

LETTER

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Response to: influence of EMS-physician presence on survival after out-of-hospital cardiopulmonary resuscitation

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Please see related Research article by Böttiger et al. <https://ccforum.biomedcentral.com/articles/10.1186/s13054-015-1156-6>

Böttiger et al. [1] present a meta-analysis demonstrating improved outcomes after out-of-hospital cardiac arrest (OHCA) attended by emergency medical services (EMS) physicians, when compared with attendance by paramedics. Because the meta-analysis is based solely on observational studies, we wonder whether a narrative review of the literature would have allowed the reader to reach a more balanced understanding of the available evidence.

There is significant heterogeneity in study sizes, ranging from $n = 49$ to $n = 95,072$. Given that the total number of analysed cases is $n = 126,829$, the study by Yasunaga et al. [2] will inevitably dominate the results.

This is of particular importance for two reasons. Firstly, Yasunaga et al. examined only a subgroup of bystander-witnessed OHCA in Japan. Secondly, EMS physicians in Japan were provided by individual hospitals. The authors point out that 'hospitals with [EMS]-physicians typically provide more optimal post-return of spontaneous circulation treatments, including therapeutic hypothermia and percutaneous coronary intervention' [2]. While the study showed significant survival benefit associated with EMS-physician presence, it is unclear whether this benefit occurs due to advanced pre-hospital or in-hospital treatment.

The same limitations apply to the second largest study ($n = 18,462$). Hagihara et al. [3] also utilised

the national Japanese OHCA database and found improvements in survival with EMS-physician presence. The authors state that their findings 'need confirming with consideration of in-hospital treatment'.

These two Japanese studies make up nearly 90 % of the cases included in the meta-analysis. Despite this imbalance, Böttiger et al. did not perform sensitivity analysis excluding these two studies because the remaining studies 'were largely consistent in effect size' [1]. However, the effect sizes presented for a number of these studies require careful consideration.

The third-largest study by Fischer et al. [4] ($n = 4298$) is a retrospective analysis of two previous publications, independently describing survival after OHCA in the UK (paramedic-based EMS) and in Germany (physician-based EMS). While survival in Germany was significantly higher, ambulance response times were also shorter in Germany. No information is available on important prognostic factors such as age of patients or percentage of cases with shockable rhythm.

The work by Kojima et al. [5] ($n = 4144$) is a conference abstract presenting limited information. The authors again used the national Japanese OHCA database and the period of data collection overlaps with both Japanese studies described earlier.

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We agree with Böttiger et al. that the individual studies included in the meta-analysis represent the best avail-

able evidence. However, we suggest that the benefit of EMS physicians attending OHCA remains uncertain.

Authors’ response

Bernd W. Böttiger, Michael Bernhard, Jürgen Knapp and Peter Nagele

We thank Dr von Vopelius-Feldt and Dr Bengel for their interest and comments on our systematic review and meta-analysis about the positive impact of EMS-physician presence on survival after out-of-hospital cardiopulmonary resuscitation [1].

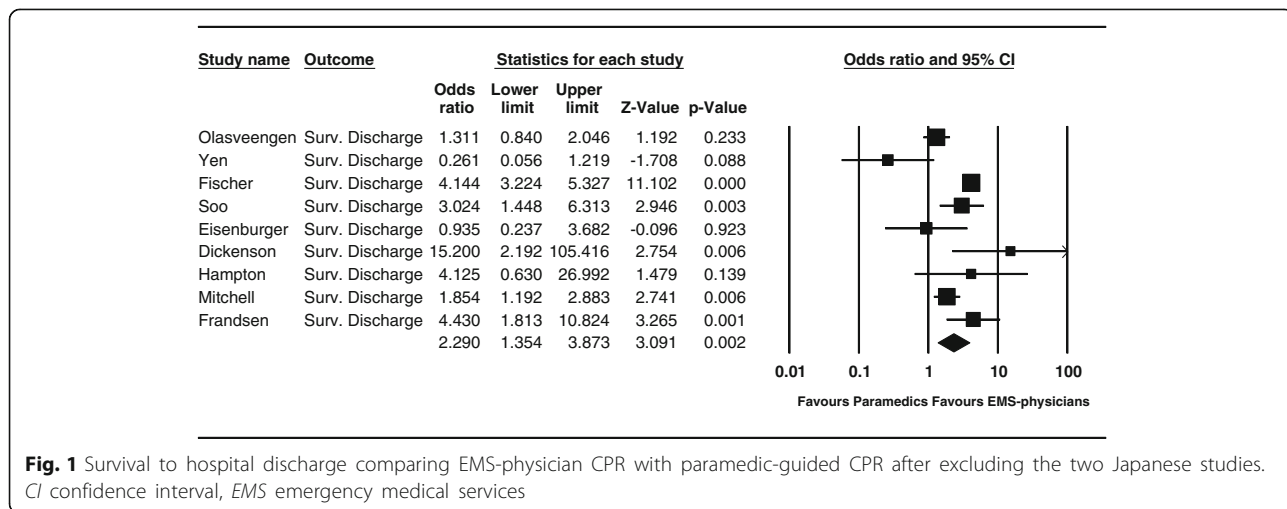
They correctly mention significant heterogeneity among the study sizes (ranging from $n = 49$ to $n = 95,072$) of patients suffering from OHCA. The pooled sample size with $n = 126,829$ was dominated by two Japanese studies [2, 3], making up nearly 90 % of all cases included in the meta-analysis. They pointed out that we did not perform a sensitivity analysis which excluded these two studies, both from a large, nationwide Japanese database. We did not present a sensitivity analysis due to the fact that all studies were largely consistent in effect size. The pooled OR for survival-to-hospital discharge for all studies was 2.03 (95 % CI: 1.48–2.79). After excluding both Japanese studies from the meta-analysis, the pooled OR for survival-to-hospital discharge was 2.29 (95 % CI: 1.36–3.87) (Fig. 1). The results were therefore consistent whether or not the Japanese studies were included in our meta-analysis.

Second, von Vopelius-Feldt and Bengel point out that the study by Fischer et al. [4] did not include

prognostic factors, such as age of patients or incidence of shockable rhythm. This observation is correct and it is theoretically possible that prognostic factors between both patient populations might differ. Fischer et al.’s study is therefore one of the methodically less valuable studies included in our analysis, but this is one of the often discussed limitations of a meta-analysis.

Third, it is correct that the cited publication by Kojima et al. [5] is a conference abstract. To our knowledge the results were not published in a peer-reviewed journal, but guidelines for systematic reviews strongly recommend the inclusion of all available evidence to reduce publication bias.

A major limitation in this whole scientific field – and as discussed in our publication [1] – is that randomised controlled trails comparing EMS-physician-guided and paramedic-guided CPR in patients suffering from OHCA will not be possible for many reasons. Therefore, all of the available evidence came from observational studies or CPR registries, resulting in an adequate level of evidence. Despite these unavoidable limitations, our systematic review provides the highest and only available evidence for the impressive effectiveness of physician-guided CPR in patients suffering from OHCA today.



Abbreviations

CI: Confidence interval; CPR: Cardiopulmonary resuscitation; EMS: Emergency medical services; OHCA: Out-of-hospital cardiac arrest; OR: Odds ratio

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Authors' contributions

JvWF prepared the first draft of the manuscript. JB revised the manuscript. JvWF and JB have read and approved the final version of the manuscript.

Competing interests

The authors declare that they have no competing interests.

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