Title

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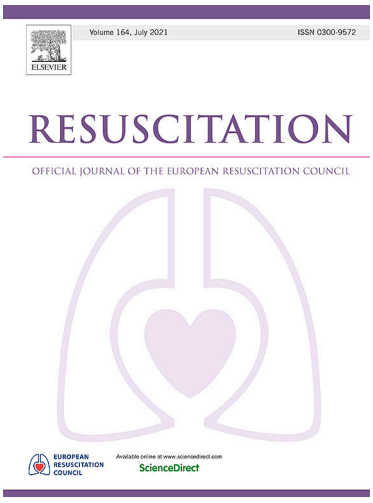

Clinical paper

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Running Title: Outcomes after cardiac arrest in Medical Intensive Care Unit: A propensity score matching analysis of COVID-19 MICU vs non COVID-19 MICU cardiac arrest

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Abstract

Aim: To assess whether there were differences in resuscitation efforts and outcomes for medical intensive care unit (MICU) in-hospital cardiac arrest (IHCA) during the COVID-19 pandemic when compared to pre-pandemic.

Methods: Comparing COVID-19 MICU-IHCA patients (03/2020 to 10/2020) to non-COVID-19 MICU IHCA (01/2014 to 12/2018) at Clevleand Clinic Health System (CCHS) of NE Ohio. Propensity score matching analysis (PSMA) was used to create comparable groups.

Results: There were a total of 516 patients, 51 in COVID-19 MICU IHCA cohort and 465 in the non-COVID-19 MICU IHCA cohort. The mean (SD) age of the study population was 60.9 (16) years and 56% were males. In 92.1% (n=475) patients, initial arrest rhythm was non-shockable. At the time of ICU admission, compared to the non-COVID-19 MICU-IHCA cohort, the COVID-19 MICU IHCA cohort had a lower mean APACHE III score (70 [32.9] vs 101.3 [39.6], P=<0.01). The COVID-19 cohort had a higher rate of survival to hospital discharge (12 [23.5%] vs 59 [12.7%], P=0.03). Upon PSMA, the algorithm selected 40 COVID-19 patients and 200 non-COVID-19 patients. Imbalances in baseline characteristics, comorbidities, and APACHE III were well-balanced after matching. Survival rate after matching became non-significant; (10 [25%) vs 42 [21%], P=0.67). Further, there were no significant differences in ICU or hospital length-of-stay or neurological outcomes at discharge for survivors in the two matched cohorts.

Conclusion: It is imperative that COVID-19 patients receive unbiased and unrestricted resuscitation measures, without any discouragement.

Key Words: Cardiac Arrest, cardiopulmonary resuscitation, coronavirus disease 2019, resuscitation, severe acute respiratory syndrome coronavirus 2, Propensity score matching analysis

CRediT author statement

Abhishek Bhardwaj – Conceptualization, Supervision, Methodology, Resources, Writing – original draft Writing – review & editing

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Introduction

The annual incidence of adult in-hospital cardiac arrest (IHCA) in the United States is 209,000 people according to the American Heart Association's registry, with 26.4% of individuals surviving to discharge.[1] Of these, approximately 53.7% of IHCA cases occur in the intensive care unit (ICU) or emergency department (ED) and 46.3% in noncritical care hospital areas.[1] Over the last two decades, outcomes after IHCA have improved as a result of comprehensive, protocolized care and due to the participation in the Get With The Guideline Resuscitation Registry.[2]

