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A more conservative test of sex differences in the treatment and outcome of in-hospital cardiac arrest

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Background: Studies investigating sex disparities related to treatment and outcome of in-hospital cardiac arrest (IHCA) have produced divergent findings and have typically been unable to adjust for outstanding confounding variables.
Objectives: The aim was to examine sex differences in treatment and survival following IHCA, using a comprehensive set of control variables including e.g., age, comorbidity, and patient-level socioeconomic status.
Methods: This retrospective study was based on data from the Swedish Register of Cardiopulmonary Resuscitation and Statistics Sweden. In the primary analyses, logistic regression models and ordinary least square regressions were estimated.
Results: The study included 24,217 patients and the majority (70.4%) were men. In the unadjusted analyses, women had a lower chance of survival after cardiopulmonary resuscitation (CPR) attempt, at hospital discharge (with good neurological function) and at 30 days ($p<0.01$). In the adjusted regression models, female sex was associated with a higher chance of survival after the CPR attempt ($B = 1.09$, $p<0.01$) and at 30-days ($B = 1.09$, $p<0.05$). In contrast, there was no significant association between sex and survival to discharge with good neurological outcome. Except for treatment duration ($B=-0.07$, $p<0.01$), no significant associations between sex and treatment were identified.
Conclusions: No signs of treatment disparities or discrimination related to sex were identified. However, women had a better chance of surviving IHCA compared to men. The finding that women went from having a survival disadvantage (unadjusted analysis) to a survival advantage (adjusted analysis) attests to the importance of including a comprehensive set of control variables, when examining sex differences.

Introduction

Sociodemographic group disparities have attracted increasing attention in numerous societal domains, health care being no exception. Regarding sudden cardiac arrest (CA), research has clearly shown that racial minorities and individuals with lower socioeconomic status (SES), such as uneducated and poor people, receive inferior treatment and are less likely to survive a sudden cardiac arrest both outside (of-hospital cardiac arrest=OHCA) and inside (in-hospital cardiac arrest=IHCA) the hospital.[1-7] Regarding sex disparities, individual studies have produced rather divergent findings,[8-10] although recent meta-analyses[11,12] suggest that men show a survival advantage after OHCA compared to women, particularly when it comes to survival to discharge and to 30 days. Various empirically supported explanations have been provided for this disparity. The most robust findings seem to be that women are more likely to be older[10,13,14] and to suffer an unwitnessed OHCA in their homes rather than in a public location.[10,13] Moreover, women are less likely to present with a shockable initial heart rhythm (ventricular fibrillation/tachycardia), and to receive advanced post-arrest therapeutic measures, such as percutaneous coronary intervention (PCI).[10,13,14]

Much less research has been conducted on sex differences in conjunction with IHCA. A recent meta-analysis based on the results from only seven studies finds a trend ($P = 0.052$) towards higher mortality rates for women.[11] More research on sex differences following IHCA is clearly needed, particularly when it comes to treatment since extant

List of abbreviations: CA, Cardiac arrest; CPC, Cerebral performance category; CPR, Cardiopulmonary resuscitation; DNAR, Do-not-attempt-resuscitation; IHCA, In-hospital cardiac arrest; OHCA, Out-of-hospital cardiac arrest; PCI, Percutaneous coronary intervention; SES, Socioeconomic status; SRCR, The Swedish register of cardiopulmonary resuscitation

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research has focused more on survival. Probing for sex differences in treatment is important as they could potentially reflect treatment bias. Presumably, female patients could receive delayed treatment because medical staff may be quicker at recognizing CAs when the patient is male due to prevalent cognitive associations whereby cardiac problems are more strongly associated with men than women.[15-17] Additionally, it should be noted that none of the aforementioned meta-analyses[11,12] on sex differences in survival have adjusted for potential confounders such as comorbidity and cause of the CA, which is often symptomatic of individual studies too. Moreover, sociodemographic factors that correlate with sex, e.g., lower income among women, have seldom been accounted for.[13] For example, we are not aware of any study that have adjusted for patient SES despite research showing that lower SES predicts lower survival after OHCA[1] and IHCA,[2] including less in-hospital prophylactic treatment (heart rhythm monitoring) and greater CPR delay immediately after the onset of the CA.[2] There is a need for studies investigating associations between sex and CA outcome, adjusting for a more comprehensive set of potential confounders, including SES and ethnicity.

