Mortality in young adults following out-of-hospital cardiac arrest: Evidence from two nationwide propensity-matched cohorts in the United States a decade apart

To the Editor,

There have been significant improvements in the care of out-of-hospital cardiac arrest (OHCA) patients in the past decade [1–4]. Despite improving outcomes in the past decade, the overall OHCA-related mortality and disease burden among survivors measured by disease adjusted life years (DALYs) still remains high in the United States [2]. Adult patients demonstrate poor outcomes following OHCA. However, the literature remains limited regarding OHCA in young population.

In this study, we compared two OHCA cohorts (706 admissions in 2007 and 720 admissions in 2017) matched for sociodemographic and clinical characteristics and traditional cardiovascular risk factors (hypertension, hyperlipidemia and diabetes whereas the 2017 cohort showed higher frequency of obesity and smoking after propensity-score matching (Table 1).

In this study, the all-cause mortality in young patients admitted for OHCA remained steady without any significant difference between 2007 and 2017 (31.0% vs. 31.9%; p = 0.694) (Table 1). On a further subgroup analysis for sex and race disparity, there was no difference in all-cause mortality among all sex (male: 25.3% vs. 30.7%, p = 0.082; female: 38.8% vs. 33.9%; p = 0.224) and race groups (White: 25.8% vs. 31.3%, p = 0.074; African American: 35.7% vs. 38.5%, p = 0.598; Hispanic: 43.8% vs. 38.5%, p = 0.520) admitted in 2007 vs. 2017. Median length of hospital stay remains stable (4 days), however; reassuringly, 2017 cohort showed more frequent routine discharges (44.4% vs. 38.4%) and fewer transfers to short-term hospitals (9.0% vs. 13.3%) or other skilled nursing facility or intermediate care facilities (6.9% vs. 12.6%) (p < 0.001) as compared to the 2007 cohort.

There are a few limitations of this analysis which should be considered while interpreting the results. Firstly, the NIS is an administrative database so there remains a possibility of over or underdiagnoses of conditions due to coding errors. Due to discrepancy in the OHCA codes in the last few years and to comprehensively include all pertinent discharge records, we have also included codes for ventricular tachyarrhythmias consistent with previous studies [10–12]. However, the methods used to identify cases for inclusion in this study have not been validated in this population before, therefore, it is likely that they are not highly specific for OHCA and might have included some records of inpatient cardiac arrest as well. The database did not reveal follow-up data, lab findings or medication history. Moreover, due to inherent characteristics of the NIS cohort, important confounders could not be accounted for, such as location of arrest, down-time, witnessed status, bystander CPR, defibrillation, and most importantly shockable initial rhythm. These factors are important determinants of survival and may significantly influence the results and conclusions. Nonetheless, the large sample allowed us to evaluate nationally representative cohort of young OHCA admissions a decade apart.

This nationwide population-based analysis of two OHCA cohorts a decade apart establishes that despite intensive preventive efforts and improved therapeutics over the last decade, the survival to discharge has not improved in young OHCA patients in the US. The progress to improved survival rate could be partly hindered due to relatively
increased rates of obesity and tobacco smoking in young OHCA patients admitted in 2017 as compared to 2007. There was no improvement in survival rates between two cohorts across all sex or race groups which warrants a more comprehensive and inclusive approach to find and implement effective ways to curb mortality following OHCA in young population. Controlling two major risk factors in young population, including severe obesity and smoking might help achieving this goal in the next decade. Concisely, nearly 1 in 3 young OHCA admissions in the US experienced inpatient mortality without improvement in survival rate across two national cohorts selected a decade apart.

### Declaration of Competing Interest

The authors report no relationships that could be construed as a conflict of interest.

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