Overall, cardiac arrests in the ICU have better outcomes than those on regular nursing floors.[3] However limited data exists regarding the outcomes of cardiac arrest in COVID-19 patients in the MICU. Since the beginning of the coronavirus disease 2019 (COVID-19) pandemic in March 2020, there have been over 633 million cases and 6.6 million deaths worldwide as of November 2022.[4] From time to time during the pandemic healthcare systems have been stretched to or beyond capacity and individuals admitted with severe COVID-19 are at risk for numerous deleterious sequelae, including IHCA. [5] Further, due to limited ICU capacity, a percentage of COVID-19 patients have experienced cardiac arrest in non-ICU parts of the hospital.[6] As a result, early reports from Wuhan, China, and the United States showed poor prognosis after IHCA in COVID-19 patients. For example, a single-center study from Wuhan, China with a cohort of 136 IHCA patients showed high rates of asystole 89.7% and a 2.9% 30-day survival.[7] Similarly, two case series from New York and Michigan reported 100% mortality for COVID-19 IHCA.[8, 9] Factors leading to poor outcomes include overwhelmed healthcare systems, cardiac arrests on the regular nursing floor instead of ICUs, and shorter duration of resuscitation efforts. These poor outcomes from the initial-pandemic data led healthcare systems to consider a universal do-not-resuscitate (DNR) order for COVID patients.[10, 11] However, over the last year, subsequent studies from the United States have demonstrated a 14.6-22.4% survival to discharge after COVID-19 IHCA.[12, 13]

Few studies compared outcomes in pre-pandemic and COVID-19 IHCA populations and found worse outcomes in COVID-19 IHCA.[14, 15] We hypothesized that outcomes for IHCA occurring in the ICU during the COVID-19 pandemic would be similar to those for IHCA in the medical intensive care unit (MICU) during the pre-pandemic period.

Methods

In this retrospective study, we compared the baseline characteristics, resuscitation event data, and clinical outcomes of IHCA in adult (age >18 yrs) patients admitted to the MICU. Patients with a Do-Not-Resuscitation (DNR) status, withdrawal care after the IHCA or those who had out-of-hospital cardiac arrest were excluded. Cohort one included COVID-19 IHCA patients who were admitted from 03/2020 - 10/2020 to the MICU of the Cleveland Clinic Health System (CCHS) of NE Ohio, which consists of a total of 154 MICU beds distributed among four main hospitals. Cohort two included non-COVID-19 patients who were admitted to the MICU of CCHS from 01/2014 - 12/2018. The study was approved by the CCHS IRB and data were obtained through electronic medical records (EMR) review and from a quality and patient safety registry. Data were extracted manually from the EMR and the registry by the research team before analysis. Baseline characteristics included age, gender, race, ethnicity, Body Mass Index in Kg/m^2, and comorbidities (coronary artery disease, hypertension, diabetes mellitus, cancer, chronic obstructive pulmonary disease, and liver disease). Relevant clinical data at and during MICU admission included the Acute Physiology and Chronic Health Evaluation (APACHE) III score, sepsis or septic shock status, venous thromboembolism, mechanical ventilation, and vasopressors before MICU-IHCA. Resuscitation-related data included the initial cardiac arrest rhythm (Non-shockable: Pulseless Electrical Activity (PEA) or Asystole; Shockable rhythm: Pulseless Ventricular Tachycardia

(pVT) or Ventricular Fibrillation(VF)); Cardio-Pulmonary Resuscitation (CPR) duration; Return of Spontaneous Circulation (ROSC), defined as return of pulse for more than 20 minutes; and post ROSC hypothermia protocol. Clinical outcomes included survival to ICU and hospital discharge; ICU and hospital length of stay (LOS); and neurological outcome for survivors at hospital discharge, measured by Cerebral Performance Category (CPC) score. A CPC score of 1 or 2 was considered a favorable neurological outcome, with disability ranging from none to moderate; a score of 3 or 4 was considered a poor outcome, requiring assistance with activities of daily living, and severe cerebral disability, coma, or vegetative state.[16]

A propensity score-matched analysis was performed to create comparable groups in the COVID-19 and non-COVID-19 cohorts. Propensity scores for each patient were generated using a multivariate logistic regression model using patient characteristics including age, gender, BMI, race, ethnicity, APACHE III score, and comorbidities (CAD, DM, HTN, COPD, Cancer, and liver disease). These covariates were selected based on clinical judgment and variables reported previously in the literature.[17, 18] COVID-19-linked variables, including sepsis status, septic shock, and use of mechanical ventilation, were excluded from the propensity score-matched model to avoid bias risk but were considered in the outcomes analysis.[19] Patients were matched (1:5) using the nearest neighbor method with replacement and a caliper width of 0.2 of the SD of the logit of the estimated propensity score.[20, 21] Standardized differences were estimated before and after matching to evaluate the balance of covariates; small absolute values ≤ 0.20 indicated a balance between the cohorts, as suggested by Cohen.[22]