The aim of the current research was to examine sex differences in treatment and survival following IHCA. In doing so, it examines how sex combine with age to influence treatment and survival, while also controlling for numerous clinical and contextual factors. The reason for studying potential age-dependent sex differences is that some OHCA studies suggest that increasing age has a more detrimental impact on survival for women than for men.[1,14] Whether this is also the case for IHCA is not known. Possibly, age may be less important for sex differences in relation to IHCA because some factors that put women at a disadvantage (e.g., greater likelihood of having an unwitnessed arrest at home) are removed from the equation. Essentially, then, IHCA constitutes a more conservative test of sex differences than OHCA.

Methods

Design

This retrospective register study is based on data from the Swedish Register of Cardiopulmonary Resuscitation (SRCR) and Statistics Sweden. It was approved by the Regional Ethical Review Board in Linköping, Sweden (No. 2017/293–31).

The Swedish Register of Cardiopulmonary Resuscitation (SRCR)

The SRCR is a national quality registry aimed at describing and improving resuscitation practices in Sweden, using a predefined, Utstein-style reporting framework. Data from the CA event are most often reported by the nurse in charge of the patient's care. Follow-up data are typically reported by a resuscitation coordinator at each hospital. All registrations are performed using a registry manual and prompts within the digital protocol. In order to validate data, random inspections are performed by the Registry Committee.

The SRCR includes all CAs in Sweden where resuscitative treatments (e.g., chest compression and/or defibrillation) have been initiated regardless of place (IHCA or OHCA). The current study is based on data from the "IHCA-part" of the registry. As of 2019, all (100%) 74 Swedish emergency hospitals report data to the registry, including sociodemographic variables (e.g., sex and age), comorbidity, variables related to CA and treatment (e.g., place of CA, monitoring, CPR delay, defibrillation, PCI), and outcome (e.g., survival and neurological function). In addition, the treatment satisfaction among hospital personnel involved in providing resuscitative efforts are included.

Statistics Sweden

Patient-level data on SES were obtained from the Statistics Sweden's longitudinal integrated database for health insurance and labor market studies (LISA). LISA holds annual registers from 1990 and includes all individuals being 16 years of age and older in Sweden. The database integrates existing data from the labor market with the educational and social sectors. SES captures the social standing or class of an individual or social group.[18] In the current study, education and income were used as SES proxies. In terms of international comparisons, Sweden is considered to be at the forefront of equality.[19] However, in recent decades OECD data reveal that inequality in, for example, income has increased at a faster rate compared to other countries.[20] Hence, SES appears to be an important construct also in Sweden. Importantly, as noted above, SES matters for the current study context as previous Swedish research has shown that patient-level SES is clearly associated with treatment and survival following IHCA.[2]

Participants

All patients, ≥40 years suffering an IHCA from January 1, 2005 to August 20, 2018 (extraction date) were included in the present study. The age criterion was used for two main reasons: 1) most younger patients have not completed their education or reached their highest income level, implicating that our SES proxies are not applicable, and 2) the prevalence of CA is low in younger patients, and they might constitute a selective group with better unobserved health prior to their CA.

Study variables

Outcome variables*: CPR delay* indicates the time elapsed from finding the patient to CPR is initiated (0=less than one minute, 1=one minute or longer); *CPR duration* (minutes); *Survival after CPR* (0=dead, 1=alive); *Treatment satisfaction* is reported by personnel involved in resuscitative treatment (0=unsatisfactory, 1=satisfactory)[1]; *Survival to hospital discharge with good neurological function* (0=Cerebral Performance Category (CPC)[21] 3–5, indicating poor neurological function or death 1=CPC≤2, indicating good neurological function with no to moderate deficits)[2]; *30-day survival* (0=dead, 1=alive).

