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Editorial

Higher socioeconomic status is associated with lower in-hospital cardiac arrest: How can we address this socioeconomic inequality?



Introduction

Numerous studies have established the role of socioeconomic status (SES) in explaining observed inequalities in incidence of cardiac arrest, receipt of care (e.g. bystander cardiopulmonary resuscitation [CPR], targeted temperature management, percutaneous coronary intervention),^{1–3} and outcomes in cardiac arrest.^{4–6} These studies, however, predominantly focus on out-of-hospital cardiac arrest (OHCA) patients. Important differences exist between the OHCA and in-hospital cardiac arrest (IHCA) patient populations, specifically patient and clinical characteristics.⁷ Given the impact of SES on observed cardiac arrest inequalities, it is important to understand the association between SES and IHCA. Few studies have comprehensively examined the association between SES and likelihood of IHCA, particularly in the adult population.

Summary of the article and review of the current literature

In this issue of *Resuscitation*, Stankovic and colleagues comprehensively assessed the association of SES and IHCA using a matched case-control study design.⁸ To conduct the analysis, cases from the Danish In-Hospital Cardiac Arrest Registry (DANARREST) were matched to a general population and hospitalized controls. The authors found a lower odds of IHCA in those with higher SES compared to those with lower SES, even after adjusting for comorbidities.⁸ The authors are to be commended for exploring a critical gap in the literature, specifically, seeking to understand the impact of individual-level SES on an often neglected condition. There were several limitations to this study including potential bias introduced through selection of the control group and lack of exploration of the role of hospital in the analysis. Despite these limitations, their findings are an important contribution to the existing literature. Furthermore, this work provides additional justification for the resuscitation community to consider addressing existing socioeconomic inequalities that impact care and outcome for all cardiac arrest patients.

A recent study using data from the Swedish Register of Cardiopulmonary Resuscitation found significant differences in treatment and survival after IHCA by SES, with higher SES patients receiving earlier CPR and having a higher likelihood of successful

resuscitation.⁹ One key observation from this study was that patients with higher SES had more frequent cardiac monitoring despite the presence of fewer comorbidities prior to their arrest, which contributed to receipt of prompt treatment after cardiac arrest.⁹ The study, however, did not primarily examine the association of SES and likelihood of IHCA.

A systematic review revealed the paucity of studies primarily focused on the association of SES and IHCA.¹⁰ Of the limited available studies, the majority originated from the US, or focused on specific populations (e.g. pediatrics)¹¹ and intraoperative IHCA,¹² which reduces the generalizability of the findings. Systems with different healthcare financing models (e.g. systems with universal healthcare) or primarily adult IHCA populations are underrepresented in the current literature.¹⁰ Given these knowledge gaps, the line of inquiry pursued by Stankovic and colleagues', namely, SES and odds of all-cause adult IHCA in a European universal healthcare system, is an important contribution to the existing resuscitation literature.⁸

Findings that impact our knowledge of SES and IHCA

Most importantly, Stankovic et al. found an individual-level association with higher SES and lower odds of IHCA. This association was analyzed using several indices of SES. The relationship was established through a matched case-control study design and supported through an individual-level analysis of SES and IHCA.⁸

Due to challenges in acquiring individual-level SES data, most cardiac arrest studies have utilized census tract-level or area-level data or other SES proxies (e.g. community-level housing type), which are susceptible to the ecological fallacy.^{10,13,14} To our knowledge, Stankovic's study is the first in the resuscitation field to include multiple individual-level SES indices, many of which confer a more precise estimate of the effect of individual-level SES. Additionally, to maximize the contribution of each IHCA case in these data, the research team used a matched case-control study design. Stankovic et al.'s analysis provides insight as to the utility of other SES indices and the matched case-control design, as well as providing a foundation to inform future analyses within the resuscitation community.

This study also highlights the utility of IHCA registries and integration of multiple sources of registry data. While there is a

proliferation of large national and international OHCA registries, IHCA registries are still largely underrepresented. A recent systematic review of cardiac arrest registries revealed that only four out of 49 cardiac arrest registries focused exclusively on IHCA.¹⁵ This is an area which warrants further work.

Future directions and next steps

Prior literature has established that low SES is associated with poor processes of care and outcomes in the community and the hospital for patients of cardiac arrest.^{4,10} The work by Stankovic et al. demonstrates that higher SES is associated with a lower odds of IHCA.⁸ Given the impact of SES on both OHCA and IHCA, the resuscitation community is challenged to consider – how do we address this known socioeconomic inequality?

Important drivers of health-related socioeconomic inequalities are access to care (e.g. location of healthcare facilities) and ability to navigate the healthcare system.^{16,17} Few studies have examined how low SES cardiac arrest patients access the healthcare system and the role of the hospital and healthcare system in attenuating socioeconomic inequalities. The role of the hospital and healthcare system were underexplored in the Stankovic et al. manuscript, presenting an area ripe for future exploration, as well as an important next step in this line of inquiry.

Additionally, given the individual-level findings of this work, the role of provider bias on the association of higher SES and lower odds of IHCA is another important avenue to consider. A recent study examined potential race-related bias in the prehospital setting and found no differences by patient race and receipt of CPR.¹⁸ Future work may consider mixed-methods or qualitative methods to explore the role of the provider and potential introduction of bias based on perceived socioeconomic status.

Finally, it is critical to consider upstream approaches to address the observed inequalities with low SES patients in both the OHCA and IHCA populations. Future work within the resuscitation field may consider partnering with public health administrators, community members, and public health researchers to address the multi-faceted nature of low SES.¹⁹ While we may not be able to create a more equitable community, we can still aim to provide access to care and similar healthcare for all cardiac arrest patients regardless of socioeconomic status, gender, race, ethnicity and social status.

Conclusion

This matched case-control study is one of the first to examine the impact of individual-level SES on IHCA. The work inspires several areas for future investigation within the domains of socioeconomic inequality and cardiac arrest. Further research is needed to address socioeconomic inequality and improve outcomes for low SES patients with cardiac arrest.

Conflict of Interest Statement

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