Normally distributed continuous variables are expressed as Mean ± Standard Deviation (SD) and an independent-samples t-test was run to determine if there were differences between cohorts. If continuous variables were non-normally distributed, they are expressed as Median [Interquartile Range (IQR)] and the Mann-Whitney U test was used to compare cohorts. Categorical variables are expressed as counts and percentages and the Chi-Square test or Fisher Exact test is used to detect significant differences between cohorts. All analyses were two-tailed and were performed at a significance level of 0.05. All statistical analyses were performed using R programming language version 4.2.2 (R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/). The propensity score matching analysis was conducted using the 'Matching' package (version 4.10-8).

Results

From March 2020 to October 2020, a total of 1214 COVID-19 patients were treated in the MICU. In contrast, during the period from January 2014 to December 2018, the MICU treated a total of 31765 patients. A total of 516 patients were included for analysis, 51 in COVID-19 and 465 in the non-COVID-19 cohort. The mean [SD] age of the two cohorts (COVID-19 vs. non-COVID-19) was similar (63.6 [15.4] vs 60.6 [16.2], P=0.21); more than the half of the patients in each cohort were male (33 [64.7%] vs 256 [55.1%], P=0.23); a lower percentage of patients in COVID-19 cohort were white (28 [54.9%] vs 324 [69.7%], P=0.04); non-Hispanic (46 [90.2%] vs 459 [98.7%]; P<0.01); and had liver disease (0 [0%] vs 54 [11.6%]; P=0.01); a higher percentage had hypertension (33 [64.7%] vs 151 [32.5%]; P<0.01).

At the time of ICU admission, compared to the non-COVID-19 cohort, the COVID-19 cohort had a lower mean APACHE III score (70.0 [32.9] vs 101.3 [39.6], P<0.01); higher incidence of sepsis (16 [31.4%] vs 34 [7.3%], P<0.01), and increased vasopressor use before IHCA (24 [47.1%] vs 146 [31.4%], P=0.03). The COVID-19 cohort had higher survival to hospital discharge (12 [23.5%] vs 59 [12.7%], P=0.03); longer ICU and hospital median [IQR] length of stay (LOS) (10.8 [4, 26.4] vs 2.9 [1, 9.9] days, P=<0.01) and (15 [8.5, 29.5] vs 9.2 [2, 21.9] days, P=0.01, respectively). No other significant differences between the cohorts regarding basic demographics, clinical characteristics, and outcomes were identified (Table 1).

The matching algorithm selected 40 COVID-19 patients and 200 Non-COVID-19 patients. Imbalances in baseline characteristics, comorbidities, and APACHE III score at ICU admission observed before matching, were well-balanced after matching with standardized differences ≤ 0.2 (Table 1). After matching, the COVID-19 cohort still had a higher percentage of sepsis at ICU admission (14 [35%] vs 18 [9%], P<0.01) and a higher percentage of patients on vasopressors before IHCA (18 [45%] vs 47 [23.5%], P=0.01). Significant observations that were present after matching but not observed before matching included a higher percentage of patients in the COVID-19 cohort with septic shock (10 [25%] vs 20 [10%], P=0.02) and longer median CPR duration for COVID-19 patients (10 [5.8, 20] vs 7.3 [4, 12.7], P=0.03). Median ICU LOS remained longer after matching (10.8 [3.8, 25.9] vs 6.1 [1.5, 14.2] days, P=0.02) while the difference in Hospital LOS decreased (17 [7, 29.3] vs 14.4 [3.7, 26.1] days, P=0.72). Furthermore, no difference detected in the hospital survival rate (10 [25%) vs 42 [21%], P=0.67).