Predictor variables: *Sex* (0=male, 1=female), *Age* (0 = 40–65, 1=>65 years of age) and *Age x Sex* (interaction term for Sex and Age).

Control variables: *Ethnicity* (African, Asian, Eastern Europe, Middle Eastern, Nordic, South American, Southern Europe, Western Europe or "Other"); *Education* (0=high school or below, 1=college/university education). *Income* reflects the relative standing of the patient in the income distribution using a percentile score. Since a large proportion of the participants are retired, both annual earned income and retirement pension were used for this variable depending on whether the patient were retired or not. *Hospital* (which hospital); *Year* (year of CA); *Comorbidity* (previous history of heart failure, myocardial infarction, stroke, respiratory insufficiency, diabetes, cancer, and metastatic cancer); initial *Heart rhythm* (first documented rhythm during CA, i.e., ventricular fibrillation, ventricular tachycardia, pulseless electrical activity, or asystole); *Heart rhythm monitoring* (if the patient was monitored or not at the time of CA) and CA *Etiology* (e.g., myocardial infarction or respiratory insufficiency).

[1] In the SRCR, treatment satisfaction is a binary measure (satisfied or not) based on an overall assessment of team performance according to international resuscitation guidelines and Swedish educational material. Data on treatment satisfaction should most often be based on consensus in the team and are reported by the nurse in charge of the patient's care. All registrations are performed using a registry manual and prompts within the digital protocol.

[2] The full CPC categories are: CPC 1=Good cerebral performance. No or minor cerebral deficits. CPC 2=Moderate cerebral disability. Able to independently perform daily activities. CPC 3=Major cerebral disability. Unable to independently perform daily activities. CPC 4=Coma or vegetative state. CPC 5=Brain death/deceased. In this study we used CPC as a dichotomized variable in conjunction with survival at hospital discharge.

Statistical analysis

To investigate sex differences in CPR delay, Survival after CPR, Treatment satisfaction, Survival to discharge with good neurological outcome, and 30-day survival (0/1 variables), we estimated logistic regression models. To investigate sex differences in CPR duration (a continuous variable), ordinary least squares regressions were estimated.

All regressions included the control variables listed above as well as fixed effects (dummy variables) for hospital and year. The fixed effects were included to address the fact that hospital characteristics and time trends could be correlated with sex and at the same time affect outcomes, which would result in inconsistent estimates due to omitted variable bias. The regressions were estimated using the statistical software Stata 17 (StataCorp LLC, College Station, TX, USA).

Results

Patient characteristics

In total, 24,217 patients were included in the study. A majority were men (n = 14,930) and the mean (SD) age was 73.6 (11.6) years. Most of the patients (59.1%) received CPR in <1 min from CA, while the treatment duration in average was 16.2 min (SD=14.8). Half of the patients (51.6%) initially survived their CA. In 71.8% of the cases the personnel involved was satisfied with the treatment they provided. Almost one fourth of patients (23.1%) survived to hospital discharge (with good neurological outcome), while 29.4% survived to 30 days post CA. More information is presented in Table 1.

Table 1
Descriptive statistics (unadjusted) for the full sample and by sex.

