



# Does targeting a higher versus lower MAP improve survival following out-of-hospital cardiac arrest?

Alie Wudwud<sup>1</sup> · Ariel Hendin<sup>2</sup> · Jeffrey Perry<sup>3</sup>

Received: 20 January 2023 / Accepted: 24 March 2023 / Published online: 23 April 2023

© The Author(s), under exclusive licence to Canadian Association of Emergency Physicians (CAEP)/ Association Canadienne de Médecine d'Urgence (ACMU) 2023

**Full Citation:** Kjaergaard J et. al. Blood-Pressure Targets in Comatose Survivors of Cardiac Arrest. *N Engl J Med.* 2022; 387: 1456–1466

**Article:** Therapy

**Ratings:** *Methods* 4/5.; *Usefulness* 4/5

## Introduction

### Background

There is currently limited evidence to support the choice of blood pressure targets for survivors of Out of Hospital Cardiac Arrest (OHCA).

### Objectives

This study assessed if a higher or lower mean arterial pressure (MAP) target is superior in preventing death/anoxic brain injury in comatose survivors of OHCA.

## Methods

### Design

Double-blind, randomized controlled trial.

### Setting

Two tertiary cardiac arrest centers in Denmark.

### Subjects

Included patients > 18 years with OHCA of presumed cardiac cause, with GCS < 9. Excluded- acute stroke or intracranial hemorrhage, unwitnessed asystole.

### Intervention

A MAP target of 63 versus 77 mmHg.

### Outcomes

#### Primary

Composite of death from any cause or hospital discharge with a Cerebral Performance Category of 3 or 4 within 90 days [categories range from 1 (no symptoms) to 5 (death)].

#### Secondary

Neuron-specific enolase levels at 48 h, death from any cause, scores on the Montreal Cognitive Assessment, the Modified Rankin Scale at 3 months.

## Main results

The two groups were well-balanced overall, only with more patients in the higher BP target group that had an arrest in a public setting (37 vs. 29%).

Among 789 patients included in the intention-to-treat analysis (ITT), the primary-outcome event of death or severe disability or coma within 90 days occurred in 133 patients (34%) in the high-target group and in 127 patients (32%) in

✉ Alie Wudwud  
awudwud@toh.ca

<sup>1</sup> Department of Emergency Medicine, University of Ottawa, Ottawa, ON, Canada

<sup>2</sup> Department of Emergency Medicine; Department of Critical Care, Hôpital Montfort, The Ottawa Hospital, Ottawa, ON, Canada

<sup>3</sup> Ottawa Hospital Research Institute, Ottawa, ON, Canada

the low-target group (HR 1.08; 95% CI 0.84–1.37;  $P=0.56$ ). There was no difference between groups in the prespecified subgroups including hypertension, renal impairment, COPD, shockable rhythm, STEMI. In the high-target group, 31% of patients died within 90 days as compared to 29% in the low-target group. There were no significant differences in the secondary outcomes between the two groups. Notably, the number of patients available for follow-up of cognitive testing was quite low at three months.

## Appraisal

### Strengths

- Meaningful question with little current evidence to guide practice
- Double-blind intervention trial
- Sample size was large and appropriately powered
- Outcomes in terms of mortality were approximately as expected: 32% and 34%
- Managed to show a separation between groups with a mean difference in MAP of 10.7 mmHg
- Results were consistent across objective outcomes
- Performed prespecified subgroup analyses of the primary outcome

### Limitations

- This study only enrolled patients with a suspected cardiac cause of cardiac arrest, and therefore the results may not apply to patients with other etiologies of cardiac arrest.
- Separation between groups did not occur until 2 h after randomization, so it is unclear whether interventions in the prehospital or emergency department would have changed results
- The mean difference in blood pressure between the groups was 10.7 mmHg and therefore lower than the expected value of 14 mmHg.

## Context

Two recent smaller trials compared the efficacy of different MAP targets using MRI brain imaging and neuron-specific enolase (NSE) as surrogate markers of the extent of brain

injury after OHCA. In one study, MAPs of 65–75 mmHg in the lower target group and 80–100 mmHg in the higher target group were attained, but this separation was not found to significantly affect the NSE concentration (20.6 vs 22.0 ug/L) [1]. In the Neuroprotect trial, the extent of anoxic brain injury as quantified on MRI did not differ between the 65 mmHg MAP and the 85–100 mmHg MAP target group [2]. These trials were not powered to assess clinical endpoints or safety.

In view of our local intensivists, this trial confirms current practice, which is targeting a MAP of 65 mmHg in most post-arrest patients. These findings also correspond with current guidelines for post-cardiac arrest care.

### Bottom line

When it comes to MAP targets in survivors of OHCA, we should continue to target a MAP of > 65 mmHg in a post-arrest setting [3]. The BOX Trial demonstrated that there is no benefit in terms of death from any cause or discharge from hospital with poor neurologic outcome at 90 days when targeting a MAP higher than 65 mmHg.

## Declarations

**Conflict of interest** The authors have no conflicts of interest to disclose.

## References

1. Jakkula P, Pettilä V, Skrifvars MB, et al. Targeting low-normal or high-normal mean arterial pressure after cardiac arrest and resuscitation: a randomised pilot trial. *Intensive Care Med.* 2018;44:2091–101.
2. Ameloot K, De Deyne C, Eertmans W, et al. Early goal-directed haemodynamic optimization of cerebral oxygenation in comatose survivors after cardiac arrest: the neuroprotect post-cardiac arrest trial. *Eur Heart J.* 2019;40:1804–14.
3. Nolan JP, Sandroni C, Böttiger BW, et al. European Resuscitation Council and European Society of Intensive Care Medicine guidelines 2021: post-resuscitation care. *Resuscitation.* 2021;161:220–69.