For the 52 survivors, no differences have been observed between both cohorts as regards the basic characteristics, comorbidities, and APACHE III score at the time of admission (Table 2). Half the survivors from the COVID-19 cohort had sepsis at the time of ICU admission (5 [50%] vs 1 [2.4%]; P<0.01). The majority of survivors in both cohorts had an initial non-shockable cardiac arrest rhythm (8 [80%] vs 35 [83.3%], P= 1). Median CPR duration time was less than 10 minutes for survivors in both cohorts (8 minutes [4.5, 10.8] vs 5 minutes [3, 6.8], P=0.14). There was no statistical differences in ICU LOS (19.5 [11.3, 28] vs 14.1 [4.6, 25.9] days; p=0.23); Hospital LOS (26 [17.5, 36] vs 24.8 [18.6, 44.8] days; P=0.56); or CPC score at time of hospital discharge; CPC 1-2 (4 [40%] vs 29 [69%]; P=0.14) and CPC 3-4 (6 (60%) vs 13 (31); P=0.14).

Discussion

In this retrospective study, the initial non-matched analysis showed that patients who underwent CPR after a MICU-IHCA before the COVID-19 pandemic were sicker, of white race and non-Hispanic ethnicity, had a shorter CPR duration, and a lower survival compared to those who had COVID-19 MICU-IHCA. Considering the nature of the COVID-19 disease and differences in the basic characteristics of the patients, propensity score matching analyses were conducted for a better understanding of the differences between both cohorts. After matching the survival differences became non-significant between the cohorts.

Our findings are in contrast to the study by Miles et al,[14] which reported a single center experience from New York City, USA, and found that IHCA in COVID-19 patients was associated with shorter duration of CPR (median duration 11 minutes vs 15 minutes; p<0.01)) and worse survival to hospital discharge (3% vs 13 %; p = 0.01) compared to a pre-pandemic historical cohort. Their COVID-19 IHCA occurred more frequently in the general ward compared to ICU, 46% vs 33%, respectively. In contrast, our IHCA patient cohort included only MICU patients. Further, their COVID-19 IHCA cohort had a shorter duration of CPR whereas in our study the duration of CPR was longer for our COVID-19 cohort compared to the non-COVID-19 ICU-IHCA historic cohort. Importantly, Miles et al's analysis did not control for imbalances in demographic characteristics and severity of illness between the two groups, which could lead to a biased interpretation of the findings. Finally, Miles et al report outcomes in New York City during the first COVID-19 surge, which overwhelmed healthcare resources whereas we report outcomes from a healthcare system that had time to prepare for the surge and did not experience the same strain as many New York City hospitals did.[12]

A recent study by Bansal et al.[15] using the national inpatient sample (NIS) database revealed that the survival rate of in-hospital cardiac arrest (IHCA) during the pandemic decreased significantly compared to before the pandemic, with rates of 13% and 37%, respectively. The study also found that there was a lower utilization of CPR and mechanical ventilation among COVID-19 patients, indicating that the adoption of universal DNR or discouragement of resuscitation by healthcare systems due to futility beliefs had a significant impact on patients. However, in our study, there was no significant change in the duration of the resuscitation attempts in patients with COVID-19 when compared to the historic cohort of critically ill patients who had an IHCA. The absence of propensity matching in Bansal et al.'s comparison of the two groups could have led to inadequate control of other clinical variables apart from COVID-19 status. Our study reveals an elevated sepsis rate in the COVID-19 cohort, aligning with existing literature that highlights the increased likelihood of sepsis when COVID-19 is the source of infection.[23] The presence of COVID-19 as an infectious source can expedite the fulfillment of sepsis criteria in patients. Furthermore, the higher proportion of COVID-19 patients requiring vasopressors prior to cardiac arrest may be attributed to the greater need for sedation and analgesic medications. These medications are frequently administered to ensure optimal mechanical ventilation synchrony and lung-protective ventilation strategies.[24]

Our study has several limitations. First of all, this is a single center study including only MICU IHCA patients which could affect the generalizability of our results. This limited scope could contribute to the observed discrepancy, with a slightly higher proportion of non-shockable rhythm (92%) in our study compared to the literature, which reported 81% non-shockable rhythm as indicated by Anderson et al.[25] Secondly, we are reporting outcomes from a specific time during an evolving and changing pandemic. The included COVID-19 patients were from the first and second surge waves which might not necessarily reflect the overall MICU-IHCA mortality for the other surges. Third, our study lacks reporting on the reason for cardiac arrest and therefore is expected to limit our ability in building more robust comparison groups. Fourth, detailed information about medication administered during MICU-IHCA resuscitation was not available and reported. Furthermore, the absence of data on survival and neurological outcomes six months after hospital discharge represents a limitation in our study, restricting a more comprehensive understanding of meaningful long-term outcomes.
Our study demonstrates that COVID-19 patients who receive standard of care resuscitation have a comparable chance of survival to patients with similar illness levels before the pandemic.