	All (n = 24,217)	Women (n = 9287)	Men (n = 14,930)
Age, mean (SD)	73.6 (11.6)	75.3 (11.7)	72.6 (11.4)
SES education, n (%)			
High SES	3760 (15.5)	1227 (13.2)	2533 (17.0)
Low SES	19,959 (82.4)	7801 (84.0)	12,158 (81.4)
Missing	498 (2.1)	259 (2.8)	239 (1.6)
SES income, mean (SD)	52.3 (24.6)	39.2 (22.3)	60.4 (22.3)
Missing, n (%)	5446 (22.5)	2103 (22.6)	3343 (22.4)
Ethnic background, n (%)			
Nordic	22,266 (91.9)	8545 (92.0)	13,721 (91.9)
Africa	110 (0.5)	38 (0.41)	72 (0.48)
Asia	146 (0.6)	59 (0.64)	87 0.58)
Eastern Europe	393 (1.6)	164 (1.77)	229 (1.53)
Middle East	437 (1.8)	145 (1.56)	292 (1.96)
South Europe	469 (1.9)	175 (1.88)	294 (1.97)
Western Europe	338 (1.4)	140 (1.51)	198 (1.33)
Other	58 (0.2)	21 (0.23)	37 (0.25)
Comorbidity index (0–7), mean (SD)	1.38 (1.19)	1.27 (1.15)	1.45 (1.21)
Initial heart rhythm, n (%)			
Ventricular fibrillation	3938 (16.3)	1180 (12.7)	2758 (18.5)
Ventricular tachycardia	1565 (6.5)	487 (5.2)	1078 (7.2)
Pulseless electrical activity	4785 (19.8)	1880 (20.2)	2905 (19.5)
Asystole	7788 (32.2)	3255 (35.1)	4533 (30.4)
Missing	6141 (25.4)	2485 (26.8)	3656 (24.5)
Cardiac etiology, n (%)			
Yes	11,514 (47.6)	4090 (44.0)	7424 (49.7)
No	2281 (9.4)	975 (10.5)	1306 (8.8)
Missing	10,422 (43.0)	4222 (45.5)	6200 (41.5)
Monitored, n (%)			
Yes	12,502 (51.6)	4604 (49.6)	7898 (52.9)
No	11,360 (46.9)	4559 (49.1)	6801 (45.6)
Missing	355 (1.5)	124 (1.3)	231 (1.6)
CPR delay, n (%)			
Yes	6118 (25.3)	2405 (25.9)	3713 (24.9)
No	14,303 (59.1)	5460 (58.8)	8843 (59.2)
Missing	3796 (15.7)	1422 (15.3)	2374 (15.9)
CPR duration in minutes, mean (SD)	16.2 (14.8)	15.7 (14.3)	16.5 (15.1)
Missing, n (%)	14,561 (60.1)	5603 (60.3)	8958 (60.0)
Survival after CPR, n (%)			
Yes	12,503 (51.6)	4654 (50.11)	7849 (52.57)
No	11,714 (48.4)	4633 (49.89)	7081 (47.43)
Treatment satisfaction, n (%)			
Yes	17,378 (71.8)	6630 (71.4)	10,748 (72.0)
No	6839 (28.2)	2657 (28.6)	4182 (28.0)
Survival to discharge with good neurological outcome, n (%)			
Yes	5597 (23.1)	1892 (20.4)	3658 (24.5)
No	16,839 (69.5)	6893 (74.2)	10,178 (68.2)
Missing	1781 (7.4)	502 (5.4)	1094 (7.3)
30-day survival, n (%)			
Yes	7130 (29.4)	2527 (27.2)	4603 (30.8)
No	17,087 (70.6)	6760 (72.8)	10,327 (69.2)

Notes: CPR duration was longer than 90 min in 0.9% of the cases. These cases were recoded as missing, since such high numbers are unrealistic. The reason for the high fraction of missing values for CPR duration is mainly that this variable did not exist in the register until 2013.

Table 2
Bivariate correlations among the studied variables (Spearman's rank correlation coefficients). n = 9319–24,217.

