Electronic Supplementary Material to:

Extracorporeal Cardiopulmonary Resuscitation in Patients with Traumatic Cardiac Arrest during the Acute Phase following Injury: A Comprehensive Systematic Review and Meta-Analysis

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Electronic Supplementary Material Table E1. Methodology of the second search of this systematic review of the literature.

Aim	to identify subjects with TCA, who were included in randomised, controlled trials or non-randomised studies on ECPR
Type of publications considered	original, peer-reviewed research articles including randomized controlled trials, prospective or retrospective cohort studies
Publications excluded	case series, case reports, trial protocols, systematic reviews, meta-analyses, narrative reviews or studies only published as abstracts or posters, as well as publications in non-peer reviewed journals
Patients	trauma patients experiencing a TCA during the acute phase following injury
Age restrictions	none
Intervention	ECPR
Information source	National Library of Medicine MEDLINE through PubMed® at https://pubmed.ncbi.nlm.nih.gov as well as hand search of reference lists and review articles
Search terms	((“extracorporeal cardiopulmonary resuscitation”) OR (“ecpr”)) AND (("randomized controlled trial"[Publication Type]) OR ("observational study"[Publication Type]))
Publication dates	January 1, 1966 until November 30, 2025
Language restriction	none
Number of reviewers	two (RE, MK)
Data extraction	identical to search 1 (see Methods section)

Electronic Supplementary Material Table E2. 2020 PRISMA checklist.

Section and Topic	Item #	Checklist item	Location where item is re-ported
TITLE			
Title	1	Identify the report as a systematic review.	Title page 1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	Done page 2 & 3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	Introduction page 4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	Introduction page 5
METHODS			
Eligibility crite-ria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	Methods page 7 & ESM
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	Methods page 7 & ESM
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	ESM Table E1 & E3

Section and Topic	Item #	Checklist item	Location where item is reported
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	Methods page 7 & 8 ESM Table E1
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	Methods page 8
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	Methods page 8
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	Methods page 6 & 8
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	Methods page 8
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	Methods page 8 & 9
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	not applicable
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	Methods page 8
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	Methods page 8 & 9

Section and Topic	Item #	Checklist item	Location where item is reported
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	Methods page 8 & 9
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	not applicable
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	not applicable
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	not applicable
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	not applicable
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	Figure 1
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	Results page 10 & Figure 1
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	ESM Figure E1
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figure 1 & Table 1

Section and Topic	Item #	Checklist item	Location where item is reported
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	Results page 10 & ESM Figure E1
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	Results page 10-12 Table 2
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	not applicable
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	not applicable
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	not applicable
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	not applicable
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	Discussion page 13-17
	23b	Discuss any limitations of the evidence included in the review.	Discussion page 17
	23c	Discuss any limitations of the review processes used.	Discussion page 17
	23d	Discuss implications of the results for practice, policy, and future research.	Discussion page 16 & 17

Section and Topic	Item #	Checklist item	Location where item is reported
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	Methods page 7
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	Methods page 7
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	Methods page 8
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Page 19
Competing interests	26	Declare any competing interests of review authors.	Page 19
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	Page 19

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Electronic Supplementary Material Table E3. Search terms used for the first search of this systematic review of the literature.

Search terms used for screening the National Library of Medicine MEDLINE through PubMed® at https://pubmed.ncbi.nlm.nih.gov
("Extracorporeal Membrane Oxygenation"[MeSH Terms] OR "venoarterial extracorporeal membrane oxygenation"[tiab] OR "veno-arterial ECMO"[tiab] OR "veno arterial ECMO"[tiab] OR "va-ecmo"[tiab] OR "va ecmo"[tiab] OR "venoarterial ECMO"[tiab] OR "extracorporeal life support"[tiab] OR "ECLS"[tiab] OR "extracorporeal cardiopulmonary resuscitation"[tiab] OR "ECPR"[tiab]) AND ("Heart Arrest"[MeSH Terms] OR "Cardiopulmonary Resuscitation"[MeSH Terms] OR "cardiorespiratory arrest"[tiab] OR "cardiorespiratory failure"[tiab] OR "cardiopulmonary arrest"[tiab] OR "cardiac arrest"[tiab] OR "heart arrest"[tiab] OR "circulatory arrest"[tiab] OR "CPR"[tiab] OR "resuscitative thoracotomy"[tiab] OR "resuscitation"[tiab] OR "pulseless electrical activity"[tiab] OR "PEA"[tiab] OR "asystole"[tiab] OR "ventricular fibrillation" [tiab] OR "VF" [tiab] OR "pulseless ventricular tachycardia" [tiab]) AND ("Wounds and Injuries"[MeSH Terms] OR

"Multiple Trauma"[MeSH Terms] OR
"Trauma, Nervous System"[MeSH Terms] OR
"Brain Injuries"[MeSH Terms] OR
damage*[tiab] OR
trauma*[tiab] OR
injur*[tiab] OR
fractur*[tiab])

Electronic Supplementary Material Figure E1. Results of the risk of bias assessment of selected studies.

Newcastle-Ottawa Scale for Cohort Studies (*n*=4)

First author, year	Selection				Comparability		Outcome		
	Represent-ativeness of the exposed cohort	Selection of the non-exposed cohort	Ascertain-ment of exposure	Demonstrat-ion that outcome of interest was not present at start of study	Study controls for _____	Study controls for an additional factor	Assessment of outcome	Was follow-up long enough for outcome to occur	Adequacy of follow up of cohorts
Bonacchi, 2013			*	*			*	*	*
Lang, 2019			*	*			*	*	*
Owattana-panich, 2021			*	*			*	*	*
Erblich, 2025			*	*			*	*	*

JBI Critical Appraisal Checklist for Case Series (*n*=2)

First author, year	Clear inclusion criteria?	Condition measured in a standard, reliable way?	Valid methods used for identific-ation of the condition?	Conse-cutive inclusion of part-icipants?	Complete inclusion of part-icipants?	Clear reporting of demog-raphics?	Clear reporting of clinical inform-ation?	Outcomes or follow-ups of cases clearly reported?	Clear reporting of the presenting site demo-graphic inform-ation?	Statistical analysis appro-priate?
Tseng, 2014										

Huh, 2017										

JBI Critical Appraisal Checklist for Case Reports (*n*=3)

First author, year	Patient demographics clearly described?	Patient history described and presented as timeline?	Clinical condition clearly described?	Diagnostic tests or assessment methods clearly described?	Interventions or treatment procedures clearly described?	Post-intervention clinical condition clearly described?	Adverse events (harms) or unanticipated events identified and described?	Takeaway lessons provided?
Gatti, 2014								
Kudo, 2017								
Hiramatsu, 2020								

yes unclear no not applicable