Conclusion

Survival to hospital discharge rate after MICU-IHCA for COVID-19 patients is similar to the baseline-matched non-COVID-19 MICU-IHCA patients who were admitted to the healthcare system before the pandemic. Propensity matching is recommended in further studies comparing the pandemic era IHCA outcomes with the pre-pandemic period IHCA outcomes to address inherent differences in the study populations.

Declaration of Interest

Co-author Benjamin S. Abella is part of the Resusitation Journal Editorial Board

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Table1: Demographics, Clinical Characteristics, and Outcomes for In-Hospital Cardiac Arrest of MICU Patients comparing COVID-19 to Non-COVID-19 patients utilizing Propensity Score Matching.

Characteristics	Unmatched Comparisons					Matched Comparisons				
	Total (516)	**COVID-19 (51)**	**Non-COVID-19 (465)**	**P value**	**SD**	**Total (240)**	**COVID (40)**	**Non-COVID (200)**	**P value**	**SD**
Age, years *	60.9 (16)	63.6 (15.4)	60.6 (16.2)	0.21	0.188	62.91 (16.6)	62.3 (16)	63 (16.8)	0.79	0.048
Male §	289 (56)	33 (64.7)	256 (55.1)	0.23	0.198	146 (60.8)	25 (62.5)	121 (60.5)	0.86	0.041
White §	352 (68.2)	28 (54.9)	324 (69.7)	**0.04**	0.308	149 (62.1)	20 (50.0)	129 (64.5)	0.11	0.209
Non-Hispanic §	505 (97.9)	46 (90.2)	459 (98.7)	**<0.01**	0.379	230 (95.8)	38 (95.0)	192 (96.0)	0.68	0.048
BMI, Kg/m2 *	29.6 (10.6)	31.23 (7.3)	29.43 (10.9)	0.25	0.194	30.96 (11.1)	31.25 (7.8)	30.90 (11.7)	0.86	0.036
Comorbidities										
CAD §	76 (14.7)	12 (23.5)	64 (13.8)	0.09	0.253	57 (23.8)	9 (22.5)	48 (24.0)	1	0.036
HTN §	184 (35.7)	33 (64.7)	151 (32.5)	**<0.01**	0.681	153 (63.7)	25 (62.5)	128 (64.0)	0.86	0.031
DM §	167(32.4)	20 (39.2)	147 (31.6)	0.27	0.159	77 (32.1)	14 (35.0)	63 (31.5)	0.71	0.074
Cancer §	76(14.7)	3 (5.9)	73 (15.7)	0.06	0.32	16 (6.7)	3 (7.5)	13 (6.5)	0.74	0.039
COPD §	164(31.8)	12 (23.5)	152 (32.7)	0.21	0.205	72 (30.0)	11 (27.5)	61 (30.5)	0.85	0.066
Liver disease §	54 (10.5)	0 (0.0)	54 (11.6)	**0.01**	0.513	0 (0.00)	0 (0.0)	0 (0.0)	1	<0.001
At ICU admission										

