

Neurological Outcome of Non-Shockable Rhythm during CPR is Highly Dependent on the Time at Which Parameters for Multivariate Analysis Were Collected

Josef Finsterer

MD, PhD, Neurology Dpt., Neurology & Neurophysiology Center, Vienna, Austria, Orcid: 0000-0003-2839-7305

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LETTER TO THE EDITOR

We read with interest the article by Chang, *et al.* on the parameters determining the neurological outcome of 332 patients with cardiac arrest and initial non-shockable rhythm (asystole, pulsatile electrical activity (PEA)) who received target temperature management (TTM) within 12 hours after recovery of spontaneous circulation (ROSC) [Chang, H. C. *et al.*, 2025]. Multivariate analysis revealed that patients with initial PEA rhythm, higher diastolic blood pressure (DBP), no new-onset seizure and hypokalemia had a better neurological outcome as assessed by cerebral performance category (CPC) than those not meeting these criteria [Chang, H. C. *et al.*, 2025]. It was found that patients with initial non-shockable cardiac arrest who had an initial PEA rhythm, higher DBP on ROSC, hypokalemia, but no new onset seizure had a better neurologic outcome after TTM than patients who did not meet these criteria [Chang, H. C. *et al.*, 2025]. The study is noteworthy, but some points should be discussed.

The first issue is that it was not reported how CPC was assessed prior to cardiac arrest in a retrospective study. Was a clinical neurological examination performed in all patients before cardiac arrest? Was CPC assessed on the basis of recorded clinical data only? The way in which CPC was determined prior to cardiac arrest is crucial, as this can be a major source of error in the assessment of pre-existing neurological impairment.

The second issue is that it is not clear why patients who died in hospital were classified as having an unfavorable neurological outcome [Chang, H. C. *et al.*, 2025]. Since it was not been recorded whether these patients actually died from neurological complications or from cardiac or other causes, patients who died in hospital should be excluded

from the group of patients with unfavorable neurological outcome. Only patients whose death in hospital could be clearly attributed to a neurological complication should remain in this outcome group.

The third issue is that the time at which CPC was taken after the time of arrest was not fixed and was therefore not the same for each of the included patients. However, as the timing of CPC classification after cardiac arrest is crucial for recording the outcome parameters, this could be a significant limitation of the study.

The fourth point is that hypokalemia was found to be a parameter for better neurological outcome [Chang, H. C. *et al.*, 2025]. However, it was not mentioned from which point in time the potassium values were used [Chang, H. C. *et al.*, 2025]. Were the potassium levels determined on admission or were the potassium levels used during hospitalization? If potassium levels were used on admission, the hypothesis that hypokalemia could be a surrogate for aggressive therapy is not convincing, as diuretics, renal replacement therapy or insulin injections are unlikely to have been used during cardio-pulmonary resuscitation (CPR) prior to hospital admission.

In summary, this interesting study has limitations that affect the results and their interpretation. Addressing these limitations could strengthen the conclusions and support the message of the study. All unanswered questions need to be addressed before readers uncritically accept the study's conclusions. The neurological outcome of non-shockable rhythms in CPR is highly dependent on the time at which the parameters were collected for multivariate analysis.

REFERENCES

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