervention	Control	Enrollment Target (n)	Recruitment Status	Estimated Completion Date
Vasopressin and Methylprednisolone for In-Hospital Cardiac Arrest	NCT03640949	Denmark	Vasopressin and methylprednisolone	Placebo	492	Recruiting	December, 2021
Thiamine vs. Placebo to Increase Oxygen Consumption After Cardiac Arrest	NCT02974257	USA	Thiamine	Placebo	100	Recruiting	August, 2021
Mechanical and Manual Chest Compressions for Resuscitation in In-Hospital Cardiac Arrest	ISRCTN38139840	UK	Mechanical chest compressions (LUCAS-2 or LUCAS-3 device)	Manual chest compressions	360	Recruiting	September, 2019
Manual and Mechanical Chest Compression During In-hospital Witnessed Cardiac Arrests Using Cerebral Oximetry[a]	NCT03238287	Turkey	Mechanical chest compressions (LUCAS-2 device)	Manual chest compressions	126	Recruiting	July, 2019
Targeted Temperature Management After In-Hospital Cardiac Arrest	NCT02578823	South Korea	Targeted temperature management at 36°C	Conventional treatment	60	Unknown	April, 2018
Alternative Resuscitation Approach to Improve Outcomes of Cardiac Arrest	ChiCTR-ICR-14005480	China	Cardiopulmonary resuscitation with quality control	Traditional resuscitation efforts	600	Unknown	December, 2016
Hypothermia After In-Hospital Cardiac Arrest	NCT00457431	Germany	Therapeutic hypothermia at 32-34°C	Standard therapy	440	Unknown	April, 2016
Comparison of Manual Resuscitation with Resuscitation Using a Mechanical Device in Patients with In-Hospital Cardiac Arrest[b]	CTRI/2013/07/003840	India	Mechanical chest compressions (AUTOPULSE® device)	Manual chest compressions	90	Unknown	Not Reported

[a] Identified on ClinicalTrials.Gov

[b] Including patients with a cardiac arrest in the Emergency Department

eTable 2. Multicenter registries of in-hospital cardiac arrest patients[a]				
Registry	**Country**	**Year launched**	**Number of records[b]**	**Website**
Danish In-Hospital Cardiac Arrest Registry (DANARREST)	Denmark	2013	7,000 (Dec. 2017)	www.rkkp.dk/om-rkkp/de-kliniske-kvalitetsdatabaser/danarrest/
German Resuscitation Registry	Germany	2007	20,000 (Dec. 2017)	www.reanimationsregister.de
Get With The Guidelines – Resuscitation	United States	2000	328,000 (Jan. 2018)	www.heart.org/en/professional/quality-improvement/get-with-the-guidelines/get-with-the-guidelines-resuscitation/
In-Hospital Emergency Registry in Japan	Japan	2010	Not available	www.ihecj.jp/about-ihecj/
International Cardiac Arrest Registry[c]	Europe and North America	2004	Not available	www.intcar.org
National Cardiac Arrest Audit	United Kingdom	2012	77,000 (Mar. 2017)	www.resus.org.uk/research/national-cardiac-arrest-audit/
Norwegian Cardiac Arrest Registry	Norway	2016	Not available	www.kvalitetsregistre.no/registers/norsk-hjertestansregister/
Penn Alliance for Therapeutic Hypothermia Registry[c]	United States	2007	2,700 (Sept. 2018)	www.med.upenn.edu/resuscitation/hypothermia/
Swedish Registry of Cardiopulmonary Resuscitation	Sweden	2005	23,500 (Dec. 2017)	www.shlrsjh.registercentrum.se

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[b] Approximate number of adult cardiac arrests per date given in parenthesis

[c] Only including post-cardiac arrest patients

REFERENCES

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2. Booth, A., et al., *Resuscitation registers: How many active registers are there and how many collect data on paediatric cardiac arrests?* Resuscitation, 2018. **129**: p. 70-75.