	CPR delay (0/1)	CPR duration (ln)	Survival after CPR (0/1)	Treatment satisfaction (0/1)	Survival to discharge with good neurological outcome (0/1)	30-day survival (0/1)	Female (0/1)	Age 65+ (0/1)
CPR delay (0/1)	1	0.0585** 9319	−0.0542** 20,331	−0.0599** 16,590	−0.0789** 18,967	−0.0769** 20,421	0.0107 20,421	0.0305** 20,421
CPR duration (ln)	–	1	−0.5020** 9382	−0.0446** 7625	−0.4924** 8685	−0.5122** 9444	−0.0224* 9444	0.0879* 9444
Survival after CPR (0/1)	–	–	1	0.0879** 18,969	0.5778** 22,304	0.6191** 24,039	−0.0242** 24,039	−0.1092** 24,039
Treatment satisfaction (0/1)	–	–	–	1	0.0741** 17,630	0.0857** 19,057	−0.0154* 19,057	−0.0071 19,057
Surv. w. good neur. outcome (0/1)	–	–	–	–	1	0.9209** 22,436	−0.0437** 22,436	−0.1471** 22,436
30-day survival (0/1)	–	–	–	–	–	1	−0.0386** 24,217	−0.1626** 24,217
Female (0/1)	–	–	–	–	–	–	1	0.0621** 24,217
Age 65+ (0/1)	–	–	–	–	–	–	–	1

Notes: ** significant at the 1% level, * significant at the 5% level.

Table 3
Association between sex and outcome variables (treatment and survival).

	CPR delay (0/1) odds ratios (se) (1)	CPR duration (ln) B (se) (2)	Survival after CPR (0/1) odds ratios (se) (3)	Treatment satisfaction (0/1) odds ratios (se) (4)	Survival to discharge with good neurological outcome (0/1) odds ratios (se) (5)	30-day survival (0/1) odds ratios (se) (6)
Female (0/1)	0.9863 (0.0365)	−0.0709** (0.0227)	1.0929** (0.0361)	0.9241 (0.0560)	1.0821 (0.0464)	1.0913* (0.0420)
N	20,407	9444	24,030	18,953	22,155	24,030

Notes: Each cell/estimate is from a separate regression. All regressions used all observations of the full study population for which the dependent variable is non-missing. All regressions included fixed effects for hospital and year and controlled for age, SES (income and education), ethnicity, comorbidity, heart rhythm, etiology, and heart rhythm monitoring. ** significant at the 1% level, * significant at the 5% level.

Unadjusted analyses

Unadjusted analyses in the form of Spearman's rank correlation coefficients showed that women were older ($p<0.01$) and received a statistically significant shorter CPR duration compared to men ($p<0.05$). In addition, the personnel were less satisfied with their treatment of women ($p<0.05$). Women also had a lower chance of survival after CPR attempt, at hospital discharge (with good neurological function) and at 30 days ($p<0.01$).

Patients 65+ had a longer CPR delay ($p<0.01$) and a shorter CPR duration ($p<0.05$). Similar to women, the chance of survival for patients 65+ were lower regardless of timepoint ($p<0.01$). All bivariate correlations for outcome and predictor variables are presented in Table 2.

Primary analyses: adjusted analyses of associations between sex and outcome variables

The full results of the regression analyses, investigating associations between sex and outcome variables, are presented in Table 3. All regression models included fixed effects for hospital and year, and were adjusted for age, SES (income and education), ethnicity, comorbidity, initial heart rhythm, heart rhythm monitoring and etiology.

Treatment outcomes

No statistically significant associations between sex and delay to CPR or treatment satisfaction were identified. However, being woman was significantly associated with a shorter duration of resuscitative efforts compared to men (B=−0.07, $p<0.01$).

Patient outcomes

Female sex was associated with a higher chance of survival after the CPR attempt (B = 1.09, $p<0.01$) and at 30-days post arrest (B = 1.09, $p<0.05$). In contrast, there was no significant association between sex and survival to discharge with good neurological outcome. In a sensitivity analysis, where age was included as a continuous variable, similar associations were displayed (Appendix, Table A1).

Interaction effects

In addition, to examine how sex combine with age to influence treatment and survival, interaction terms were included. In Table 4, the female dummy was replaced by two interaction variables: Female x Age 65+ and Female x Age less than 65 (the regressions also contain the 65+ dummy itself). Hence, the estimated coefficients show the female association with the outcomes separately for the two age groups. The difference in the sex coefficient between the two age groups is not significant for any of the outcomes (see the p-values in the table which are from F-tests of equal female coefficients). However, when age was included as a continuous variable, significant interaction effects for treatment duration and survival at 30 days emerged such that older women, relative to men, receive shorter CPR duration and are more likely to survive (Appendix, Table A2). Note that these findings are consistent with those in Table 4, where the coefficients show the same tendency although they are not significant in this different model specification. Taken together, we conclude that there is some suggestive evidence of an interaction between sex and age for these two outcomes.

