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Letter to the Editor

Authors' reply

We are grateful to Drs. Soar and Hormis for their review of the recent study comparing initial access between intravenous (IV) and intraosseous (IO) during out-of-hospital cardiac arrest (OHCA) resuscitation [1]. They note the need to exercise caution in interpreting the clinical implications of the study given its retrospective design, the lack of a formal protocol for IO versus IV placement, and the methodological approach to analyses. We agree and accordingly were measured in our presentation and interpretation of the results.

As we highlight in the original publication, this study is indeed a retrospective observational investigation, though comprehensive in having included all adults treated for non-traumatic OHCA within a single emergency medical services system who required vascular access and in whom the type of access was known. The study was not a randomized trial. As a consequence, the variable of interest (IO versus IV) was not randomized. As the manuscript notes, the distribution of IO versus IV was due in part to paramedic training and practice, as paramedics are trained to prioritize an initial attempt at IV access before proceeding to IO placement. The strategy could produce selection bias and confound the comparison. As also pointed out, several characteristics that can influence resuscitation outcomes were distributed differently between the IV and IO groups.

This is precisely why the analysis undertook multivariable models to adjust for these potential confounders in an effort to assess the true relationship between IO vs IV access and outcomes. Sensitivity models even included information about the time-to-placement as a means to address potential confounding. As the limitations note, multivariable adjustment may still not adequately account for all confounding.

We agree that the study was not robustly powered to assess clinical survival outcome given the distribution of the main exposure variable and the frequency of outcome. These are in fact acknowledged as another potential explanation for the lack of a statistically significant association between access exposure and survival.

We agree that these limitations should restrain readers from

interpreting our findings as conclusive and changing clinical practice. Nonetheless, the study is the first of its kind to evaluate the relationship between the type of vascular access and clinical outcomes in resuscitation. As such, it provides a starting point to consider the question about whether mode of access may influence outcome.

Importantly, our conclusions highlight the need for additional research to investigate if and how this intervention might influence outcomes following OHCA. We hope more rigorous evaluation will be forthcoming in the near term as we strive to improve resuscitation care.

Conflict of interest

The authors have no conflicts of interest to declare.

References

- [1] Feinstein BA, Stubbs BA, Rea T, Kudenchuk PJ. Intraosseous compared to intravenous drug resuscitation in out-of-hospital cardiac arrest. *Resuscitation* 2017;117:91–6.



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