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Letter to the Editor

Impact of age, gender, race, and ethnicity on mortality in out-of-hospital cardiac arrest with psychiatric disorder in the United States

Sir,

We read with great interest the article by *Barcella et al.* regarding the unfavorable 30-day survival following an out-of-hospital cardiac arrest (OHCA) in 27,523 adult Danish patients.¹ We would like to contribute empirical data to this crucial topic by providing a nationwide United States (US) inpatient demographic perspective.

A majority of cardiac arrests in the US are OHCA, which have abysmal survival rates.² Although the impact of OHCA on the mental health of surviving patients is profound and has been well described,³ the impact of mental health on OHCA has not been sufficiently studied. It is essential to identify independent demographic risk factors that may influence mortality outcomes among these patients.

We utilized the US National Inpatient Sample (NIS) database (2007–2014) (<https://www.hcup-us.ahrq.gov/nisoverview.jsp>) to analyze the frequency of OHCA related hospitalizations in adult patients with co-existing psychiatric disorders and their impact on in-patient mortality. OHCA-related admissions were identified using ICD-9 code 427.5 to evaluate all primary discharge diagnoses.⁴ Psychiatric disorders were identified using ICD-9 codes as detailed in our earlier studies.^{5,6}

Of total 68,386 OHCA-related admissions (2007–2014) in the US, 32.8 % (n=22,426) had comorbid psychiatric disorders (Table 1). There was a 23% higher risk of in-hospital mortality in geriatric

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Table 1 – Multivariable odds of in-hospital mortality following out-of-hospital cardiac arrest.

Demographics	Without psychiatric disorders (n = 45,960)			With psychiatric disorders (n = 22,426)		
	Adjusted OR	95% CI	P*	Adjusted OR	(95% CI) [#]	P*
Age (Years)						
18–44		Referent			Referent	
45–64	1.45	1.29–1.62	<0.001	0.99	0.87–1.12	0.83
≥65	2.09	1.85–2.36	<0.001	1.23	1.06–1.42	0.006
Sex						
Female vs. Male	1.16	1.10–1.23	<0.001	1.12	1.03–1.21	0.006
Race						
Caucasian		Referent			Referent	
African American	0.92	0.85–0.99	0.031	0.86	0.77–0.96	0.006
Hispanic	1.01	0.91–1.12	0.89	1.26	1.05–1.52	0.012
Asian/Pacific Islander	1.32	1.10–1.59	0.003	1.02	0.75–1.38	0.92
Native American	0.67	0.51–0.88	0.004	2.13	1.09–4.16	0.027
Others	1.08	0.92–1.27	0.36	0.96	0.75–1.21	0.71

CI = confidence interval; OR = odds ratio.

*P < 0.05 indicates statistical significance. CI = confidence interval.

Multivariable model was adjusted for demographics including age, sex, race, median household income, payer status, type (elective-non elective) and day (weekday vs. weekend) of admission, hospital characteristics including bed size, location/teaching status and hospital region, and comorbidities including hypertension, diabetes, dyslipidemia, obesity, peripheral vascular disorder, chronic obstructive pulmonary disease, congestive heart failure, pulmonary circulation disorder, renal failure, prior myocardial infarction or revascularization, valvular heart disorders, hypothyroidism, tumor and metastasis, and fluid electrolyte disorders.

(≥65 years) OHCA patients with psychiatric disorders (OR: 1.23, 95% CI: 1.06–1.42, $p=0.006$) as compared to young (18–44 years) patients. However, in OHCA patients without psychiatric disorders, odds of mortality were high across both age groups – 45–64 and ≥65 years. In the OHCA cohort with psychiatric disorders, we observed a 26% higher risk of in-hospital mortality (OR: 1.26, 95% CI: 1.05–1.52, $p=0.012$) in Hispanics as compared to white patients. However, the cohort without psychiatric disorders showed no significant change in odds of mortality for Hispanics as compared to whites ($p>0.05$). In addition, there was a 113% higher risk of in-hospital mortality (OR: 2.13, 95%CI: 1.09–4.16, $p=0.027$) among Native Americans with psychiatric disorders as compared to white patients. On the contrary, Native Americans without psychiatric disorders had 33% decreased odds of mortality (OR: 0.67, 95% CI: 0.51–0.88, $p=0.004$) as compared to whites.

Our analysis reveals that the prevalence of OHCA with comorbid psychiatric disorders is nearly two times higher (32.8% vs. 17.3%) in hospitalized US patients than the Danish population.¹ Geriatric patients (>65 years) with OHCA and comorbid psychiatric disorders are significantly predisposed to higher mortality outcomes. Also, Hispanic or Native American demographic background significantly decreases the odds of survival in these patients.

In summary, we provide evidence of nearly two times higher prevalence of comorbid psychiatric disorders in the US hospitalized patients with OHCA as compared to Danish population. The odds of survival following OHCA with psychiatric disorder are significantly lower in the geriatric age group, especially with a Hispanic or Native American demographic background. With approximately one in three patients admitted with OHCA suffering from psychiatric disorders, further efforts should explore this intricate relationship, with special focus on underserved/underrepresented demographic groups.

Author contributions

Conception and design: R. Desai, A.R. Amraotkar.

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Drafting of article: R. Desai, A.R. Amraotkar, L.E. Brown.

Critical revision for important intellectual content: R. Desai, A.R. Amraotkar, and L.E. Brown.

Conflict of interest

All authors have no financial, personal, or other conflicts of interests to disclose

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REFERENCES

- Barcella CA, Mohr GH, Kragholm K, et al. Out-of-hospital cardiac arrest in patients with psychiatric disorders - characteristics and outcomes. *Resuscitation* 2019. 70
Q10 71
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74
75
76
77
78
79
80
81
- Benjamin EJ, Virani SS, Callaway CW, et al. Heart disease and stroke statistics-2018 update: a report from the American Heart Association. *Circulation* 2018;137:e67–e492.
- Wilder Schaaf KP, Artman LK, Peberdy MA, et al. Anxiety, depression, and PTSD following cardiac arrest: a systematic review of the literature. *Resuscitation* 2013;84:873–7.
- Shelton SK, Chukwulebe SB, Gaieski DF, Abella BS, Carr BG, Perman SM. Validation of an ICD code for accurately identifying emergency department patients who suffer an out-of-hospital cardiac arrest. *Resuscitation* 2018;125:8–11. 82
83
84
85
86
87
88
89
- Desai R, Singh S, Patel K, Fong HK, Kumar G, Sachdeva R. The prevalence of psychiatric disorders in sudden cardiac arrest survivors: a 5-year nationwide inpatient analysis. *Resuscitation* 2019;136:131–5.
- Patel K, Bhivandkar S, Desai R, Antin T. The burden of psychiatric illnesses in adult patients with beta-thalassemia: a 5-year nationwide inpatient evaluation in the United States. *Ann Hematol* 2019;98:851–60.

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