APHACHEIII *	98.2 (40.1)	70 (32.9)	101.3 (39.6)	**<0.01**	0.86	79.1 (33.2)	77.7 (32.7)	79.4 (33.4)	0.77	0.05
Sepsis §	50 (9.7)	16 (31.4)	34 (7.3)	**<0.01**	0.64	32 (13.3)	14 (35)	18 (9)	**<0.01**	0.661
Septic Shock §	95 (18.4)	10 (19.6)	85 (18.3)	0.85	0.034	30 (12.5)	10 (25.0)	20 (10.0)	**0.02**	0.403
VTE During ICU admission										
DVT §	32 (6.2)	5 (9.8)	27 (5.8)	0.23	0.149	19 (7.9)	3 (7.5)	16 (8.0)	1	0.019
PE §	21 (4.1)	2 (3.9)	19 (4.1)	1	0.008	11 (4.6)	0 (0.0)	11 (5.5)	0.21	0.341
Before Cardiac Arrest										
Mechanical Ventilation §	365 (70.7)	34 (66.7)	331 (71.2)	0.52	0.098	151 (62.9)	26 (65.0)	125 (62.5)	0.86	0.052
Vasopressors §	170 (32.9)	24 (47.1)	146 (31.4)	**0.03**	0.325	65 (27.1)	18 (45.0)	47 (23.5)	**0.01**	0.465
Cardiac Arrest										
PEA/Asystole §	475 (92.1)	48 (94.1)	427 (91.8)	0.79	0.09	216 (90.0)	38 (95.0)	178 (89.0)	0.39	0.223
P. V.Tach/V.Fib §	41 (7.9)	3 (5.9)	38 (8.2)	0.79	0.09	24 (10.0)	2 (5.0)	22 (11.0)	0.39	0.223
CPR duration †	7.7 [4, 13]	9 [5, 19]	7.6 [4, 12.7]	0.10	0.26	7.6 [4, 14]	10 [5.8, 20]	7.3 [4, 12.7]	**0.03**	0.419
ROSC §	390 (75.6)	33 (64.7)	357 (76.8)	0.06	0.268	169 (70.4)	26 (65.0)	143 (71.5)	0.45	0.14
Post ROSC TTM §	55 (10.7)	7 (13.7)	48 (10.3)	0.47	0.105	21 (8.8)	6 (15.0)	15 (7.5)	0.13	0.239
ICU survival §	115 (22.3)	13 (25.5)	102 (21.9)	0.60	0.084	72 (30.0)	11 (27.5)	61 (30.5)	0.85	0.066

Hospital survival	71 (13.8)	12 (23.5)	59 (12.7)	**0.03**	0.284	52 (21.7)	10 (25)	42 (21)	0.67	0.095
CPC 1-2 §	40 (56.3)	4 (33.3)	36 (61.0)	0.08	0.004	34 (14.2)	4 (10.0)	30 (15.0)	0.62	0.152
CPC 3-4 §	31 (43.7)	8 (66.7)	23 (39.0)	0.08	0.359	19 (7.9)	6 (15.0)	13 (6.5)	0.10	0.277
ICU LOS days †	3.5(1.0,11.3)	10.8 (4, 26.4)	2.9 (1, 9.9)	**<0.01**	0.634	6.5 [1.7, 17.1]	10.8 [3.8, 25.9]	6.1 [1.5, 14.2]	**0.02**	0.397
Hospital LOS days †	9.7(2.2,22)	15 (8.5, 29.5)	9.2 (2, 21.9)	**0.01**	0.255	14.6 [3.7, 26.3]	17 [7.0, 29.3]	14.4 [3.7, 26.1]	0.72	0.009

* Normally distributed data presented as Mean (Standard Deviation) and independent t-test used for groups comparison

† Non-normally distributed data presented as Median (IQR) and Mann-Whitney U test used for groups comparison

§ Categorical data presented as Number (Percentage) and the Chi-Square test or Fisher Exact test used for groups comparison

Abbreviations: **SD,** Standardized difference; **BMI**, Body Mass Index; **HTN**, Hypertension; **CAD**, Coronary Artery Disease; **COPD**, Chronic Obstructive Pulmonary Disease; **DM**, Diabetes Mellitus; **APACHE III**, Acute Physiologic Assessment and Chronic Health Evaluation III; **CPR**, Cardio-Pulmonary Resuscitation; **VTE**, Venous thromboembolism; **DVT**, Deep vein thrombosis; **PE**, Pulmonary Embolism; **IHCA**, In-Hospital Cardiac Arrest; **PEA**, Pulseless electrical activity; **TTM,** Targeted Temperature Management; **P**.**V.Tach**, Pulseless Ventricular Tachycardia; **V.Fib**, Ventricular Fibrillation; **ROSC**, Return Of Spontaneous Circulation; **ICU**, Intensive Care Unit; **LOS**, Length Of Stay