Table 4
Association between sex, age and outcome variables (treatment and survival).

	CPR delay (0/1) odds ratios (se) (1)	CPR duration (ln) B (se) (2)	Survival after CPR (0/1) odds ratios (se) (3)	Treatment satisfaction (0/1) odds ratios (se) (4)	Survival to discharge with good neurological outcome (0/1) odds ratios (se) (5)	30-day survival (0/1) odds ratios (se) (6)
Female x Age 65+ (0/1)	0.9685	−0.0781**	1.0830*	0.9321	1.1040*	1.1101*
	(0.0407)	(0.0248)	(0.0407)	(0.0640)	(0.0554)	(0.0500)
Female x Age less than 65 (0/1)	1.0463	−0.0453	1.1249	0.8992	1.0294	1.0453
	(0.0770)	(0.0515)	(0.0734)	(0.1056)	(0.7926)	(0.0733)
p-value (F-test of equal female coeff.)	.355	.563	.609	.787	.437	.462
N	20,407	9444	24,030	18,953	22,155	24,030

Notes: Each cell/estimate is from a separate regression similar to those in Table 3. The difference is that the female dummy in Table 3 is replaced by female x age 65+ interaction variables. See also the notes below Table 3. ** significant at the 1% level, * significant at the 5% level.

Discussion

This nationwide population study, based on merged data from two separate quality registries, demonstrates significant sex differences in patient treatment and outcome when suffering IHCA. In the primary analyses, women were more likely to receive shorter treatment duration and had a higher likelihood of survival (immediately after resuscitation and at 30 days) compared to men. Whether sex differences related to survival exist have been debated for decades. Our results contradict the recently published meta-analyses on potential sex differences,[11,12] indicating a survival advantage for men. This might be an effect of the comprehensive set of control variables in our regression models. In contrast to the previously mentioned meta-analyses, our "dual-registry design" enabled us control for additional individual-level sociodemographic factors i.e., SES and ethnicity. These factors are recently reported to be associated with both IHCA treatment and survival.[2,3] In addition, only a few IHCA registry studies have been able to control for comorbidity when examining sex differences. A previous IHCA study from SRCR, found a 10% survival advantage (at 30 days) for women after controlling for comorbidity, but not SES and ethnicity.[8] Another study from the US, by Teodorescu et al., examining sex differences in OHCA where the initial rhythm was ventricular fibrillation or pulseless electrical activity, found a survival advantage for women after controlling for a similar set of control variables like ours, including SES, race and comorbidity.[10] The importance of using an extended set of control variables should also be seen in the light of the results in our unadjusted bivariate analyses, where being male correlated significantly with a higher chance of good outcome; survival after CA, survival at discharge with good neurological outcome, and survival at 30 days. The reasons of the survival advantage for women in our study are not clear. An American study by Topjian et al., suggested a protective effect of estrogen resulting in a better chance of survival merely among younger women.[22] Consequently, examining potential interaction effects with age may be important. We find suggestive evidence of that older women, relative to men, receive shorter CPR duration and are more likely to survive 30 days after a CA. Research also including patients suffering IHCA and *not* receiving any treatment, e.g., those with a Do-Not-Attempt-Resuscitation (DNAR) decision, have reported a higher proportion of male patients receiving CPR.[23,24] If there are sex differences related to such decisions, women receiving CPR may constitute a more selective (healthier) group with a higher chance of survival. In our sample, women had a lower comorbidity index compared to men. Although, we have controlled for comorbidity, there may be other important aspects of health not included in our comorbidity index. The potential relation between sex and DNAR decisions should be further examined in order to identify any disparities.

