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Letter to the Editor

Reply to: The role of extracorporeal life support in patients with hypothermic cardiac arrest

Sir,

Thank you for the opportunity to reply to Dr. Sylweriusz Kosiński and colleagues' discussion of our systematic review[1]. We welcome and appreciate the feedback and additional insights into our study.

The primary objective of our systematic review was to assess the current state of evidence for the effect of extracorporeal membrane oxygen-assisted CPR (ECPR) on survival with good neurologic recovery after out-of-hospital cardiac arrest (OHCA), regardless of etiology. We thank Dr. Kosiński for highlighting the recent study by Pasquier et al. published in *Resuscitation* in a similar timeframe to our systematic review and the identification that hypothermic cardiac arrest warrants specific consideration with ECPR use given the greater potential for neurologic recovery[2].

We agree that there may be select subgroups that could potentially derive increased benefit from ECPR. To this end, we reported the etiology of arrest for included cohort studies (n = 12) in our publication and also for the remainder of included studies (n = 63 case series)[1]. Likewise, we intentionally did not use measures of central tendency (such as mean or median) and instead reported ranges to emphasize the degree of heterogeneity between studies. It is likely that the variation in the etiology of arrest, as well as a number of other uncontrolled confounders inherent in the case series study design contributed significantly to this heterogeneity.

Furthermore, as Dr. Kosiński and colleagues appropriately highlighted, hypothermia is a unique etiology of cardiac arrest. In this situation it is quite possible that ECPR is a treatment for the underlying etiology of the arrest, as opposed to a supportive measure to facilitate other forms of resuscitation. As such it becomes difficult to determine a comparator group against which to evaluate the impact of ECPR in this scenario. However, the original study referenced by the European Resuscitation Council Guidelines for Resuscitation explicitly stated that patients must have suffered deep hypothermia (core temperature $<28\,^{\circ}C$) and temperatures in the study ranged from 17.1 to $25.0\,^{\circ}C$[3,4]. The patients were also quiet young, with a mean age (SD) of 25.2 ($\pm$9.9). These results leave us with the same question that many clinicians face when treating a patient with ECPR; do these patients survive because of the use of ECPR or, was their premorbid condition so favourable that, they were able to survive despite the use of ECPR?

Interestingly, the two case series in question involved sample sizes of 10 and 17 patients[5,6]. These small sample sizes suggest that these unique, favourable scenarios may occur very infrequently. Regardless, in order to confirm that a specific etiology of OHCA arrest may derive a greater benefit from ECPR than other causes, conducting future studies with larger sample sizes and appropriate control groups, be it conventional CPR or less invasive warming methods, remains essential.

In summary, we believe the conclusions stated in our systematic review are appropriately conservative, emphasize the broad variability in patient selection criteria, and highlight the general lack of consistency in ECPR protocols. We thank Dr. Kosiński and colleagues for their insightful letter and agree with the need to define specific subgroups in future studies to better identify target populations that may derive the greatest benefit from ECPR.

Financial support

None.

Conflict of interest

None.

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http://dx.doi.org/10.1016/j.resuscitation.2018.10.027