Table2: Demographics, Clinical Characteristics, And Outcomes for the MICU-IHCA Survivors from the Matched Groups, Before And During The COVID-19:

Characteristics	Total (52)	COVID-19 (10)	Non-COVID-19 (42)	P-value
Age, years *	57.9 (17.8)	58.4 (19.8)	57.7 (17.6)	0.92
Male §	36 (69.2)	8 (80)	28 (66.7)	0.71
White §	29 (55.8)	5 (50)	24 (57.1)	0.73
Non-Hispanic §	47 (90.4)	10 (100)	37 (88.1)	0.57
BMI, Kg/m2 *	34 (14.9)	29.7 (7.5)	35.1 (16)	0.31
Comorbidities				
CAD §	6 (11.5)	1 (10)	5 (11.9)	1
HTN §	33 (63.5)	6 (60)	27 (64.3)	1
DM §	19 (36.5)	5 (50)	14 (33.3)	0.47
Cancer §	1 (1.9)	0 (0)	1 (2.4)	1
COPD §	21 (40.4)	3 (30)	18 (42.9)	0.72
Liver disease §	0	0	0	-
APHACHEIII *	79.3 (29.9)	66.4 (29.1)	82.4 (29.6)	0.13
At ICU admission				
Sepsis §	6 (11.5)	5 (50)	1 (2.4)	**<0.01**
Septic Shock §	6 (11.5)	1 (10)	5 (11.9)	1

VTE During ICU admission				
DVT §	7 (13.5)	0 (0)	7 (16.7)	0.32
PE §	3 (5.8)	0 (0)	3 (7.1)	1
Before Cardiac Arrest				
Mechanical Ventilation §	39 (75)	5 (50)	34 (81)	0.10
Vasopressors §	17 (32.7)	3 (30)	14 (33.3)	1
Cardiac Arrest				
PEA/Asystole §	43 (82.7)	8 (80)	35 (83.3)	1
P. V.Tach/V.Fib §	9 (17.3)	2 (20)	7 (16.7)	1
CPR duration †	5 [3, 8]	8 [4.5, 10.8]	5 [3, 6.8]	0.14
Post ROSC TTM §	8 (15.4)	3 (30)	5 (11.9)	0.17
ICU LOS days †	14.1 [7, 27.9]	19.5 [11.3, 28]	14.1 [4.6, 25.9]	0.23
Hospital LOS days †	24.8 [18.4, 44.8]	26 [17.5, 36]	24.8 [18.6, 44.8]	0.56
CPC 1-2 §	33 (63.5)	4 (40)	29 (69)	0.14
CPC 3-4 §	19 (36.5)	6 (60)	13 (31)	0.14

* Normally distributed data presented as Mean (Standard Deviation) and independent t-test used for groups comparison

† Non-normally distributed data presented as Median (IQR) and Mann-Whitney U test used for groups comparison

§ Categorical data presented as Number (Percentage) and the Chi-Square test or Fisher Exact test used for groups comparison

Abbreviations: **MICU-IHCA**, Medical intensive care unit-in-hospital cardiac arrest; **BMI**, Body Mass Index; **HTN**, Hypertension; **CAD**, Coronary Artery Disease; **COPD**, Chronic Obstructive Pulmonary Disease; **DM**, Diabetes Mellitus; **APACHE III**, Acute Physiologic Assessment and Chronic Health Evaluation III; **CPR**, Cardio-Pulmonary Resuscitation; **VTE**, Venous thromboembolism; **DVT**, Deep vein thrombosis; **PE**, Pulmonary Embolism; **IHCA**, In-Hospital Cardiac Arrest; **PEA**, Pulseless electrical activity; **TTM,** Targeted Temperature Management; **P**.**V.Tach**, Pulseless Ventricular Tachycardia; **V.Fib**, Ventricular Fibrillation; **ROSC**, Return Of Spontaneous Circulation; **ICU**, Intensive Care Unit; **LOS**, Length Of Stay

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Declaration of interests

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