While no sex differences in CPR delay or treatment satisfaction were identified, women received shorter CPR duration compared to men. This is most likely not due to any treatment disparity. Since women are more likely to be successfully resuscitated, they may not need prolonged treatment to the same extent as men. This might explain the somewhat (mean difference = 0.8 min) shorter treatment duration.

Limitations

This study has some limitations. The SRCR merely includes those receiving CPR and/or defibrillation. Further studies including those not receiving treatment should be performed to be able to identify sex disparities related to the decision-making process prior to suffering an IHCA. In addition, compared with our other measurements (e.g., survival or CPR delay) the treatment satisfaction measure could be less reliable since the hospital staff may use and interpret the reporting instructions differently. Also, the retrospective design of does not allow us to draw any casual conclusions. To be able to gain more knowledge of potential sex differences and treatment disparities, additional study designs, e.g., qualitative or experimental, are warranted. For example, experimental studies that hold potential confounders constant are needed to pinpoint the mechanism(s) underlying sex differences. A rare example of such a study is Kramer et al.'s patient simulation study. It showed that participants were more reluctant to remove the clothing when giving CPR to simulated OHCA female patients, but also that the hand placement was better (more centered between the breasts) when the simulated patient was female.[25] This suggests that socio-cultural norms may be one factor that could contribute to sex differences in CA treatment.

Conclusions

In this nationwide registry study, no signs of treatment disparities or discrimination related to sex were identified. However, women had a better chance of surviving IHCA compared to men. The finding that women went from having a survival disadvantage in the unadjusted analysis to a survival advantage in the adjusted analysis attests to the importance of including a comprehensive set of control variables, including SES and comorbidity, when examining sex differences in IHCA outcome.

Declaration of Competing Interest

None declared.

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Appendix

Tables A1 and A2

Table A1
Association between sex and outcome variables (treatment and survival). Age as continuous variable.

	CPR delay (0/1) odds ratios (se)	CPR duration (ln) B (se)	Survival after CPR (0/1) odds ratios (se)	Treatment satisfaction (0/1) odds ratios (se)	Survival to discharge with good neurological outcome (0/1) odds ratios (se)	30-day survival (0/1) odds ratios (se)
	(1)	(2)	(3)	(4)	(5)	(6)
Female (0/1)	0.9874	−0.0640**	1.1069**	0.9218	1.0993	1.1130*
	(0.0366)	(0.0227)	(0.0363)	(0.0559)	(0.0471)	(0.0429)
N	20,407	9444	24,030	18,953	22,155	24,030

Notes: The regressions mirror those in Table 3, but with age entered as a continuous variable instead of a dummy variable. See the notes below Table 3. ** significant at the 1% level, * significant at the 5% level.

Table A2
Association between sex, age and outcome variables (treatment and survival). Age as continuous variable.

	CPR delay (0/1) odds ratios (se)	CPR duration (ln) B (se)	Survival after CPR (0/1) odds ratios (se)	Treatment satisfaction (0/1) odds ratios (se)	Survival to discharge with good neurological outcome (0/1) odds ratios (se)	30-day survival (0/1) odds ratios (se)
	(1)	(2)	(3)	(4)	(5)	(6)
Female x Age	0.9984	−0.0052**	0.9979	1.0056	1.0059	1.0071*
	(0.0029)	(0.0019)	(0.0028)	(0.0048)	(0.0033)	(0.0030)
Female	1.0015	−0.0185	1.1271**	0.8792	1.0577	1.0612
	(0.0448)	(0.0300)	(0.0451)	(0.0636)	(0.0508)	0.0463
Age	1.0030	−0.0013	0.9814**	0.9989	0.9678**	0.9630**
	(0.0020)	(0.0013)	(0.0017)	0.0034	(0.0021)	(0.0020)
N	20,407	9444	24,030	18,953	22,155	24,030

Notes: The regressions are similar to those in Table 4. However, they enter age as a continuous variable instead of a dummy variable and include the Female x Age interaction instead of the two dummy interaction variables in Table 4. See the notes below Table 3. ** significant at the 1% level, * significant at the 5% level.

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